CANADIAN SOCIETY FOR BRAIN, BEHAVIOUR AND COGNITIVE SCIENCE

SOCIÉTÉ CANADIENNE DES SCIENCES DU CERVEAU, DU COMPORTEMENT ET DE LA COGNITION

EXPERIMENTAL PSYCHOLOGY SOCIETY

Joint Meeting
St. John's, NL, Canada
July 4-7, 2018

MEMORIAL UNIVERSITY

For more information:
asurpren@mun.ca

CSBBCS SCSCCC

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Welcome

Welcome to CSBBCS/EPS 2018! As chair of the organizing committee for the 28th Annual meeting of The Canadian Society for Brain, Behaviour and Cognitive Science, it gives me great pleasure to welcome you to the St. John's for this important scientific conference. As in years past, this meeting represents a vital opportunity for researchers in a broad array of areas in experimental psychology, neuroscience, and allied disciplines to share their ideas, form new collaborative relationships, and pro- mote our scientific disciplines.

I would like to thank all the people whose hard work and dedication have made this meeting possible. It has been my great pleasure to work with an amazing crew of enthusiastic fellow faculty and students. Thank you all for putting in so many hours on this project when you no doubt had many other demands on your time. I would also like to thank our sponsors, which include Memorial University of Newfoundland, MIT Press, SR Research, MUN's Graduate Student Union, Memorial University Student Union, MagStim, Roxon, Norton, Brain Vision. The financial support of these organizations is what has enabled us to put together a conference that we hope will be as entertaining as it is edifying.

Having said all this, the success of this kind of meeting rests above all on the participation of its attendees and the quality and diversity of your scientific contributions. For this, the organizers of the conference are deeply grateful to you all.

I hope you will find the meeting an enjoyable and valuable opportunity to share your ideas and learn those of others.

Sincerely, Aimée Surprenant, Chair of the CSBBCS/EPS 2018 Organization Committee, Professor, Psychology, Memorial University of Newfoundland.

Facebook: Canadian Society for Brain, Behaviour, and Cognitive Science

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Thanks to the Conference committee: Kathleen Hourihan, Ian Neath, Carol Sullivan, Jon Fawcett, Darcy Hallett, Jacqueline Blundell, Chrissy Chubala, Victoria Kavanagh, and all the Volunteers!

Thanks also to the EPS committee, Anna Weighall and John Towse!

Statement of Inclusion

CSBBCS is committed to providing a welcoming and harassment-free environment for participants of all races, gender identities, sexual orientations, physical abilities, physical appearances, and beliefs.

We ask that all participants refrain from demeaning, discriminatory, or harassing behaviour and speech. Harassment includes, but is not limited to: deliberate intimidation; stalking; unwanted photography or recording; sustained or willful disruption of talks or other events; inappropriate physical contact; use of sexual or discriminatory imagery, comments, or jokes; and unwelcome sexual attention.

General Information

Located at 120 New Gower Street, St. John's, NL, the **Delta Hotel** is steps from famous George Street and connected by overhead walkway to Mile One Centre and St. John's Convention Centre, the hotel offers the perfect location from which to explore the historic city including national historic sites Signal Hill and Cape Spear.

Staying in **residence**? It is approximately 40 minutes to walk from MUN to the Delta, and it is uphill both ways! The #10 Metrobus goes from the Student Centre to the Delta. The fare is $2.50 per ride and you can buy a refillable MetroCard at the student centre.

Registration is in the Crush Lobby of the Delta (outside Salon A) from 14:00-17:00 on Wednesday, July 4, 8:00 -14:00 on Thursday, July 5, St. Mary's Bay Room all other times.

Coffee will be available mornings of July 5, 6, and 7 in Crush Lobby (outside of Salon A) from 8:00-8:50.

Poster sessions will be held in Salons BCD. A cash bar will be available at all poster sessions.

Talks are scheduled for 15 minutes of presentation with 5 minutes for questions. Talk rooms will have a Windows laptop with PowerPoint available; connections with VGA and HDMI will be available for laptops. Please load your talk onto the computer in the room before the session begins (or be ready with your laptop).

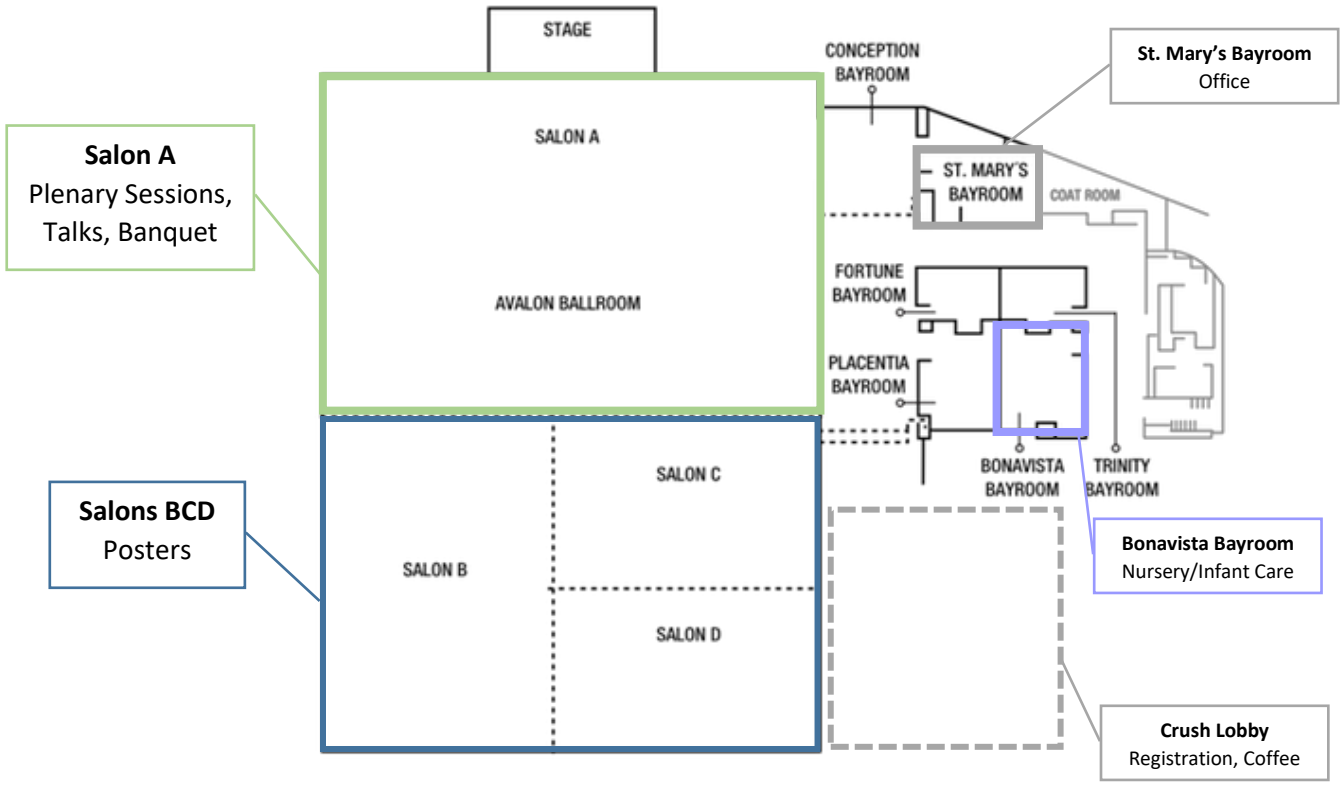
The **banquet** will be held Thursday, July 5 (19:30-21:30) in Salon A.

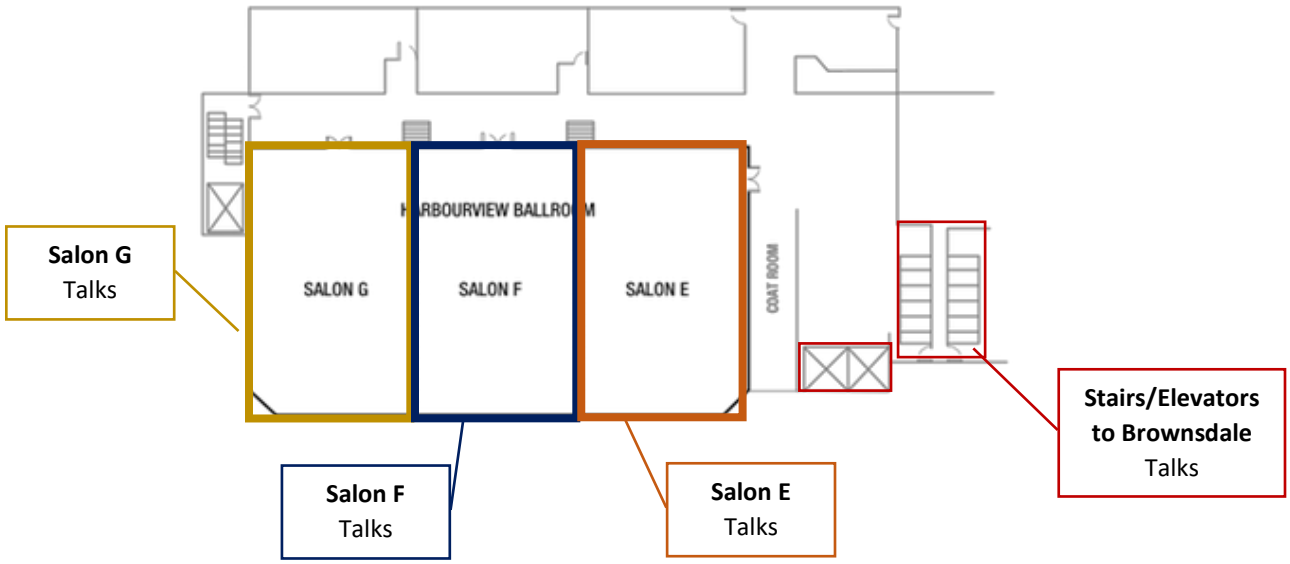
The Bonavista Bayroom is reserved as a **nursey**/infant care room. Comfortable seating and a change table will be provided.

Free Wi-fi will be available in all talk/poster rooms. Just sign in to Convention.

Dining: St. John's offers numerous restaurants within close walking distance of the hotel. We strongly recommend that you make reservations: They get booked very quickly during this time of year.

Hotel Maps


STAGE
SALON A
AVALON BALLROOM
SALON B
SALON C
SALON D
CONCEPTION BAYROOM
ST. MARY'S BAYROOM
COAT ROOM
FORTUNE BAYROOM
PLACENTIA BAYROOM
BONAVISTA BAYROOM
TRINITY BAYROOM
Salon A
Plenary Sessions, Talks, Banquet
Salons BCD
Posters
St. Mary's Bayroom
Office
Bonavista Bayroom
Nursery/Infant Care
Crush Lobby
Registration, Coffee


SALON G
SALON F
SALON E
COAT ROOM
Salon G
Talks
Salon F
Talks
Salon E
Talks
Stairs/Elevators to Brownsdale
Talks

Pre-Conference Information

From good to better: Skills for executing a transparent research project. When: Wednesday, July 4, 2018. **Where:** Memorial University of Newfoundland Arts Building, Rm A1043. **Time:** 10 AM - 2:30 PM (small lunch and refreshment breaks included)

Questions? Contact Jonathan Fawcett, jfawcett@mun.ca

3rd Annual Meeting of Women in Cognitive Science – Canada

Wednesday July 4, 2018, at 3:00 pm

Order of Events:

1. Presentation of the WiCSC **Mentorship Award**
2. Presentation of the WiCSC **Seed Grant**
3. Panel Discussion on **"Two-Body Problem"/Managing Dual Careers**:

   Aimée Surprenant & Ian Neath

   Jennifer Sutton & Marc Joanisse

   Debra Titone & Robert Durham Vincent

Questions? Contact Penny Pexman or Debra Titone, WICSC Co-Founders at wicscanada@gmail.com

Sponsors

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CSBBCS 2018 Award Information

2018 Donald O. Hebb Distinguished Contribution Award Winner

Michael E. J. Masson
University of Victoria

Hebb Award Address: Thursday, July 5, 09:00 (Salon A)

Intentions and Actions

The objective of much of my recent work, carried out in collaboration with Dr. Daniel Bub, has been to understand the relation between cognition and action. In this presentation, I will emphasize one aspect of that work, namely, the potential for objects to evoke action representations from memory. I will critically examine the conditions under which objects seem to do this, particularly the importance of the role played by intentions. I will also present evidence concerning the nature of action representations. Crucially, recent results indicate important distinctions between the representation of impending action and the representation of action elicited by passively viewed objects.

Something that sets Dr. Michael E. J. Masson apart from other outstanding scientists is the remarkable breadth of his scholarly reach. Throughout his career, Mike has made field-altering contributions to our understanding of memory, priming and word recognition, language processing, cognitive-motor interactions, and data analysis.

Mike received his B.A. from the University of British Columbia, then completed his graduate training at the University of Colorado supervised by Peter Polson (M.A.) and Walter Kintsch (Ph.D.). Mike then undertook post-doctoral training with Marcel Just at Carnegie Mellon University. He joined the University of Victoria in 1980, where he climbed the ranks to become Professor, and served as Department Chair. He currently serves as Associate Dean (Research and Graduate Studies) for the Faculty of Social Sciences.

A few examples provide a sense of Mike's admirable research trajectory. For decades, he advanced our understanding of language processes. Clever studies of reading inverted text teased apart the relative influence of form versus meaning on comprehension. He clarified the benefits and limits of skimming a text. He advanced our understanding of word processing and its contributions to higher-level cognition. Mike's current research with Daniel Bub on cognitive-motor interactions has extended this work toward understanding the interrelations between sentence comprehension and manual actions. As such, it has incisively and uniquely refined hypotheses about cognitive embodiment.

Mike's research has also served the broader field via advances in quantitative analysis. With Geoff Loftus, he championed the evaluation of experimental effects using within-subject confidence intervals. More recently, his treatment of Bayesian analysis has helped promote the informed interpretation of experimental results.

These research activities of Mike's have taken the form of over 100 research articles in the most influential journals of psychological science. These contributions earned Mike the status of Fellow in several psychological associations. In 2003, Mike received the University of Victoria Faculty of Social Sciences Award for Research Excellence.

Mike has guided the training of many academics and researchers, who now serve the field in several countries. He has supervised over 100 undergraduate student research assistants in his very active lab. As a stalwart collaborator, it is fair to say that Mike's skills and insights have contributed to the training of his collaborators and to their trainees in turn. In these ways, Mike's steady mentorship has had a long-lasting and widespread influence on cognitive psychology. Reflecting the high esteem in which Mike is held, his list of collaborators includes some of the most acclaimed investigators of cognitive psychology.

Mike's service and leadership accomplishments are likewise exemplary. Indeed, they figured centrally in his earning CSBBCS's Richard Tees Distinguished Leadership Award in 2010. He has also served dutifully in roles for numerous psychological associations: As CSBBCS president in 2001-02 (and CSBBCS conference co-organizer in 2007), and as Board of Governors member both for the Canadian Psychological Association and the Psychonomic Society. He has served and chaired grant panels and other bodies of the Natural Sciences and Engineering Research Council of Canada. He has served as acting editor of Journal of Experimental Psychology: Learning, Memory, and Cognition and as associate editor of the Canadian Journal of Experimental Psychology. Mike's conscientious, tireless, and masterful efforts have benefitted our Society and have had a lasting impact on psychological science.

Although not specific to the criteria of this award, many would echo the sentiment that Mike is an unusually congenial friend, mentor, and colleague. He provides patient and insightful input about others' research while applying the highest standards of scientific rigour. Conferring this award honours Mike while acknowledging the good fortune our society has enjoyed in having him as a long-standing member.

2018 CSBBCS Vincent Di Lollo Early Career Award Winner

Nathan Spreng
McGill University and Montréal Neurological Institute

Early Career Award Address: Thursday, July 5, 16:10 (Salon A)

Explorations into the default network of the human brain

The default network, an assembly of functionally connected brain regions, has been one of the most robustly observed features of the brain, and is implicated in a vast array of cognitive abilities and disorders. Yet the specific functional role of the default network has remained controversial. Long-held perceptions of the default network has suggested that it is "task-negative," or behaviourally relevant only in its deactivation. My work has argued that, far from being 'task negative', these brain regions are actively involved in self-generated thought and necessary for flexible goal pursuit, allowing past knowledge and experience to guide ongoing thought and action. In this talk I will outline a series of studies demonstrating that the default network is involved in social cognition, memory, and future-oriented thinking. I will also describe how the architecture of the default network, and its connectivity with other brain systems, change across the lifespan, and how these changes predict individual differences in the trajectory of cognitive aging. To conclude, I extend these explorations of default network function to formulate a broader theoretical framework, integrating the shifting architectures of brain and cognitive aging, towards a new perspective on late life development.

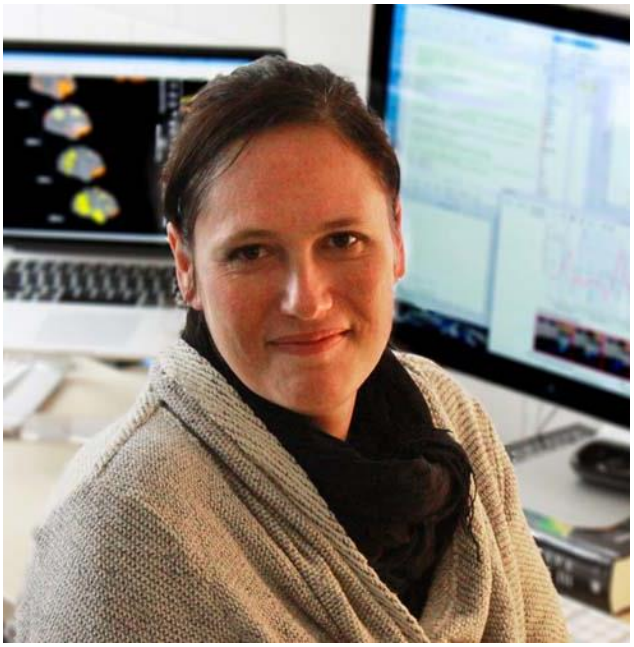
Dr. Nathan Spreng received his PhD in Psychology from the University of Toronto in 2008. After a one year post-doctoral fellowship at the Rotman Research Institute in Toronto, he took up a fellowship at Harvard University in the Department of Psychology. In 2012, He established the Laboratory of Brain and Cognition as an Assistant Professor at Cornell University. In 2017, Dr. Spreng returned to Canada as an Associate Professor at McGill University and a research scientist at the Montreal Neurological Institute.

Dr. Spreng's research examines large-scale brain network dynamics and their role in cognition. Currently, his lab investigates attention, memory, cognitive control, and social cognition, and the interacting brain networks that support them. He is also actively involved in the development and implementation of multivariate and network-based statistical approaches to assess brain structure and function, with an emphasis on large-scale network dynamics and interactivity. In doing so, he aims to better understand the properties of brain networks underlying cognition, as they change across the lifespan in health and disease.

For his work in cognitive network neuroscience, Dr. Spreng was recognized as a "Rising Star" by the Association for Psychological Science. He has published over 65 peer-reviewed articles. One of his earliest papers continues to be among the highest cited in the Journal of Cognitive Neuroscience and his recent work with colleagues from the University of British Columbia was cited as the best paper for 2015 in the journal Neuroimage. His research program is funded by the Canadian Institutes of Health Research, the Natural Science and Engineering Research Council of Canada, as well as the National Institutes of Aging, the Alzheimer's Association, and the Elder Justice Foundation in the U.S.

2017 CSBBCS/CPA CJEP Best Article Award Winner

Jelena Ristic
McGill University



Hayward, D.A., Voorhies, W., Morris, J.L., Capozzi, F. and **Ristic, J**. (2017). Staring Reality in the Face: A Comparison of Social Attention Across Laboratory and Real World Measures Suggests Little Common Ground. *Canadian Journal of Experimental Psychology/Revue Canadienne de Psychologie Expérimentale*, 71(3), 212 - 225. http://dx.doi.org/10.1037/cep0000117

2018 Richard Tees Distinguished Leadership Award Winner

Aimée Surprenant
Memorial University of Newfoundland

Dr. Aimée M. Surprenant is Professor of Psychology and Dean of Graduate Studies at Memorial University of Newfoundland. She is an outstanding researcher who has made important contributions to our understanding of human memory. Aimée has provided extraordinary leadership and exemplary service to the CSBBCS community. As such, she is a highly deserving recipient of the CSBBCS Richard C. Tees Distinguished Leadership Award.

Aimée has been a highly effective co-organizer of two major CSBBCS Annual Meetings: the 2009 meeting in York, UK, and the 2018 meeting in St. John's NL. Remarkably, these have both been joint meetings with the Experimental Psychology Society, which presents extra organizational and logistical challenges. These joint meetings are important to our community and Aimée's leadership is an important element in their success.

Aimée is an outstanding supervisor, having mentored dozens of highly successful graduate and undergraduate thesis students in her laboratory. As Dean of Graduate Studies at Memorial, she is playing an important role in the success of hundreds of graduate students at that institution. In 2012, Aimée was honoured with the Memorial University Outstanding Contribution to Student Life Award. This award "recognizes faculty and staff members who go above and beyond the call of duty in helping their students achieve both inside and outside the classroom."

Aimée has also played key roles at important funding agencies and professional and scientific organizations. From 2011 to 2014 she served as a member of the NSERC Life Sciences (1502) Grants Adjudication committee. From 2009 to 2014 she held the seat on the CPA Board of Directors that is reserved for an experimental psychologist conducting basic research. Since 2016 she has been Chair of the CPA's Brain and Cognitive Science Section.

In these and many other ways, Aimée has provided extraordinarily generous service to the CSBBCS community. That she has managed this while also achieving great success in her scientific career is truly impressive. She has played a vital role in all aspects of Canadian Cognitive Science. Aimée Surprenant is an ideal candidate for this recognition and provides a fine example to others in our community.

EPS President's Address

Cecilia Heyes
University of Oxford

EPS President's Address: Saturday, July 7, 10:50 (Salon A)

Cognitive gadgets: The cultural evolution of thinking

Evolutionary psychology casts the human mind as a collection of cognitive instincts - organs of thought shaped by genetic evolution and constrained by the needs of our Stone Age ancestors. This picture was plausible 25 years ago but, I argue, it no longer fits the facts. Research in psychology and cognitive neuroscience - involving nonhuman animals, infants and adult humans - now suggests that genetic evolution has merely tweaked the human mind, making us more friendly than our pre-human ancestors, more attentive to other agents, and giving us high capacity, general-purpose mechanisms of learning, memory and cognitive control. Using these resources, our special-purpose organs of thought – including language, theory of mind, and imitation - are built in the course of development through social interaction. They are products of cultural rather than genetic evolution, cognitive gadgets rather than cognitive instincts.

Schedule Summary

Wednesday, July 4

Time	***Salon A***	***Salon BCD***	***Brownsdale***	***Salon E***	***Salon F***	***Salon G***
15:00-17:10	Women in Cognitive Science-Canada Meeting					
17:10-19:10		Poster Session 1 (P101-P150)				

Thursday, July 5

8:00-8:50 Coffee available in *Crush Lobby*

Time	***Salon A***	***Salon BCD***	***Brownsdale***	***Salon E***	***Salon F***	***Salon G***
9:00-10:20	Hebb Award Address: Mike Masson					
10:20-10:50	*Break*					
10:50-12:10			Working Memory (101-104)	Social Cognition (105-108)	Perception (109-112)	Individual Differences (113-116)
12:10-14:00	*Lunch*					
14:00-15:40			Symposium: Control Processes in Human Memory (117-121)	Symposium: Accessing the Meanings of Words (122-126)	Attention I (127-131)	Methods and Models (132-136)
15:40-16:10	*Break*					
16:10-17:10	BBCS Early Career Award Address: Nathan Spreng					
17:10-19:10		Poster Session 2 (P201-P250)				
19:30-21:30	Banquet					

Friday, July 6

8:00-8:50 Coffee available in *Crush Lobby*

Time	***Salon A***	***Salon BCD***	***Brownsdale***	***Salon E***	***Salon F***	***Salon G***
8:20-10:20	Symposium: Interdependence between cognition and the social environment (201-206)					
8:40-10:20			Symposium: The Diversity of Bilingual Experience (207-211)	Symposium: Mathematical Cognition (212-216)	Memory I (217-221)	Cognitive Neuroscience (222-226)
10:20-10:50	*Break*					
10:50-12:10	BBCS Executive Symposium: New Directions in Multisensory Integration (S1-S4)					
12:10-14:00	*Lunch*					
14:00-16:00	Symposium: Interactions between selective attention and working memory (S5-S10)					
16:00-16:20	*Break*					
16:20-17:20	NSERC Meeting					
17:10-19:10		Poster Session 3 (P301-P349)				

Saturday, July 7

8:00-8:50 Coffee available in *Crush Lobby*

Time	***Salon A***	***Salon BCD***	***Brownsdale***	***Salon E***	***Salon F***	***Salon G***
8:40-10:20			Symposium: Analytic Thinking: Individual Differences (301-304)	Symposium: On the Control of Visual Attention (305-309)	Memory II (310-314)	Cognition in the Real World (315-319)
10:20-10:50	*Break*					
10:50-12:10	EPS President Address: Cecilia Heyes					
12:10-14:00	*Lunch*					
14:00-15:20			Symposium: Analytic Thinking: Strategic Differences (320-323)	Language (324-327)	Learning (328-331)	Metacognition (332-335)
15:20-15:40	*Break*					
15:40-16:40			Decision Making (336-338)	Music (339-341)	Attention II (342-344)	Cognitive Development (345-347)
16:40-16:50	*Break*					
16:50-17:50	BBCS Business Meeting and Hebb Student Award Presentation					

Talk Schedule

Thursday, July 5 Morning

9:00-10:20 Hebb Award Address (Mike Masson)

1) Session Title: Working Memory (Chair: Johnson)

Time	Number	Title	First Author
10:50-11:10	101	Ranschburg Effects in Tactile Memory: The Roles of Verbal Re-coding and Participant Awareness	Andrew Johnson
11:10-11:30	102	No flexible re-distribution of visual working memory resources after encoding.	Blaire Dube
11:30-11:50	103	A Daytime Nap Enhances Visual Working Memory Performance and Alters Event-Related Delay Activity	Kevin MacDonald
11:50-12:10	104	Dual-task costs to memory and processing in young adults: An adversarial collaboration	Jason Doherty

2) Session Title: Social Cognition (Chair: Chu)

Time	Number	Title	First Author
10:50-11:10	105	Shared credit for shared success: Effective interpersonal coordination strengthens joint agency	Janeen Loehr
11:10-11:30	106	A problem shared is not always a problem halved: Joint cognition and random sequence generation	John Towse
11:30-11:50	107	The Role of Cognitive Load in Modulating Social Looking	Laura Bianchi
11:50-12:10	108	Decoding indirect messages from body language in face-to-face communication	Mingyuan Chu

3) Session Title: Perception (Chair: Sandford)

Time	Number	Title	First Author
10:50-11:10	109	Testing the Pacemaker Explanation: A Multipronged Behavioural Investigation of the Human Timing System	Emily Williams
11:10-11:30	110	Are same-different task characteristics dependent on stimuli onset type?	Bradley Harding
11:30-11:50	111	Discriminating Different Visual Acceleration Rates: What Determines Thresholds?	Brian Timney
11:50-12:10	112	Contrast negation impairs familiar face recognition and is additive to picture-plane inversion: Implications for utilization of configural and surface properties in recognition of familiar faces	Adam Sandford

4) Session Title: Individual Differences (Chair: Chubala)

Time	Number	Title	First Author
10:50-11:10	113	Developing a New Measure of Trait Boredom	Dana Gorelik
11:10-11:30	114	Bullshit Makes the Art Grow Profounder: Evidence for False Meaning Transfer Across Domains	Martin Harry Turpin
11:30-11:50	115	Tracking the Subjective Experience of Effort and Discomfort During Working Memory Versus Sustained Attention Processes	Veerpal Bambrah
11:50-12:10	116	Predicting Fallacious Beliefs: Gambling and Paranormal	Carrie A. Leonard

Thursday, July 5 Afternoon

5) Session Title: Symposium: Control Processes in Human Memory: The Role of Retrieval Suppression and Retrieval Practice (Chair: Fawcett)

Time	Number	Title	First Author
14:00-14:20	117	Forgetting as a Consequence of Retrieval Suppression: A Meta-Analytic Review of the Think/No-Think Paradigm	Daniel Todorovic
14:20-14:40	118	Suppression is in the Eye of the Beholder: Pupillometric Markers of Successful and Unsuccessful Retrieval Suppression	Jonathan Fawcett
14:40-15:00	119	Tracking Memory Intrusions with EEG	Robin Hellerstedt
15:00-15:20	120	Retrieval-induced forgetting and second language vocabulary acquisition: Insights from a Welsh language training study	Lyam Bailey
15:20-15:40	121	Retrieval-induced forgetting has low test-retest reliability: Implications for individual differences research	Ben Levy

6) Session Title: Symposium: Accessing the Meanings of Words: Perspectives on Lexical Ambiguity (Chair: Rodd)

Time	Number	Title	First Author
14:00-14:20	122	How do listeners know what words mean? Insights from lexical ambiguity	Jennifer Rodd
14:20-14:40	123	Ambiguity effects diverge for concrete and abstract words: Insights from the Calgary Semantic Decision Project	Penny Pexman
14:40-15:00	124	Overnight retuning of meanings for lexically ambiguous words	M. Gareth Gaskell
15:00-15:20	125	The effects of bilingualism and cognitive impairment on processing of lexical ambiguity	Vanessa Taler
15:20-15:40	126	How are ambiguous word meanings learned, represented, and processed? Insights from computational modeling	Blair Armstrong

7) Session Title: Attention I (Chair: Ivanoff)

Time	Number	Title	First Author
14:00-14:20	127	A failure to suppress visual imagery in visual search	Brett A. Cochrane
14:20-14:40	128	(withdrawn)	
14:40-15:00	129	Exogenous but not Endogenous Attention Depends on Saccade Programming	Daniel Smith
15:00-15:20	130	Controlling capture: No role for activated visual long-term memory	Lindsay Plater
15:20-15:40	131	Out of Control? A Speed-Accuracy Tradeoff Investigation of Stroop Conflict in Mostly Incongruent Lists	Jason Ivanoff

8) Session Title: Methods and Models (Chair: Cousineau)

Time	Number	Title	First Author
14:00-14:20	132	Confidence intervals of p values and p factor	Denis Cousineau
14:20-14:40	133	Meaning in motion: How to make semantic representations dynamic	Doug Mewhort
14:40-15:00	134	Accumulators models fits on Same-Different data	Marc-André Goulet
15:00-15:20	135	The Relative Advantage of "Data-Peeking" in the Context of Publication Bias	Mark Brown
15:20-15:40	136	Behavioural phenotyping of transgenic mice	Richard Brown

16:10-17:10 BBCS Early Career Award Address (Nathan Spreng)

Friday, July 6 Morning 1

9) Session Title: Symposium: Experimental Evidence of the Interdependence between cognition and the social environment (Chair: Martin)

Time	Number	Title	First Author
8:20-8:40	201	Natural Language Analysis of Information Seeking and Stereotype Content	Susan Fiske
8:40-9:00	202	Ignoring older people: own-age biases in social attention	Louise Phillips
9:00-9:20	203	Top-down influences on face perception in an intergroup context	Kerry Kawakami
9:20-9:40	204	Strategic, shared social cognition shapes stereotypes and speech	Hilary Bergsieker
9:40-10:00	205	The development of dehumanization and intergroup bias	Niamh McLoughlin
10:00-10:20	206	How cognitive bias influences the formation and evolution of stereotypes	Douglas Martin

10) Session Title: Symposium: The Diversity of Bilingual Experience and its Impact on Language Processing, Brain Structure, and General Cognition (Chair: Jared)

Time	Number	Title	First Author
8:40-9:00	207	The impact of individual differences on cross-language activation of meaning by phonology	Debra Jared
9:00-9:20	208	The impact of language proficiency and executive control ability on cross-language semantic priming	Deanna Friesen
9:20-9:40	209	Electrophysiological correlates of auditory discourse processing in bilinguals	Angela Grant
9:40-10:00	210	Early second language exposure has lasting effects on bilinguals' white matter tracts	Marc F. Joanisse
10:00-10:20	211	The impact of current non-L1 usage and L2 age of acquisition on executive control in the Simon task among bilingual adults.	Debra Titone

11) Session Title: Symposium: Mathematical Cognition (Chair: Douglas)

Time	Number	Title	First Author
8:40-9:00	212	Knowledge of Math Symbols in Young Adults: Beyond Counting and Ordering	Heather Douglas
9:00-9:20	213	Memory Interference in Simple Addition and Multiplication Across Cultures	Jamie I.D. Campbell
9:20-9:40	214	Do you see what I see: What information do students attend to when solving realistic math word problems?	Cheryll Fitzpatrick
9:40-10:00	215	Longitudinal patterns in individual differences in conceptual and procedural knowledge of fractions	Darcy Hallett
10:00-10:20	216	Errors on fraction problems for different fraction knowledge profiles for university students.	Shawn Tan

12) Session Title: Memory I (Chair: Brown)

Time	Number	Title	First Author
8:40-9:00	217	The Enactment Effect: An Integrative Review	Brady Roberts
9:00-9:20	218	Production does not improve picture memory	Landon A. Churchill
9:20-9:40	219	The Effects of Reward on Levels of Memory Representation	Liyana Swirsky
9:40-10:00	220	The benefits (and costs) of drawing in episodic memory	Melissa Meade
10:00-10:20	221	Harry Potter and Me: A Direct Comparison of the Retrieval and Organization of Fictional and Autobiographical Events	Norman Brown

13) Session Title: Cognitive Neuroscience (Chair: Sheldon)

Time	Number	Title	First Author
8:40-9:00	222	Intra and interhemispheric phase synchronization during visuo-spatial attention deployment and retention in visual work memory	Anne Monnier
9:00-9:20	223	Decomposing the stages of cognitive processing: A comparison of stimulus- and response-locked averaging techniques during an effortful visual search task.	Brandi Lee Drisdell
9:20-9:40	224	Overlap of lexical and sublexical reading with reflexive and voluntary attention: An fMRI investigation	Chelsea Eckstrand
9:40-10:00	225	Visual event related magnetic field in aging population with prior mild traumatic brain injury.	Martine Desjardins
10:00-10:20	226	A common role for episodic memory in re-membering the past and solving problems	Signy Sheldon

Friday, July 6 Morning 2

14) BBCS Executive Symposium: New Directions in Multi-Sensory Integration (Chair: Titone)

Time	Number	Title	First Author
10:50-11:10	S1	Multisensory self-motion perception and aging	Jennifer Campos
11:10-11:30	S2	Multisensory synchrony in perception and action	Vanessa Harrar
11:30-11:50	S3	The benefit of multisensory audio-visual speech cues in first and second language processing	Natalie Phillips
11:50-12:10	S4	Executive Symposium: Multisensory Integration and Perception (Discussant)	Genevieve Desmarais

Friday, July 6 Afternoon

15) Session Title: Symposium: Interactions between selective attention and working memory (Chair: Eimer)

Time	Number	Title	First Author
14:00-14:20	S5	The Role of Top-Down Attentional Biases in Visual Working Memory Performance	Stephen M. Emrich
14:20-14:40	S6	The role of visual working memory in controlling access to visual long-term memory storage	Keisuke Fukuda
14:40-15:00	S7	Templates for attentional selection in working memory	Martin Eimer
15:00-15:20	S8	Dynamics of attentional control during visual-spatial selection of foveal and peripheral targets: ERPs and phase synchrony.	Pierre Jolicoeur
15:20-15:40	S9	Attending to visual-spatial memoranda: Evidence from eye movements	Candice Morey
15:40-16:00	S10	The attentive brain: Insights from developmental cognitive neuroscience	Jacalyn Guy

Saturday, July 7 Morning

16) Session Title: Symposium: Causes and Consequences of Analytic Thinking: Individual Differences in Abilities and Propensities (Chair: Thompson)

Time	Number	Title	First Author
8:40-9:00	301	Cognitive capacity and problem complexity: What are the boundary conditions for "logical intuitions?"	Valerie A. Thompson
9:00-9:20	302	Contributions of working memory and strategy choice to belief bias	Pier-Luc de Chantal
9:20-9:40	303	Finding meaning in the clouds: Illusory pattern perception predicts bullshit receptivity	Alexander Walker
9:40-10:00	304	Susceptibility to partisan fake news is explained by a lack of deliberation, not willful ignorance	Gordon Pennycook

17) Session Title: Symposium: On the Control of Visual Attention (Chair: Redden)

Time	Number	Title	First Author
8:40-9:00	305	Using temporal order judgments and colour perception to dissociate inhibitory cueing effects	Ralph S. Redden
9:00-9:20	306	Are faces subject to IOR? Evidence from dynamic displays	Robert Swalwell
9:20-9:40	307	Drift diffusion models in speed-accuracy trade-off space	Joe MacInnes
9:40-10:00	308	No single electrophysiological marker for facilitation and inhibition of return	Ana B. Chica
10:00-10:20	309	Variations in strategies during search	Amelia Hunt

18) Session Title: Memory II (Chair: Hourihan)

Time	Number	Title	First Author
8:40-9:00	310	Increasing word distinctiveness eliminates the picture superiority effect in recognition: Evidence for the physical distinctiveness account	Tyler M. Ensor
9:00-9:20	311	No matter the place, I'd recognize that face	Christopher Lee
9:20-9:40	312	Human memory for the immediate past is temporally distorted	Priya Varma
9:40-10:00	313	Processing Fluency: An Encoding Heuristic	Tamara Rosner
10:00-10:20	314	Stimulus repetition and spacing: A transient encoding decrement in recognition memory	Robert Collins

19) Session Title: Cognition in the Real World (Chair: Hallett)

Time	Number	Title	First Author
8:40-9:00	315	How the Internet is Making Us Impatient: The Impact of Wait Times & Individual Differences on Information Search Behaviours	Alyssa Smith
9:00-9:20	316	Flow, arousal, and urge-to-play in Candy Crush	Chanel Larche
9:20-9:40	317	Predictors of Mind-Wandering While Driving: Task Length, Fatigue, and Individual Attentional Differences	Heather Walker
9:40-10:00	318	Deep Effortless Concentration in the Lecture Hall	Jeremy Marty-Dugas
10:00-10:20	319	Using a classroom-based Mindfulness intervention to ameliorate math anxiety	Nadine Yildiz

10:50-12:10 EPS President's Address (Cecilia Heyes)

Saturday, July 7 Afternoon 1

20) Session Title: Symposium: Symposium: Causes and Consequences of Analytic Thinking: Strategic Differences in Reasoning (Chair: Fugelsang)

Time	Number	Title	First Author
14:00-14:20	320	Fast reasoning and the dual strategy model	Henry Markovits
14:20-14:40	321	Thinking in a foreign language distorts reasoning	Michal Bialek
14:40-15:00	322	Base-rate neglect is a function of conflict resolution strategy	Ian R. Newman
15:00-15:20	323	Dual strategy model and reasoning with familiar premises	Janie Brisson

21) Session Title: Language (Chair: Jamieson)

Time	Number	Title	First Author
14:00-14:20	324	Dialectal Influences on Understanding Speech-In-Noise	Laura Howell
14:20-14:40	325	Evidence for Idiom Processing Advantage of L1 Idioms in an L2	Tianshu Zhu
14:40-15:00	326	A computational approach for discourse analysis	Harinder Aujla
15:00-15:20	327	An Instance Theory of Semantics	Randall Jamieson

22) Session Title: Learning (Chair: MacLeod)

Time	Number	Title	First Author
14:00-14:20	328	Updating humans' headings and positions using landmarks and path integration	Weimin Mou
14:20-14:40	329	Somatosensory Functional Plasticity Supports Observational Motor Learning	Heather McGregor
14:40-15:00	330	Interactions between the elements of an outcome during causal and diagnostic learning	Martyn Quigley
15:00-15:20	331	When contingency learning is difficult	Colin M. MacLeod

23) Session Title: Metacognition (Chair: Fiacconi)

Time	Number	Title	First Author
14:00-14:20	332	(withdrawn)	
14:20-14:40	333	What does an expert know that I don't? Undermining an illusion of knowledge increases the influence of experts.	Ethan Meyers
14:40-15:00	334	Examining Metacognitive Behaviors During an Associative Recognition Memory Task	Mario Doyle
15:00-15:20	335	Isolating the Contribution of Perceptual Fluency in Judgments of Learning (JOL)	Chris Fiacconi

Saturday, July 7 Afternoon 2

24) Session Title: Decision Making (Chair: Hunt)

Time	Number	Title	First Author
15:40-16:00	336	Do Slow Responses Feel less Right? Investigation Using the Dual-Response Paradigm	Kaiden Stewart
16:00-16:20	337	Does adding a wildcard to lineups reduce correct identifications?	Ryan Fitzgerald
16:20-16:40	338	Limited transfer of insight across parallel decision dilemmas	Amelia Hunt

25) Session Title: Music (Chair: Russo)

Time	Number	Title	First Author
15:40-16:00	339	Behavioral and neural measures of temporal coordination between performing musicians	Anna Zamm
16:00-16:20	340	Event-related desynchronization of the mu rhythm in experts and non-experts during audio, visual, and audio-visual perception of percussion music	Frank Russo
16:20-16:40	341	Musical Expertise and Spontaneous Production Rates Influence Synchronization Accuracy Across Rates	Rebecca Scheurich

26) Session Title: Attention II (Chair: Enns)

Time	Number	Title	First Author
15:40-16:00	342	Media-multitasking ability and executive functioning in young adults	Alexandra Seddon
16:00-16:20	343	Investigating different alerting types and their impact on human performance	Colin R. McCormick
16:20-16:40	344	Just in time: When seeing and doing collide	James Enns

27) Session Title: Cognitive Development (Chair: Melnyk Gribble)

Time	Number	Title	First Author
15:40-16:00	345	Learning new words from explicit and implicit exposures in children who speak English as an additional language.	Emily Oxley
16:00-16:20	346	Learning about tools: children’s social learning preferences	Erika Nurmsoo
16:20-16:40	347	Comparing lineup procedures to facilitate children's accuracy in face recognition	Laura Melnyk Gribble

Poster Schedule

Poster Session 1

Wednesday, July 4 17:10-19:10 Salons BCD

Number	Title	First Author
P101	Cognitive maps in real and virtual worlds	Jennifer Sutton
P102	The impact of spatial and semantic congruence on sensory processing and the Colavita effect	Genvieve Desmarais
P103	Context-Based Expectations Change Duration Perception for Repeated Stimuli	Corinna D.
P104	Attention does not modulate audiovisual integration in a Colavita task	Hilary Pearson
P105	Effects of Acute Stress on Cognitive and Emotional Interference	Dominique Dupuis
P106	How to catch a falling star: improving asteroid detection by studying blink comparison using change blindness	Mark Tovey
P107	Monitoring eye movements while measuring the item-specific proportion congruency effect	Chao Wang
P108	An Ex-Gaussian Analysis of Reaction Time Distributions in Inhibition of Return	Jason Ivanoff
P109	The Influence of Graphics on Mind Wandering in Video Lectures	Laura Bianchi
P110	Fixated in Unfamiliar Territory: Mapping Estimates Across Typical and Atypical Number Lines	Sabrina M. Di Lonardo
P111	Sensory attenuation in interpersonal coordination	Nicole Bolt
P112	Predicted reach consequences drive time course of tactile suppression	Lindsey E. Fraser
P113	Left cerebellar transcranial direct current stimulation facilitates the onset of inhibition of return.	Brittany Angus-Cook
P114	Instagram Status and Motor Resonance: Instagram “Leaders” Show Decreased Motor-Evoked Potential Facilitation	Sumeet Farwaha
P115	Chronic gray matter degeneration is widespread in moderate to severe traumatic brain injury	Zorry Belchev
P116	Interindividual neural and behavioral differences in moral decision-making: Relevance for driverless cars	Annemarie Wolff
P117	Medial prefrontal cortex compresses concept representations through learning	Michael Mack
P118	Therapeutic-like effects of stress controllability related to long-term potentiation in the dentate gyrus and the endocannabinoid system	Courtney Clarke
P119	Altered Rostromedial Tegmental Activation and Behavioural Response to Chronic Ethanol Exposure in a Preclinical Model of Depression-addiction Comorbidity	Tristian Critch

P120	Preconception predator stress increases stress-susceptibility in adult offspring.	Sriya Bhattacharya
P121	The "Dual Hormone Hypothesis" in Domestic Dogs: Cortisol X Testosterone Interactions Predict Wins in a Competitive Task	Carolyn Walsh
P122	Measuring fear in free-living wild animals	Phillip MacCallum
P123	Reaction time measures are more sensitive than accuracy to the acute impact of cardio exercise in healthy young adults	Hannah Rose
P124	Simulated and Live Training Predictors of Police Driving Performance	Chet Hembroff
P125	The association between adverse childhood experiences and the suppression of painful memories	Brittany Flood
P126	Scaling learning theories to complex problems	Bradley Smith
P127	Using graph theory to understand the structure of event knowledge in memory	Nickolas Christidis
P128	Is Forgetting Effortful? A Pupillometric Investigation of Item-Method Directed Forgetting	Julia Greenham
P129	Costs and Benefits of Item-based Directed Forgetting for Pictures: Perceptual Details versus Gist	Fahad Ahmad
P130	Mechanisms Underlying the Production Effect for Singing	Chelsea Quinlan
P131	Delay Discounting and Prospective Memory Can Predict Risky Decision Making	Ahmad Sohrabi
P132	Comparing immediate serial recall and immediate serial recognition	Chrissy M. Chubala
P133	The Role of Distinctiveness in the Word-Frequency Effect in Recognition: Evidence from Orthographic Neighbourhood Size	Hannah V. Willoughby
P134	The role of lexical representations in the Hebb repetition effect	René-Pierre Soniet
P135	Selective attention at encoding impacts memory representation	Sagana Vijayarajah
P136	Conducting Research, Fast and Slow: The Importance of Valuing Scientific Process over Scientific Products	Heath Matheson
P137	A preliminary exploration of media-multitasking and executive functioning in pre-adolescent children	Anna Law
P138	Meta-Reasoning, calibration, accuracy, and error awareness	Daniel Geary
P139	When the smoke clears: Chronic cannabis use and spatial memory performance	James Donovan
P140	Synthetic Estrogen and Cognition: Does Time of Oral Contraceptive Pill Ingestion Affect Working Memory?	Laura Gravelsins
P141	Schema Violation in Images: Does Violating Sexuality have a Cognitive Impact?	Krista Piper
P142	Undergraduates' Perceptions towards Psychology as a Science: Differentiating explicit responses from implicit associations	Demi Plagianakos
P143	Early Orthographic Knowledge	Derrick Bourassa
P144	The impact of two attention-orienting strategies on word recognition and vocabulary acquisition in pre-readers during shared book reading	Annie Roy-Charland
P145	Concreteness in Explicit vs. Implicit Tasks in Deep Dyslexia	Simritpal Malhi

P146	Are math games helping or hurting flexible mathematical thinking: Testing the role of attention in flexible strategy use.	Adam Dubé
P147	Psychometric properties of Mathematics Anxiety Rating Scale/Brief Version	Bob Uttl
P148	(withdrawn)	
P149	Capitalizing on variability in bilingual language experience: Language entropy predicts L2 abilities and brain organization	Jason Gullifer
P150	Looking v. Seeing: Unexpectedly Poor Spellers Look as Much But See Less	Tru Kwong

Poster Session 2

Thursday, July 5 17:10-19:10 Salons BCD

Number	Title	First Author
P201	Individual Differences in Executive Control and Language Background Modulate Cross-Language Syntactic Activation During Bilingual Reading	Naomi Vingron
P202	Applying the Generalized Context Model to Text Classification	Matthew Cook
P203	Investigating factors that influence the interpretation of ambiguous phrases as literal or sarcastic	Ruth Filik
P204	Concreteness and Semantic Neighbours in a Lexical Decision Task	Simritpal Malhi
P205	Semantic priming of reading aloud and lexical decision by visual processing stream: Exploring semantic engagement through manipulation of stimulus quality and foil-type	Josh Neudorf
P206	A scan of the mathematics educational apps in the App Store: What information are developers providing to parents?	Adam Dubé
P207	Understanding the impact of parental math anxiety on the homework helping environment	Michela DiStefano
P208	Preschoolers use helpful and harmful interactions to predict membership in familiar social category membership	Jessica Switzer
P209	Pattern classification reveals developmental differences in how memories influence new learning	Margaret Schlichting
P210	Adolescents Circadian Rhythms: The Relation Between Sleep and Eating Behaviours and Cognitive Performance	Jillian Cleary
P211	Investigating the limits of essentialism in chimpanzees (Pan troglodytes)	Michael McWhirter
P212	Investigating a possible relationship between self-awareness and theory of mind in chimpanzees (Pan troglodytes)	Carla Krachun
P213	The effect of eccentricity on event related potentials in a lateralized detection task	Pénélope Pelland-Goulet
P214	Repetition Suppression of Face Images among Adults with High and Low Characteristics of Autism Spectrum Conditions: ERP and RTs Results	Ahmad Sohrabi
P215	Resting state network functional connectivity and the Five-Facet Mindfulness Questionnaire (FFMQ)	Tracie Parkinson
P216	An fMRI investigation of the reproducibility of motor cortex activation for isometric handgrip contractions	Layla Gould
P217	ERP Correlates of Feedback Processing in Reward and Error Based Motor Learning	Dimitrios Palidis
P218	Investigating the long-term effects of concussion on task-relevant sensory processing	Jake Tennant

P219	Transgenerational effects of stress:impact of pre-weaning maternal behaviour versus epigenetics on offsprings	Audrey Fontaine
P220	Neural and Behavioural Correlates of Musicians' Natural Frequencies in Music Performance	Anna Zamm
P221	Neural encoding of musical rhythm in older and younger adults	Emily Bolt
P222	Intergenerational learning of current popular music: Young adults, parents, and non-parents.	Annabel Cohen
P223	Auditory Processing Differences Between Formally Trained and Self-Taught Musicians	Emily Alexander
P224	Inter-individual differences between action and perception for the habitual subjective vertical	Nils Bury
P225	Effortful Processing in Estimation of Internally-Defined Durations	Michael Klein
P226	Visual self-motion through a virtual environment is modulated by perceived body orientation relative to earth vertical	Meaghan McManus
P227	Effect of instructions on surround motion integration and the attentional blink	Jiali Song
P228	Elusive boundary conditions of the attentional boost effect	Lisa Lorentz
P229	Does Standing Improve Performance on the Stroop Task?	Emilie E. Caron
P230	Schema violations of sexuality: examining the moderating effect of gender on the N400 component with Event Related Potentials	Denis Vaillancourt
P231	Emotional Expressivity and Exposure to New Culture	Anne Tseu
P232	Cross-Modal Emotion Perception: A Validation Study	Misha Sokolov
P233	Recognition memory for affective and neutral stimuli: A small-scale meta-analysis	Kaitlyn Fallow
P234	Relation between working memory and implicit learning in the contextual cueing paradigm	Chao Wang
P235	The Efficacy of Concept Mapping for Long-Term Knowledge Retention	Ellen MacLellan
P236	Some limits of the repetition decrement and spacing effects	Robert Collins
P237	Did you study "ate" or "eight"? Homophone lures do not reduce the production effect in a 2AFC recognition task	Jonathan Fawcett
P238	Producing a Word as "Elvis" is No More Memorable Than Reading It Silently	Rachelle Wakeham-Lewis
P239	Interactive processes in an instance-based model of memory	Evan T. Curtis
P240	The Impact of Perceptual Fluency on Cue Familiarity and Feeling of Knowing Judgments	Michelle A. Dollois
P241	Metamemory in an Immediate Serial Recall Task	Kaiden Stewart
P242	Factors That Influence Earwitness Confidence	Kelly Thiessen
P243	Memory for temporal context in temporal lobe epilepsy	Daniella Ladowski

P244	Chronic cannabis use and cannabis-related problems: Do individual differences in cognitive capacity alter the relationship?	Tayler Sullican
P245	The Role of Within-Person and Context Variability on Face Learning	Rebekah L. Corpuz
P246	Please Empathize! Observed pain intensity and explicit instructions to empathize modulate response facilitation	Carl Michael Galang
P247	The Biasing Effects of Unclaimed Prize Information: Investigating the Harms and Reducing the Bias	Alexander Walker
P248	Not all scientists agree: exploring scientific dissent on belief and policy support.	Ethan Meyers
P249	Meta-analysis of North American Adult Reading Test: Verbal intelligence scores are declining	Bob Uttl
P250	The Relationship Between Political Orientation and Bullshit Detection in Canadian Politics: Results from a Pilot Study	Rick Mehta

Poster Session 3

Friday, July 6 17:10-19:10 Salons BCD

Number	Title	First Author
P301	Less Text Improves Poster Appeal	Peter Graf
P302	Using the Hebb Legacy to Integrate Psychological Science	Raymond Klein
P303		
P304	The Efficacy of Paroxetine and Transcranial Direct Current Stimulation (tDCS) as Antidepressant Treatments in Adolescent and Adult Rats	Shannon Waye
P305	Can the FEO Ameliorate the Deleterious Effect of Circadian Rhythm Disruption in an Animal Model of Social Jet Lag?	Leanna Lewis
P306	Bilateral Lesions to the Lateral Mammillary Nucleus Impair Spatial Learning in Rats	Marie-Ann Wasef
P307	Speed and Accuracy Trade-off on the Spatial Orientation Test	Xing Huang
P308	Updating Perceived Distance during Self-Motion	Jong-Jin Kim
P309	The representation basis of non-spatial facilitation and Inhibition of Return effects	Brett A. Cochrane
P310	Mind wandering and temporal focus in task switching	Lydia Jiang
P311	Global verses Local Control in an AB Task	Ellen MacLellan
P312	Attentional Bias and Tolerance Threshold Level to Mess and Uncleanliness	Adèle Gallant
P313	Event-related potential and power spectral analysis of memory scanning during an auditory Sternberg task	Amour Simal
P314	Self-other Processing in Pain Observation: Evidence from Event-related Potentials	Michael Jenkins
P315	The impact of lifetime noise exposure on the cortical processing of sounds presented in noise	David Fleming
P316	Neural Correlates of Approachability Judgments for Novel and Familiar Faces	Kirstin Loates
P317	Relationship between Schizotypal Delusional Personality Features, Global/Local Processing, and EEG Frequency Bands	Ahmad Sohrabi
P318	Inviting hallucinatory percepts during speech-listening to detect cognitive changes in early psychosis	Ana-Bianca Popa
P319	Would You, Could You? A behavioural and TMS investigation of the role of manipulability in a divergent thinking task	Heath Matheson
P320	Driving the locus coeruleus: Relating pupil diameter and EEG metrics to performance on a naturalistic highway driving task	Andrew Reid

P321	The Dual Mechanisms for Control Framework: Examining Cognitive Control and Autonomic Nervous System Activity	Michelle A. Dollois
P322	Using temporal order judgements to explore spatial attention after stroke	Jasmine Aziz
P323	Neural Correlates of the Production Effect: An fMRI Study	Aaron Newman
P324	P600: A response to syntactic violations or learning?	Fareeha Rana
P325	Managing Ambiguity: An Eye-Tracking Study of the Relationship between Executive Function and L2 Homograph Processing	Pauline Palma
P326	Effects of Familiarity on Auditory Distance Perception: The effects of interpersonal voice familiarity on auditory distance perception of human speech under reverberant conditions	Ozgen Demirkaplan
P327	How aggressive is a shark lawyer? Comparing the intensity of the figurative meaning of noun-noun metaphors, X is Y metaphors and similes	Juana Park
P328	Are all near-misses created equal? The effect of scratch card game structure on outcome reactivity	Madison Sange
P329	The Influence of Irrelevance: Examining the Impact of Irrelevant Magnitudes on Task Relevant Magnitude Estimations	Rylan Waring
P330	Explaining Biased Beliefs about Global Economic Inequality	Kathleen Daly
P331	Evaluating effort: A dissociation between online subjective effort ratings and performance measures	Michelle Ashburner
P332	The Mismatch Effect and Measuring Implicit Mental Illness Stigma: The Influence of Schema Incongruence on Reaction Time in Undergraduate Students	Nicole Harris
P333	Judgments of Problem Solvability During a Water Jug Task	Ian Newman
P334	The Effect of a Concurrent Task on Function Learning	Mark Brown
P335	Preschoolers' speaker-specific interpretations of emotional prosody during online language processing	Justine Thacker
P336	How children use testimony from inaccurate speakers	Erika Nurmsoo
P337	Prevalence and sex differences in innumeracy among undergraduate students	Bob Uttl
P338	Students don't like numbers: Replication and extension	Bob Uttl
P339	Understanding the relation between parents' math anxiety and their perception of their interactions around mathematics homework	Bronwyn O'Brien
P340	You're a novice, I'm an expert: Examining individual differences within the testing effect	Yichu Zhou
P341	Changes in attention following instructions to forget: Evidence from hand movement trajectories	Ian Palmer
P342	The Effects of Concussions on Source Memory: A Retrieval or Encoding Deficit	Akeila Gabriel

P343	Production is in the Eye of the Beholder: A Pupillometric Investigation of the Production Effect	Jenny Tiller
P344	Does Implicitly Activated Nonstudied Material Facilitate False Recall? A Test of the CLS Model's Predictions.	Alexis Payne
P345	Order recall in verbal short-term memory is influenced by orthographic neighborhood activation	Dominic Guitard
P346	The modality of interference during encoding impacts object representations in memory	Logan Doyle
P347	Olfactory Working Memory: Quantitative and Qualitative Differences in N-Back Performance for High and Low Verbalisable Odours	Andrew Moss
P348	Re-examining the Relationship between Visual Working Memory and Mental Rotation	Biljana Stevanovski
P349	Unconscious influences on working memory using a novel paradigm: The in-back	Fatou Sarr

Abstracts

Invited Symposia

Friday, July 6 Morning

BBCS Executive Symposium: New Directions in Multi-Sensory Integration

S1 Multisensory self-motion perception and aging. Jennifer Campos, *Toronto Rehabilitation Institute - University Health Network* ■ As we move though our complex environments our brain must effectively integrate information from visual inputs, auditory inputs, our muscles and joints (proprioception), and the acceleration detectors in our inner ear (vestibular). Combining and optimally integrating these sensory and motor inputs allows us to estimate important movement parameters such as speed and heading direction with greater certainty. Recent evidence has suggested that the processes underlying multisensory integration may change with older age, but little is known about whether/how these effects are observed for multisensory self-motion perception specifically. In this talk I will describe studies that investigate the role and integration of visual, auditory and vestibular inputs on tasks ranging from psychophysical movement discrimination tasks to simple driving tasks in younger and older adults. The specific role of age-related hearing loss on safe mobility and falls risk will also be highlighted.

S2 Multisensory synchrony in perception and action. Vanessa Harrar, *University of Montreal*, Charles Spence, *Oxford University*, Laurence Harris, *York University*, Jocelyn Faubert, *University of Montreal*, Rafael Doti, *University of Montreal*, Eduardo Lugo, *University of Montreal* ■ Multisensory reaction times are faster than unisensory reaction times. Theoretically, multisensory stimuli activate an additional set of neurons, which decreases our thresholds, which in turn result in faster reaction times (RTs). Using statistical summation (the race model) we can identify conditions where multisensory RT facilitation appear to be driven by an independent processing stream (i.e. those theoretical additional neurons). We find that the largest RT facilitation occurs when the slower of the two stimuli is given a headstart. However, RTs are objectively fastest when the two stimuli are presented at the same time. Indeed, synchrony is a critical feature in many demonstrations of multisensory integration benefits. However, synchrony perception can change with experience. While the point of subjective of simultaneity is usually close to true simultaneity, it can change in response to temporal adaptation. I will present data that demonstrates that although the perception of simultaneity changes with experience, the RT benefits associated with multisensory stimuli remain fixed. In order to explain this disassociation, I will explain the concept of stochastic facilitation, which has been used to explain facilitation at the neural level. I will demonstrates that stochastic facilitation can, at least in part, explain multisensory facilitation of RTs.

S3 The benefit of multisensory audio-visual speech cues in first and second language processing. Natalie Phillips, *Concordia University* ■ Speech understanding in a first or native language (L1) requires a complex set of processes that map degraded acoustic inputs onto stored representations of phonological and lexical information and integrate that information with long-term knowledge. When listening to an imperfect signal, additional cognitive resources (verbal working memory [WM], cognitive control, higher-order language information) are needed to understand speech. This task is even harder for a bilingual listener who has imperfect abilities in their second language (L2) due to poorer phonological competence and lower vocabulary and syntactic knowledge. One outstanding question is whether

audiovisual (AV) speech cues facilitate sentence processing in L2. This talk examines the contribution of bottom-up (visual/hearing acuity, viseme and phoneme perception) and top-down factors (context, WM, processing speed) as bilinguals perceive sentences in unimodal (visual- and auditory-only) and bimodal (AV) conditions in L1 and L2. I will present data on the extent to which bilinguals benefit from AV speech cues in L2, over and above their ability to exploit these cues in L1. This research contributes to a more comprehensive model of L2 speech understanding that accounts for complex listening conditions and individual differences.

S4 Multisensory Integration and Perception. Genevieve Desmarais, *Department of Psychology, Mount Allison University* ■ Though we experience the world through multiple sensory modalities, these various inputs are integrated relatively seamlessly and we experience a unified perception of our surroundings. We encounter this phenomenon every day. Simply moving around the world creates both visual and vestibular information, while having a conversation involves integrating sight and sound information. Having more than one type of information presented to us often leads to an advantage (e.g., speech may seem clearer and responses may be faster) but can also create difficulties (e.g., for individuals who suffer from motion sickness). The way our minds integrate information can change through practice, over the lifespan, as well as in special populations. Dr. Campos will address whether changes in multisensory integration associated with aging impact the perception of self-motion. Dr. Harrar will discuss how experience impacts out perception of multisensory events ,Äì but not necessarily objective responses to those events. Dr. Phillips will address whether the facilitation from audiovisual speech cues also facilitate the perception of a second language. This symposium brings together a panel of distinguished scholars who are investigating various aspects of how multisensory integration affects daily functions.

Friday, July 6 Afternoon

Symposium: Interactions between selective attention and working memory

S5 The Role of Top-Down Attentional Biases in Visual Working Memory Performance. Stephen M. Emrich, *Brock University*, Holly A. Lockhart, *Brock University* ■ Previous studies examining the relationship between attention and visual working memory (VWM) have often focused on filtering ñ i.e., keeping unwanted information out of capacity-limited memory storage. However, this model doesnít address the relationship between attention and memory performance when all items are relevant, or when some items might be more relevant than others (attentional priority). Moreover, recent evidence suggests that memory performance may not be limited by a fixed upper limit, and may also vary significantly across items. In the current talk, I will present evidence from a series of behavioural experiments that demonstrate attentional priority is a major source of variance in VWM performance. Importantly, attentional priority better accounts for performance than memory load, suggesting that attentional priority plays a critical role in limiting VWM abilities, independent of filtering mechanisms or fixed capacity limits. I will also present evidence from a fMRI study which demonstrates that when attention varies across memoranda, activity in the dorsolateral prefrontal cortex (dlPFC), but not the intraparietal sulcus (IPS), is predictive of VWM precision, consistent with a top-down attentional bias mechanism. These findings implicate attentional biases over storage and filtering as critical to encoding and maintaining information in working memory.

S6 The role of visual working memory in controlling access to visual long-term memory storage. Keisuke Fukuda, *University of Toronto Mississauga*, Caitlin

Tozios, *University of Toronto Mississauga* ■ We are capable of storing a virtually infinite amount of visual information in visual long-term memory (VLTM). However, not all the visual information that we encounter gets encoded into this massive offline memory storage. What, then, determines the successful memory encoding of visual information? In this study, we examined the role of visual working memory in controlling access to visual long-term memory storage. Here, we found that visual working memory gates the information flow into visual long-term memory. Additionally, we also demonstrate that our ability to voluntarily control the quality of memory encoding is up-regulatory in nature. More precisely, our behavioral and electrophysiological results demonstrate that although we can voluntarily increase the likelihood of successful VLTM encoding (=up-regulation) by preferentially representing the information in visual working memory, we cannot voluntarily decrease such likelihood (=down-regulation). To do so, one has to upregulate the memory encoding of the other visual information that accompanies the to-be-down-regulated information. Together, these results demonstrate a direct yet limited role that visual working memory plays in granting access to visual long-term memory storage.

S7 Templates for attentional selection in working memory. Martin Eimer, *Birkbeck, University of London, UK* ■ The question whether attentional templates for target objects in visual search are always stored in working memory (WM) remains disputed. It has been argued that such search templates are transferred from WM to a long-term store when target features remain constant across trials (Carlisle et al., 2011). I will present evidence that this may apply only to single-feature search templates (e.g., preparing for a red target), but not to multiple-feature templates (e.g., preparing for a red or green target). We measured the contralateral delay activity (CDA) as an electrophysiological marker of holding target templates in WM during the preparation for one-colour or two-colour search (Grubert et al., 2016). When target colours changed frequently, CDA components were present for both types of tasks. When they remained constant, the CDA was abolished for one-colour search but remained present for two-colour search. In another study, we demonstrated that the load of a concurrent search-unrelated WM task affects the speed of search target selection (reflected by N2pc components) during two-colour but not one-colour search. These results demonstrate that observers can maintain search templates for multiple target features, and that these templates are always held in WM, even when they remain constant.

S8 Dynamics of attentional control during visual-spatial selection of foveal and peripheral targets: ERPs and phase synchrony. Pierre Jolicoeur, *Université de Montréal*, Jean-Marc Lina, *Ecole de technologie supérieure*, Brandi Lee Drisdelle, *Université de Montréal*, Guillaume Collard, *Université de Montréal*, Charlotte Even, *RWTH Aachen University*, Iring Koch, *RWTH Aachen University* ■ We examined the control mechanisms of spatial attention when selecting a target at fixation or a color singleton in the periphery. The experiment included trial blocks in which targets were always at screen center (Pure Center), always in the pheripheryat an unpredictable location (Pure Peripheral), or both at center (C) or periphery (P) in Alternating-Runs (CCPPCCP, PPCCPPC). Variations in N2pc amplitude across conditions suggested greater resistance to capture by a peripheral singleton in Pure Center blocks compared with attention at center in Alternating-Runs blocks. We also examined the switch negativity (or repetition positivity), mixing negativity, and P3, across conditions, as well as associated patterns of phase synchrony in different frequency bands to understand differences in brain dynamics of attentional control across the various conditions. Independent components analysis (ICA) was used to isolate patterns of strong and weak synchrony ("networks") and their associated timecourse (event-related dynamics), for different attentional modes. These analyses help to

characterize the network dynamics underlying attentional control.

S9 Attending to visual-spatial memoranda: Evidence from eye movements. Candice Morey, *Cardiff University* ■ Monitoring fine-grained changes to which elements of a set of memoranda are fixated may reveal important information about relationships between deploying attention and memory. Eye movements toward memoranda could reflect attempts to re-activate memoranda or link them to adjacent items via gestural repetition, or could simply indicate which elements the individual is thinking of (or avoiding). My colleagues and I have examined eye movements during serial order recognition tasks and visual change detection tasks, documenting consistent patterns which provide insights into how participants focus on elements within a set of memoranda. I shall present evidence suggesting that 1) individuals focus most on items in an array that are unique or prioritized, and, in context, most important to encode, 2) adults attend to spatial locations during encoding for serial order reconstruction differently than they attend to verbal information, but 3) children under 7 years do not attend to serial spatial locations in the manner adults do. Altogether, these findings do not clearly support the idea that eye movements are used analogously to speech to passively keep non-verbal memoranda active. Implications for theories of working memory will be considered.

S10 The attentive brain: Insights from developmental cognitive neuroscience. Jacalyn Guy, *University of Oxford*, Gaia Scerif, *University of Oxford* ■ Attentional control plays a crucial role in biasing incoming information in favour of what is relevant to further processing, action selection and long-term goals. As such, many models of adult attentive processes are predicated on the functioning of frontoparietal control circuits and its role as a gateway to processing. However, developmental data illustrate how attentional processes are best understood not simply as a control homunculus, but rather as bidirectionally influencing and influenced by prior experience. Our recent data highlight change and stability in the interplay between attentional control, memory and learning. Children and young adults differ in the extent to which they deploy visuo-spatial attentional control to optimize maintenance in short-term memory. At the same time, attentional effects on memory are not unidirectional: previously learnt information and resistance to distraction during learning guide later attentional deployment, in adulthood and in childhood. In conclusion, assessing attentional development, both in populations at high risk for attentional difficulties and over typical development, points to the bidirectional influences between attention and memory.

Papers

Thursday, July 5 Morning

Working Memory

101 Ranschburg Effects in Tactile Memory: The Roles of Verbal Re-coding and Participant Awareness Andrew Johnson, *Bournemouth University*, Rachel Skinner, *Bournemouth University*, Pwamoti Takwoingi, *Bournemouth University*, Christopher Miles, *Bournemouth University* ■ The Ranschburg effect concerns the recall inhibition of items repeatedly presented during an immediate serial recall (ISR) trial. In two experiments we investigate the Ranschburg effect for tactile stimuli. Employing an immediate serial recall (ISR) procedure, participants recalled sequences of 6 rapidly presented finger stimulations by lifting their fingers in the order of original stimulation. In Experiment 1, within-sequence repetition of an item separated by 2-intervening items resulted in impaired recall for the repeated item (the Ranschburg effect), thus replicating the findings of Roe et al. (2017). This impairment was also evident with concurrent articulation, suggesting that the Ranschburg effect is not reliant upon verbal re-

coding. When participants were aware of the repetition (Experiment 2), the Ranscburg effect was attenuated, a finding consistent with that found for verbal stimuli (Jahnke, 1972). These data further suggest commonality between tactile and verbal order memory, and provide evidence for the Ranscburg effect being observed in non-verbal stimuli.

102 No flexible re-distribution of visual working memory resources after encoding. Blaire Dube, *University of Guelph*, Naseem Al-Aidroos, *University of Guelph* ■ Attention regulates visual working memory (VWM) performance by determining which information in the environment is granted access to its resources, and how they are distributed among encoded items. Our work has shown that the mechanism underlying resource distribution is flexible: Assigning priorities to items prior to encoding (i.e., by manipulating the validity of the cues signalling their importance) causes those that are most relevant to be maintained with the greatest precision. We investigated whether we see evidence of this capability using internal attention. Can we flexibly re-distribute resources in VWM following cues indicating their relative priority that are presented post-encoding? Across three experiments, participants memorized the colours of various shapes and we provided information regarding their priority in the form of feature-based (E1 and E2) and spatial (E3) retro-cues. Despite a reliable retro-cue effect (i.e., the cues benefitted memory performance on tests of the cued item), we observed no evidence that manipulations of cue validity affect precision of the cued item. Observers can use internal attention to prioritize a memory representation after encoding; however, there appears to be no control over the extent to which it is prioritized, highlighting an important difference in the flexibility of internal and external attention.

103 A Daytime Nap Enhances Visual Working Memory Performance and Alters Event-Related Delay Activity. Kevin MacDonald, *Brock University* ■ Working Memory (WM) is impaired following sleep loss. We sought to better understand the role of sleep in WM processes by assessing the fidelity of WM reports, investigating WM capacity and properties of sleep as predictors of sleep-related enhancement, exploring event-related delay activity associated with maintaining items in WM, and using mixed-effect modelling at a trial-by-trial level to examine performance changes over time. Thirty-six young adults completed a 300-trial visual WM task following a 90-min nap opportunity and, separately, an equivalent period of wakefulness. The odds of WM success (i.e., within 20¬∫ of the target) were approximately equal between nap and wake conditions at the start of the task, but by the end, odds were 1.26 times greater in the nap condition. Successful WM reports had higher fidelity after a nap, independent of time on task. Neither WM capacity nor any sleep variables measured were found to moderate the nap effect. Lastly, amplitude of frontal and occipital delay activity was altered after the nap relative to the wake condition. Together, these results indicate that a 90-min daytime nap benefits WM performance, perhaps by reducing attentional lapses and by reducing random, background neuronal firing that may decrease the fidelity of representations.

104 Dual-task costs to memory and processing in young adults: An adversarial collaboration. Jason Doherty, *University of Edinburgh, UK*, Clement Belletier, *University of Fribourg, Switzerland*, Stephen Rhodes, *University of Missouri-Columbia, USA*, Agnieszka Jaroslawska, *University of Edinburgh, UK*, Valerie Camos, *University of Fribourg, Switzerland*, Pierre Barrouillet, *University of Geneva, Switzerland,* Nelson Cowan, *University of Missouri-Columbia, USA*, Moshe Naveh-Benjamin, *University of Missouri-Columbia, USA*, Robert Logie, *University of Edinburgh, UK* ■ There exists a number of theories relating to the structure, organisation, and functional limits of working memory. Particular debate surrounds the ability to co-ordinate concurrent tasks, notably the existence or extent of

trade-off between maintenance of memoranda and attending to attentionally demanding processing tasks. The Working Memory Across the Adult Lifespan: An Adversarial Collaboration(WoMAAC) project brings together proponents of three theoretical frameworks of working memory: the Multiple Component Model, the Time-based Resource Sharing model, and the Embedded Processes model. The project aims to test dual-task predictions from these theories by collaboratively conceiving, designing, and running experiments. Utilising methods such as preregistration, open science, and cross-lab replication, our first set of experiments investigated dual-task costs to verbal memory and verbal/visuospatial processing in young adults. Dual-task costs were investigated across different memory and presentation formats (i.e. auditory presentation and oral recall vs. visual presentation and typed recall) and with processing tasks designed to interfere with verbal and visual storage mechanisms. Our results reveal mixed successes from each theory in predicting the outcome of experiments, but demonstrate a consistent pattern of dual-task effects that may lead to a novel, integrated model of working memory.

Social Cognition

105 Shared credit for shared success: Effective interpersonal coordination strengthens joint agency. Janeen Loehr, *University of Saskatchewan* ■ When people coordinate their actions with others, they experience a sense of joint agency, or shared control over actions and effects. Little research has examined the cues that contribute to the sense of joint agency. The current study examined how internal and external cues related to the success of interpersonal coordination influence joint agency. In three experiments, pairs of participants coordinated their actions to produce eight-tone sequences that matched a metronome pace. Across experiments, more successful joint performance (closer match to the required pace) was associated with stronger feelings of joint agency. This relationship was evident whether participants rated their experience of control over the timing of the sequence or their feelings of responsibility for the outcome of the task. Furthermore, the relationship was stronger when participants received external cues to joint success (i.e., veridical feedback about the joint performance) compared to when participants could rely only on internal cues. Together, these findings indicate that a) people derive their sense of joint agency from success at the level of the dyad rather than from egocentric processes, and b) similar to self-agency, cues to joint agency may be weighted according to their salience in a given context.

106 A problem shared is not always a problem halved: Joint cognition and random sequence generation. John Towse, *Lancaster University, UK*, Satoru Saito, *Graduate School of Education, Kyoto University, Japan*, Yukio Maehara, *Faculty of Education, Nagasaki University, Japan*■ Cognitive psychology normatively focuses on individual performance, regardless of whether those individuals act alone. Task-sharing, even where it has been studied, can be compromised by the fixed pool of answers (your recall answer makes it redundant for me to offer the same response) and response blocking (your answer interrupts the cognitive processing that would otherwise allow mine). We describe a paradigm that overcomes some of the traditional methodological problems in joint cognition - task-sharing in random sequence production (Towse et al, 2016). The paradigm is widely used in an individual context, providing a empirical backdrop for exploring task sharing, and performance is nuanced and therefore open to subtle as well as obvious profile changes. We report key phenomena when pairs attempt to produce a joint random sequence, including an advantage of neglecting the other's contribution over collaborative engagement. We also discuss the role of social engagement as a necessary and sufficient condition for joint performance (Maehara et al, in press), and describe a shared task in which

contributions do not alternate at every response. In this AABB paradigm, the response schedule allows us to discriminate between switch effects and share-effects in joint performance.

107 The Role of Cognitive Load in Modulating Social Looking. Laura Bianchi, *University of Waterloo*, Alan Kingstone, *University of British Columbia*, Evan F. Risko, *University of Waterloo* ∎ Across two experiments the effect of cognitive load on social looking was examined in an authentic (i.e., live) pedestrian passing scenario and an inauthentic one (i.e., the same scenario presented as a video). In both Experiments, load was manipulated using an auditory 2-back task. While wearing a mobile eye-tracker, participant's fixation behaviour toward a confederate was recorded and analyzed based on temporal proximity from the confederate (near or far) and specific locations within the confederate (i.e., head or body). In both Experiments we demonstrated an effect of cognitive load such that there was a lower proportion of fixations and time spent fixating towards the confederate in the dual task condition, suggesting an interaction between cognitive control and social attention.

108 Decoding indirect messages from body language in face-to-face communication. Mingyuan Chu, *University of Aberdeen* ∎ In everyday conversation, we often need to use indirect expressions to avoid embarrassing others. The current study aims to examine the beneficial role of non-verbal behaviours (e.g., gesture, eye movement, and facial expression) in detecting indirect messages. In study 1, 34 participants were presented with short scenarios (e.g., "Your friend David just played in a football match, but he did not play well") and a question (e.g., "How did I play in the match?"). They were then asked to reply either in a direct way (e.g., "You didn't play well.") or in an indirect way (e.g., "The opponents were really good."). In study 2, 41 participants watched the video-recorded responses from study 1 with the sound muted. They needed to judge the type of response (i.e., direct vs. indirect) based on non-verbal behaviour alone. Results showed that participants were able to identify both direct and indirect responses significantly above chance level. 'palm-up' interactive gestures, gaze switching, and cheek muscles raising led to higher accuracy in detecting indirect responses, and head shaking led to higher accuracy in detecting direct responses. These findings indicate that non-verbal behaviour plays a crucial role in helping people to detect indirect messages during face-to-face conversation.

Perception

109 Testing the Pacemaker Explanation: A Multipronged Behavioural Investigation of the Human Timing System. Emily Williams, *University of Manchester*, Andrew Stewart, *University of Manchester*, Luke Jones, *University of Manchester* ∎ Scalar timing theory proposes that interval timing is controlled by a pacemaker-accumulator internal clock (Gibbon et al., 1984). Several non-temporal characteristics of stimuli affect our perception of duration, including modality, intensity, and filled versus empty intervals (Jones et al., 2009; Matthews et al., 2011; Wearden et al., 2007). For each of these, duration judgements differ significantly between conditions; an effect which persists across tasks. Scalar timing theory explains these illusions by suggesting the pacemaker runs at different speeds under the different conditions. We investigated the validity of the pacemaker explanation using these three illusions. We will cover each investigation, but summarise part of the stimulus modality prong here. We first sought correlations between estimation and sensitivity tasks within each modality. Frequentist and Bayesian statistics found no evidence of correlations. Though the same modality pattern in performance emerges in each task at mean level, sensitivity to duration does not necessarily predict accuracy in estimates at participant level. Therefore, the pacemaker explanation does not hold up in this instance when the two tasks are compared. A similar

theme of results was found across prongs, and alternative explanations for these illusions are considered.

110 Are same-different task characteristics dependent on stimuli onset type? Bradley Harding, *University of Ottawa*, Denis Cousineau, *University of Ottawa* ■ While we have previously shown that most same-different task results are replicated when stimuli are dynamically deblurred (Harding & Cousineau, 2016), the fast-same phenomenon, the cognitive paradigm's most prominent effect (Bamber, 1969), is not. Therefore, to have a task in which all results are replicated when stimuli are dynamically presented, we opted to have stimuli increase their saturation from black to white while being presented on a black background. This novel change in experimental design also allows participants to process information as soon as it becomes available (just like in the deblurring task), yet ensures that there are no contaminants or priming cancellation effects that are often associated with the presentation of noise during the inter-stimulus interval. In this presentation we will show that this new experimental design has underlying mechanisms that are nearly identical to those stemming from a design with statically presented stimuli. We will present the results of the Race Model Inequality, analyses of distribution characteristics, as well as analyses of slope and intercept measures. We will also present a new cascade-coactive accumulator model that can account for these types of asynchronously presented stimuli.

111 Discriminating Different Visual Acceleration Rates: What Determines Thresholds? Brian Timney, *Brain and Mind Institute, Western University*, Hannah Der, *Brain and Mind Institute, Western University* ■ Although there is an abundance of studies on the perception of constant velocity motion, the literature on the perception of visual acceleration is relatively limited. Within that literature there is a consensus that acceleration is perceived indirectly, through the comparison of initial and final velocities. Surprisingly, however, there are no available data on how we discriminate between different acceleration rates. In this experiment we measured the ability to discriminate between several different rates of acceleration (1.5, 3.0 and 6 deg/s2 and several different initial velocities (2.0, 4.0 and 8.0 deg/s). All data were collected using 2-alternative forced choice procedures and a method of constant stimuli. As expected from Weber's Law, greater absolute acceleration rate differences were needed for faster standard accelerations and for greater initial velocities. However, when the data were standardized by comparing the ratios of the final velocities for the test accelerations to those of the standard rates, they showed that a speed difference of 10 to 15% was necessary to discriminate between two acceleration rates, regardless of the initial velocity or the standard acceleration rate. These results are compared with constant velocity speed discrimination and the detection of acceleration from constant speeds.

112 Contrast negation impairs familiar face recognition and is additive to picture-plane inversion: Implications for utilization of configural and surface properties in recognition of familiar faces. Adam Sandford, *University of Guelph-Humber*, Courtney Rende, *University of Guelph-Humber*, Kavita Brijpaul, *University of Guelph-Humber*, Afnan Khan, *University of Guelph-Humber*, Markus Bindemann, *University of Kent* ■ Configural processing has recently been defined as the encoding of metric distances between features of the face, and evidence has supported the role of configural processing in discriminating metric distances between images of upright compared with upside-down unfamiliar faces. Some studies have concluded that such evidence supports an important role of configural processing in face recognition, despite few showing familiar faces. In the current study, we had participants discriminate two images for the correct appearance for a given identity (set of

60 familiar, 60 unfamiliar faces), presented upright then upside down, blocked by orientation. The correct appearance represented an image whose configuration was unchanged, whereas the other image represented shorter or longer eye distance relative to the unchanged image. In Experiment 2, we reversed contrast polarity of the face images. Across the experiments, performance in the task was better for upright familiar compared with unfamiliar faces, and upright compared with inverted familiar faces. However, contrast negation impaired the task only with familiar faces. Additive effects of contrast negation and picture-plane inversion were evidenced. These results suggest a supporting role of surface properties and raise questions about configural processing in familiar face recognition.

Individual Differences

113 Developing a New Measure of Trait Boredom. Dana Gorelik, *York University*, Andrew Hunter, *York University*, John Eastwood, *York University* ■ Emotion and cognition are inextricably linked; thus, to understand cognition with all its complexity, we must consider emotion. For example, people who are prone to boredom perform poorly on attention tasks. Boredom propensity is also correlated with self-reported cognitive processes such as executive dysfunction and hyperactivity. However, understanding the link between boredom and cognition is hampered by poor measures of boredom propensity. The present study aimed to evaluate the psychometric properties of a new measure, the Trait Boredom Scale (TBS). The scale consists of 10 trait items from the Disengagement factor of the Multidimensional State Boredom Scale (MSBS), 3 items from the Boredom Susceptibility Scale (ZBS), 3 items with improved wording, and 2 new items. Nine hundred and thirteen participants completed the TBS. Seven items were removed from the scale, including items with redundant content, high skew and poor loadings. A factor analysis revealed a one factor structure was the best fit for the data. The scale demonstrated high internal consistency (Œ± = .94). It was distinct from trait life meaning, and significantly correlated with existing boredom propensity scales. This scale will be utilized to examine the relationship between boredom propensity and wide range of cognitive performance beyond attention.

114 Bullshit Makes the Art Grow Profounder: Evidence for False Meaning Transfer Across Domains. Martin Harry Turpin, *University of Waterloo*, Andrea Carolina Castro, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Jennifer Stolz, *University of Waterloo* ■ Four hundred participants across two studies rated the profoundness of randomly generated art images while the images were paired with a randomly generated title or presented alone. It was hypothesised that inclusion of a randomly generated title would result in an increase of perceived meaning in abstract art. The presence of a title boosted the perception of profoundness in the images. In addition, the tendency to find meaning in randomly generated art and titles was strongly related to the degree a participant perceived meaning in "Pseudo-Profound Bullshit," which are vacuous, but superficially impressive, statements.

115 Tracking the Subjective Experience of Effort and Discomfort During Working Memory Versus Sustained Attention Processes. Veerpal Bambrah, *York University, Department of Psychology*, Dr. Chia-Fen Hsu, *York University, Department of Psychology*, Dr. Maggie Toplak, *York University, Department of Psychology*, Dr. John Eastwood, *York University, Department of Psychology* ■ Conceptualizations of cognitive effort are primarily grounded in "objective" indices of task-demand and performance. However, individual differences in the subjective experience of effort have been recognized as equally critical for the deployment and persistence in exerting mental effort. This study examined the trajectory of the subjective experience of cognitive effort. Participants completed a working memory task or

sustained attention task, and reported their level of discomfort and their mental effort required at three time-points: directly after completing brief practice trials, during, and after completing the full cognitive task. Analyses revealed that after the practice trials, participants anticipated that the working memory task would be more cognitively effortful, whereas participants of the sustained attention task reported more effort during the task, remembered the task as being more effortful, and consistently reported more discomfort. These results suggest the subjective experience of cognitive effort depends on the task characteristics (working memory versus sustained attention), which cue different expectations of effort and discomfort, and, in turn, can differentially impact motivation and performance. Furthermore, cognitive effort and discomfort are not identical phenomenological experiences whose changes track one another. Understanding the subjective experience of effort is critical for comprehending basic cognitive-affective mechanisms underpinning learning and performance.

116 Predicting Fallacious Beliefs: Gambling and Paranormal. Carrie A. Leonard, *University of Lethbridge*, Robert J. Williams, *University of Lethbridge* ■ There are a collection of erroneous beliefs about how gambling works, collectively, these beliefs are called "Gambling Fallacies". Relatively little is understood about the individual differences that lend to susceptibility to this collection of fallacious beliefs. In the current study, it was hypothesized that the factors responsible for gambling fallacy susceptibility might be similar to the factors that create susceptibility to other types of fallacious beliefs, specifically, belief in paranormal phenomenon. In a sample of 266 Lethbridge community members and university students, the individual differences associated with, and predictive of, endorsement of gambling fallacies were identified. Comparisons between these factors, and those predicting belief in paranormal phenomenon, were then made. Our hypothesis was confirmed, as it was found that a similar set of factors were predictive of both fallacious belief types: gambling fallacies and paranormal beliefs. Specifically, greater reliance on intuitive thought, a less rational cognitive style, and poorer probabilistic reasoning ability were significant predictors of both belief in the paranormal and endorsement of gambling fallacies. Directions for future research and interventions are discussed.

Thursday, July 5 Afternoon

Symposium: Control Processes in Human Memory: The Role of Retrieval Suppression and Retrieval Practice

117 Forgetting as a Consequence of Retrieval Suppression: A Meta-Analytic Review of the Think/No-Think Paradigm. Daniel Todorovic, *University of Waterloo*, Benjamin Levy, *University of San Francisco*, Kathrin Eschmann, *Saarland University*, Mike Klein, *University of Waterloo*, Michael Anderson, *University of Cambridge*, Jonathan Fawcett, *Memorial University of Newfoundland* ■ Preventing an unwanted experience from coming to mind when faced with a reminder has been shown to reduce its accessibility later on. This finding has been referred to as suppression-induced forgetting and is most often studied in the laboratory using the Think/No-Think paradigm. According to one perspective, exerting control over retrieval in this manner invokes inhibitory processes to disrupt the representation of unwanted memories and prevent their coming fully to mind. These mechanisms have important real-world implications with applications to fields such as clinical psychology or eyewitness memory. Given the central role this paradigm has played in advancing our understanding of memory processes, it is surprising that no one has yet conducted a comprehensive quantitative review. To this end, we meta-analytically synthesized all studies using the Think/No-Think paradigm from 2001 to 2016 with

the goal of quantifying the magnitude of suppression-induced forgetting observed across this literature and to explore potential moderating variables. Results support a small-to-moderate effect. The implications of our findings will be discussed with respect to theoretical perspectives and boundary conditions.

118 Suppression is in the Eye of the Beholder: Pupillometric Markers of Successful and Unsuccessful Retrieval Suppression. Jonathan Fawcett, *Memorial University of Newfoundland*, Marcus Alves, *Memorial University of Newfoundland*, Michael Anderson, *MRC Cognition and Brain Sciences Unit, Cambridge, UK* ■ Preventing an unwanted memory from coming to mind when faced with a reminder invokes Fronto-Parietal control regions in the brain to mitigate retrieval along with the representation of the memory itself. However, these control mechanisms sometimes fail, allowing the unwanted memory to emerge into conscious awareness. The current experiment characterized the psychophysiological dynamics involved in such unwanted memory intrusions using a modified Think/No-Think paradigm. In this task, participants first learned cue-target pairs (e.g., CHAIR-BALL) until the cue (CHAIR) reliably activated the target (BALL). They then received a subset of the cues and practiced retrieving (Respond trials) or suppressing retrieval (Suppress trials) of the associated targets. Following each trial participants provided a subjective report as to whether the target came to mind. Pupil diameter was measured throughout to index mental effort. Results indicated greater pupil dilation for Suppress than Respond trials with the greatest dilation for Suppress trials wherein participants reported unintended memory intrusions. Our findings are the first to use pupillometry to track the emergence and resolution of unwanted intrusions in human memory.

119 Tracking Memory Intrusions with EEG. Robin Hellerstedt, *University of Kent* ■ There are negative life experiences that we would prefer to not think of, for example to avoid psychological distress. Previous research suggest that it is possible to suppress retrieval of such unwanted memories. Retrieval suppression is however not always successful, and involuntary retrieval of unwanted memories is a common symptom in several clinical conditions, including post-traumatic stress disorder. The present study aimed to investigate the neurocognitive mechanisms underlying such memory intrusions. Electrophysiological correlates of brain activity were recorded while the participants tried to avoid retrieval of an associate upon presentation of a retrieval cue. The participants rated the extent to which they thought of the associate, despite efforts to suppress retrieval, following each trial. These ratings were used to contrast memory intrusion trials and non-intrusion trials in an event-related potential (ERP) analysis. The ERP results showed that memory intrusions elicited a negative slow wave, that may reflect the presence of the intruding memory in working memory. Furthermore, memory intrusions were associated with a reduced left posterior positivity, which may indicate avoided recollection. More broadly, the study utilises the high temporal resolution of ERPs to elucidate the neurocognitive mechanisms underlying memory intrusion and voluntary retrieval.

120 Retrieval-induced forgetting and second language vocabulary acquisition: Insights from a Welsh language training study. Lyam Bailey, *Dalhousie University*, Aaron Newman, *Dalhousie University* ■ The current work explored the role of retrieval-induced forgetting (RIF), a process whereby retrieval of information from memory perturbs access to related material, in second language (L2) vocabulary acquisition. Prior research on bilingual subjects has indicated that retrieving words in one language may cause difficulties remembering equivalent words in another. The potential involvement of RIF in early L2 acquisition remains to be investigated. Here, subjects learned novel L2 (Welsh) words by means of picture-noun association training. In an adaptation of the traditional retrieval-

practice paradigm, half of the learned items were retrieved in participantsnative language (L1), prior to a final test of knowledge for all the learned Welsh words by means of a two-alternative forced choice task. Our results showed that participants exhibited significantly longer reaction times to learned words retrieved in L1 (compared to those that were not retrieved in L1), suggesting perturbation of access to L2 representations as a direct result of L1 retrieval-practice. These data provide the first evidence that RIF may impact newly formed memory representations, and more generally act as a barrier to early L2 acquisition.

121 Retrieval-induced forgetting has low test-retest reliability: Implications for individual differences research. Ben Levy, *University of San Francisco* ■ Retrieving a memory can cause forgetting of other related memories, a phenomenon known as retrieval-induced forgetting (Anderson, Bjork, and Bjork, 1994). With considerable evidence supporting the existence of retrieval-induced forgetting (e.g., Murayama et al., 2014), there has been growing interest in exploring individual differences in this type of forgetting. The magnitude of retrieval-induced forgetting has been found to correlate with many other measures, including working memory capacity, anxiety, and recruitment of the prefrontal cortex. At the same time, however, there is evidence to suggest that these measures have low test-retest reliability (Potts et al., 2012). Here we conducted multiple large sample (n>100) assessments of the reliability of retrieval-induced forgetting. We also assessed several other measures that have previously been reported to correlate with retrieval-induced forgetting, such as working memory and anxiety. As reported by Potts et al. (2012) we found the reliability of retrieval-induced forgetting to be quite low (r2<.2) and, unsurprisingly, we failed to replicate the published correlations with other measures. Discussion will focus on explanations of why reliability might be so low and the implications that this has on the use of this paradigm to assess individual differences in inhibitory control.

Symposium: Accessing the Meanings of Words: Perspectives on Lexical Ambiguity

122 How do listeners know what words mean? Insights from lexical ambiguity. Jennifer Rodd, *University College London, UK* ■ The ability to rapidly and accurately access appropriate word meanings within sentence contexts is made difficulty by the inherent ambiguity of most words. For example, the verb "run" has a multitude of different interpretations (e.g., the athlete/river/program/paint/manager/dye/train/candidate runs). Successful word-meaning access occurs when the "correct" meaning/sense is selected from the range of familiar possibilities. Previous models of word-meaning access argue that (i) the different meanings of words become available in parallel, and (ii) that the order in which meanings become available is modulated by their relative frequency (dominance), and the preceding sentential context. Here, I review recent research that has shown that readers/listeners use a far wider range of cues to "nudge" themselves towards correct meanings quickly and accurately. In particular, I present data from a set of web-based experiments showing how both recent experience and knowledge of the speaker's accent can influence word meaning access.

123 Ambiguity effects diverge for concrete and abstract words: Insights from the Calgary Semantic Decision Project. Penny Pexman, *University of Calgary*, Melvin Yap, *National University of Singapore* ■ Previous findings for ambiguity effects in semantic tasks are mixed. We considered two possibilities: 1) that ambiguity effects differ for abstract and concrete words, and 2) that there are individual differences in ambiguity effects within a population of skilled readers. Using the Calgary Semantic Decision dataset, we examined ambiguity effects using the semantic diversity variable (SemD) first described by Hoffman, Lambon Ralph, and Rogers (2013). SemD measures the extent to which

words appear in more diverse contexts, and it is assumed that words that appear in more diverse contexts have more varied meanings. We found support for the first possibility: results included a facilitatory effect of SemD for responses to abstract words (faster responses for high SemD words) and a modest inhibitory effect of SemD for responses to concrete words (slower responses for high SemD words). We did not find support for individual differences in ambiguity effects, although other semantic effects were related to individual differences. We interpret these findings as evidence for differences in representation for concrete and abstract words, and for the proposal that contextual and situational information is particularly important to abstract meaning (Wilson-Mendenhall et al., 2013).

124 Overnight retuning of meanings for lexically ambiguous words. M. Gareth Gaskell, *University of York*, Scott A. Cairney, *University of York*, Jennifer M. Rodd, *University College London* ■ Evidence is growing of the involvement of consolidation processes in the learning and retention of novel language (e.g., new words). We assessed whether consolidation effects are also found for highly familiar words. The experiments were based on the word-meaning priming paradigm in which a homophone is encountered in a context that biases interpretation towards the subordinate meaning. The homophone is subsequently used in a word-association test to determine whether retrieval of the primed meaning is facilitated. In Experiment 1 we tested the resilience of priming over 2-12 hours including wake or sleep, and found that periods including sleep were associated with stronger subsequent priming effects. Experiment 2 determined whether the sleep benefit could be explained as a lack of retroactive interference by testing participants 24 hours after priming. Participants primed in the evening showed stronger effects after 24 hours than participants primed in the morning, suggesting that sleep makes priming resistant to subsequent interference. The results suggest that consolidation effects can be found even for highly familiar linguistic materials. We interpret these findings in terms of a contextual-binding account in which all language perception provides a learning opportunity, with sleep and consolidation updating our expectations ready for the next day.

125 The effects of bilingualism and cognitive impairment on processing of lexical ambiguity. Vanessa Taler, *University of Ottawa*, Cassandra Morrison, *University of Ottawa*, Shanna Kousaie, *McGill University*, Rocio Lopez, *BCBL* ■ An important way to understand the representation and processing of lexical ambiguity is by examining the ways in which these functions change in populations with differing language experience and cognitive function. We report a series of studies using behavioral measures and event-related potentials (ERPs) in three populations: bilinguals, cognitively healthy older adults, and people with mild cognitive impairment (MCI). This approach allows us to specify the ways in which differences in (i) semantic organization and (ii) executive function affect the activation of different meanings of homonyms (e.g., bank). We also explored the contribution of semantic richness (number of related senses) to lexical processing in these populations. We found that bilingualism reduces the advantage seen for polysemous lexical items as well as the use of context for selective activation of one meaning of a homonym. In MCI, words with richer semantic representations (high number of related senses) appear to be better preserved than those with fewer related senses.

126 How are ambiguous word meanings learned, represented, and processed? Insights from computational modeling. Blair Armstrong, *Department of Psychology, University of Toronto*, Barend Beekhuizen, *Department of Computer Science, University of Toronto*, Caitlin Rice, *Department of Psychology, University of Pittsburgh*, Sasa Milic, *Department of Computer Science, University of Toronto*, Suzanne Stevenson,

Department of Computer Science, University of Toronto ■ I will discuss several ways in which coordinated computational modeling and behavioural investigation can shed light on the learning mechanisms, representations, and processes underlying semantic ambiguity resolution. First, I will review how processing dynamics in a connectionist model that instantiates a more biologically plausible separation of excitation and inhibition can interact with the number and relatedness of a word's meanings over time to give rise to different ambiguity effects consistent with many experimental findings. Second, I will discuss how a word-sense disambiguation model can be used to infer homonym meanings in context and estimate meaning frequencies comparable to those derived behaviourally. These results also suggest that infrequent meanings are over-represented during learning. Third, I will discuss how the number of meanings associated with a word relates to the distributional properties stored in word co-occurrence models, for example, in terms of the similarity of contexts\ derived from natural text and semantic neighbourhoods. However, meaning relatedness is only apparent in analyses of context clusterability. This observation generates specific predictions regarding how meaning relatedness is learned. Collectively, this work illustrates how computational models can provide a foundation for developing a unified account of semantic ambiguity resolution.

Attention I

127 A failure to suppress visual imagery in visual search. Brett A. Cochrane, *McMaster University*, Bruce Milliken, *McMaster University* ■ We used two robust visual search effects to explore the ability to shift voluntarily between engaging in visual imagery and not engaging in visual imagery. One of the visual search effects is known as Priming of Pop-out (PoP; Maljkovic & Nakayama, 1994) ‚Äì a passive and automatic effect marked by faster responses when a singleton visual search target repeats rather than switches across trials. The other visual search effect we call the imagery effect (Cochrane et al., 2017), a consciously effortful effect that speeds responses to a color held in mind. We put these two effects in opposition by presenting search trials in pairs and cuing participants either to imagine the color opposite of the previous target, between trials pairs, or to suppress this imagery task. If imagery can be suppressed at will, the PoP effect should be observed when participants are instructed not to imagine. We found that this was not the case --even imagery instructions from 150 trials earlier influenced the PoP effect. It was only by providing participants with an alternative instruction were they able to suppress imagery. Implications of this finding will be discussed.

128 WITHDRAWN

129 Exogenous but not Endogenous Attention Depends on Saccade Programming. Daniel Smith, *Durham University (UK)*, Soazig Casteau, *Durham University (UK)* ■ The Premotor Theory of Attention has been hugely influential in developing understanding of the mechanisms of attention. It's central claim is that endogenous, covert orienting is the consequence of programming a saccade. Here, we show that covert, endogenous orienting is possible to locations that lie beyond the effective oculomotor range and therefore cannot become the goal of a saccadic eye-movement. This dissociation between saccade programming and the locus of endogenous covert attention is contrary to the central claim of Premotor theory, thus offering a significant challenge to one of the canonical theories of spatial attention. In contrast, exogenous, covert orienting was abolished when stimuli were presented beyond the range of eye-movements. We conclude that the strict coupling between attention and eye-movements posited by Premotor theory is only true for a weak, exogenous only version of Premotor theory which we label PremotorEX.

130 Controlling capture: No role for activated visual

long-term memory. Lindsay Plater, *University of Guelph*, Naseem Al-Aidroos, *University of Guelph* ■ Why do some objects in our visual environments capture attention, while others do not? Our recent work shows that long-term memory (LTM) plays a role in determining capture; when participants memorize 30 complex visual objects and then search for 15 of them, they adopt an attentional control setting (ACS) whereby only the searched-for objects capture attention. The mechanism through which ACSs are created based on LTM representations, however, is unclear. One potential explanation is that the representations for these objects are activated in LTM—i.e., represented with a higher level of baseline activation than other LTM representations—and are consequently able to interface with perception to regulate attentional capture. Here, we investigated this explanation by testing whether inducing participants to represent visual objects in activated LTM forms an ACS for those objects. Results indicated that the objects were successfully represented in activated LTM, but these objects did not capture attention more than novel objects. We conclude that representing a visual object in activated LTM is not sufficient to induce an ACS for that object. While it remains an open question how LTM can generate ACSs, it is clear from the present study that this is not accomplished through LTM activation.

131 Out of Control? A Speed-Accuracy Tradeoff Investigation of Stroop Conflict in Mostly Incongruent Lists. Jason Ivanoff, *Saint Mary's University*, Geralda Boudreau, *Saint Mary's University*, Sean McKay, *Saint Mary's University* ■ The Stroop effect is usually absent in tasks with more incongruent than congruent trials (mostly incongruent; MI). This has been taken to reflect the operation of an inhibitory control mechanism that minimizes the impact of the word reading pathway on responding. Recently, Ivanoff et al. (2018) discovered a failure of this inhibitory control mechanism when responding was postponed in a speed-accuracy tradeoff (SAT) task. Here, we investigated this failure of control further in three SAT tasks with MI lists. In the first experiment, the stimulus remained present throughout the duration of the response window. The Stroop effect was not eliminated with prolonged responses. In the second experiment, we extended the response window to 3s, allowing more time for inhibitory control. Again, the Stroop effect was not eliminated. In the last experiment, we replaced congruent trials with neutral trials. Performance on incongruent trials was slightly better than it was on neutral trials, suggesting that there is a benefit for the more frequent stimulus type. These results provide further support for the idea that the putative inhibitory control mechanisms that inhibit the word reading pathway in MI lists are transitory.

Methods and Models

132 Confidence intervals of p values and p factor. Denis Cousineau, *Université d'Ottawa*, Jean-Christophe Goulet-Pelletier, *Université d'Ottawa* ■ The p value is one descriptive statistic of effect size among others. One advantage of the p values is that it abstracts out unit of measurement, sample size, experimental design, sampling procedure and even population distribution. As a consequence, the p value is probably the most universal effect size of all. In this presentation, we argue that p values for most commonly used statistical tests have a unique asymptotic distribution which depends only on two factors: Whether the test performed was unidirectional or bidirectional, and the true population statistical power. Hence, it is possible to compute the expected p value, a standard error and a confidence interval. Additionally, if a decision threshold is used, it is also possible to compute a p factor which is a ratio of the strength of evidence in favor of H_1 relative to the strength of evidence in favor of H_0.

133 Meaning in motion: How to make semantic representations dynamic. Douglas Mewhort, *Queen's University*, Kevin Shabahang, *University of Melbourne* ■ In the last twenty years, within both Psychology and AI, we have developed methods to construct vectors that represent the meaning of words. There are now several ways to create such semantic vectors. Currently, they are static in the sense that they do not change once they have been developed. To track thought while simulating a behavioural experiment, however, we may need to alter the vectors dynamically as the task progresses. We illustrate one way to modify vectors on the fly by exploiting orthogonal projection. We can change vectors representing the meaning of ambiguous words from one sense to another (e.g., bank as a river versus bank as a financial institution). In addition, we show how to focus on the meaning of words to reduce noise. We test our technique by applying it to predictions of several behavioural benchmarks, including the TOEFL, word-similarity judgements, free-association norms, and Release from Proactive Interference. We offer the technique as a way to alter vectors dynamically within a model of thought.

134 Accumulators models fits on Same-Different data. Marc-André Goulet, *University of Ottawa*, Denis Cousineau, *University of Ottawa* ■ A common finding in Same-Different studies is that participants respond significantly faster for Same trials compared to Different trials. This phenomenon might be due to variations in (1) information processing rates (2) inherent biases and/or (3) encoding/motor base time. Two models, the Linear Ballistic Accumulator (LBA) and the Ratcliff Diffusion (RDM) were fit to Same-Different data of eighteen participants. These accumulator models estimate parametric values for the (1) rate of evidence accumulation (2) the starting point of the accumulation process and (3) base time due to encoding and motor responses. Using the best-fitting parameters for each model, we tested three hypotheses (expecting significant differences on these three parameters) that were proposed in the literature to explain the fast-same effect. The LBA fit suggests that (i) both Sameand Differentjudgments benefit from coactivity; (ii) Sameresponses are characterized by higher starting points and lower decision thresholds compared to Differentresponses; and unexpectedly (3) Sameresponses have higher encoding/motor base time than Differentresponses. The RDM fit suggests that (i) there is very little variation in accumulation rates; (ii) participants are biased in favour of the Sameresponse; and (iii) Sameresponses benefit for smaller encoding/motor base time than Differentresponses.

135 The Relative Advantage of "Data-Peeking" in the Context of Publication Bias. Mark Brown, *Carleton University*, Guy Lacroix, *Carleton Univeristy* ■ There has been much discussion of how questionable research practices have undermined confidence in the psychology literature. One such practice is to increase the sample size of a study after checking if the results are statistically significant (i.e., data-peeking, ,optimal stopping, etc.). Although the nefarious effects of data-peeking are well-established, the issue becomes more complicated when only statistically significant results are deemed publishable (i.e., publication bias). If publication bias exists, we suggest that a non-significant result leaves the researcher with two bad options: increase the sample size of the original experiment, or, put the original study in the file-drawer and conduct a new experiment. We present the results of two simulations that illustrate the effect of both options on Type-1 errors, statistical power, effect size estimates, and efficiency. Overall, we suggest that increasing the sample size of the original experiment may be the better option.

136 Behavioural phenotyping of transgenic mice. Richard Brown, *Dalhousie University* ■ A behavioural phenotype is a pattern of behaviour resulting from genetic mutations and is used to define neuropsychiatric disorders. Transgenic mouse models have been developed to study the

mechanisms underlying such disorders and to aid in developing novel treatments for these disorders. The work on transgenic mouse models in my lab involves the study of the pattern of neural and behavioural sequelae to genetic manipulations in mice and uses a battery of tests to detect behaviours that are altered in transgenic mice. Sensory, motor, cognitive, affective, and social behaviours may all be affected by gene manipulation, thus careful behavioural techniques, with attention to the mice themselves, the apparatus, and procedure, experimenter variables, and environmental effects are necessary in order to determine a reliable and valid mouse behavioural phenotype. This presentation will discuss mouse models of ADHD, Alzheimer's disease and Autism.

Friday, July 6 Morning

Symposium: Experimental Evidence of the Interdependence between cognition and the social environment

201 Natural Language Analysis of Information Seeking and Stereotype Content. Susan Fiske, *Princeton University, USA*, Gandalf Nicolas, *Princeton University, USA*, Xuechunzi Bai, *Princeton University, USA* ■ The Stereotype Content Model (Fiske, Cuddy, Glick, & Xu, 2002) measures ambivalent biases toward societal groups (e.g., ethnicity, class, age, gender). Across 46 countries so far, group stereotypes consistently differ along two arguably functional dimensions: warmth (their intent to be sociable, trustworthy) and competence (their capability to enact intent: ability, effectiveness). Cooperative groups seem warm; high-status groups seem capable. Over the past 20 years, this theory-driven approach has found support across time, place, stimuli, and measures. However, a more data-driven approach might discover other dimensions in spontaneous stereotypes. Some studies analyze open-ended descriptions of as many as 82 groups, using natural language processing (a relatively objective, systematic, quantitative method) to derive topics and dictionaries. Emergent topics (in order of frequency) were the groupswarmth, competence/status, appearance, emotions, and beliefs. Competence words are mentioned faster and appear earlier in the list than warmth words. Other studies ask what participants would like to know about an unfamiliar group moving to their neighborhood,Äîwhich elicits queries first about their warmth (sociability, morality) and competence/status,Äîor moving to their nation, which adds beliefs. The data-driven approach affirms the big-two dimensions, but does not suggest that either has priority in stereotype content.

202 Ignoring older people: own-age biases in social attention. Louise Phillips, *University of Aberdeen, UK* ■ Young adults show an own-age bias in face memory: they are less likely to remember the faces of older people compared to those from their own age group. A couple of studies indicate that these own-age biases also occur at an earlier stage of information processing: attention to older faces, assessed using gaze cueing tasks. In two experiments we looked at the nature of those own-age biases in gaze cueing amongst young adults, to understand more about social and cognitive influences on social attention. Experiment 1 suggested that the attractiveness of faces did not underlie the own-age bias in gaze cueing. Experiment 2 provided evidence that in-group categorisation might influence attention to older faces. When older faces were associated with a background story which provided individual-level information the own-age bias disappeared. However, across both studies the level of social contact with older people did not relate to younger participantstendency to follow the gaze of older people. These results suggest that own-age biases in attending to faces are most influenced by a tendency by younger adults to categorise older people as an out-group.

203 Top-Down Influences on Face Perception in an Intergroup Context. Kerry Kawakami, *York*

University, Canada, Larissa Vingilis-Jaremko, *York University, Canada*, Justin Friesen, *University of Winnipeg, Canada*, Amanda Williams, *University of Bristol, UK* ■ Recent research has demonstrated that people focus more on the eyes of ingroup than outgroup faces and that this attentional preference has important consequences. The present research investigated top-down influences on this process. In particular, using an eye tracker, we examined the impact of similarity, individuation instructions, and trust on White participants attention to the eyes of White compared to Black targets. In Experiment 1, we varied the extent to which participants were ostensibly similar to targets using a bogus personality test and found a linear trend for similarity -- as similarity increased so did attention to the eyes of Black targets. In Experiment 2, we investigated the impact of individuation processes and found that when instructed to individuate Blacks, participants no longer attended more to the eyes of White compared to Black targets. Finally, in Experiment 3, using a single trial trust game, we manipulated trust for Blacks and found that after a trusting experience with a Black student, preferential attention to the eyes of White over Black targets was reduced. Together these findings provide convergent evidence for the importance of top-down influences on attentional biases in intergroup face perception.

204 Strategic, shared social cognition shapes stereotypes and speech. Hilary Bergsieker, *University of Waterloo, Canada*, Susan Fiske, *Princeton University, USA*, Nicolas Kervyn, *University of Louvain, Belgium*, Lisa Leslie, *New York University, USA*, Harrison Oakes, *University of Waterloo, Canada*

■ Social cognition is collaborative: People routinely discuss others, sharing and shaping impressions of targets. The stereotype content model (SCM; Fiske, Cuddy, Glick, & Xu, 2002) asserts warmth and competence as fundamental axes of perception, with pragmatic implications for interpersonal communication. Communicators, motivated by strategic self-presentation, defy accuracy norms (Grice, 1975) by selectively underreporting negative content in describing their impressions of targets, especially those characterized by mixed warmth versus competence (Studies 1-3). Such negativity omission is heard as innuendo, with listeners inferring that unspoken warmth or competence implies deficits (Studies 4 & 5). Highlighting the precarious position of stereotyped targets, high-warmth descriptions undercut the perceived competence of working women in particular (Study 5). Conversely, descriptions including mixed content (avoiding omission) carry greater inferential weight, amplifying the apparent warmth or competence of targets (Studies 6-8). Preventing inferences about strategic omission by presenting information about target groups randomly reverses classic compensation effects (Studies 9 & 10). Collectively, these experiments apply and extend the SCM to describe not only how we organize but also how we strategically share and infer social information.

205 The development of dehumanization and intergroup bias. Niamh McLoughlin, *Boston University, USA*, Harriet Over, *University of York, UK*

■ Dehumanization is a complex social phenomenon, intimately connected to intergroup harm and neglect. This bias has long been considered an important topic in philosophy, sociology, social and moral psychology but, until recently, research investigating the developmental origins of dehumanization has been rare. In this talk, I will present two studies in which we examined when young children begin to selectively attribute humanity to members of their own and other social groups. I close by making a series of suggestions for future developmental research that may enable us to better understand the nature and causes of this harmful phenomenon.

206 How cognitive bias influences the formation and evolution of stereotypes. Douglas Martin, *University of Aberdeen, UK*, Jacqui Hutchison, *University of Aberdeen, UK*, Maria Bulmer, *University of Aberdeen, UK*, Carolyn Dallimore, *University of*

Aberdeen, UK, Sheila Cunningham, *Abertay University, UK*, Kenny Smith, *University of Edinburgh, UK* ■ When information is repeatedly socially transmitted the effects of people's shared cognitive biases can accumulate resulting in the development of categorical structure that was not previously present. We examined how cognitive biases associated with membership of real-world social categories, novel social categories and knowledge of existing stereotypes influenced the way that information evolved as it passed down social transmission chains. We asked participants to try to remember personality attributes associated with novel social targets, depicted by unfamiliar female and male faces, who belonged to either the same or different novel minimal group to themselves. The target-attribute associations participants remembered at test were transmitted as the learning materials for the next participant in their chain. As information passed down the chains it became increasingly simplified, structured and learnable. Knowledge of existing stereotypes exerted substantial influence on the way that information evolved, with participants at the end of the chains recalling more gender stereotyped target-attribute pairings than participants at the start of the chains. The effects were more pronounced for male targets than female targets and when the target pool was mixed sex than when it was single sex. Real-world category membership influenced how information evolved but minimal group membership did not.

Symposium: The Diversity of Bilingual Experience and its Impact on Language Processing, Brain Structure, and General Cognition

207 The impact of individual differences on cross-language activation of meaning by phonology. Debra Jared, *University of Western Ontario*, Deanna Friesen, *University of Western Ontario*, Veronica Whitford, *University of Texas, El Paso*, Olivia Ward, *University of Western Ontario*, Debra Titone, *McGill University* ■ We examined whether bilinguals activate phonological representations associated with both English and French when reading English sentences, and whether these representations in turn activate their corresponding semantic representations. Bilinguals read sentences while their eye movements were monitored. Target words were English-French interlingual homophones (e.g., *mot* means word in French, but sounds like *mow* in English) and their matched control words. Sentences were written so that the meaning associated with the homophone member that was not presented fit the context. In Experiment 1, the French member of the homophone pair was presented and the matched control was another French word (e.g., Tony was too lazy to mot/mois the lawn). In Experiment 2, the English member was presented and the matched control was another English word (e.g., Hannah wrote another mow/mop on the blackboard for the spelling test). If shared phonology activates cross-language meaning, fixation latencies should be shorter on homophones than on control words. This was indeed the case in both experiments. Importantly, the magnitude of the phonologically-mediated meaning activation was modulated by word frequency, as well as by several participant-level characteristics, including French age of acquisition, French oral word reading fluency, English semantic knowledge, and executive control ability.

208 The impact of language proficiency and executive control ability on cross-language semantic priming. Deanna Friesen, *Western University*, Corinne Haigh, *Bishop's University* ■ We investigated the impact of language proficiency and executive control (EC) ability on cross-language semantic activation. 58 French-English bilinguals performed an English semantic priming lexical decision task using interlingual homographs (e.g., *pain* (bread)) or matched control words (e.g., pale) as primes. Prime Type was either translation (e.g., pain-BREAD) or cross-language associative (e.g., pain-BUTTER). Unlike previous priming studies, our

study included EC ability as an individual difference variable and found that it interacted with language proficiency to impact associative priming performance. Linear Mixed Effects models revealed that for associative priming, participants with slow English access exhibited homograph facilitation, whereas individuals with poor EC ability experienced homograph interference. Furthermore, individuals with poor EC but fast English access exhibited the most interference, while individuals with poor EC but slow English access exhibited the greatest facilitation. We will discuss how theories of bilingual word recognition need to incorporate individual difference variables beyond language proficiency.

209 Electrophysiological correlates of auditory discourse processing in bilinguals. Angela Grant, *Concordia University*, Maude Brisson-McKenna, *Concordia University*, Natalie Phillips, *Concordia University* ■ Learning how to converse is often the goal when acquiring a second language (L2). Yet, previous studies have focused on lexical and sentence processing. Our study addresses this gap by examining auditory discourse comprehension in 15 English/French bilinguals. We compare the capacity-based model, which predicts reduced sensitivity to discourse cues compared to lexical cues in the L2, with the noisy channel model, which predicts the reverse. Our ERP paradigm uses three-sentence stories with prime and target words in the final sentence whose lexical association is manipulated, as is the congruence of the target with the preceding discourse. We found that the N400 effect is larger for incongruent targets, but this effect was qualified by a 4-way interaction such that the effect of congruency varied in its topography and relationship with lexical association in each language. Overall, our results support the noisy channel model of L2 processing.

210 Early second language exposure has lasting effects on bilingual's white matter tracts. Joanisse, Marc F. Nichols, Emily S., *Liu, Lily* ■ We used Diffusion Tensor Imaging (DTI) to compare neural white matter microstructure in English-Mandarin bilinguals compared to monolingual English speakers. Our analyses identified groupwise differences across several language-related white matter tracts; interestingly, we observed that fractional anisotropy (FS) in monolinguals was higher compared to that of the bilingual group, suggesting stronger inter-region connectivity in monolinguals. A follow-up analyses revealed that within the bilingual group, there was a positive association between FA and second-language age of acquisition, such that later learners showed neural signatures more similar to those of monolinguals. Overall the results suggest white matter differences between groups reflect the impact of language exposure on brain maturation.

211 The impact of current non-L1 usage and L2 age of acquisition on executive control in the Simon task among bilingual adults. Debra Titone, *Department of Psychology, McGill University*, Pauline Palma, *Department of Psychology, McGill University*, Jason Gullifer, *Department of Psychology, McGill University*, Naomi Vingron, *Department of Psychology, McGill University*, Veronica Whitford, *Department of Psychology, University of Texas, El Paso*, Deanna Friesen, *Faculty of Education, University of Western Ontario,* Debra Jared, *Department of Psychology, University of Western Ontario* ■ We investigated whether bilingual experience impacted non-linguistic executive control in the Simon task. Past studies tend to use coarse bilingual-monolingual comparisons which presume that all bilingual experience is the same, or assessed executive control in conflict tasks using global congruency alone. However, bilinguals differ, and global congruency alone may be misleading given how readily prior trial experience impacts current trial performance in a manner that may also reflect executive control. Thus, we examined 65 bilingual adults tested at McGill and Western, who varied in non-L1 language usage, the age they first learned their L2, and the interaction between prior and current trial congruency. Generally, current trial congruency effects were substantially larger when

the prior trial was congruent vs. incongruent (see also Grundy et al., 2017). However, as non-L1 experience increased, this interaction diminished, specifically reducing the overall prior trial effect independently of age of acquisition. Neither non-L1 experience nor age of acquisition impacted current trial congruency alone. These preliminary results suggest that differences in bilingual experience are important determinants of when and how performance may vary in a non-linguistic executive control task. We are further investigating whether individual differences in social language use also play a role with these data.

Mathematical Cognition

212 Knowledge of Math Symbols in Young Adults: Beyond Counting and Ordering. Heather Douglas, *Carleton University*, Stephanie Hadden, *Carleton University*, Gail Headley, *University of Delaware*, Jo-Anne LeFevre, *Carleton University* ■ Mathematics requires people to acquire a large range of symbols. Digits are among the most familiar math symbols and they are used to represent many concepts, including quantities (e.g., 4 dogs), order (e.g., 1 2, 3), and arithmetic (e.g., 3 + 5). Research suggests a hierarchy such that cardinal (quantity) skills are acquired before ordinal skills, which subsequently predict arithmetic. However, although digits are fundamental, they are only one aspect of mathematical symbol knowledge. Where does knowledge of more complex mathematical symbols fit into this hierarchy of skill development? Fifty-eight young adults completed a battery of early and advanced mathematical skills. Knowledge of math symbols was measured by how accurately young adults distinguished between well-formed and poorly-formed mathematical expressions (e.g., $x2$ versus $2x$). Using mediation analyses, we assessed the relations among cardinal skills, ordinal skills, math symbols, and basic (e.g., 34 + 57) and advanced arithmetic (e.g., fractions, decimals, and algebra). We found that math symbol knowledge accounted for variance in advanced arithmetic skills and partially mediated the well-established link between arithmetic and ordinal knowledge. These findings suggest that as arithmetic skills become more advanced, math symbol knowledge helps explain individual differences in performance.

213 Memory Interference in Simple Addition and Multiplication Across Cultures. Jamie I. D. Campbell, *University of Saskatchewan*, Yalin Chen, *University of Saskatchewan*, Zijun Zhou, *University of Saskatchewan* ■ Chinese adults' memory for arithmetic facts (e.g., 2 + 3 = 5) is less susceptible to retrieval-induced forgetting (RIF) from practice of multiplication counterparts (e.g., 2 × 3 = 6) compared to Canadian adults. The present study investigated if this difference generalized to the associative confusion effect (ACE) observed when equations to be verified appear with the correct answer to the other operation (e.g., 2 + 3 = 6, 2 × 3 = 5). Chinese (n = 52) and Canadian (n = 26) university students were tested. The ACE was substantially larger in the Canadian group compared to the Chinese group, but the Chinese nonetheless presented a robust ACE. The ACE was observed for both numerically small problems (sum ≤ 10) and large problems. As arithmetic RIF was not observed for large problems, observing an ACE for large problems indicates that different mechanisms underlie the two phenomena.

214 Do you see what I see: What information do students attend to when solving realistic math word problems? Cheryll Fitzpatrick, *Memorial University of Newfoundland*, Darcy Hallett, *Memorial University of Newfoundland*, Jonathan Fawcett, *Memorial University of Newfoundland*, Brandon Slaney, *Memorial University of Newfoundland* ■ Research regarding realistic word problems – math word problems that require the consideration of real world knowledge – have notoriously found that children in North American, European, and Asian countries have difficulty with these problems. Research also indicates that when students see a word problem, they often pick out numbers and

keywords to apply a math operation without even reading the problem text in full. This talk describes a research project that investigated undergraduate students' performance on both standard – those that can be solved using the straightforward application of a mathematical operation – and realistic word problems while students' eye movements were being recorded using eye-tracking technology. Students also completed written measures of math anxiety, general anxiety, test anxiety, general math performance, and need for cognition, and these measures were related to undergraduate students' performance on word problems. This talk also describes how the amount of time spent viewing each type of word problem, the type of information being viewed in the problem text, and the specific information drawing focus when rereading problems differs in realistic and standard word problem solving.

215 Longitudinal patterns in individual differences in conceptual and procedural knowledge of fractions. Darcy Hallett, *Memorial University of Newfoundland*, Peter Smith, *Memorial University of Newfoundland*, Meagan White, *Memorial University of Newfoundland*, Catherine Snow, *Memorial University of Newfoundland*, Felix Ayesu, *Memorial University of Newfoundland* ■ In the math cognition literature, recent research in fraction understanding has suggested that there are individual differences in children's use of conceptual and procedural knowledge (Hallett et al., 2010; 2012; Hecht & Vagi, 2012). Some children have a relative strength in procedural knowledge, some children have a relative strength in conceptual knowledge, and some (who tend to perform the best) have equal strength on both. It is not clear, however, whether these clusters represent entrenched and persistent tendencies to combine conceptual and procedural knowledge or whether they represent momentary snapshots that children pass through as they learn more about fractions. The present study investigated these possibilities with a longitudinal study on children's fraction understanding. Children were tested in Grade 6 and again in Grade 8 on the same measures of conceptual and procedural fraction understanding. A cluster analysis was conducted at each time, and cluster membership was compared across time. The results found that there was a relation between cluster classifications in Grade 6 and those in Grade 8. At the same time, there was some movement between clusters. These results suggest these individual differences are not set in stone, but are not ephemeral to the moment either.

216 Errors on fraction problems for different fraction knowledge profiles for university students. Shawn Tan, *Carleton University, Institute of Cognitive Science*, Jo-Anne LeFevre, *Carleton University, Institute of Cognitive Science* ■ People have difficulty understanding and working with fractions. Accordingly, they solve fraction problems in different ways, contributing to variability in responses. Two types of knowledge are used to solve fraction problems: Conceptual knowledge involves understanding the properties of fractions and relationships of magnitudes between two fractions whereas procedural knowledge involves knowing how to execute a sequence of steps to obtain correct solutions. Undergraduates (N = 178) responded to an online fraction knowledge assessment (FKA) that assessed conceptual and procedural knowledge (Hallett, Nunes, Bryant & Thorpe, 2012). Participants also solved fraction arithmetic problems that were previously used with sixth- and eighth-grade students. Cluster analysis performed on scores from the FKA revealed that participants could be optimally classified into two groups of solvers: one group performed relatively better on conceptual items, whereas the other performed relatively better on procedural items. We compare frequency of correct responses and most frequently observed errors from these two groups to those observed in children. Overall performance was better for adults than children across all four operations. Overall error rates were similar for conceptual and procedural solvers. However, frequently observed errors were more prevalent in conceptual solvers compared to

procedural solvers for addition, subtraction, and division fraction problems.

Memory I

217 The Enactment Effect: An Integrative Review. Brady Roberts, *University of Waterloo*, Myra Fernandes, *University of Waterloo*, Colin MacLeod, *University of Waterloo* ■ The enactment effect refers to the finding that physically performing an action that represents a word results in better memory than does simply reading the word. A comprehensive review considered data from 3 different methodological approaches: behavioural, neuroimaging, and neuropsychological studies. Extensive literature searches across several databases resulted in the inclusion of 70 behavioural, 8 neuroimaging, and 18 patient studies. Overall patterns were highlighted across 225 reported effects in the behavioural studies. The magnitude of the memory boost from enactment as an encoding strategy was compared to that produced by simply reading words, by watching an experimenter perform the action, and by engaging in self-generated imagery. The effects of popular moderating variables were also explored, including: study design, enactment action performer, test delay length, learning instruction type, and use of real objects. Neuroimaging studies were tabulated and summarized to reveal enactment-related activation found most commonly in the Primary Motor Cortex and Supramarginal Gyrus. The benefits of enactment were also compared between neurotypicals, patients with memory impairments such as Alzheimer's, and motor-impaired patients such as those with Apraxia. Overall, the enactment effect has proven to be a robust, consistently replicated finding across almost 40 years of research.

218 Production does not improve picture memory. Landon A. Churchill, *Memorial University of Newfoundland*, Kathleen L. Hourihan, *Memorial University of Newfoundland* ■ Words read aloud are later recalled and recognized better than words read silently: the production effect. Previous research (Fawcett, Quinlan, & Taylor, 2012) has demonstrated a production effect in old/new recognition of line drawings. The current study examined whether production at encoding can improve memory for the visual details of a picture, or whether it is primarily memory for the picture's verbal label that benefits from production. Participants studied a list of photos of nameable objects by naming half of the objects aloud and half silently. A control group completed a free recall test for the object names, and showed a production effect. The experimental group completed a 4-alternative forced-choice recognition test for the studied pictures, and provided confidence judgements in their recognition decisions. Recognition accuracy did not show a production effect, although confidence judgments were significantly higher for items that had been named aloud at encoding, relative to items named silently. Thus, naming a picture appears to enhance memory for that produced verbal information, but does not necessarily extend to the visual details of a named object, despite increasing confidence in the memory for the object.

219 The Effects of Reward on Levels of Memory Representation. Liyana Swirsky, *Ryerson University*, Ryan Marinacci, *Ryerson University*, Julia Spaniol, *Ryerson University* ■ According to a recent proposal, anterior and posterior hippocampus support different levels of memory representation, with anterior hippocampus facilitating gist-based representations and posterior hippocampus subserving detailed representations (Poppenk et al., 2013). These regions also differ in their functional connectivity, with anterior hippocampus connected to dopaminergic structures involved in value-based motivation. This suggests that reward motivation should influence gist memory more than memory for details. To test this hypothesis, we examined the effects of reward motivation on incidental memory for gist and for details. Fifty participants completed an incidental encoding task where attention to gist

vs. detail was manipulated trial-by-trial. Participants viewed object pairs and indicated whether they came from the same category (gist) or whether the pictures showed the same object (detail). Reward cues indicating the point value (high/low) of a correct response preceded encoding trials, which ended with feedback. During a subsequent recognition test, participants made old/new judgments to old items representing all combinations of level of representation (gist/object) and reward value (high/low), as well as new items. As predicted, reward only boosted recognition of items encoded with attention to gist. This finding provides novel support to the proposal of gist-vs-detail specialization along the longitudinal axis of the hippocampus.

220 The benefits (and costs) of drawing in episodic memory. Melissa Meade, *University of Waterloo*, Michael Klein, *University of Waterloo*, Myra Fernandes, *University of Waterloo* ■ Drawing has previously been found to provide robust memory benefits for studied information (Wammes, Meade, & Fernandes, 2016). In the current work, we investigated the effect that drawing has on false memory performance. We found that while drawing led to higher hit rates relative to writing, it surprisingly also led to higher false alarm (FA) rates to lures that were synonyms (e.g. rabbit) to studied words (e.g. bunny). Interestingly, when FA responses did occur, participants were equally likely to indicate in a source judgment task that synonyms of drawn words had been drawn at encoding as actual old drawn words, whereas synonyms of written words were far less likely to be identified as having been written. These results indicate that while participants were able to retrieve specific visual perceptual information, it was not highly integrated with the particular verbal label. We suggest that the rich visual perceptual information provided by drawing can easily be retrieved from episodic memory, however, a high degree of visual overlap among related objects may result in confusion of specific verbal labels associated with drawings during subsequent retrieval.

221 Harry Potter and Me: A Direct Comparison of the Retrieval and Organization of Fictional and Autobiographical Events. Norman Brown, *University of Alberta*, Liangzi Shi, *University of Alberta*, Dominic Lorrain, *University of Alberta* ■ It is parsimonious to assume that a core set of processes is involved in creating, revising, and structuring event memories regardless of whether the events in question are experienced directly or vicariously and regardless of whether they refer to actual occurrences, imagined occurrences or fictional ones. The present study was conducted to test this position. Specifically, we selected methods previously used to study autobiographical memory (AM; e.g., timed word-cued & event-cued retrieval, retrieval-strategy menus, event-pair relation menus) and employed them to investigate both AM and Pott-obiographical memory ‚Äì event knowledge gained from reading or viewing the Harry Potter (HP) series. In general, performance of the HP and AM groups was very similar. Consistent with prior research, participants in both groups directly (and rapidly) retrieved event memories in response neutral cues (e.g., TABLE) direct retrieval rate ~60%; direct retrieval was even more common (~80%) when event memories retrieved in response to the word cues were themselves used as cues; and cueing and cued events were also often (~70%) considered part of the same narrative sequence. We argue that these findings demonstrate that personal and fictional events are processed and represented in much the same way.

Cognitive Neuroscience

222 Intra and interhemispheric phase synchronization during visuo-spatial attention deployment and retention in visual work memory. Anne Monnier, *Université de Montréal, CERNEC*, Jean-Marc Lina, *Ecole de Technologie Supérieure, CEAMS*, Roberto Dell'Aqua, *University of Padova*,

Mattia Doro, *University of Padova*, Lesley Wu, *University College London*, Pierre Jolicoeur, *Université de Montréal, CERNEC, IUGM, BRAMS* ■ To deepen our understanding of the mechanisms of visuo-spatial attention and visual working memory, we recorded EEG from fifty observers completing a visual search task. Different numbers of color oddballs were shown in different locations among 50 fillers. Three types of instructions were given: matching the location of the oddballs (above or below the fixation cross), matching the number of color oddballs, or purely detecting the presence of any oddball. The amplitude of N2pc and N2pb increased significantly with the number of oddballs in all tasks. Importantly, this effect was significantly larger for target than for non-target oddballs in the location and discrimination number tasks, suggesting the effect of the number of oddballs depended on how attention was deployed. ICA was used to extract patterns of phase synchrony across brain areas. Alpha synchrony increased within the hemisphere ipsilateral to targets (relative to contralateral) during perceptual encoding (80-200 ms); gamma synchrony increased between occipital and parietal areas in the contralateral hemisphere during attentional process latency (e.g. N2pc) (200-300 ms); beta synchrony increased between posterior and central contralateral electrodes during a latency reflecting visual working memory (400-500 ms).

223 Decomposing the stages of cognitive processing: A comparison of stimulus- and response-locked averaging techniques during an effortful visual search task. Brandi Lee Drisdelle, *Université de Montréal*, Pierre Jolicoeur, *Université de Montréal* ■ The N2pc is an electrophysiological index of the deployment of attention to a lateral target and is characterised by a negative and posterior activity contralateral to the target hemifield. Researchers studying the N2pc generally segment data by time-locking to the search array onset using pop-out stimuli. These target stimuli attract attention with little variance from stimulus onset to attentional engagement. Our goal was to track the stages of cognitive processing in effortful search, where the target is not necessarily the first selected, by examining the N2pc using stimulus-locked and response-locked averaging techniques. Subjects located a box with a single gap among boxes of the same colour with two gaps. There were two response options: Subjects reported whether the gap was on top or not (2 options) or indicated which side contained a gap (4 options), varying response selection difficulty. An increase in neural activity associated with the number of distractors (boxes with two gaps) for both stimulus- and response-locked activity was observed. For response difficulty, more time passed between component onset and the response when response selection was more difficult. Using both averaging methods in conjunction, we could therefore examine, compare, and contrast different stages of target processing.

224 Overlap of lexical and sublexical reading with reflexive and voluntary attention: An fMRI investigation. Chelsea Ekstrand, *University of Saskatchewan*, Josh Neudorf, *University of Saskatchewan*, Layla Gould, *University of Saskatchewan*, Marla Mickleborough, *University of Saskatchewan*, Ron Borowsky, *University of Saskatchewan* ■ Both reading and spatial attention dissociate along dorsal and ventral streams - lexical reading engaging a ventral occipito-temporal circuit and sublexical reading engaging a dorsal temporo-parietal circuit. Similarly, voluntary attention engages a dorsal attentional system, whereas reflexive attention engages a ventral attentional system. However, the neuroanatomical overlap of reading and attention has been relatively unexplored. We hypothesized that lexical reading should rely on reflexive attention, whereas sublexical reading should rely on voluntary attention. In Experiment 1, we examined the conjunctive overlap of fMRI activation from lexical (exception words, EXCs) and sublexical (pseudohomophones, PHs) reading tasks with voluntary and reflexive spatial attention tasks, and

found that EXCs showed greater unique overlap with reflexive attention, whereas PHs overlapped with voluntary attention. In Experiment 2, participants performed hybrid attentional orienting tasks (reflexive and voluntary) with EXC and PH targets, and we found greater activation in the right temporoparietal junction for EXCs than PHs in the voluntary attention task, and PHs showed greater activation in the right superior parietal lobule, left visual word form area, and left inferior frontal gyrus in the reflexive orienting task. These results show that spatial attention and reading overlap in different locations depending on the reading strategy employed.

225 Visual Event related magnetic field in aging population with prior mild traumatic brain injury. Martine Desjardins, *Université du Québec a Montréal*, Christine Lefevre, *Université de Montréal*, Jean-Marc Lina, *École de Technologies Supérieures*, De Beaumont Louis, *Centre de recherche de l'Hôpital du Sacré-Cœur de Montréal*, Pierre Jolicoeur, *Institut universitaire de gériatrie de Montréal* ■ Visual system plays a critical role in cognitive health and a decrease in its efficiency is often an early symptom of cognitive disorders. Visual symptoms are common after mild traumatic brain injury and the underlying mechanisms affected remain unknown. However, it is known that age plays an important role during the recovery following an mTBI. The present study aimed to investigate differences in the the visual event related magnetic field (ERF) of an aging population with mTBIs in the chronic phase. We anticipate a decrease in amplitude for early and late visual components and a decreased performance on visual cognitive tasks in aged mTBI group compared with matched controls. Forty subjects aged 50 to 72 conducted a visual search task during a MEG recording. Compared with their matched controls, the mTBI group showed a decrease in amplitude for the M1, a component linked to early perception and for the MN2pc, a component linked to the visual attention. There is also a significant difference in speed of completion for several visual cognitive tests. These results suggest that a mTBIs appear to therefore affect both early and late mechanisms of visual cognition mechanism.

226 A common role for episodic memory in remembering the past and solving problems. Signy Sheldon, *McGill University* ■ It is now clear that episodic memory contributes to both remembering the past (autobiographical memory) but also other non-memory tasks like real-world problem solving. Yet, these tasks involve distinct retrieval stages, including a generation stage, in which several examples of a memory or solution are created, and an elaboration stage, in which one memory or solution is selected and imagined in detail. We report two studies that investigated how episodic memory processes supported by the hippocampus are recruited during these stages of memory and problem solving. In study one, we scanned the brains of 24 younger adults as they thought about multiple memories or problem solutions (generation) and when they thought about one memory or solution in detail (elaboration). We found overlap across these tasks in the hippocampus during the generation but not during the elaboration stage. In study two, we tested the effects of age-related episodic memory deficits on these tasks by testing younger and older adults on similar behavioral experiment. Although older adults were impaired during both retrieval stages, this deficit was most pronounced during generation. Together, these studies provide new insights into how episodic memory functions to support both autobiographical memory and related tasks like problem solving.

Saturday, July 7 Morning

Symposium: Causes and Consequences of Analytic Thinking: Individual Differences in Abilities and Propensities

301 Cognitive capacity and problem complexity: What are the boundary conditions for "logical intuitions? Valerie Thompson, *University of*

Saskatchewan, Gordon Pennycook, *Yale University*, Jonathan St B. T. Evans, *University of Plymouth* ■ Dual process theories suggest that many reasoning biases occur because autonomous (Type 1) processes deliver answers based on readily-accessible characteristics of the problem, such as conclusion believability. These pre-empt slower (Type 2) processes, which would provide an answer based on logic or probability. Several recent papers have challenged this assumption, showing that answers based on logic and probability can be as (and even more) accessible as answers based on belief. However, these studies used only very simple reasoning tasks. To provide a better test of dual process theories, reasoners (N = 100) completed moderately complex and difficult three-term logical syllogisms under instructions to reason logically or according to beliefs. For half the problems, conclusion believability and validity conflicted; for half, there was no conflict. Reasoners also completed a battery measuring analytic thinking skills. Consistent with dual process theories, reasoners experienced more difficulty resolving conflict in favour of logic than beliefs, especially on the more difficult problems, suggesting that belief-based information was more accessible. This effect was mitigated for high-ability reasoners, who showed less effect of conflict overall, even under logic instructions. These data provide clear boundary conditions for the so-called "intuitive" logic effect.

302 Contributions of working memory and strategy choice to belief bias. Pier-Luc de Chantal, *Université du Québec à Montréal*, Henry Markovits, *Université du Québec à Montréal* ■ Previous research has shown that individual differences in resistance to belief bias are related to strategy choice as proposed by the dual-strategy model. However, dual-process theories generally suggest that the belief bias effect is explained by individual differences in working memory capacity, which is required for analytical processes. In this study, we examined to contributions of strategy choice and working memory to belief bias. Participants received a diagnostic test for strategy use, an online working memory task, and a classic belief bias reasoning task. Results show that strategy choice has an effect on belief bias above the effects of working memory.

303 Finding meaning in the clouds: Illusory pattern perception predicts bullshit receptivity. Alexander Walker, *University of Waterloo*, Martin Turpin, *University of Waterloo*, Jennifer Stolz, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Derek Koehler, *University of Waterloo* ■ Previous research has demonstrated a link between illusory pattern perception and various irrational beliefs. On this basis, we investigated illusory pattern perception as a potential mechanism for receptivity to pseudo-profound bullshit. Across multiple experiments and various distinct measures of pattern perception (i.e., visual and conceptual measures), we found that participants displaying greater degrees of illusory pattern perception were more likely to rate pseudo-profound bullshit statements as profound. This positive relation was shown to be restricted to illusory (and not non-illusory) pattern perception, was not a product of a general proclivity to rate all statements as profound and was not explained by individual differences in thinking style. We also examined the degree to which manipulations that alter illusory pattern perception transfer to bullshit receptivity. These data will be discussed in terms of current theories of reasoning.

304 Susceptibility to partisan fake news is explained by a lack of deliberation, not willful ignorance. Gordon Pennycook, *University of Regina*, David Rand, *Yale University* ■ Why do people believe blatantly inaccurate news headlines ("fake news")? Do we use our reasoning abilities to convince ourselves of the truth of statements that align with our ideology, or does reasoning allow us to effectively differentiate fake from real? Here we test these competing accounts and find a positive correlation between the propensity to think analytically, as measured by the Cognitive Reflection

Test (CRT), and the ability to differentiate fake news from real news. This occurs even for headlines that align with individualspolitical ideology. Contrary to popular opinion, falling for fake news is a consequence of lazy thinking, not intense partisanship.

305 Using temporal order judgments and colour perception to dissociate inhibitory cueing effects. Ralph S. Redden, *Dalhousie University*, Austin J. Hurst, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ Inhibition of return (IOR) is an inhibitory aftereffect of visuospatial orienting, typically observed in the spatial cueing paradigm. Early work on IOR using temporal order judgments (TOJ) showed no effect on arrival time judgments, suggesting IOR is acting at a post-perceptual information processing stage. Recent work, however, suggests that there are two forms of IOR; an input form affecting the quality of inputs and an output form affecting responding, whereby the type of effect that is manifest is contingent upon the activation state of the reflexive oculomotor system at the time the effect is generated. We tested this theory in a TOJ task, where subjects were required to either make a prosaccade (output form) or antisaccade (input form) after the onset a spatially uninformative peripheral cue, and subsequently execute a TOJ or speeded colour identification response. Both groups showed inhibited RT for colour probes presented at the cued location. We saw dissociations on both colour identification and TOJ performance depending on whether input or output IOR was generated. These findings provide converging evidence that there are two forms of IOR: an input effect operating on a saliency map, and an output effect operating on a priority map.

Symposium: On the Control of Visual Attention

306 Are faces subject to IOR? Evidence from dynamic displays. Robert Swalwell, *Durham University*, Anthony Atkinson, *Durham University*, Daniel Smith, *Durham University* ■ Inhibition of return (IOR) is traditionally explained as a mechanism designed to reduce our ability to reorient to a previously attended location. However, given that IOR can be separated from the orienting process, this explanation is insufficient. Subsequently, IOR has been proposed as a form of habituation to resolve this inconsistency. Although this accounts for IOR without orienting, it appears inconsistent with research that has found IOR even for highly relevant and salient objects, including social stimuli. We propose that this inconsistency is a result of previous research conflating location and object IOR. In two experiments, IOR was examined for faces and houses using dynamic displays: this allowed location IOR and object IOR to be measured separately. Faces did not produce IOR, while IOR was observed for houses. The same pattern of results was found for manual responses to peripheral cues and saccadic responses to central cues. This suggests that faces are not subject to IOR in dynamic displays and provides an indication that previous contrary results primarily reflect a location IOR. By showing that social stimuli do not generate IOR, these results support a habituation account of IOR.

307 Drift diffusion models in speed-accuracy trade-off space. Joe MacInnes, *National Research University Higher School of Economics*, Ralph Redden, *Dalhousie University*, Raymond Klein, *Dalhousie University* ■ Drift diffusion models have been enormously successful in modelling perceptual decisions. By describing the process as a parameterized accumulation of evidence to one of multiple decision thresholds, these models often match human reaction time and error distributions perfectly. In addition, the parameters used to match the human data can provide insight into key aspects of whether experiment manipulations have resulted in changes of information rate, bias or non-decision components. We present results from a classic drift diffusion model that has been trained to model, not only reaction time and error, but also trade-offs in speed-accuracy trade-off (SAT) space. Redden et al

(2016) have suggested that different forms of Inhibition of return (IOR) can be distinguished by the relationship of performance when responding to cued vs uncued targets in SAT space. We confirm this hypothesis with the SAT diffusion model by showing IOR as a reduction in evidence rate when the oculomotor system is suppressed, and as a bias when it is not.

308 No single electrophysiological marker for facilitation and inhibition of return. Ana B. Chica, *University of Granada*, Elisa Martin-Arévalo, *University of Granada*, Juan Lupiez, *University of Granada* ■ Different electrophysiological components have been associated with behavioral facilitation and inhibition of return (IOR), although there is no consensus about which of these components are essential to the mechanism/s underlying cueing effects. We have demonstrated (Martín-Arévalo et al., 2016) that there is no single neural marker for facilitation and IOR because the behavioral effect that is observed depends on the contribution of several components: perceptual (P1), late-perceptual (N1, Nd), spatial selection (N2pc), and decision processes (P3). In a follow-up TMS study we explored the causal contribution of the left parietal cortex on facilitation and IOR, and the modulatory role of superior longitudinal fascicule (SLF) connecting the parietal and frontal cortex. Results demonstrated a TMS modulation of facilitation but not IOR, which was mediated by the integrity of the left SLF. These results reveal that not only gray matter is important for spatial orienting effects; even in healthy participants, the integrity of white matter tracks connecting the parietal and frontal lobe differently contributes to facilitation and IOR.

309 Variations in strategies during search. Amelia Hunt, *University of Aberdeen*, Anna Nowakowska, *University of Aberdeen*, Alasdair Clarke, *University of Essex* ■ How efficient are we at using eye movements to maximize information gain? We recently reported a large range of different individual strategies in a visual search task, with some observers performing close to optimal, some random, and some the opposite of optimal. These individual differences are stable over time. In the original version of the task, observers searched for a target in an oriented array of line segments, with heterogeneous distractors on one side and homogeneous distractors on the other. The optimal strategy is to direct fixations onto the heterogeneous side of the display, because the target is visible on the homogeneous side using peripheral vision. Here we manipulate both internal (time pressure) and external (stimulus layout) factors and compare performance to the original task. We find external, but not internal, manipulations can decrease individual differences, with all participants following a more efficient search strategy when the search stimuli provide a closer match with the statistics of natural scenes, and when the search context is more familiar. We conclude that unfamiliar and artificial tasks promote idiosyncratic, sub-optimal eye movements.

Memory II

310 Increasing Word Distinctiveness Eliminates the Picture Superiority Effect in Recognition: Evidence for the Physical Distinctiveness Account. Tyler M. Ensor, *Memorial University of Newfoundland*, Aimee M. Surprenant, *Memorial University of Newfoundland*, Ian Neath, *Memorial University of Newfoundland* ■ A well-established phenomenon in the memory literature is the picture superiority effect—the finding that, all else being equal, memory is better for pictures than words (Paivio & Csapo, 1973). Theorists have attributed pictures' mnemonic advantage to dual coding (Paivio, 1971), conceptual distinctiveness (Hamilton & Geraci, 2006), and physical distinctiveness (Mintzer & Snodgrass, 1999). Here, we present a novel test of the physical-distinctiveness account of picture superiority: If the greater physical variability of pictures relative to words is responsible for their mnemonic benefit, then increasing the

distinctiveness of words and/or reducing the physical variability of pictures should reduce or eliminate the picture superiority effect. In the present experiments we increased word distinctiveness by varying font style, font size, colour, and capitalization. Additionally, in Experiment 3, we reduced the distinctiveness of pictures by presenting black and white pictures with similar orientations. In Experiment 4, a forced-choice procedure in which subjects were asked to identify the form that each probe took during the study phase was used. Results were consistent with the distinctiveness prediction and, notably, inconsistent with dual coding.

311 No matter the place, I'd recognize that face. Christopher Lee, *University of Waterloo*, Shahnaz Koji, *Columbia College*, Myra A. Fernandes, *University of Waterloo* ■ The context reinstatement (CR) effect suggests that changing the context in which we initially encounter a person impairs later memory for that face (Gruppuso, Mason & Lindsay, 2007; Mandler, 1980). However, there are some faces we would recognize regardless of context. In three experiments, we investigated the influence of familiarity, with either the target face or context scene, on the CR effect. Experiment 1 showed the benefit of CR was reduced for famous (familiar) compared to non-famous (unfamiliar) faces. Experiment 2 showed CR benefit decreased as number of pre-exposures to a target face increased, and was significantly smaller for faces pre-exposed 10 times compared to 0 times. In Experiment 3, we manipulated familiarity with context scenes by pairing unfamiliar faces with either famous or non-famous locations. Results indicated that as familiarity with the context scene increased, the amount of memory benefit it offered to the target face diminished. Throughout the three experiments, as familiarity with one side of the face-context pairing increased, its memory trace progressively began to outshine the memory trace for the relatively less familiar side of the pair (Smith & Vela, 2001), leading to a reduction in the CR benefit to memory.

312 Human memory for the immediate past is temporally distorted. Priya Varma, *School of Psychology, University of Leeds, UK*, Denis McKeown, *School of Psychology, University of Leeds, UK* ■ Psychological time, unlike physical time, is believed to be compressivein the sense that the mental representations of successive events may be internally arranged with ever decreasing inter-event spacing (looking back from the most recently encoded event). If this is true, the record within immediate memory of recent events is severely temporally distorted. This notion of temporal distortion of the memory record is captured within some accounts of human forgetting, notably temporal distinctiveness accounts, but rarely informs the way events are scheduled in studies of memory. Here we manipulated the spacing of items for recall in an attempt to reversethis supposed natural compression. We compared recall performance using differing schedules of presentation of word lists (having logarithmically expanding, contracting or fixed irregular inter-item spacings). Statistically significant benefits of temporal isolation were observed, with the contracting word series (we think of this as reversing the natural compression of the memory record) showing highest performance. Further experimental tests support the view that the encoding benefit of reversed compressiondid not rely on verbal maintenance early in the word sequence; for example, the pattern of performance improvement was observed using Chinese characters rather than words. Human memory encoding is therefore temporally distorted.

313 Processing Fluency: An Encoding Heuristic. Tamara Rosner, *McMaster University*, Bruce Milliken, *McMaster University* ■ The role of fluency (ease of processing) has been examined in many studies of memory recognition, with the finding that fluent processing increases the likelihood that people claim to recognize items. Importantly, this

fluency heuristic can produce misattributions of fluency, or false recognition effects; that is, fluently processed stimuli tend to be judged as familiar regardless of whether or not they have or have been previously experienced. Specifically, classic studies have shown that repetition at test can lead to illusory recognition for repeated words. In our past work, we examined how a similar heuristic may influence memory encoding. In particular, if fluency provides a signal that something is known then fluently processed items may signal that they need not be further encoded. Previous experiments in which we manipulated repetition at study have supported this notion: better recognition performance for words presented once than words presented twice in rapid succession. In a series of studies, we offer evidence that this effect may be driven by the same fluency heuristic that produces classic false recognition effects, and suggest that fluency can both be used as a heuristic for encoding and at retrieval.

314 Stimulus repetition and spacing: A transient encoding decrement in recognition memory. Robert Collins, *McMaster University*, Bruce Milliken, *McMaster University* ▪ Rosner, Lopez-Benitez, D'Angelo, Thomson, and Milliken (2018; see also Collins, Rosner & Milliken, 2018) reported a counter-intuitive effect in recognition. In an incidental study phase, participants named target words that were preceded by either an identical or different prime. In the following recognition test, sensitivity was higher for targets preceded by different primes than for targets preceded by the same prime. Here, we explore the link between this effect and the spacing effect (Ebbinghaus, 1885). When encoding of the prime was carefully controlled in a within-subject design, immediate repetition resulted in a cost in recognition performance whereas spaced repetition (by about 10 minutes) resulted in a benefit in recognition performance. With explicit reference to deficient processing theory (Hintzman, 1974), we argue that both our effect and the spacing effect are due to transient reductions in encoding of repeated stimuli that are strongest when spacing between repetitions is minimal. This transient encoding decrement hypothesis fits well with findings of repetition suppression in neuroimaging studies of the spacing effect (Xue, Mei, Chen, Poldrack, and Dong, 2010).

Cognition in the Real World

315 How the Internet is Making Us Impatient: The Impact of Wait Times & Individual Differences on Information Search Behaviours. Alyssa Smith, *University of Waterloo*, Brandon CW Ralph, *University of Waterloo*, Jeremy Marty-Dugas, *University of Waterloo*, Emilie Caron, *University of Waterloo*, Daniel Smilek, *University of Waterloo* ▪ Prior studies of internet exploration have shown that people often search strategically, aiming to maximize the rate and amount of information gained. Building on previous studies exploring how information content influences internet search behavior, we examined how information accessibility (i.e., webpage load time) influences search habits and how individual differences impact our tolerance of barriers to information access. On each trial of our experiments, participants were presented with a screen containing a matrix of six clickable icons. Each icon represented a video, and clicking on an icon played the video. Participants had five minutes to watch as many of the videos as possible; participants were told there would be a test on the contents of the videos. Critically, the "load time" of the videos (delay prior to video playing following a click) was varied. We found that when people are given access to multiple information sources (videos), and they come across a barrier (loading time), they are more likely to give up and switch to another more easily accessible source. We will also discuss how individual differences (such as self-control, boredom proneness and trait mind wandering) are related to behaviour when people encounter barriers to information access.

316 Flow, arousal, and urge-to-play in Candy Crush.

Chanel Larche, *University of Waterloo*, Mike Dixon, *University of Waterloo* ■ Retrospective self-reports suggest that flow is related to excessive, potentially problematic videogame play (Hull, 2013). An antecedent of flow in videogames involves a balance of skill and challenge. Arousal is a primary reinforcer in games with greater arousal following winning outcomes (e.g., Brown & Anderson, 1984). Using Candy Crush as a platform, the present research aim was twofold: 1) to show that different outcomes affect the skill-challenge balance and hence flow, 2) to ascertain the role of both flow and arousal in playersurge to continue gameplay. Game trials of 30 Candy Crush players were binned by outcome (wins, near-misses (just failing to win) and losses). Players rated their level of skill, challenge, arousal, urge to keep playing, and degree of flow after each outcome. Ratings of skill and challenge were most similar (i.e., balanced) for wins, and least balanced for losses. Consistent with our skill-challenge balance predictions, flow was highest for wins and lowest for losses. For all three outcomes, both flow and arousal were correlated with urge. Using multiple regression, only following wins did flow and arousal account for unique urge variance. For wins, flow and arousal combine to increase urge to keep playing -- a finding of relevance for problem-gaming.

317 Predictors of Mind-Wandering While Driving: Task Length, Fatigue, and Individual Attentional Differences. Heather Walker, *University of Guelph*, Lana Trick, *University of Guelph* ■ Mind-wandering occurs when individuals experience task-unrelated-thoughts, which can interfere with their performance. The goal of this study was to investigate mind-wandering while driving, as predicted by time-on-task, fatigue, and individual differences in executive working memory, as measured by the Sustained Attention to Response Task (SART). Participants completed three drives in an immersive driving simulator, during which time they were periodically asked whether they were thinking of driving; the proportion of trials where they reported they were not thinking of driving was used as an index of mind-wandering. After each drive participants also rated how difficult they felt it was to focus. Driving speed, steering variability, and self-reported driving performance were also recorded. As predicted, self-reports revealed that drivers experienced greater difficulty focusing with increased time-on-task; however, the increase in off-task thoughts per drive did not reach significance. Similarly, although driving speed increased with as a function of time-on-task, and SART scores predicted driving speed, the interaction between SART scores and time-on-task did not have the predicted effect on steering variability. Overall, the best predictors of mind-wandering were fatigue and hours of sleep. Lastly, those who reported more mind-wandering also reported more instances of emotional rumination (e.g., worries, feeling guilty).

318 Deep Effortless Concentration in the Lecture Hall. Jeremy Marty-Dugas, *University of Waterloo*, Brandon Ralph, *University of Waterloo*, Marcel O'Gorman, *University of Waterloo*, Alyssa Smith, *University of Waterloo*, Daniel Smilek, *University of Waterloo* ■ We investigated studentsexperiences of deep, effortless concentration (i.e., flow) in an undergraduate course with the goal of exploring three primary questions: 1) Does flow proneness in everyday life relate to flow during lectures; 2) is flow experienced in the classroom related to learning during the class; and 3) will the absence of smartphones facilitate flow experience? At the end of each lecture, participants reported the amount of flow they experienced during the class using iClickers. Following this response, participants used their iClickers to answer quiz questions based on the lecture content from that day. In addition, we randomly assigned participants to one of two groups. Each lecture, one group had their phones magnetically sealed in a special pouch, while the other group was allowed to access their phones as normal. The results showed that participants higher in the tendency to experience flow in everyday life (measured at the beginning of the term) were more likely to experience flow during the lectures.

Furthermore, those who reported higher levels of flow during lectures performed better on the quiz questions at the end of the classes. The removal of smartphones, however, did not influence flow experiences or quiz performance.

319 Using a classroom-based Mindfulness intervention to ameliorate math anxiety. Nadine Yildiz, *Memorial University of Newfoundland*, Johanna Murphy, *Memorial University of Newfoundland*, Darcy Hallett, *Memorial University of Newfoundland*, Kelly Aung, *Memorial University*, Felix Ayesu, *Memorial University of Newfoundland*, Cheryll Fitzpatrick, *Memorial University of Newfoundland* ■ Previous research has highlighted the negative effects of math anxiety on math learning and performance. However, when math anxious individuals are also high in emotional regulation, research demonstrates they perform as well in math as their non-math-anxious peers. Mindfulness has been used as a treatment for anxiety by relieving stress, improving emotional regulation, and self-regulation skills. We hypothesised that a classroom-based mindfulness intervention would serve to reduce math anxiety among 4th and 5th grade students, and that these effects would be attributed to mindful aspects of the program (i.e., meta-cognitive awareness, focus on the present) beyond what was due to relaxation. Furthermore, we investigated how conceptual and procedural knowledge would relate to math anxiety. Twelve Grade 4 and 5 classrooms from 6 different schools were assigned to 1 of 3 conditions: a) MindUp mindfulness program, b) a relaxation program, and c), Business-as-usual. Students in each class (N=120) completed measures of procedural and conceptual math ability, math anxiety, general anxiety, and mindfulness before and after program implementation. Results demonstrated not only an improvement in the math anxiety in the mindfulness condition, but also that conceptual knowledge was a better predictor of math anxiety than procedural knowledge.

Saturday, July 7 Afternoon

Symposium: Causes and Consequences of Analytic Thinking: Strategic Differences in Reasoning

320 Fast reasoning and the dual strategy model. Henry Markovits, *Université du Québec à Montréal*, Pier-Luc de Chantal, *Université du Québec à Montréal*, Eloise Dubé, *Université du Québec à Montréal*, Janie Brisson, *Université du Québec à Montréal* ■ Newman, Gibb, & Thompson (2017) have recently provided evidence that fast reasoning leads to responses that are both rule-based and belief-based. We present two studies that are consistent with a dual strategy approach to reasoning, which proposes that people have access to either a probabilistic or a counterexample form of reasoning. The first study provides a developmental perspective on fast reasoning that is consistent with the dual strategy model. The second study shows a dissociation between the effects of time and strategy.

321 Thinking in a foreign language distorts reasoning. Michal Bialek, *University of Waterloo, Ontario, Canada* ■ Thinking in a foreign language has recently claimed to debias decision making, e.g. it reduces fallacies such as framing effects, loss aversion, and the hot-hand fallacy. There are two suggested mechanisms how using a foreign language might work: the first suggests that people engage in more effortful processing (Type 2) when reasoning in a foreign language; the second explanation is that people use less affect and heuristics when reasoning in a foreign Language (Type 1). We tested these hypotheses in a deductive reasoning paradigm, where one is required to assess logical validity of a conclusion whilst ignoring its believability. Regardless of the cognitive mechanism employed, we predicted that people should make more valid deductions when a problem is presented in a foreign

language. Specifically, if more valid reasoning is caused by decreased Type 1 processing, we should observe decrease in the belief index; if this change is caused by increased Type 2 processing, we should observe an increase in the logic index. Contrary to our predictions, in two experiments (n = 350) we observed a decrease in logic and increase in belief indexes when participants reasoned in a foreign language. These data will be discussed in terms of current theories of the Foreign-language effect.

322 Base-rate neglect is a function of conflict resolution strategy. Ian Newman, *University of Saskatchewan* ■ Base-rate neglect is the tendency to undervalue statistical information, often studied using probability estimates of category membership. The base-rate reasoning problems contain personality descriptions and base-rate ratios that suggest either consistent or conflicting responses. On conflict items, reasoners give less accurate probability estimates and are less confident in those responses. The prevailing conflict-detection interpretation is that reasoners respond less confidently on conflict items because they implicitly detect the conflict, regardless of how they resolve the conflict and respond to the problem. In my talk, I will discuss evidence that 1) probability estimates, confidence, and visual attention on relevant task information are a function of the conflict-resolution strategy adopted by the reasoner and 2) reasoners can accurately self-report their conflict-resolution strategy despite poor explicit calibration to conflict.

323 Dual strategy model and reasoning with familiar premises. Janie Brisson, *Université du Québec à Montréal*, Henry Markovits, *Université du Québec à Montréal* ■ Growing evidence supports the dual strategy model, which suggests that reasoners have access to both a statistical and a counterexample reasoning strategy. In three studies, we clarify the relationship between strategy use and reasoning with meaningful premises. One of the most robust effects found with conditional reasoning with familiar conditionals is the clear effect of alternative antecedents on the endorsement of AC and DA inferences. In a first study, participants were presented with conditional reasoning problems having more or fewer accessible alternatives and the dual strategy diagnostic test. Results showed that strategy use had an independent effect on the inferences made with the AC and DA forms, over and above the effect of number of antecedents, but was not related to responding to the MP and the MT forms, as hypothesized. A second study found that this relation extends to reasoning from an incompatibility statement. Finally, a third study showed that this effect did not hold with probabilistic rather than logical response instructions, suggesting that the way reasoners transform a probabilistic evaluation into a dichotomous judgment is a key determinant of strategy use.

Language

324 Dialectal Influences on Understanding Speech-In-Noise. Laura Howell, *Department of Linguistics, Memorial University of Newfoundland*, Benjamin Zendel, *Faculty of Medicine, Memorial University of Newfoundland* ■ Measurements of the ability to understand speech-in-noise (SIN) increase the ecological validity of audiometric assessments. Standardized SIN assessments rely on pre-recorded speech and are therefore created using a common dialect. There is evidence that foreign-accented SIN is more difficult to perceive than native-accented, and some research suggests that this effect may extend to regional dialects. A recent study demonstrated that speakers of Newfoundland English performed outside of clinical norms for a SIN assessment, despite having normal hearing abilities. To further explore the impact of dialect on the ability to understand SIN, we compared SIN understanding when the target speech was in a standard or regional dialect. Newfoundlanders performed below the expected norms on the test, but surprisingly were

better able to understand SIN when spoken in a standard dialect compared to their regional dialect. Overall, the second half of sentences were harder to understand compared to the first half, suggesting an effect of cognitive load. Importantly, the decreased understanding for the second half of a sentence was greater when the sentences were spoken in the standard dialect compared to the regional dialect. This pattern of results suggests that dialect and cognitive load interact when understanding speech in noise.

325 Evidence for Idiom Processing Advantage of L1 Idioms in an L2. Tianshu Zhu, *Western University*, Paul Minda, *Western University* ∎ The facilitatory effect shown in native speakersprocessing of idiomatic phrases compared to matched novel phrases can be explained by a dual-route model which postulates that familiar phrases are processed by a faster, direct route, and novel phrases are processed by an indirect route. The goals of the current project were to test the dual-route model and to understand the underlying mechanisms in direct route activation. English idioms and translated Chinese idioms were presented to both native English speakers and Chinese-English bilinguals in random order. Participants listened to the idiom up until the last word (e.g., draw a snake and add___), then saw either the idiom ending (e.g., feet) or the matched control ending (e.g., hair); to which they made lexical decision and reaction times were recorded. Results showed that the two groups processed idioms of different origins differently. Native English speakersfaster responses to English idioms than controls supported dual-route model; and Bilingual speakersfaster responses to Chinese idioms than controls were seen as preliminary evidence that direct route is driven by speakersfamiliarity to the underlying concept.

326 A computational approach for discourse analysis. Harinder Aujla, *University of Winnipeg* ∎ The construction of meaning from text is an important component of discourse analysis. However, discourse analysis is typically limited to particular samples of text. We solve the small-sample constraint with a computational method for discourse analysis that leverages existing vector-space models of meaning like BEAGLE and LSA to measure and compare meaning in cultural and political text corpora. Vector-space models are able to process vast quantities of information and are able to provide quantitative measures of relationships between words and documents. We apply the method to and present results for (i) politicized internet forums, (ii) national newspapers, and (iii) academic databases.

327 An Instance Theory of Semantics. Randall Jamieson, *University of Manitoba*, Johnathan Avery, *Indiana University*, Brendan Johns, *University at Buffalo*, Michael Jones, *Indiana University* ∎ Distributional semantic models (DSMs) specify learning mechanisms with which humans construct a deep representation of word meaning from statistical regularities in language. Despite their remarkable success at fitting human semantic data, virtually all DSMs may be classified as prototype models in that they try to construct a single representation for a word's meaning aggregated across contexts. This prototype representation conflates multiple meanings and senses of words into a centre of tendency, often losing the subordinate senses of a word in favour of more frequent ones. We present an alternative exemplar-based DSM based on the classic MINERVA multiple-trace model of memory. The model stores a representation of each language instance in a corpus, and a word's meaning is constructed on-the-fly when presented with a retrieval cue. Across two experiments with homonyms in both an artificial and natural language corpus, we show how the exemplar-based model can naturally account for the subordinate meanings of words in appropriate context due to nonlinear activation over stored exemplars, but classic prototype DSMs cannot. The exemplar-based account suggests that meaning may

not be something that is created during learning or stored per se, but may rather be an artifact of retrieval from an episodic memory store.

Learning

328 Updating humans' headings and positions using landmarks and path integration. Weimin Mou, *University of Alberta* ■ During navigation, humans update their spatial relations relative to environments using path integration, which relies on self-motion information (e.g. vestibular, proprioceptive information, and optic flow), and familiar landmarks. Researchers examined participantserrors in localizing the origin of a path (homing error) after they walk the path and see some displaced or rotated landmarks to understand how people use path integration and landmarks in spatial updating. We instead examined participantserrors in localizing not only the origin of the path but also other targets so that we could measure participantserrors in estimating their facing direction (heading error) and position (position error) in the environment as well the homing error. Our results showed that a rotated distal landmark determined participantsheading estimates whereas path integration determined participantsposition estimates; a displaced proximal landmark determined participantsposition estimates whereas path integration determined participantsheading estimation. Moreover, when the rotational angle of landmarks was small, participants combine the heading estimates from path integration and from the landmarks but there was no evidence of combination of homing estimates. All these results indicate that landmarks and path integration interact in estimations of people's heading and position prior to homing estimations.

329 Somatosensory Functional Plasticity Supports Observational Motor Learning. Heather McGregor, *Brain and Mind Institute, The University of Western Ontario, London, Canada*, Joshua Cashaback, *Brain and Mind Institute, The University of Western Ontario, London, Canada*, Paul Gribble, *Brain and Mind Institute, The University of Western Ontario, London, Canada* ■ An influential idea is that action observation activates the sensory-motor system. This idea has recently been extended to motor learning; action observation changes motor behaviour and somatosensory perception. Here we test the involvement of the somatosensory system in observational learning. We tested the idea that observing motor learning changes S1 excitability. Subjects observed a learning video showing a tutor undergoing force-field adaptation or a control video showing a tutor reaching in an unlearnable force-field. S1 excitability, as measured by somatosensory evoked potentials (SEPs), increased following observation only for those subjects who observed learning. Moreover, SEP increases predicted subsequent behavioural measures of observational learning. This suggests that S1 plasticity supports observational learning. We then tested if the somatosensory system plays a necessary role in observational learning. We used median nerve stimulation to interfere with somatosensory processing throughout observation. Stimulation disrupted observational learning in a limb-specific manner; stimulation delivered to the right arm (same arm used by the tutor) disrupted learning whereas left arm stimulation did not. This is consistent with the idea that a somatosensory representation of the observed effector plays an important role in observational learning. Taken together, these findings support the idea that somatosensory system supports observational learning.

330 Interactions between the elements of an outcome during causal and diagnostic learning. Martyn Quigley, *The University of Nottingham*, Mark Haselgrove, *The University of Nottingham* ■ Conditioning experiments with rats and pigeons have shown that when an element (O1) of an outcome compound (O1&O2) has been previously well-predicted, it will block learning about the novel

element of a compound with a preceeding cue. Two experiments sought to explore this effect in humans. In Experiment 1 participants were first presented with cue-outcome pairings of the form: AO1, BO2, CO3, DO4. In Stage 2, cues A and B, continued to predict the same outcome which was now presented with an additional outcome (AO1&O5, BO2&O6), whilst cues C and D were now paired with different outcomes (CO4&O7, DO3&O8). In contrast to animal studies, at test, participants displayed more learning toward the blocked outcomes (AO5/BO6) relative to the control outcomes (CO7/D-O8). Explanations of these results can be provided by at least two associative theories. One focuses on learned changes in the processing of cues (Mackintosh, 1975), the other focuses on learned changes in the processing of the outcome (Wagner, 1981). Experiment 2 sought to address these explanations of these results by employing a one-trial outcome blocking procedure. The results of these experiments are discussed.

331 When contingency learning is difficult. Colin M. MacLeod, *University of Waterloo*, Noah D. Forrin, *University of Waterloo* ■ We have been exploring the learning of simple colour-word contingencies as a way to understand the fundamentals of associative learning. In this task, there are three words and three colours, with each word appearing usually in one colour (80%, HI) and more rarely in the other two colours (10% each, LO). Ordinarily, the learning of these contingencies onsets rapidly and is very stable thereafter, as demonstrated by the consistently faster responding to Hi than to LO stimuli. We will report experiments aimed at hampering this normally rapid learning through systematic prior experience, the goal being to better understand how these associations are learned.

Metacognition

332 WITHDRAWN

333 What does an expert know that I don't? Undermining an illusion of knowledge increases the influence of experts. Ethan Meyers, *University of Waterloo*, Michal Bialek, *University of Waterloo*, Martin Turpin, *University of Waterloo*, Jennifer Stolz, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Derek Koehler, *University of Waterloo* ■ When are experts afforded privilege of opinion over the public? Research has found that economistsopinions on economic issues are at best equally as influential as opinions of the public (Johnston & Ballard, 2016). We sought to better understand the factors that make it more likely that people will revise their beliefs in response to expert vs. public opinion. We reasoned that people experience an illusion of explanatory depth (Rozenblit & Keil, 2002) when it comes to economics - thinking they understand it more than they truly do. We hypothesized that exposing this illusion would lead to economists being more influential. Participants completed a standard illusion of explanatory depth procedure, then rated their agreement with a statement regarding an economic issue and did so again while being presented consensus of either economists or the public on the issue. We found that after exposing the illusion of knowledge, experts were more influential than the public. Trust in economists predicted beliefs about the issue but did not interact with the source of consensus. Our results suggest that experts may not be afforded privilege of opinion in their own domains over the public because people think they know more than they likely do.

334 Examining Metacognitive Behaviors During an Associative Recognition Memory Task. Mario Doyle, *Wilfrid Laurier University*, William Hockley, *Wilfrid Laurier University* ■ The purpose of this study was to examine how accurately people can monitor and control their associative memory. In Experiment 1 participants studied a list of word pairs of various associative strength. Judgments of learning (JOLs) and study time were recorded during study, while confidence judgments (CJs) and response time were

recorded during the yes/no associative recognition test. Experiments 2 and 3 replicated the first Experiment while introducing a second study-test block and feedback, respectively. Overall the results indicated that compared to weakly or unrelated pairs, highly related pairs had higher hit rates but also higher false alarm rates (concordant effect) and no differences in discriminability (d'). Highly related pairs also had higher JOLs and CJs, but lower study time and reaction time at test compared to weakly or unrelated pairs. No significant changes were found when a second study-test block (Experiment 2) or when feedback was introduced (Experiment 3). Future research will attempt to extend these findings to a different stimulus manipulation (concrete vs abstract words) and explore the metacognitive measures further (e.g., comparing immediate vs delayed JOLs).

335 Isolating the Contribution of Perceptual Fluency in Judgments of Learning (JOL). Chris Fiacconi, *University of Guelph*, Evan Mitton, *University of Guelph*, Skylar Laursen, *University of Guelph* ■ Judgments of learning (JOLs) refer to explicit predictions regarding the likelihood of remembering newly acquired information on a later test of memory. In recent years, there has been considerable interest in understanding the processes that underlie such judgments. Recent theorizing on this matter has characterized JOLs as inferential in nature - that is, they are derived from the implicit utilization of a variety of different cues of which only some are diagnostic of future memory performance. The present series of experiments examine the potential role for one such cue, namely, perceptual fluency (i.e., the subjective ease of perceiving a stimulus) in guiding JOLs. Borrowing a clever methodological approach first used by Masson (1986), we demonstrate that perceptual fluency per se can indeed inform JOLs, but that its influence is likely dependent on the extent to which the task context renders perceptual fluency salient. We discuss these results in relation to experience- vs. theory-based contributions to metamemory judgments.

Decision Making

Session: 24 336 Do Slow Responses Feel less Right? Investigation Using the Dual-Response Paradigm. Kaiden Stewart, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Evan Risko, *University of Waterloo* ■ In dual-response reasoning tasks, participants are asked to generate a quick, intuitive response, and then later given unlimited time to give a deliberative answer. The second, deliberative response sometimes differs from their initial, intuitive response. When the intuitive response is produced more fluently, termed answer fluency, participants report a high Feeling of Rightness (FOR) and reflect less upon their response (Thompson, Prowse Turner, & Pennycook, 2011). In the current investigation, we manipulate the fluency of responding by delaying the mouse movement to establish whether fluency of the response itself impacts FOR judgments, and consequently reflection, in a dual-response task. We find across two experiments (where fluency conditions are blocked and mixed, respectively) that response disfluency influences neither FOR nor reflection, supporting Thompson and colleaguesanswer fluency account.

337 Does adding a wildcard to lineups reduce correct identifications? Ryan Fitzgerald, *University of Portsmouth*, Devon Tomlinson, *University of Portsmouth*, Eva Rubinova, *University of Portsmouth*, James Ost, *University of Portsmouth* ■ When children can choose a blank silhouette or wildcardto reject a lineup, they make fewer false positives. But in a previous experiment with adults, adding the wildcard to high-similarity lineups increased incorrect rejections of target-present lineups and reduced correct identifications of the target. We administered lineups to children that varied in wildcard presence and lineup member similarity. Much like the previous research with adults, children

rejected more high-similarity, target-present lineups if the lineup contained the wildcard. But this time, the increase in correct rejections corresponded with a decrease in filler selections rather than a decrease in correct identifications.

338 Limited transfer of insight across parallel decision dilemmas. Amelia Hunt, *University of Aberdeen*, Warren James, *University of Aberdeen*, Alasdair Clarke, *University of Essex* ■ With tightly limited time and resources, it makes sense to focus on accomplishing a single goal. With less resource constraints, we can try to accomplish more. Although this appears to be simple logic, we observe a profound failure to adjust strategy according to resource constraints across a wide range of different contexts. One exception is an extremely simplified version of this decision dilemma: we ask participants to choose one of three possible chairs from which to try and reach one of two possible objects positioned on a long table. When the two objects are close together, participants choose a chair in between the two objects. When the objects are too far apart to reach from a central location, participants choose a chair close to one of the objects. We test if participants can transfer this optimal strategy to a slightly more complex context: choosing a place to stand to throw an object at one of two possible targets placed at varying distances apart. Despite the similar optimal solution across tasks, participants made idiosyncratic, suboptimal decisions in the throwing task, revealing an underlying reliance on random response selection under conditions of uncertainty.

Music

339 Behavioral and neural measures of temporal coordination between performing musicians. Anna Zamm, *Department of Psychology, McGill University*, Caroline Palmer, *Department of Psychology, McGill University*, Anna-Katharina R. Bauer, *Institute for Psychology, Carl von Ossietsky University*, Martin G. Bleichner, *Institute for Psychology, Carl von Ossietsky University*, Alexander P. Demos, *Department of Psychology, University of Illinois at Chicago*, Stefan Debener, *Institute for Psychology, Carl von Ossietsky University* ■ The ability to coordinate rhythmic movements with a partner is critical for many group behaviors. We explored whether oscillator dynamics are reflected on behavioral and neural levels during joint music performance, which requires fine temporal coordination. Wireless EEG was measured from 20 pairs of pianists as they performed a melody at their natural rate or frequency, alone (Solo) and then with their partner (Duet). Partners took turns setting the pace of performance (Leader) at their natural rate in Duet performances. Partnersnatural frequencies in Solo performance were compared with temporal synchrony (Leader tone onsets - Follower tone onsets) in Duet performances. Inter-brain correspondences were measured by correlating amplitude fluctuations of partnerscortical oscillations at the Duet frequency. Differences in partnersnatural frequencies in Solo performance were positively associated with Duet synchronization; the size and direction of the partnersdifference in Solo rates corresponded to the size and direction of the asynchronies. Moreover, partners' spectral amplitudes at the Duet frequency increased as the size of partnerstone onset asynchronies decreased. Finally, partners showed temporally correlated amplitude fluctuations of cortical oscillations at the Duet frequency, suggesting inter-brain correspondences. These findings provide evidence for oscillator dynamics of temporal coordination between performing musicians.

340 Event-related desynchronization of the mu rhythm in experts and non-experts during audio, visual, and audio-visual perception of percussion music. Frank Russo, *Ryerson University*, Fran Copelli, *Ryerson University*, Paolo Ammirante, *Ryerson University*, Michael Schutz, *McMaster University* ■ The Action Observation Network (AON) is a fronto-parietal network that is activated during the

execution and observation of biological movement. The frontal node has been associated with movement simulation while the parietal node has been associated with simulation of proprioceptive cues arising from movement. Here we use event-related desynchronization of the mu rhythm (mu ERD) to explore AON activation. Past research suggests that mu ERD under observation conditions is primarily driven by visual input and that it is enhanced for experts. In the current study, expert percussionists and non-experts viewed the principal percussionist of the Toronto Symphony play excerpts from Rimsky-Korsakov Scheherazade in audio, visual, and audio-visual conditions. As a staple of the audition repertoire, the expert percussionists would have performed this particular piece hundreds of times, making them highly expert. An independent components analysis (ICA) was run on the EEG data to localize activity to frontal and parietal nodes of the AON. Although visual information was dominant across nodes, we did manage to find evidence for mu ERD in the audio-alone condition of the parietal node. No evidence was found for enhancement of mu ERD in the audio-visual condition. Experts did not show greater mu ERD than non-experts.

341 Musical Expertise and Spontaneous Production Rates Influence Synchronization Accuracy Across Rates. Rebecca Scheurich, *McGill University*, Caroline Palmer, *McGill University* ■ The rates at which individuals produce auditory rhythmic sequences are consistent across time, limbs, and tasks. The consistency of these spontaneous production rates (SPRs) suggests that they may reflect a natural frequency at which synchronization is optimized and energy expenditure is minimal. Musical expertise also enhances synchronization accuracy. Little is known about how musical expertise modulates individualssynchronization as they adapt to rate changes away from their SPRs. We investigated whether musical expertise enhances synchronization during rate adaptation away from individualsSPRs. Musicians and nonmusicians performed a musical tapping task that assessed their SPRs in which they tapped the beat of a familiar melody at a comfortable, regular rate while hearing melody tones. Participants then synchronized their tapping in the musical task with a metronome that unexpectedly changed its rate to be faster or slower than participantsSPRs. Musicians adapted faster than nonmusicians to both speeding and slowing rate changes, and all participants took longer to adapt to speeding than to slowing rate changes. Additionally, all participants took longer to adapt to rate changes when the baseline rate was faster than participantsSPRs. These findings suggest that musical expertise facilitates synchronization when individuals adapt to rates away from their SPRs.

Attention II

342 Media-multitasking ability and executive functioning in young adults. Alexandra Seddon, *Liverpool John Moores University*, Anna Law, *Liverpool John Moores University*, Anne-Marie Adams, *Liverpool John Moores University*, Fiona Simmons, *Liverpool John Moores University* ■ The majority of previous research has examined the relationship between self-reported frequency of media-multitasking and executive functioning, with evidence indicating negative associations with biases in attentional control and working memory, albeit with some inconsistent findings. Research examining the extent that variance in ability to successfully media-multitask is explained by variance in executive functioning is more limited. The present study investigated the relationships between executive functioning and media-multitasking ability in young adults (aged 18-25, n=116), utilising a battery of ten executive function tasks. A task requiring participants to watch a video whilst reading a piece of text, whilst also responding to instant messages, was used to assess media-multitasking ability. It included a novel manipulation of between and within device media-multitasking. Media-multitasking ability was assessed using a multiple choice questionnaire assessing memory of

the content of the video and text passage. Media-multitasking ability was found to be associated with performance on working memory and cognitive flexibility tasks, but not inhibition tasks. For media-multitasking manipulation, the between device group was found to take significantly longer to respond to instant messages than the within-device group.The present study therefore provides evidence of working memory and cognitive flexibility as predictors of media-multitasking ability.

343 Investigating different alerting types and their impact on human performance. Colin R. McCormick, *Dalhousie University*, Austin Hurst, *Dalhousie University*, Bronwyn O'Connor, *Dalhousie University*, Piper Sawchyn, *Dalhousie University*, Samantha Howard, *Dalhousie University*, Lindsey Puddicombe, *Dalhousie University,* Ralph S. Redden, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ A seminal study by Posner, Klein, Summers, and Buggie (1973) focused on how changing the interval between an alerting signal and a target would impact the speed and accuracy of responding. Participants indicated whether targets appeared on the left or right of the screen. Auditory warning signals were played at various intervals prior to the target to alert or prepare the participant. Reaction times revealed a robust, U-shaped, preparation function. Importantly, a clear speed-accuracy tradeoff (SAT) was observed. In the current experiment, we replicated methodological components of the seminal study while implementing a novel auditory warning signal (Lawrence and Klein, 2013) that was either purely endogenous (change in quality without a change in intensity; analogous to isoluminant colour change in vision) or both endogenous and exogenous (change in both quality and intensity). We expected to replicate the U-shaped preparation function and SAT observed by Posner and colleagues. Based on Lawrence and Klein's (2013) findings we also expected the SAT to be more robust with the intense signal. Regardless of the type of warning signal, our results replicated the important findings reported in the seminal study. The lack of an effect of warning signal type remains a puzzle for discussion.

344 Just in time: When seeing and doing collide. James Enns, *UBC*, Troy Visser, *University of Western Australia* ■ I will describe a new behavioural phenomenon that links action and vision in a compelling way. If you are watching a rapid serial presentation of digits in order to detect a target letter and at the same time are asked to make a simple voluntary action (i.e., press a key), then target accuracy peaks at the moment of the key press. However, if the action is involuntary (the same key press is made for you by a mechanical tap on your finger) then the peak in target accuracy is delayed by 300 milliseconds. I will describe our explorations of this effect to date and discuss its implications for theories of brain synchronization and the coupling of action and vision.

Cognitive Development

345 Learning new words from explicit and implicit exposures in children who speak English as an additional language. Emily Oxley, *University of Leeds, UK*, Hannah Nash, *University of Leeds, UK*, Anna Weighall, *University of Leeds, UK*■ Children who enter UK schools speaking English as an additional language (EAL) often have significantly smaller English vocabularies than their monolingual peers (Murphy, 2014), but relatively little is known about how best to support their vocabulary growth. We compared explicit/implicit word learning in EAL and monolingual (ML) children aged 7-8 years old. In experiment 1 children (67 = EAL; 52 ML) were explicitly taught 6 novel words. EAL children initially exhibited significantly better recall than ML children ($p < .01$), but this advantage did not remain 7 days later. Thus, EAL children displayed a phonological advantage for initial learning but not in longer term lexical integration. In contrast, when words were learned via two spoken stories (Experiment 2) EAL children (N= 50) demonstrated poorer immediate

recall compared to ML (N= 30; p <.01) but not after a delay (p =.54). Children who speak more than one language may have an immediate advantage compared to MLs for explicit phonological learning, but be disadvantaged when learning is implicit. In both cases, recall decayed significantly after one week, suggesting repeated exposures may be necessary to facilitate long-term integration. Implications for the role of existing vocabulary in learning new words will be considered.

346 Learning about tools: children's social learning preferences. Erika Nurmsoo, *University of Kent*, Angelique Eydam, *Kinder- und Jugendpsychiatrische Praxis Salzgitter*, YuQing Che, *University of Bath*, Annie Boskova, *University of Kent* ■ Human beings have stable representations of objects as tools, crafting them in advance, carrying, and storing them for future use (Csibra & Gergely, 2006; Keleman, 1999). Indeed, Csibra and Gergely (2006) argue that this approach towards tools may be the evolutionary root of imitation. Children seem to privilege learning about tools in early imitation; 18-month-olds are more likely to faithfully imitate novel tool use than novel body actions (e.g., using a tool vs the forehead to turn on a light; Eydam et al, 2012). This work raises additional questions: Do children prefer to imitate or perform tool actions, and how do they understand tool use? To address the first question, 3- and 4-year-old children and adult participants were presented with videos showing an actor using two different ways of operating a toy. To determine whether novel tool actions are preferred over novel body actions, one set of videos showed the actor using a novel tool and a novel body action to operate the toy (Tool-Body condition). After watching the videos, participants could operate the toys themselves, and their actions were recorded. Participants in both age groups overwhelmingly chose to use the tool in this condition. However, after observing videos where a tool action was paired with the prepotent action of using the hand to operate a toy (Tool-Hand condition), adults and children differed. While adults significantly preferred to use their hand, children did not show this pattern. Finally, even when presented with cases where no tool use was demonstrated (Hand-Body condition), 30% of children nevertheless opted to use a tool to operate the toy. Children are interested in, and prefer to imitate, novel tool use, although this preference might not persist into adulthood. To explore the second question, we presented a second set of children with a demonstration of how to operate a toy either using a tool, or using the hand. The child's caregiver then joined the game, and operated the toy using the reverse method (e.g., when a tool was demonstrated, the parent used his or her hand to operate the toy). Children were significantly more likely to subsequently imitate their caregivers' tool actions than hand actions. In addition, they were significantly more likely to protest when the caregiver failed to use a tool, than when s/he used a tool that was not demonstrated, suggesting that children view tool use as normative (e.g., see Schmidt, Rakoczy & Tomasello, 2010). We suggest that children have an early predisposition to learn about tools, and that they view tool use normatively. We discuss the implications of these findings for theories of early learning from others.

347 Comparing lineup procedures to facilitate children's accuracy in face recognition. Laura Melnyk Gribble, *King's University College at Western University*, Nicole Skikavich, *King's University College at Western University* ■ Children's ability to recognize faces in in lineup tasks is comparable to adultsaccuracy, but children are more prone than adults to make false identifications when the target face is not included in the array. Two modified lineup procedures have been developed with the goal of reducing children's false identifications: In the elimination procedure, the child is first asked which person looks most like the target and is then asked whether the selected person is indeed the target. In the wildcard procedure, a non-foil option is included that the child may select if the child doesn't see the target in the lineup.

We compared the relative effectiveness of these two procedures using a cross-sectional 2x2 experimental design (elimination vs. wildcard; target-present vs. target-absent) with 549 children, ages 3 to 14. When the target was present in the lineup, the procedures were equally effective in promoting accurate identifications for 3- to 11- year-olds, but the wildcard procedure yielded more correct identifications for 12- to 14-year-olds. When the target was absent from the lineup, the correct rejection rates were comparable between procedures for children 3 to 11, but for 12- to 14-year-olds, the elimination procedure promoted higher accuracy rates than the wildcard procedure.

Posters

Wednesday, July 4

Poster Session 1

P101 Cognitive maps in real and virtual worlds. Jennifer Sutton, *Brescia University College & Western University*, Nicole Youngson, *Western University*, Chantelle Cocquyt, *Brescia University College* ■ A cognitive map is a powerful mental representation of an environment, as it allows a navigator to perform shortcuts and detours while travelling. It is clear that individual differences exist in the ability to create a cognitive map of an unfamiliar virtual environment presented in the laboratory. These differences are often assumed to reflect the accuracy of participantsmental representations of their real world surroundings, although the connection between mental representations of real-world and virtual laboratory environments is not well understood. In the current study, 98 participants (48 female) explored the virtual environment Silcton and then completed direction estimation and map building tasks based on memory for the layout of Silcton landmarks. They also provided four frequently visited locations in their city of residence (London, ON) and completed the same direction estimation and map building tasks using those locations. Real-world direction estimation was correlated with Silcton map building accuracy. Males were more accurate on the Silcton measures than females, although the sexes were equally accurate when estimating directions based on memory of their real-world environments. In addition, perspective-taking skill was significantly correlated with both Silcton and real-world assessments, underscoring the importance of this type of spatial visualization for cognitive maps.

P102 The impact of spatial and semantic congruence on sensory processing and the Colavita effect. Genevieve Desmarais, *Department of Psychology, Mount Allison University*, Atkinson Daryl, *Department of Psychology, Mount Allison University*, Tsukiko Miyata, *Department of Medical Biophysics, University of Toronto* ■ The Colavita effect is a robust phenomenon where participants fail to detect the auditory component of an audiovisual stimulus. We evaluated the combined effects of semantic and spatial congruence on the Colavita effect. We asked participants to report the modality (auditory, visual, or audiovisual) of animal and musical instruments stimuli that were presented to the left or right of centre. During audiovisual trials, half the trials were semantically congruent (e.g., the picture and the sound of a cat) while the other half were semantically incongruent (e.g., the picture of a cat and the sound of a dog). Also, half of the trials were spatially congruent (e.g., both items appeared on the same side) while the other half were spatially incongruent (e.g., the picture was on the left while the sound came from the right speaker). Participants did not produce more 'visual-only' errors than 'auditory-only' errors, but they were less accurate during congruent trials than incongruent trials, and particularly so when the stimuli were animals, and when the stimuli were spatially congruent. Our findings suggest that presenting congruent information increases integration, resulting in more failures to detect a second stimulus, but without favoring visual information over auditory information.

P103 Context-Based Expectations Change Duration Perception for Repeated Stimuli. Corinna D. McFeaters, *University of New Brunswick*, Daniel Voyer, *University of New Brunswick* ■ Duration judgments for novel stimuli are usually longer than for repeated stimuli. When repetition is anticipated, however, the expectation of repetition may reduce or abolish this effect (Matthews, 2015). Matthews hypothesized that expectations change perception, but decisional influences may also be responsible

for the expansion of subjective duration for repeated stimuli. We therefore examined the role of decisional factors in this effect using psychophysical methods and replicated Matthewsfindings. Sixty participants completed two judgment tasks in which they were presented with faces with neutral expressions and asked to indicate whether the duration of a comparison stimulus was longer or shorter than a 500-ms standard stimulus presented immediately prior. Comparison stimuli were presented for 500 ms in the replication task. In the critical extension task, they ranged in duration from 200 to 1250 ms, which allowed assessment of sensitivity, difference thresholds, and response bias. Discrimination was more difficult when repetition was common than uncommon, but no decisional bias was evident, suggesting that modulating expectations influenced perception. Still, stimuli that met expectations, regardless of whether novel or repeated stimuli were expected, were judged more accurately, suggesting that adherence to contextual expectations plays a central role in the observed effect.

P104 Attention does not modulate audiovisual integration in a Colavita task. Hilary Pearson, *Mount Allison University*, Genevieve Desmarais, *Mount Allison University* ■ The Colavita effect is a multisensory integration phenomenon that occurs when participants only report the visual component of an audiovisual stimulus. Whether attention can modulate attention has been debated, and the purpose of this study was to evaluate the effect that attention has on audiovisual integration using the Colavita effect. In Experiment 1, participants were presented with a series of abstract and concrete stimuli, and asked to identify their modality (visual, auditory, or audiovisual). Importantly, they completed these tasks under full attention and while concurrently completing a foot tapping pattern. In Experiment 2, this procedure was repeated but with a more complex tapping pattern for the divided attention conditions. In Experiment 1, we confirmed that our experimental protocol created a Colavita effect: when we presented bimodal stimuli, participants reported that stimuli were visual more often than auditory. Attention reduced reaction time and accuracy but did not otherwise impact the Colavita effect. Experiment 2 failed to produce a Colavita effect but replicated the reduced reaction time and error rates in the focused attention condition. These results suggest that attention is not required for the integration of audiovisual information in low-level tasks such as the Colavita task.

P105 Effects of Acute Stress on Cognitive and Emotional Interference. Dominique Dupuis, *University of Regina*, Laurie Sykes Tottenham, *University of Regina* ■ Stress impacts cognitive and affective processing by affecting neural chemistry. The impact of this effect may differ based on task type and stressor duration (acute/chronic). The Stroop task is a well-established test of interference. Chronic stress and cortisol administration may increase Stroop interference; however, less is known about how acute stress and endogenous cortisol increase affect interference, and whether this differs for emotional and cognitive distractors. In this study, 66 participants experienced a high or low stress manipulation before completing a colour- and emotion-word Stroop task. Unexpectedly, the high stress condition demonstrated less emotion-word accuracy interference than the low stress condition. Corrrelational analyses further showed that greater increases in subjective stress were associated with less emotion-word accuracy interference overall and less colour-word accuracy interference in the high stress condition, and greater increases in cortisol were associated with less colour-word interference for reaction time in the low stress condition only. While past research suggests that chronic stress or exogenous cortisol increase may be associated with greater interference, the results of the present study suggest that acute stress may facilitate performance on tasks requiring inhibition of irrelevant cognitive and emotional information.

P106 How to catch a falling star: improving asteroid detection by studying blink comparison using change blindness. Mark Tovey, *Centre for Planetary Science and Exploration (CPSX), Western University*, Paul Wiegert, *Centre for Planetary Science and Exploration (CPSX), Western University*

On February 15th, 2013, the unexpected appearance of a meteor over the Russian city of Chelyabinsk reminded us that our ability to detect near-earth asteroids is not perfect. Even assisted by algorithms, asteroid detection is a surprisingly time-consuming task, in part because knowledge from cognitive psychology about human attention has not been applied. Efficiency in asteroid detection is important in mitigating the worst effects of a collision. The standard method to assist human observers to find moving asteroids on a background of stars is to rapidly alternate images of the same star field captured at successive intervals (blink comparison). Under ideal circumstances, only the astronomical object of interest, whether an asteroid or supernova, will exhibit movement in a scene, enabling the observer to spot it immediately. Circumstances, however, are rarely ideal. Blink comparators, while intended to reveal an object of interest, can also inhibit detection when other changes, however subtle, are also simultaneously present in the scene, distracting attention from the target, a form of change blindness similar to the mudsplash paradigm. Data will be presented demonstrating this phenomenon, with some notes towards strategies for mitigation.

P107 Monitoring eye movements while measuring the item-specific proportion congruency effect. Chao Wang, *McMaster University*, Mitchell LaPointe, *McMaster University*, Hongjin Sun, *McMaster University*, Bruce Milliken, *McMaster University*

Attentional sets can be formed and bound to specific stimuli and contexts, such that upon new instantiations of the stimulus or context, a retrieval of the attentional set will help guide attention (see Crump et al., 2018). In the current study, we measure an item-specific proportion congruency (ISPC) effect using a variant of the attentional capture task (Theeuwes, 1991). By comparing a set of congruent trials, wherein a target differs on two dimensions from a set of distractors, to a set of incongruent trials, wherein a target differs on one dimension, but another singleton also differs on one dimension, from a set of distractors, we measure a congruency effect. Moreover, using two sets of stimuli, we manipulate the proportion of congruent/incongruent trials, such that for one set there is a high proportion of congruent trials, but for the other set there is a high proportion of incongruent trials. Consequently, we measure a congruency effect that differs by item type--an item-specific proportion congruency effect. We couple these behavioural measurements with eye movement measurements to assess the eye movement patterns (e.g., different stages in a search trial and eye movement trajectory) that could explain the behavioural effect.

P108 An Ex-Gaussian Analysis of Reaction Time Distributions in Inhibition of Return. Jason Ivanoff, *Saint Mary's University*, Noor-Bano Rehman, *Saint Mary's University*, Sean McKay, *Saint Mary's University*, Xingjuan Liu, *Jilin Agricultural University*

Peripheral cues tend to inhibit target processing (i.e., inhibition of return [IOR]) with long cue-target onset asynchronies (CTOAs). Previous research on IOR has typically relied on the analysis of mean reaction times (mRTs). While mRTs offer a convenient summary of the RT distribution, they may be misleading when distributions are skewed. We used the ex-Gaussian function to provide a simple description of distributions in three peripheral cueing experiments. In a detection task, consistent with an effect of IOR, mRTs at the cued location were slowed at long CTOAs. The ex-Gaussian analysis revealed that this was the result of the cue slowing the mean of the Gaussian component (μ) without having much of an effect on the exponential component (τ). In a localization task, there was no effect of cueing on mRT at long CTOAs. However, the ex-Gaussian analysis revealed that the cue slowed μ while facilitating τ. In a localization task with a central cue intervening

between the peripheral cue and target, the cue slowed μ but had little impact on τ. These findings suggest that distributional analyses of RTs may help reveal the effects of IOR when they are obscured by occasional failures to disengage attention from the cue.

P109 The Influence of Graphics on Mind Wandering in Video Lectures. Laura Bianchi, *University of Waterloo*, Kristin E. Wilson, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ∎ There is a rising interest in determining the most effective (i.e., the most conducive for learning) way to present online lecture information. Past research has suggested that lecture graphics that are interesting but irrelevant to the content (e.g., a celebrity), can impair comprehension of the material (i.e., the seductive detail effect). In this study, the use of graphics on the slides of an online psychology lecture was manipulated to determine the extent to which images can improve (or impair) comprehension as well as the effect it may have on intentional and unintentional mind-wandering behaviours. In all conditions the participants were presented with a video lecture which included the instructor audio, and lecture slides. Across the three conditions –no graphics (i.e., no images), informative graphics (i.e., images are relevant to the lecture content), and seductive graphics (i.e., the images are irrelevant to the lecture content) –there were no differences seen in overall comprehension and limited differences mind wandering behaviour.

P110 Fixated in Unfamiliar Territory: Mapping Estimates Across Typical and Atypical Number Lines. Sabrina M. Di Lonardo, *Carleton University*, Matthew G. Huebner, *Carleton University*, Michelle Hosang-Roy, *Carleton University*, Katherine Newman, *York University*, Jo-Anne LeFevre, *Carleton University* ∎ Number line estimation traditionally involves conventional number ranges (i.e., 0 – 100; 0 – 1,000), thus, little is known about how estimations are affected for an atypical range. In the present research, undergraduate students (n = 94) were asked to estimate visually presented target numbers on either a typical (i.e., 0 – 10,000) or an atypical (i.e., 0 – 7,000) number line while their eye movements were recorded. Number lines were presented both in the traditional direction, where the left endpoint value was 0, and in the reverse direction, where the right endpoint value was 0. Linear mixed modelling revealed significant main effects of range and target magnitude, as well as an interaction between range, direction, and target magnitude for final number line estimates. Eye-tracking data revealed that participants made more accurate estimations on the typical number line, fixating on smaller values more frequently than larger values. Though participants in both the traditional and reverse direction conditions were more likely to underestimate, those in the reverse direction conditions referred to the 0 endpoint and midpoint significantly more often than those in the traditional direction conditions. These findings suggest that estimation patterns are influenced by both the direction and endpoint value of the number line.

P111 Sensory attenuation in interpersonal coordination. Nicole Bolt, *University of Saskatchewan*, Janeen Loehr, *University of Saskatchewan* ∎ Sounds that follow self-initiated actions are perceived as less loud and show a reduced neural response compared to sounds produced by an external source. This effect, termed sensory attenuation, is thought to result from sensory prediction. Recent work suggests that a similar predictive process exists when observing othersactions; however, little research has investigated sensory attenuation during interpersonal coordination. The current study tested whether people show attenuation for predictable sounds produced by an interaction partner (social sensorimotor equivalence) or not (social sensorimotor differentiation). Pairs of participants produced four-tone sequences that matched the pace set by a metronome. Participants produced sequences alone, with their partner (alternating actions: ABAB), and listened to a computer produce sequences. Auditory N1 event-

related potentials that followed partner tones were not attenuated relative to computer tones. This finding is consistent with social sensorimotor differentiation: When people coordinate their actions with a partner, they distinguish the sensory consequences of their own actions from those produced by their partner.

P112 Predicted reach consequences drive time course of tactile suppression. Lindsey E. Fraser, *Center for Vision Research, York University, Toronto Canada*, Laurence R. Harris, *Center for Vision Research, York University, Toronto Canada*, Katja Fiehler, Department of Psychology, Justus-Liebig Universität Gießen, Gießen Germany ■ Sensitivity to touch is reduced during movement. This "tactile suppression" has been shown to positively correlate with overall movement speed. Here we assessed how natural changes in speed within a movement modulate suppression. FittsLaw states that reaches to small targets show increased late-trajectory correction, and thus reduced late-reach speed, compared to reaches to larger targets. We predicted that this reduction in speed might lead to similarly reduced late-reach suppression. In Experiment 1, we recorded participants performing speeded reaches to small, medium and large targets. We determined 50% detection thresholds for a vibration stimulus delivered at early (~25% reach time) and late (~75%) reach, and compared these to detection at rest. We found a significant increase in detection thresholds in every movement condition. For all targets, suppression increased in late reach despite significant deceleration. Smaller targets did elicit the slowest late-reach speeds but suppression was not affected by target size. In Experiment 2 we found increased late-reach suppression for reaches to a target with an associated secondary vibration consequence compared to reaches to a same-sized target with no consequence. We conclude that it is the predicted consequences associated with movement that drive tactile suppression in a temporally sensitive way.

P113 Left cerebellar transcranial direct current stimulation facilitates the onset of inhibition of return. Brittany Angus-Cook, *Department of Psychology, MacEwan University, Edmonton, Alberta, Canada*, Brandon Craig, *Department of Psychology, MacEwan University, Edmonton, Alberta, Canada*, Nadia Botha, *Department of Psychology, MacEwan University, Edmonton, Alberta, Canada*, Christopher Striemer, *Department of Psychology, MacEwan University, Edmonton, Alberta, Canada* ■ Over the past 20 years our knowledge of the functional role of the cerebellum has evolved from that of a structure strictly involved in coordinating motor outputs, to one that is also heavily engaged in cognitive functions, including attention. Specifically, patient work indicates that cerebellar damage slows rapid shifts of reflexive covert attention, as well as the onset of inhibition of return (IOR). In addition, fMRI studies suggest that the left lateral cerebellum may play an important role in covert attention. In the current study we further examined the role of cerebellum in covert attention using transcranial direct current stimulation (tDCS) where a weak electrical current is applied to electrodes on the scalp to induce changes in baseline neural activity in the underlying cortex. Participants (n=23) completed a reflexive covert attention task using stimulus onset asynchronies (SOAs) of 50, 100, 300, and 600ms before, during, and after either anodal (+), cathodal (-), or sham tDCS applied to the left cerebellum (2mA for 20min). Results indicated that active tDCS stimulation facilitated the onset of IOR at the longest SOA compared to sham. Our results provide further evidence that the left lateral cerebellum plays an important role in reflexive covert visual attention.

P114 Instagram Status and Motor Resonance: Instagram "Leaders" Show Decreased Motor-Evoked Potential Facilitation. Sumeet Farwaha, *McMaster University*, Sukhvinder Obhi, *McMaster University* ■ High power and high socioeconomic status individuals have been found to exhibit less motor system activity during observation of another individual's behaviour. In the modern world, the use

of online social networks for social interaction is increasing, and these social networks afford new forms of social status hierarchy. An important question is whether social status in an online setting affects social information processing in a way that resembles the known effects of real-world status on such processing. Using transcranial magnetic stimulation (TMS), we examined differences in motor resonance via measures of motor cortical output between Instagram leadersand followers'. Instagram Leaders were defined as individuals who have more followers than they are following, while Instagram Followers were defined as individuals who have fewer followers than they follow. We found that Leaders exhibited reduced Motor-evoked Potential (MEP) facilitation during action observation compared to Followers. Correlational analyses also revealed a positive association between an individual's Instagram follower/following ratio and their perceived sense of online status. Overall, the findings of this study provide some evidence in favour of the idea that our online sense of status and offline sense of status might be concordant in terms of their effect on motor resonance.

P115 Chronic gray matter degeneration is widespread in moderate to severe traumatic brain injury. Zorry Belchev, *Rotman Research Institute at Baycrest; University of Toronto*, Asaf Gilboa, *Rotman Research Institute at Baycrest; University of Toronto*, Brenda Colella, *Toronto Rehabilitation Institute*, Mark Bayley, *Toronto Rehabilitation Institute*, David Mikulis, *Krembil Research Institute*, Robin Green, *Toronto Rehabilitation Institute; University of Toronto* ■ Longitudinal studies of moderate-to-severe traumatic brain injury (TBI) indicate that in addition to immediate impact, there is chronic neurodegeneration of gray and white matter (Adnan et al., 2013; Cole et al., 2018; Green et al., 2014; Ng et al., 2008). We extended our previous findings of hippocampal and corpus callosum volume loss to examine regional volume changes in chronic TBI using a segmentation protocol sensitive to lesions (MALP-EM). We observed large increases of ventricular size between 5 months and 2 years post-injury, consistent with our previous findings of increased ventricle-to-brain ratio. MALP-EM subcortical regions of interest (i.e., thalamus, brainstem, hippocampus, amygdala, accumbens) known to predict functional outcome (Ledig et al., 2017) showed significant degeneration between 5 and 24 months post-injury. In an exploratory principal component analysis the first component revealed widespread cortical atrophy. Three other components displaying significant atrophy involved some of the ROI subcortical structures and ventral and lateral cortical structures that are typically also affected acutely. Our findings of chronic neurodegeneration in chronic TBI survivors emphasizes the importance of developing interventions to offset this neurodegeneration, minimize the functional impairment associated with it, and counter the risk of disease later in life.

P116 Interindividual neural and behavioral differences in moral decision-making: Relevance for driverless cars. Annemarie Wolff, *University of Ottawa*, Georg Northoff, *University of Ottawa*, ■ As technology in Artificial Intelligence has developed, the question of how to program driverless cars to respond to an emergency has arisen. It was recently shown that approval of the consequential behavior of driverless cars varied with the number of lives saved and showed interindividual differences. In the present study, interindividual differences in individualized moral decision-making at both the behavioral and neural level were investigated. It was found that a late ERP – the Late Positive Potential (LPP) - is closely related to interindividual differences in moral decision-making. Second, a central role for alpha event-related spectral perturbation (ERSP) and delta/theta phase-locking – intertrial coherence (ITC) and phase-locking value (PLV) - in mediating interindividual differences in moral decision-making was shown. Finally, LPP ERP activity from individualized stimuli, alpha power, and delta/theta ITC are closely related to reaction time and subjectively perceived emotional distress.

This demonstrates that interindividual differences in moral decision-making are mediated neuronally by various markers – LPP in individualized stimuli, alpha ERSP, and delta/theta ITC - and psychologically by reaction time and subjectively perceived emotional distress. This data shows how and according to which neuronal and behavioral measures driverless cars may require programming to adapt to the individual moral preferences of individuals.

P117 Medial prefrontal cortex compresses concept representations through learning. Michael Mack, *University of Toronto* ■ Much of learning can be described as data reduction: less critical features of incoming information are compressed to emphasize encoding of goal-relevant knowledge. This view parallels prominent theories of medial prefrontal cortex (mPFC); yet, support for mPFC's role in learning is lacking. Here, we directly assess the data reduction hypothesis with fMRI. Participants learned to classify the same multidimensional stimuli across three problems, each defined by rules requiring 1-3 stimulus dimensions. This manipulation of conceptual complexity allowed us to test the prediction that brain regions that learn to compress will represent simpler problems with fewer dimensions. We measured learning-related compression of fMRI activation patterns with principal component analysis. Throughout the brain, only mPFC showed the predicted relationship: Greater neural compression was found for problems with lower dimensional concepts. Further, computational modeling revealed that learners with greater problem-specific neural compression showed more optimal attention to stimulus dimensions. These findings support the view that mPFC is critical for transforming information into low-dimensional representations useful for the task at hand.

P118 Therapeutic-like effects of stress controllability related to long-term potentiation in the dentate gyrus and the endocannabinoid system. Courtney Clarke, *Memorial University of Newfoundland*, Victoria Mackey, *Memorial University of Newfoundland*, Francis Bambico, *Memorial University of Newfoundland* ■ The impact of chronic stress on cognitive functioning has been shown to be aggravated by both the perceived loss of control and the stressor severity. The behavioural control training (BCT) procedure was developed to understand the mechanism underlying stress controllability. In mice exposed to chronic uncontrollable stress (CUS), the effects were measured on depressive/anxiety-related behaviour and the generation of long-term potentiation (LTP) in the dentate gyrus (DG) of the hippocampal formation. CUS-exposed mice underwent BCT in the Morris water maze (MWM) where BCT+ animals learned to evade swim stress with the presence of an escape platform, while BCT- were subjected to inescapable swim stress conditions. BCT+ training reversed the effects of CUS, as is evident in the recovery of sucrose preference levels and a decrease in immobility in the forced swim test. Administration of the CB1 receptor inverse agonist AM251 prior to BCT training sessions induced anxiety-like behaviours, suggesting the role of the endocannabinoid system in producing anti-depressive effects in stressed animals. LTP recordings showed CUS was associated with decreased population spike amplitude. Normal LTP was rescued in the BCT+ CUS-exposed animals, however AM251 blocked this effect. This suggests that uncontrollability of stressors relates to depression/anxiety-related behaviour and LTP impairment.

P119 Altered Rostromedial Tegmental Activation and Behavioural Response to Chronic Ethanol Exposure in a Preclinical Model of Depression-addiction Comorbidity. Tristian Critch, *Memorial University of Newfoundland*, Josh Conway, *Memorial University of Newfoundland*, Nageeb Hasan, *Memorial University of Newfoundland*, Stefan James, *Memorial University of Newfoundland*, Gerryt Bruijns, *Memorial University of Newfoundland*, Francis Bambico, *Memorial University of Newfoundland* ■ To elucidate

neurobehavioural correlates of addiction-depression comorbidity, we examined depressive and anxiety-like behaviour, and ethanol consumption in a diathesis(risk)-stress model. We tested the response of the rostromedial tegmental nucleus (RMTg) to ethanol since it is known to mediate the impact of aversive stimuli on dopamine and serotonin activity. Next, we employed an olfactory bulbectomy (OBX) which conferred a sensitized response to novelty without necessarily producing depressive/anxiety-like phenotypes in a sucrose preference test and novelty-suppressed feeding test. We found that long-term ethanol exposure results in an anxiolytic-like response despite profound anhedonia-like reactivity, an effect associated with indices of increased behavioural sensitivity to ethanol. Sham animals displayed lower peak-trough amplitudes and maintained a biphasic, negative-positive glucose profile, suggesting lower basal RMTg activity. OBX animals had greater initial peak-trough amplitudes followed by a stable decrease in glucose signal, suggesting high basal RMTg activity. Moreover, OBX powerfully attenuated the correlational strength between RMTg activation and comorbidity scores for depression and ethanol sensitivity, indicating a drastic narrowing of the dynamic range in RMTg activation. These findings highlight that the RMTg may mediate an increase of depressive-like symptoms concurring under comorbid conditions, which potentially offers a therapeutic target for the effective treatment of comorbid disorders.

P120 Preconception predator stress increases stress-susceptibility in adult offspring. Sriya Bhattacharya, *Psychology department, Memorial University* ■ It is well known that traumatic stress can have deleterious effects on an individual. Recent data suggests that these harmful effects can propagate into future generations, making offspring more prone to mental illness (i.e. anxiety, depression and/or posttraumatic stress disorder). While recent data from the animal literature supports transgenerational effects of stress, little is known regarding the consequences of pre-conception stress on adolescent offspring. Furthermore, whether these changes persist into adulthood and make offspring more susceptible to future stressors is not known. Male and female mice were exposed to a predator or control condition for five minutes. Ten days later, male stressed mice were bred to female stressed mice, male controls were bred to female controls. We show that pre-conception parental stress increased anxiety-like at adolescence, and increased stress-susceptibility in adulthood in offspring. Furthermore, pre-conception parental stress increased stress-induced neural activation, as well AMPA receptors, but not NR1, in the hippocampus of F1 adult male mice. Overall, our data suggest that traumatic stress not only affects an individual, but it can alter the behavioural and physiological responses of future generations. Our study represents a major advance in the field, and may lead to novel treatments for such devastating disorders.

P121 The "Dual Hormone Hypothesis" in Domestic Dogs: Cortisol X Testosterone Interactions Predict Wins in a Competitive Task. Carolyn Walsh, *Department of Psychology, Memorial University of Newfoundland*, Mariana Castro, *Cognitive and Behavioural Ecology Program, Memorial University of Newfoundland*, Mari Kinnunen, *Department of Biology, University of Oulu, Finland*, Rita Anderson, *Department of Psychology, Memorial University of Newfoundland* ■ In primates, competitive ability and social dominance are related to individual differences in the interaction between cortisol (C) and testosterone (T). Individuals with combined low C/high T have more successful outcomes during conspecific competitive interactions than do those with other combinations of these hormones. We examined this “dual hormone hypothesis” in 66 domestic dogs (Canis familiaris) living in 35 multi-dog households. Most dogs (86%) were gonadectomized. Competitive ability was assessed using the toy possession test (TPT); a toy was thrown six times and the dog obtaining it each time

was scored as the winner. The proportion of TPT trials in which a dog participated was negatively correlated with mean salivary C, but was not predicted by a C X T interaction. In contrast, the proportion of TPT wins was predicted by the interaction; dogs with low baseline C and high T won the toy proportionately more often. Relative age and the canine personality dimension Extraversion were also significant predictors of TPT wins, with younger and more extraverted (active) dogs in the household winning more competitions. TPT wins were unrelated to other measures of social dominance, perhaps suggesting that competitive performance in the TPT task and dominance are unrelated in dogs.

P122 Measuring fear in free-living wild animals. Phillip MacCallum, *Department of Psychology, Memorial University of Newfoundland* ■ Exposure to a species-relevant predator is a robust model of post-traumatic stress disorder (PTSD) that induces long lasting changes closely related to the sequelae of PTSD. Field studies of predator-induced stress on wild animals have demonstrated adverse effects on demographics and physiology. However, whether these effects are the result of sustained psychological stress and not from chronic physical challenges remains unanswered. To validate concepts of long lasting neurobehavioral changes in wild animals from strong predation-risk we systemically manipulated perceived predator risk in wild free-living deer mice. Over twenty days, predator playbacks were broadcast on two grids, while two other grids received non-predator playbacks. On the last two days, the amount of seeds left uneaten from feeding trials were measured to evaluate fear in the field. Following this, blood and brains were sampled from a subset of mice. Frightened wild mice had significantly higher stress hormone levels, foraged less, and reduced brain activation of biomarkers associated with behavioral plasticity and recovery from stress. Importantly, these results are akin to those seen in laboratory models of stress-induced psychopathologies, while also providing support for the notion of the 'ecology of fear' in shaping population parameters at larger time-scales of birth and survival.

P123 Reaction time measures are more sensitive than accuracy to the acute impact of cardio exercise in healthy young adults. Hannah Rose, *Mount Allison University*, Geneviéve Desmarais, *Mount Allison University* ■ Cardiovascular exercise can protect against cognitive decline in older adults, especially older women, and improve cognitive performance in children. However, there has been little research in this area using young adults. Our purpose was therefore to examine the acute impact of exercise on attention and memory in male and female undergraduates. Healthy young adults completed attention and memory tasks before and after an exercise session (either exercising on a stationary bicycle or stretching). Participants also completed a test of reading comprehension after the exercise session. Unfortunately, not enough males completed the study to evaluate gender differences. The analysis of change scores in sustained attention and memory tasks and of the reading test scores did not reveal differences between the experimental and control groups. However, an analysis of the interference observed in the modified Stroop revealed greater improvement (less interference) for the cardiovascular exercise group than the control group. Thus, cardiovascular exercise improved participantsability to inhibit irrelevant information. We therefore propose that tasks that measure processing speed and reaction time may be more sensitive to the immediate benefits of exercise on cognitive performance.

P124 Simulated and Live Training Predictors of Police Driving Performance. Chet Hembroff, *University of Regina*, Gregory Krätzig, *Royal Canadian Mounted Police* ■ Policing is a career that involves some of the most complex driving operations that may often occur while performing multiple, simultaneous tasks and/or during an emergency. It has been continuously demonstrated

that performing an additional task while driving, whether this task is auditory, visual, or physical, will reduce driving ability and reaction time. Although police officers will receive extensive training on driving procedures during routine and emergency operations, the majority of police fatalities are vehicular-related. Understanding what factors are predictive of police driving ability is an important endeavour to ensuring officer safety. This study collected driving performance data, in both simulated and live environments, from law enforcement students as they completed various driving requirements within their training academy. These data were compiled into a latent variable structural equation model to explore the predictive validity of both simulated and live driving performance measures on the final police driving test within the training academy. As much of the driving procedures involve concurrent communication, these analyses were further divided to examine differences between English- and French-speaking students to investigate any additional dual-task/translation effects. Results and conclusions are discussed.

P125 The association between adverse childhood experiences and the suppression of painful memories. Brittany Flood, *Memorial University of Newfoundland*, Joshua Rash, *Memorial University of Newfoundland*, Jonathan Fawcett, *Memorial University of Newfoundland* ■ Those who report a greater number of adverse childhood experiences (ACEs) are more likely to develop chronic pain. Bias in memory has been shown to affect the subsequent experience of pain and may mediate this association. The present experiment investigated whether there is a memory bias for pain-related material in individuals who report high ACEs relative to those who report low ACEs. A preliminary sample of ten participants were recruited to: 1) complete screening questionnaires (e.g., ACEs questionnaire, pain catastrophizing scale); and 2) undergo a retrieval-induced forgetting (RIF) paradigm in the laboratory to assess involuntary memory suppression of pain-related items. The group by cue-type interaction was not significant but the effect size was large, $\eta 2 = 0.17$, and observed power low at 18.4%. Relative to their low-ACEs counterparts, participants who reported high ACEs tended to exhibit less RIF for pain-related cues, $M = -0.13$, $SE = 0.09$, relative to neutral cues, $M = 0.19$, $SE = 0.09$. Pain catastrophizing was significantly associated with RIF, $r = .64$, $p < .05$. While not statistically significant, individuals who reported greater ACEs appeared to have more difficulty suppressing pain-related memories than their low ACE counterparts. Results were encouraging and provide the impetus for replication with a sample size that is sufficiently powered to detect large effect.

P126 Scaling learning theories to complex problems. Bradley Smith, *University of Manitoba*, Randall Jamieson, *University of Manitoba* ■ Learning theories are typically tested against results from simple learning problems (e.g., acquisition, blocking, discrimination, and so on). However, the simple procedures in the learning canon are unrepresentative of the complex and uncertain problems animals face outside the lab. To address the difference, we present experimental data from a series of complicated probability learning experiments and assess several learning models against the results. Not all theories translate cleanly to these tasks nor do all theories replicate the results. We conclude that people's behavior can be best understood by an instance-based approach to learning and memory.

P127 Using graph theory to understand the structure of event knowledge in memory. Nickolas Christidis, *University of Western Ontario*, Ken McRae, *University of Western Ontario*, Jeff Elman, *University of California, San Diego* ■ People's knowledge of common events plays a critical role in numerous aspects of cognition, including language processing, recall, planning, action, and social decision making. Despite numerous theoretical proposals such as scripts, schemas, stories, mental models, and situation models, the highly variable

nature and complexity of event knowledge has been a considerable barrier to comprehensively characterizing the structure of event knowledge in memory. We used graph theory to develop empirical profiles of the structure of common events and test assumptions underlying traditional theories of event knowledge. Specifically, we used graphical analysis to establish profiles for a relatively large number of common events to determine the range and importance of possible activities within an event, discover which activities can be grouped into hierarchical scenes (network communities), and characterize the temporal structure (order of activities), both within and between scenes that comprise an event. Additionally, as events differ considerably in terms of their range of activities and temporal structure, this study aimed to determine which events share similar empirical network profiles and classify them into groups. This investigation provides a novel solution for characterizing the structure of event knowledge in memory using graphical analysis.

P128 Is Forgetting Effortful? A Pupillometric Investigation of Item-Method Directed Forgetting. Julia Greenham, *Department of Psychology, Memorial University of Newfoundland* , Marcus Alves, *Department of Psychology, Memorial University of Newfoundland*, Julia Rose, *Department of Psychology, Memorial University of Newfoundland*, Tracy Taylor, *Department of Psychology and Neuroscience, Dalhousie University* , Jonathan Fawcett, *Department of Psychology, Memorial University of Newfoundland* ■ Trying to forget an unwanted piece of information in an item-method directed forgetting paradigm has been shown to slow responses in the period immediately following the forget instruction and to facilitate removal of attention from the representation of the preceding study item, including its spatial location. These findings have been interpreted as evidence of an active control process associated with the cessation of rehearsal. The current experiment sought to provide converging evidence in support of this argument using changes in pupil diameter (i.e., pupillometry) to gauge the mental effort involved in enacting item-method instructions to remember (R) or forget (F). We predicted greater pupil dilation (indicating greater mental effort) following F than R instructions at study. Our predictions were not supported. Although we obtained a significant directed forgetting effect with greater recognition of R than F items at test we observed larger pupil dilations following R than F instructions. We discuss our findings in relation to their theoretical implications and interpretation in light of previous evidence.

P129 Costs and Benefits of Item-based Directed Forgetting for Pictures: Perceptual Details versus Gist. Fahad Ahmad, *Wilfrid Laurier University*, Pelin Tan, *Queen's University, Kingston*, William Hockley, *Wilfrid Laurier University*■ The 2-alternative forced-choice recognition test procedure has been used to distinguish memory based on perceptual details with memory based on conceptual gist for categorized pictures of objects and scenes (e.g., Ahmad, Moscovitch, & Hockley, 2017). When the distractor is from the same category as the target, discrimination must be based on memory for perceptual details, whereas when the distractor is from a novel category, recognition can be based on gist information of the picture categories. In four experiments, we combined this test procedure with an item-based directed forgetting (DF) procedure. We included a remember-all control condition in Experiments 3 and 4 to examine potential benefits of DF. Recognition memory was greater for Remember-cued compared to Forget-cued pictures when discrimination had to be based on perceptual details. There was also a benefit of DF as R-cued pictures were better remembered than in remember-all control lists. No DF effect was observed when discrimination could be based on gist. Fewer perceptual details are encoded for Forget-cued pictures compared to Remember-cued pictures, but DF instructions do not affect memory for conceptual information.

P130 Mechanisms Underlying the Production

Effect for Singing. Chelsea Quinlan, *Dalhousie University*, Tracy Taylor, *Dalhousie University* ■ The production effect is the finding that memory performance is better for words that are produced (i.e., read aloud) compared to words that are not produced (i.e., read silently). In three previously published experiments, we found that alternate forms of vocal production, such as singing and reading aloud loudly had more pronounced effects on the magnitude of the production effect than reading aloud in a normal voice. In several subsequent experiments, we examined possible mechanisms underlying the greater production effect for singing versus reading aloud. Through these experiments, we were able to determine that the greater production effect for singing versus reading aloud cannot be fully accounted for by a bizarreness account, differences in production duration, or differences in elaborate encoding or memory strength. Rather, our findings provide support for a distinctiveness account of the production effect, emphasizing that the number and type of potential distinct elements available at encoding is likely associated with subsequent memory performance at test and consequently the magnitude of the production effect.

P131 Delay Discounting and Prospective Memory Can Predict Risky Decision Making. Ahmad Sohrabi, *Department of Psychology, University of Kurdistan, Sanandaj*, Ali Avajian, *Department of Psychology, University of Kurdistan, Sanandaj* ■ Present study was carried out in order to investigate the predictability of risk-taking based on delay discounting and prospective memory. The study conducted via quantitative methodological approach in a descriptive procedure among healthy individuals. Samples of research included 100 female and male MA/BA students (53 males and 47 females), aged 18 to 35, who were selected through summon and screening. All participants were tested using computerized Delay Discounting Task, Balloon Analogue Risk Task, and Prospective Memory Task. Statistical analysis with Pearson's Correlation and Regression Analysis showed a significant correlation between delay discounting and risk-taking, and a significant negative correlation between prospective memory and risk-taking. Likewise, delay discounting and prospective memory significantly predicted participants' risk-taking. Therefore, it seems that delay discounting and prospective memory are two main factors that play role in predicting risk taking behavior. The temporal processing are common in the two predicting variable and further investigation of their shared neurocognitive basis are worth considering in the future.

P132 Comparing immediate serial recall and immediate serial recognition. Chrissy M. Chubala, *Memorial University of Newfoundland*, Aimée M. Surprenant, *Memorial University of Newfoundland*, Ian Neath, *Memorial University of Newfoundland* ■ In an immediate serial recall test, participants are presented with a list of items that they must subsequently report back in the original presentation order. Although immediate serial recall is taken as the hallmark of short-term and working memory tasks, a growing body of literature has increasingly made use of immediate serial recognition. In immediate serial recognition, a list of items is presented and subsequently re-presented, either in the exact same order or with two adjacent items in swapped orders. Participants must decide whether the order of the list items was the same or different across the two presentations. Whereas serial recall and serial recognition are often treated as comparable tasks, the relationship between them has not been carefully examined. We report a series of experiments that directly compare the effects of various manipulations on the two tests. We demonstrate that serial recall, but not serial recognition, is susceptible to word frequency and semantic relatedness effects. In contrast, both tests are similarly affected by word concreteness and phonological similarity. We consider theoretical and methodological implications of these findings and propose that immediate serial recognition shares some elements of both immediate serial recall and standard (non-serial) recognition tasks.

P133 The Role of Distinctiveness in the Word-Frequency Effect in Recognition: Evidence from Orthographic Neighbourhood Size. Hannah V. Willoughby, *Memorial University of Newfoundland*, Tyler M. Ensor, *Memorial University of Newfoundland*, Dominic Guitard, *Université de Moncton*, Aimée M. Surprenant, *Memorial University of Newfoundland* ■ It has been demonstrated many times that recognition memory for low-frequency words is better than for high-frequency words. This advantage typically manifests as a mirror effect, with a higher hit rate and lower false-alarm rate to low-frequency words than high-frequency words (Glanzer & Adams, 1985). However, in most studies on the word-frequency effect, the number of orthographic neighbours of the words in the stimulus pool has not been controlled. In two experiments, we crossed high- and low-frequency words with large- and small-neighbourhood words to examine the relative effect of each stimulus property on recognition memory. Both experiments produced the standard word-frequency mirror effect. More interesting was the finding that word frequency interacted with neighbourhood size for analyses on false-alarm rates and response bias: The typical low-frequency advantage on false alarms was attenuated for small neighbourhood probes, and response bias was more liberal for high-frequency words than low-frequency words in the small neighbourhood. The results suggest important boundary conditions on the word-frequency mirror effect.

P134 The role of lexical representations in the Hebb repetition effect. René-Pierre Sonier, *Université de Moncton*, Dominic Guitar, *Université de Moncton*, Jean Saint-Aubin, *Université de Moncton* ■ In an immediate serial recall task, when one list of items is repeated over the course of the experiment, recall performance improves. This phenomenon, known as the Hebb repetition effect (Hebb, 1961), is considered an experimental analogue to language learning. Our objective was to investigate the impact of lexical processes on language learning by manipulating orthographic neighbours, which refers to two items that share all letters at the same position, but one. Thirty-two participants made a written recall of 38 lists of 6 non-words, with one list being repeated every three trials. In the control group, the same repeated items were used throughout the experiment, while in the experimental group, the sequence of repeated items changed halfway. Each nonword used in the second repeated sequence was an orthographic neighbour of the nonword located at the same serial position in the first repeated sequence. Results revealed the presence of Hebb repetition effect for both the control and the experimental groups. Most importantly, recall performance at the first block of the second repeated sequence was significantly higher than recall performance at the first block of the first repeated sequence. Implications for models linking the Hebb repetition effect to word-form learning are discussed.

P135 Selective attention at encoding impacts memory representation. Sagana Vijayarajah, *University of Toronto*, Margaret Schlichting, *University of Toronto* ■ Despite extensive evidence that attention influences memory, the specific nature of this influence is unclear. Paradoxically, previous research has shown better memory when participants attend to both semantic and perceptual information at encoding. Here, we examine whether these different types of attention impact the degree to which memories are maintained as precise vs. integrated into related experiences. During incidental encoding, participants viewed blocks of illustrations varying in semantic (story) and perceptual (artist) features while searching for either story or artist repeats (1-back) across blocks. Participants then completed a surprise memory test for all illustrations. One-back results revealed accurate detection of repeats in both semantic and perceptual dimensions. In the memory test, participants had better performance on fillerillustrations encoded during semantic vs. perceptual attention blocks. However, memory for targetor repeat illustrations showed the opposite

pattern: Perceptual attention was associated with greater hits during the memory test, suggesting that perceptual attention at encoding may support later mnemonic precision for behaviour-relevant information. In contrast, semantic attention was associated with greater subsequent false alarms to semantic lures, consistent with integration of repeats into existing semantic networks. Our findings highlight that selective attention to different types of information constrains memory representation.

P136 Conducting Research, Fast and Slow: The Importance of Valuing Scientific Process over Scientific Products. Heath Matheson, *University of Northern British Columbia*, Jon Fawcett, *Memorial University* ∎ Universities increasingly behave as firms encouraging the rapid production of marketable knowledge on topics likely to garner scientific or public attention. Productivity is maximized within this system in part by a production-based incentive structure valuing "success" above all else. This leads to punchy but methodologically questionable projects that serve as a form of scientific theatre intended to emulate scientific progress rather than ensure it. To overcome this issue, we call for a shift away from metrics based on scientific products (e.g., citations or impact) towards a system that places a greater emphasis on scientific process (e.g., identifying falsifiable questions, use of appropriate methods, adequate power). We believe that this shift will require a commitment to conducting research in a more thorough manner than has been popular in recent decades. Because conducting rigorous work without widespread support would place junior researchers at a disadvantage, we expect change to come gradually. Nonetheless, so long as product-based metrics are used to gauge scientific merit, poor research practices will be incentivized.

P137 A preliminary exploration of media-multitasking and executive functioning in pre-adolescent children. Anna Law, *Liverpool John Moores University*, Anne-Marie Adams, *Liverpool John Moores University*, Fiona Simmons, *Liverpool John Moores University*, Rachel Hagan, *Liverpool John Moores University* ∎ Media-multitasking involves engagement with information streams from multiple media at the same time. Although media-multitasking and its correlates have been studied extensively in adolescents and adults, its prevalence and correlates in pre-adolescents have received less empirical scrutiny. We used a questionnaire measure of media-multitasking to ascertain the level of media-multitasking in pre-adolescent children via parental reports, whilst also testing children's executive functions, specifically task-switching and inhibition, using the Delis-Kaplan Executive Function System. Concurrent relationships between media-multitasking and executive functioning were analysed in a sample of 51 children aged 8 to 11 years. Media multitasking was quantified using the Media-multitasking Index (MMI) (Ophir et al., 2009), however, this score, while producing a spread of values and a normal distribution, correlated very weakly (and non-significantly) with executive function measures. The executive function measures were also not related to total hours of engagement with media, although time spent playing video games was positively associated with inhibition scores. Future studies may wish to explore other potential correlates of MMI or use observational methods to quantify media-multitasking behaviour in pre-adolescents.

P138 Meta-Reasoning, calibration, accuracy, and error awareness. Daniel Geary, *University of Saskatchewan*, Valerie A. Thompson, *University of Saskatchewan* ∎ Meta-Reasoning describes the specific processes which oversee and manage the advancement of one's reasoning and problem-solving actions, as well as controlling and organizing the level of exertion and time given to them. The nascent framework for Meta-reasoning proposes that one's monitoring judgments (and the subsequent allocation of time and effort) are mediated by cues not always well calibrated with accuracy. We tested this claim by investigating if calibration accuracy is different for two distinct

proposed monitoring processes within the Meta-reasoning framework in the context of conditional reasoning tasks: The feeling of rightness (FOR), which is the degree to which the first solution that comes to mind feels right; and The feeling of error (FOE) which is the subjective experience that something went wrong during a reasoning or calculation task.

P139 When the smoke clears: Chronic cannabis use and spatial memory performance. James Donovan, *Nipissing University* ■ The association between spatial working memory (SWM) and chronic cannabis use is mixed and varies as a function of cannabis use intensity. Personal characteristics, such as pre-existing intelligence levels, may moderate the effects of cannabis. This study investigates how SWM and its components (working memory and spatial processing) are associated with chronic cannabis use and various potential covariates of interest. Seventy participants (42 cannabis-users) provided demographic information, past and current cannabis use information, completed proxy measures of crystallized (NAART) and fluid (Digit-Symbol Substitution task) intelligence, and performed computer-based assessments of working memory (digit span), spatial processing (mental rotation) and SWM (CORSI) capacity. We tested for group differences and associations with the intensity of cannabis use. Cannabis-users performed as well as non-users on SWM, working memory, and spatial processing. Although cannabis-users reported more mental illnesses than non-users, they generated comparable scores in our proxy measures of intelligence. SWM, working memory, and spatial processing performance were unrelated to intelligence and mental illness. Unexpectedly, task scores were unrelated to degree of cannabis use. Our study suggests that chronic-cannabis use does not definitively lead to deficits in SWM. Future investigations are needed to examine the link between cannabis use and people's cognitive functioning.

P140 Synthetic Estrogen and Cognition: Does Time of Oral Contraceptive Pill Ingestion Affect Working Memory? Laura Gravelsins, *University of Toronto*, Ava Ma Bon DaSousa, *University of Toronto*, Clara McNamee, *University of Toronto*, Karla Machlab, *University of Toronto*, Katherine Duncan, *University of Toronto*, Gillian Einstein, *University of Toronto* ■ The main estrogen produced by the ovaries, 17-beta estradiol (E2), plays a key role in cognition. Whether synthetic estrogens act in the brain remains largely unknown. Studying women taking hormonal birth control presents an opportunity to examine whether synthetic estrogen affects memory in a young population. Plasma concentrations of ethinylestradiol (EE), the main synthetic estrogen in oral contraceptives (OCs), typically peak 1-2 hours after pill ingestion. No study has considered the pharmacokinetics of EE when investigating cognition in OC users. By accounting for time of pill ingestion, the current study aims to characterize the effects of EE on working memory (WM) in women taking combined OCs as compared to normally cycling (NC) controls. OC users were tested at a peak EE state 1-2 hours after pill ingestion, and at a low EE state just before pill ingestion. NC controls were tested at a low and high E2 menstrual cycle phase. No difference in WM performance was found between OC and NC women, however performance was sensitive to estrogen condition. NC women had better WM performance in the low E2 phase than the high E2 phase, while OC women showed the opposite pattern. These data suggest active OC use affects WM.

P141 Schema Violation In Images: Does Violating Sexuality Have A Cognitive Impact? Krista Piper, *Laurentian University*, Denis Vaillancourt, *Laurentian University*, Emalie Hendel, *Laurentian University*, Matthew Schurr, *Laurentian University*, Joel Dickinson, *Laurentian University* ■ The purpose of the current study was to evaluate the cognitive impact of schema violation in images depicting romantic relationships between gay, lesbian, and straight couples. This study specifically evaluated the difference that occurs when processing

sexuality schema violation in images opposed to processing sexuality schema violation in language. In addition, this study also analyzed whether metacognitive monitoring has an influence on attribute ratings of likeability when schemas are fluent and congruent or disfluent and incongruent. While it was hypothesized that there would be delayed reaction times for gay and lesbian images in incongruent schema trials, with these trials also yielding the lowest ratings on the likeability scale, as consistent with prior sexuality schema violation studies using language as stimuli, the results demonstrated the opposite. Overall it was found that sexuality schema violation using images as stimuli are not processed in the same way as sexuality schema violations using language as stimuli, as well, there is no accompanying metacognitive monitoring process.

P142 Undergraduate's Perceptions towards Psychology as a Science: Differentiating explicit responses from implicit associations. Demi Plagianakos, *Carleton University*, Lindsay Morgan, *Carleton University*, Guy Lacroix, *Carleton University* ■ People are generally skeptical of psychology's status as a science (See Lilienfeld, 2010). Researchers have examined psychology's scientific image primarily by employing explicit measures (Friedrich, 1996; Leong & Zachar, 1991). Thus, the present study aimed to explore whether such perceptions can similarly be observed at an implicit level. To achieve this goal, a go/no-go lexical decision task was adopted (See Perea, Rosa, & Gomez, 2002). Preliminary results suggest that first year psychology students did not implicitly associate science with psychology to the same degree as they did with physics and biology. Moreover, participants were significantly slower to respond to trials in which psychology was paired with methodological terminology (e.g., analysis, experiment, hypothesis, and observation) compared to when the hard sciences were paired with this terminology. These results suggest that implicitly, psychology is not as strongly associated with science as the natural sciences are. Additional analysis that compare first year psychology students and fourth year psychology majorsresponses will determine whether these implicit associations change over time with greater exposure to psychological research.

P143 Early Orthographic Knowledge. Derrick Bourassa, *University of Winnipeg*, Keaden Shebaylo, *University of Winnipeg* ■ An important aspect of spelling development involves sensitivity to orthographic patterns (i.e., permissible letter sequences) that exist in the English language. However, there have been relatively few detailed analyses of children's sensitivity to these regularities, particularly among beginning spellers. The present study examined first gradersknowledge of a variety of rudimentary and context-specific orthographic patterns. Analyses revealed considerable individual differences in both overall sensitivity and sensitivity to particular types of spellings. Theoretical and practical implications of these findings are discussed.

P144 The impact of two attention-orienting strategies on word recognition and vocabulary acquisition in pre-readers during shared book reading. Annie Roy-Charland, *Université de Moncton*, Mélanie Perron, *Laurentian University*, Joannie Quenneville, *Laurentian University* ■ The current study examined the effect of pointing to words or to illustrations on receptive vocabulary acquisition and word reading when pre-readers were exposed to three books containing frequent and non-frequent target words. For each condition (when the words were pointed, when the illustrations were pointed and a neutral condition when no intervention was done), children were exposed to one book. Receptive vocabulary and word reading measures were administered. Eye movement measures showed that participants spent more time on the illustrations but spent more time on the object when it was pointed and more time on the word when it was pointed. No children read any of the target words. For all children, illustrations corresponding to frequent words were

recognized with a greater accuracy than non-frequent words. When children were exposed to the non-frequent words, the corresponding illustrations were recognized with greater accuracy when they were pointed.

P145 Concreteness in Explicit vs. Implicit Tasks in Deep Dyslexia. Simritpal Malhi, *University of Windsor*, Tara McAuley, *University of Windsor*, Brette Lansue, *University of Windsor*, Lori Buchanan, *University of Windsor* ■ The objective of this study was to test the failure of inhibition theory (FIT; Buchanan et al., 2003) using concrete and abstract stimuli. FIT proposes that deep dyslexia impairs performance on tasks that explicitly involve phonological output, whereas performance on implicit tasks of comprehension not requiring phonological output is spared. We predicted that on the explicit task (i.e., word reading), a deep dyslexic (GL) would be impaired in reading aloud abstract words. However, on the implicit task (i.e., concrete categorization), we predicted that GL would demonstrate concreteness effects that are observed in controls. On the word reading task, there were no differences in accuracy between concrete (14.6%) and abstract (20.2%) words, $\chi(1)=1.07$, $p=.38$, $\varphi=-.11$. While GL was not impaired in reading aloud abstract words per se, he still made characteristic reading errors, suggesting inefficiencies in phonological output. On the concrete categorization task, GL made more errors when categorizing abstract (21.1%) than concrete (6.7%) words, $\chi(1)=9.36$, $p=.004$, $\varphi=.32$. GL was also slower to make correct responses for abstract ($M=10580.04$, $SD=5527.41$) over concrete ($M=4871.15$, $SD=5729.73$) words, $t(63)=-3.99$, $p<.0001$, showing concreteness effects consistent with controls, suggesting intact comprehension. Overall, the results of this study provide support for FIT.

P146 Are math games helping or hurting flexible mathematical thinking: Testing the role of attention in flexible strategy use. Adam Dubé, *McGill University*, Sabrina Shajeen Alam, *McGill University*, Run Wen, *McGill University*, Chu Xu, *McGill University*, Gulsah Kacmaz, *McGill University* ■ Tablets are rapidly being deployed into elementary mathematics education with the majority of math applications involving gamification (e.g., play a mini-game and then solve addition problems; McEwen & Dubé, 2015). Unfortunately, the effortful, split-second responses found in many math games may be so cognitively taxing that children have insufficient attentional resources remaining to think flexibly about mathematics. This argument is founded on Siegler and Araya's (2005) theory that flexible strategy use requires and draws upon attentional resources, which has not been empirically tested. In the present study, adults (n = 80) solved 160 math problems (e.g., a x b □ b) with their strategy use and solution latencies being measured. They then completed a Flanker task to assess attentional resource depletion. Cluster analyses identified good (m = 2ms difference between congruent and incongruent trials), weak (89ms), and poor (189ms) performers on the Flanker task. Preliminary analyses indicate that all three groups use flexible strategies with equal frequency (~80%), but poor performers solve math problems faster (1179ms) than good ones (1342ms). This suggests that flexible strategy use does tax attention. Subsequent studies will test whether taxing children's attention reduces flexible strategy use and whether math games have the same effect.

P147 Psychometric properties of Mathematics Anxiety Rating Scale/Brief Version. Bob Uttl, *Mount Royal University*, Bethan McBreen, *Mount Royal University*, Anne Tseu, *Mount Royal University* ■ Mathematical anxiety is anxiety about one's ability to understand and to do mathematics. Suinn and Winston (2003) shortened the Mathematics Anxiety Rating Scale (MARS) to a new 30-item Mathematics Anxiety Rating Scale/Brief Version (MARS/B). To examine psychometric properties of this scale, we administered MARS/B to a large sample of nearly four hundred undergraduate students and conducted a number of psychometric analyses

including reliability, validity, factor, and item analyses. Our results show that MARS/B has excellent reliability, validity, factor structure, and well-performing items.

P148 WITHDRAWN

P149 Capitalizing on variability in bilingual language experience: Language entropy predicts L2 abilities and brain organization. Jason Gullifer, *McGill University & The Centre for Research on Brain, Language and Music*, Debra Titone, *McGill University & The Centre for Research on Brain, Language and Music* ■ Bilinguals vary widely in their usage of language within and across social contexts, which has consequences for language and executive control. Theoretical and empirical studies in the neurocognition of bilingualism attempt to capture this variability, but there remains a focus on static measures of language experience (second language [L2] age of acquisition [AoA]) and on one-dimensional measures of current experience (L2 exposure). This focus may fail to capture the full range of bilingual language experience. Drawing on insights from information theory, we propose an innovative measure of current language experience. We formalize bilingual language diversity using Shannon entropy, a classic measure of uncertainty. Entropy continuously characterizes language diversity among social contexts on a continuum from compartmentalized (i.e., single language usage, low entropy / diversity) to integrated usage (i.e., balanced language usage, high entropy / diversity). On a large sample of bilinguals (N=507), we show that entropy relates to classic measures of experience: entropy is weakly associated with early AoA and strongly associated with overall L2 exposure. Crucially, entropy is a significant predictor of L2 abilities and of functional brain networks over and above classic measures, indicative of its utility as a measure of bilingual experience (Gullifer et al., in press).

P150 Looking v. Seeing: Unexpectedly Poor Spellers Look as Much But See Less. Tru Kwong, *Mount Royal University*, Jaimey Hintz, *Mount Royal University* ■ One prevailing theory for why good readers can be poor spellers is that they may read by looking only at partial cues, limiting their exposure to each of the letters (and the letter order) for a word. We have previously shown that unexpectedly poor spellers can achieve the same accuracy on orthographic matching tasks as do good spellers only by sacrificing speed and exhibiting longer reaction times (Kwong, Desjarlais, & Duffy, 2013; Kwong & Joseph, 2016). In this study, we tracked participantseye movements as they completed orthographic matching tasks that included both words and nonwords. Poorer spellers spent the same amount of time on the tasks as did better spellers and spent just as much time focused on the letter strings presented. However, by maintaining speed comparable to that of better spellers, the unexpectedly poor spellers sacrificed accuracy. Specifically, they failed to detect differences in letter strings, particularly when a presented pair included a real word. Good spellers were better able to detect these differences. This supports the idea that unexpectedly poor spellers are processing only partial cues, and further suggests that they are likely giving the task as much time and attention as are good spellers.

Thursday, July 5

Poster Session 2

P201 Individual Differences in Executive Control and Language Background Modulate Cross-Language Syntactic Activation During Bilingual Reading. Naomi Vingron, *McGill University*, Pauline Palma, *McGill University*, Jason Gullifer, *McGill University*, Veronica Whitford, *University of Texas at El Paso*, Deanna Friesen, *University of Western Ontario*, Debra Jared, *University of Western Ontario,*Debra Titone, *McGill University* ■ A bilingual's languages are active to some degree during reading creating cross-language competition (Schwartz & Kroll, 2006; Libben & Titone, 2009). However, less work has examined how bilingual

processing is modulated by language experience and executive control at a syntactic level. We thus investigated this issue using constructions that mismatch across English and French. English exclusively places adjectives before nouns (the red truck), whereas French typically places adjectives after nouns (le camion rouge). Similarly, the direct-object follows the verb in English (I miss her) but the direct-object precedes the verb in French (Elle me manque). We monitored eye movements of French-English bilinguals as they read intact English sentences or English sentences containing violations consistent/inconsistent with French (The truck red was parked on the street. vs. Red the truck was parked on the street; He it needs vs. Needs he it.). Interestingly, cross-language activation for adjective-noun constructions was generally strong and modulated by language experience but not executive control. In contrast, cross-language activation was less pronounced for pronoun constructions and modulated by executive control but not language experience. Thus, it appears that cross-language activation of syntactic constructions occurs to some degree during reading but not comparably for all syntactic constructions.

P202 Applying the Generalized Context Model to Text Classification. Matthew Cook, *University of Manitoba*, Randall Jamieson, *University of Manitoba* ∎ The generalized context model (GCM) presents a tested and sophisticated account of human classification behaviour. However, the method has typically been presented in relation to simple perceptual classification. We extend the GCM method to the problem of complex text classification. To make the case, we collected written essays by undergraduates with and without depression, developed vector-based semantic representations of the essays, and show that the GCM can perform adequate exemplar-based classification of depression from text sentiment. We discuss our results in relation to Brooks and Norman's exemplar-based theory of medical diagnosis and argue in favour of developing psychological methods for machine learning and analysis.

P203 Investigating factors that influence the interpretation of ambiguous phrases as literal or sarcastic. Ruth Filik, *University of Nottingham*, Christina Ralph-Nearman, *Laureate Institute for Brain Research*, Rachel Giora, *Tel Aviv University* ∎ We investigated factors influencing whether an ambiguous statement receives a literal or sarcastic interpretation. In Experiment 1, participants rated positive ("It was so interesting") or negative ("It was so boring") ambiguous utterances in terms of how sarcastic they sounded. Comments were accompanied by a full stop, wink, or ellipsis (""). Utterances were rated as most sarcastic when accompanied by a wink, less sarcastic with an ellipsis, and least sarcastic with a full stop. Sarcasm rating scores were positively correlated with participantsself-reported levels of sarcasm use and tendency to use indirect aggression, and were negatively correlated with participant age. In Experiment 2, participants provided sarcasm ratings for negative phrases mitigating a highly positive concept (e.g., "He's not the best lawyer"). Overall, participants judged materials as being sarcastic. Results across both experiments showed a negative correlation between participant age and self-reported use of sarcasm, which would concur with the finding (in Experiment 1) that the tendency to interpret ambiguous materials sarcastically was negatively correlated with age. In general, results would indicate that a broad range of factors (both text-based and perceiver-based) can influence the sense of sarcasm that is experienced when reading ambiguous stimuli, offering support for constraint-satisfaction approaches.

P204 Concreteness and Semantic Neighbours in a Lexical Decision Task. Simritpal Malhi, *University of Windsor*, Lori Buchanan, *University of Windsor* ∎ Previous research (Malhi & Buchanan, 2018) revealed effects of reverse concreteness, semantic neighbourhood, and iconicity in semantic relatedness and iconicity tasks. In that study, abstract words were processed faster than concrete

words, close neighbours were associated with shorter RTs than distant neighbours in the semantic relatedness task, and iconic word pairs had shorter RTs than reverse-iconic word pairs in the iconicity task. Consistent with the symbol interdependency hypothesis (Louwerse, 2007), the symbolic factor (e.g., semantic neighbours) was recruited in a task that taps symbolic relations (e.g., semantic relatedness task) and the embodied factor (e.g., iconicity) was recruited in a task that taps embodied relations (e.g., iconicity task). The present study used a shallow task (i.e., lexical decision task; LDT) and hypothesized that the reverse concreteness effect would disappear. As LDTs tap symbolic relations, not embodied relations, the present study also hypothesized that only the symbolic factor would be recruited. Participants (N=25) determined whether word pairs were real or nonword pairs. Consistent with hypotheses, results found no main effect of concreteness or iconicity, but a main effect of semantic neighbours [b = -.083, t(75.69) = -3.25, p = .0017], with close neighbours yielding shorter RTs.

P205 Semantic priming of reading aloud and lexical decision by visual processing stream: Exploring semantic engagement through manipulation of stimulus quality and foil-type. Josh Neudorf, *University of Saskatchewan*, Chelsea Ekstrand, *University of Saskatchewan*, Shaylyn Kress, *University of Saskatchewan*, Alexandra Neufeldt, *University of Saskatchewan*, Ron Borowsky, *University of Saskatchewan* ■ Converging evidence supports a distributed-plus-hub view of semantic processing, in which there are distributed modular semantic sub-systems connected to an amodal semantic hub. Furthermore, object semantic processing of colour and shape, and lexical reading/decision, are processed mainly along the ventral stream, while action semantic processing, and phonetic decoding, occur mainly along the dorsal stream. In four experiments, participants read prime words that required imagining either the object or action referent. In Experiment 1, they then named a lexical word target or sublexical pseudohomophone (PH) target. In Experiment 2, targets were degraded by decreasing the contrast to examine processing at the encoding level. Experiments 3 and 4 were lexical decision tasks (LDTs) using the same primes and target words with either legal nonword or PH foils. In general, object priming produced faster reaction times for word targets than action priming, reflecting the degree of shared-stream processing between imagined object primes and word targets. These priming effects were similar in size within each type of target, reflecting the degree of amodal priming, and across stimulus quality thus ruling out encoding as locus for effects. These experiments extend the distributed-plus-hub model, and provide a novel paradigm for further research.

P206 A scan of the mathematics educational apps in the App Store: What information are developers providing to parents? Adam Dubé, *McGill University*, Run Wen, *McGill University*, Gulsah Kacmaz, *McGill University*, Chu Xu, *McGill University*, Sabrina Shajeen Alam, *McGill University* ■ There are over 80,000 educational apps in the iTunes App Store (Hirsh-Pasek, et al., 2015) with math apps accounting for the greatest number of subject-specific apps (Shuler, 2012). Despite this popularity, little is known about how math apps are described in the App Store. The present study surveys the math apps in the App Store to examine how developers are marketing them to parents and how parents are selecting apps. We did a search for mathin the education category and selected the top 10 apps from within each of the 3 filters provided by Apple (Relevance, Popularity, Rating) and for each of the 3 child categories (0-5, 6-8, 9-11). This resulted in 73 unique apps. The written descriptions for each app were then coded to cover basic information (e.g., price, file-size), educational content (e.g., math subject, development team, learning theory) and user ratings. There was a surprising dearth of information. Only 20% of apps detailed their curriculum focus, only 30% explained if math educators were part of the development team, and fewer than 6% of the apps describe the

pedagogical approach. Developers of topmath apps are not providing enough information for parents to make an informed choice.

P207 Understanding the impact of parental math anxiety on the homework helping environment. Michela DiStefano, *University of Ottawa*, Bronwyn O'Brien, Erin Maloney ■ Previous research has demonstrated that when parents are high in math anxiety, and they frequently help their children with their math homework, their children learn less math over the course of the school-year and they develop increased math anxiety themselves (Maloney et al., 2015). In this study, we investigate how parents' perception of the mathematics homework environment varies as a function of their own anxiety about mathematics. Parents of children in grades 4-6 answered an online questionnaire about their attitudes and beliefs towards math and math homework. Higher-math-anxious parents report experiencing negative emotions (e.g., anxiety, lower confidence, lower enjoyment) when helping their young children with their math homework, yet they report feeling less comfortable seeking help when they do not understand their child's math homework and report spending more time helping their children with their math homework than do lower-math-anxious parents. Higher-math-anxious parents also report lower expectations for their children in mathematics and report valuing their children's success in mathematics less than lower-math-anxious parents. These results, while correlational, provide some insight into potential mechanisms by which parents' math anxiety may impact their children's math learning and attitudes.

P208 Preschoolers use helpful and harmful interactions to predict membership in familiar social category membership. Jessica Switzer, *University of Calgary*, Valerie San Juan, *University of Calgary*, Susan Graham, *University of Calgary* ■ This study examined whether 4- and 5-year-olds: (1) infer the category membership of a character based on the social interactions between that character and a known member of a familiar social category; and (2) use these familiar categories to guide inductive inferences about social conventions. Children were introduced to two familiar social categories (singers and dancers) that each followed a distinct social convention (bake cake for parties vs. bake cookies for parties). During test trials, children witnessed members from each familiar category perform different social actions (harmful, helpful, neutral) towards a series of novel test characters. After each action, children were asked a categorization and generalization question about the newly identified character. Results suggest that children use harmful actions, but not helpful actions, to predict category membership with familiar categories. Once children identify category membership on the basis of harmful actions, children extend social conventions to the new member of the category. These results support the theory that social categories mark social obligations, such that members of the same social category are obligated to protect, not harm one another. Unlike novel social categories, children expect members of familiar categories to help members of their ingroup and outgroup equally as often.

P209 Pattern classification reveals developmental differences in how memories influence new learning. Margaret Schlichting, *University of Toronto*, Katharine Guarino, *Loyola University Chicago*, Hannah Roome, *The University of Texas at Austin*, Alison Preston, *The University of Texas at Austin* ■ Recent studies suggest that the ability to combine multiple memories to make new choices emerges gradually with development; however, the mechanistic changes that underlie this shift remain unknown. We hypothesized that this reduced memory flexibility in children is partially due to their inability to retrieve and link existing memories to new information during encoding. Here, 7- to 30-year-old participants studied overlapping AB and BC associations across three repetitions during functional MRI. We used multi-voxel pattern analysis to measure reactivation of related (C) memories across AB study repetitions. Adults

showed sustained reactivation of related content through the third repetition, while children show no reactivation at all. Interestingly, both younger and older adolescents showed an intermediate pattern, with initial reactivation followed by decreases as learning continued. The relationship between reactivation and behavioural flexibility—specifically, the ability to link indirectly related A and C items—also changed with age, with sustained reactivation being associated with slower performance early and speeded performance later in development. These results suggest developmental differences in the tendency to bring to mind related knowledge during new events, which may yield important differences in memory representation continuing through adolescence—despite adult-like memory behaviour having already been reached.

P210 Adolescents Circadian Rhythms: The Relation Between Sleep and Eating Behaviours and Cognitive Performance. Jillian Cleary, *Memorial University of Newfoundland*, Leanna Lewis, *Memorial University of Newfoundland*, Kayla Wall, *Memorial University of Newfoundland*, Abby Robbins, *Memorial University of Newfoundland*, Christina Thorpe, *Memorial University of Newfoundland* ■ Recent research has shown the importance of circadian rhythmicity for optimal cognitive and health function. Given that the majority of this research has been conducted with adults, we chose to examine whether adolescents were susceptible to circadian rhythm disruption. Specifically, we investigated the relation between circadian rhythm disruption and hippocampal dependent memory. Adolescents aged 13-16 participated in two sessions. In the first session participants completed the Pittsburgh Sleep Quality Index Questionnaire (PSQI), Morningness-Eveningness Questionnaire (MEQ), Cleveland Adolescent Sleepiness Questionnaire (CASQ) and the Perceived Stress Scale (PSS) and a hippocampal dependent cognitive task. For the following 10 days participants wore an actigraphy watch to monitor sleep and activity and completed a sleep diary, food diary, activity diary and electronic use dairy. In the second session participants again completed the cognitive task. There was a significant relationship between circadian rhythmicity (e.g., variability in meal times) and performance in the cognitive task. These findings suggest that circadian rhythmicity is also important in adolescents and that regular meal times may be beneficial in memory performance in adolescence.

P211 Investigating the limits of essentialism in chimpanzees (Pan troglodytes). Michael McWhirter, *Memorial University of Newfoundland*, Carla Krachun, *University of Saskatchewan*, Robert Lurz, *Brooklyn College, CUNY*, William Hopkins, *Georgia State University; Yerkes National Primate Research Center* ■ Psychological essentialism is the ability to recognize that the class or kind to which an object belongs does not alter with changes in its surface features. Likewise, changes to an object's essence can occur without changes in its outward appearance. This study examined the limits of psychological essentialism in chimpanzees. In two tests using an object-choice paradigm, chimpanzees needed to recognize that what was initially a preferred kind of item (half orange) had been altered in its essence to become a non-preferred kind of item (orange peel), although its outward appearance had not changed. In one test (the non-occluder test), chimpanzees behaved as basic essentialists by rejecting a faux half orange (orange peel) in favor of an unaltered quarter orange. However, in a second test designed to rule out visual tracking of the preferred item (the occluder test), chimpanzees did not behave in accordance with an essentialist orientation. Thus, we found no evidence that chimpanzeesessentialist reasoning extends beyond the simple ability to track objects through observed transformations. Further research aimed at specifying the limits of essentialism in chimpanzees can inform debates about the phylogenetics of essentialism and the role of language in its development and/or expression.

P212 Investigating a possible relationship between

self-awareness and theory of mind in chimpanzees (Pan troglodytes). Carla Krachun, *University of Saskatchewan*, Robert Lurz, *Brooklyn College, CUNY*, Lindsay Mahovetz, *Georgia State University*, William D. Hopkins, *Georgia State University and the Yerkes National Primate Research Center* ■ Gordon Gallup and others have long theorized that self-awareness evolved in our primate ancestors because it allowed individuals to use their own experience as a model for understanding others, including othersmental states. In this study, we investigated a possible relationship between self-awareness and mental-state understanding (called theory of mind, ToM) in our closest evolutionary relative, the chimpanzee. To measure self-awareness, we used a classic mirror self-recognition (MSR) test developed by Gallup. Chimpanzees were categorized as pass,failor intermediatebased upon their frequency of self-directed behaviours while looking in the mirror. We then compared chimpanzeesMSR performance to their performance on three simple ToM tests: perspective taking (N=22), imitation recognition (N=42), and a social-cognition test derived from the Primate Cognition Test Battery (N=82). MSR was found to be moderately positively correlated with perspective taking in chimpanzees (Spearman's r=.460, p=.031). Additionally, chimpanzees that passed the MSR test showed significantly greater signs of imitation-recognition on two separate measures than those that failed or were intermediate on MSR (p=.022; p=.004). Finally, chimpanzees that passed the MSR test had significantly higher social-cognition scores than chimpanzees in both other MSR categories (p=.017). Our findings provide initial support for Gallup's longstanding but previously untested theory.

P213 The effect of eccentricity on event related potentials in a lateralized detection task. Pénélope Pelland-Goulet, *Université de Montréal*, Martin Arguin, *Université de Montréal*, Pierre Jolicoeur, *Université de Montréal* ■ Recent ERP research focusing on the N2pc (an ERP component that is thought to reflect attentional allocation) mostly relies on simple abstract targets, such as colored geometric shapes. In this project, we assessed the difference in N2pc amplitude in a modified Posner cueing task using an endogenous (symbolic) cue composed of a central cue indicating which letter to report, and a series of 4 horizontally aligned random letters, 2 of them near the fixation point but still lateralized, and 2 of them being more eccentric, appearing in rapid and random order, during 33ms each, over a period of 150ms. The task was to report the cued letter. The total spatial extend of the 4 letters spanned 0,4 x 1,5 degrees of visual angle. The goal was to determine whether N2pc could be used to distinguish spatial locations that were finely spaced, and thus be potentially useful in studies of attention during reading. Report accuracy was very high (93%), and the N2pc was larger for the target stimuli that were closer to the central fixation point than for peripheric targets. The results suggest that posterior event-related lateralized potentials can track endogenous cueing effects within relatively small region around fixation.

P214 Repetition Suppression of Face Images among Adults with High and Low Characteristics of Autism Spectrum Conditions: ERP and RTs Results. Ahmad Sohrabi, *Carleton Cognitive Modeling Lab and University of Kurdistan*, Somayeh Maleki, *University of Kurdistan*, Parastoo Kordestani Moghadam, *Lorestan University of Medical Science* ■ In this study aimed to investigate the face repetition suppression in adults with high and low autistic characteristics and the intermediating effect of inter-stimuli interval. Previous studies have employed fMRI that has a higher spatial but lower temporal resolution compared with EEG. Here, a convenient sample of 30 male university students were asked to fill autism quotients and do computerized face repetition task while undergo EEG recordings. There were three conditions: Face priming face target, shape priming shape target, and mixed face and shapes, as prime and target. Both behavioural (faster RTs in congruent repeated

stimuli) and ERP data (lack of N2 component) revealed less repetition suppression among high autistic characteristics compared to low ones. However, the repetition suppression effects occurred only when target followed the prime by less than 100 milliseconds not after 200 milliseconds, an effect well known in attentional blink and masked priming. We assume that less repetition suppression among high autistic characteristics compared to low, might be due to higher brain resources resulted from less neuronal pruning in the former group, mentioned in previous developmental studies.

P215 Resting state network functional connectivity and the Five-Facet Mindfulness Questionnaire (FFMQ). Tracie Parkinson, *University of Manitoba*, Jennifer Kornelsen, *University of Manitoba*, Stephen Smith, *University of Winnipeg* ■ Mindfulness has been described as an orientation of attention to the present moment, with openness, and compassion. Mindfulness is commonly practiced to enhance personal well-being and may refer to a transient experience (state mindfulness) or a more permanent personality attribute (trait mindfulness). Neuroimaging techniques have been used to gain insights into the neural substrates of mindfulness. Our study examined whether differential patterns of neural functional connectivity (FC) could explain individual differences on a measure of trait mindfulness, the Five-Facet Mindfulness Questionnaire (FFMQ). Twenty-eight undergraduate students completed the FFMQ prior to entering an MRI scanner. After undergoing a structural MRI scan, participants completed a seven-minute resting-state functional MRI scan. Resting-state data were analyzed using independent-component analysis (ICA), which allowed us to identify regions of correlated FC in resting-state networks. When examining the default mode network, we found that trait mindfulness positively correlated with FC in the right anterior cingulate cortex and negatively correlated with FC in the middle temporal gyri and right superior frontal gyrus. These regions have been associated with resilience during emotion processing, introspective thought, and mind-wandering. These results provide evidence that elevated trait mindfulness indicates less evaluation of emotional experiences and greater ability to reappraise negative stimuli.

P216 An fMRI investigation of the reproducibility of motor cortex activation for isometric handgrip contractions. Layla Gould, *University of Saskatchewan*, Justin Andrushko, *University of Saskatchewan*, Doug Renshaw, *University of Saskatchewan*, Jon Farthing, *University of Saskatchewan*, Ron Borowsky, *University of Saskatchewan* ■ This study investigated the reproducibility of repeated fMRI scans involving an isometric handgrip task. Three maximal voluntary contractions were acquired followed by three separate scans involving handgrip contractions at sub-maximal intensities. Coefficient of variation was calculated for handgrip MVC force, sub-maximal target forces, number of voxels, and intensity of activation in motor cortex. Between session MVC and sub-maximal handgrip intensities showed reproducibility across the two sessions. For the fMRI activation, two methods were used to compute thresholds: A fixed threshold method, in which the threshold was set to r=0.65, and a novel relative threshold method, in which the threshold was determined by finding the highest threshold before brain activation disappeared and the lowest threshold for which the map was 'clean' then calculating the 50% value between those values. For the number of voxels, the relative threshold method resulted in similar or much better reproducibility across conditions. For intensity, reproducibility was excellent for both methods. These results demonstrate that MVC, sub-maximal intensities, and fMRI activation for handgrip contractions are reproducible across two fMRI sessions. Moreover, the relative method for determining threshold for activation maps resulted in improved reproducibility for number of voxels,

which has implications for studies involving repeated fMRI scans.

P217 ERP Correlates of Feedback Processing in Reward and Error Based Motor Learning. Dimitrios Palidis, *University of Western Ontario*, Joshua Cashaback, *University of Western Ontario*, Paul Gribble, *University of Western Ontario* ■ Adaptation of motor output to changing environments occurs by multiple distinct processes. In sensory error based learning, it is thought that the nervous system predicts the low level sensory consequences of motor commands, and that sensory prediction error (SPE) drives learning when sensory input violates these predictions. In reinforcement learning, it is thought that the brain predicts the subjective value of actions, and that reward prediction error (RPE) drives learning when the outcome value differs from that which is expected. Actions that produce better than expected outcomes are reinforced while actions that produce worse than expected outcomes are deterred. Using EEG, we dissociate the neural correlates of RPE and SPE during two different learning tasks designed to isolate each response. We observed sensory error based learning in a visuomotor rotation task, in which learning occurred in response to altered visuospatial feedback of hand position. In a reward learning task, learning occurred in response to binary reward feedback. We found that a fronto-central event related potential called the feedback related negativity occurred specifically in response to RPE during reward based learning, while a more posterior component called the P300 was modulated by different parameters of feedback in each task.

P218 Investigating the long-term effects of concussion on task-relevant sensory processing. Jake Tennant, *University of Waterloo*, Meaghan Adams, *University of Waterloo*, W. Richard Staines, *University of Waterloo* ■ Previous research suggests that the prefrontal cortex (PFC) may be particularly vulnerable to impairment following a concussion. One of the many functions of the PFC is to filter incoming sensory information based on its relevance to a given task. This investigation sought to determine the consequences of sustaining a concussion on relevancy-based sensory gating at early cortical processing stages. Somatosensory evoked potentials (SEPs) were elicited via median nerve stimulation at the wrist, and measured using electroencephalography (EEG) over the contralateral somatosensory cortex. Participants stimulated wrists were passively moved while they completed tasks that altered the relevance of somatosensory feedback generated by the passive movements. Relative to healthy controls, previously concussed participants demonstrated an impaired ability to facilitate relevant somatosensory information at early cortical processing stages. Additional findings from a wrist position matching task suggest that these effects may result in an early cost to behavioural performance, which quickly adapts to preserve overall sensorimotor function.

P219 Transgenerational effects of stress: impact of pre-weaning maternal behaviour versus epigenetics on offsprings. Audrey Fontaine, *Université Pierre et Marie Curie, Sorbonne University, Paris, France & Department of Psychology Memorial University of Newfoundland, St. John's, Canada*, Sriya Bhattacharya, *Department of Psychology Memorial University of Newfoundland, St. John's, Canada*, Jacqueline Blundell, *Department of Psychology Memorial University of Newfoundland, St. John's, Canada* ■ Introduction: Preconception stress increases anxiety-like behaviours, with significant changes in neuronal connectivity and epigenetic processes. However, the relative contribution of sex, epigenetics and breeding environment on offsprings' anxiety and depressive-like behaviours remains unknown. Methods: We conduct a cross-fostering experiment on a group of mice. Offsprings from stressed and controlled moms are cross-fostered at birth to control or stressed, biologically unrelated, moms. The foster mother feeds and cares for the offspring until weaning. Starting on PND 24, all offsprings undergo a behavioral test

battery to assess anxietyand depression-like behaviors. Results We first analyse the behavior of the foster mum with the offsprings, underlying differences between stressed and control mums. Then we focus on the changes of behaviours of the offsprings at adolescence age (PND24) and at adult age, through the following battery : elevated plus maze, open field, and dark/light box for anxiety-like behaviors ; social interaction test for social anxiety and forced swim test for depression-like behaviors. Conclusion:The results of this work reveals how maternal behavior affects the impact of epigenetic mechanisms on offspring behavioral profiles.

P220 Neural And Behavioural Correlates Of Musician's Natural Frequencies In Music Performance. Anna Zamm, *Department of Psychology, McGill University*, Youyi Wang, *Department of Psychology, McGill University*, Caroline Palmer, *Department of Psychology, McGill University* ■ Many spontaneous human actions, from walking to music performance, are inherently rhythmic. The intrinsic rate at which individuals spontaneously produce these movements, or natural frequency, is thought to represent optimal temporal coordination that is most efficient. Previous studies found most stable and least variable performance at natural (spontaneous) rates relative to other rates. The current study measured behavioral and neural (electroencephalography) responses as musicians performed a simple melody at their spontaneous rate and at faster and slower self-paced rates. Behavioural results confirmed most stable (least variable) performance at spontaneous rates. EEG measures of spectral power at individuals' natural frequencies indicated that higher spectral power was associated with lower temporal variability.

P221 Neural encoding of musical rhythm in older and younger adults. Emily Bolt, *Faculty of Medicine, Memorial University of Newfoundland*, David Fleming, *Memorial University of Newfoundland*, Benjamin Zendel, *Faculty of Medicine, Memorial University of Newfoundland* ■ The perception of musical beat is represented through neural oscillations that match the frequency of the perceived beat. The perception of beat can occur without an explicit stimulus at the time of the beat, such as a syncopated rhythm. Neuroelectric studies show that there are neural oscillations that match the frequency of the perceived beat, regardless of if there is a stimulus at the time of the beat. This suggests that beat can be derived exogenously from the stimulus, or endogenously based on the overall structure of the rhythmic sequence. There is emerging evidence that older adults are better than younger adults at using contextual information (i.e., endogenous) during speech and melody perception tasks, however the impact of age on rhythm perception remains poorly understood. Accordingly, neural oscillations evoked by a syncopated and non-syncopated rhythm were compared between older and younger adults. The amplitude of oscillatory activity at the beat and related frequencies were similar for both age groups when the rhythm was non-syncopated. When the rhythm was syncopated the amplitude of the oscillatory activity was reduced in older adults compared to younger adults. This suggests that aging may reduce the ability to extract contextual information from a syncopated rhythm.

P222 Intergenerational learning of current popular music: Young adults, parents, and non-parents. Annabel Cohen, *University of Prince Edward Island*, Breea MacLean, *University of Prince Edward Island* ■ Knowledge of popular music and listening contexts were examined for 18 young adults (mean 18.5 years, SD 1.29), 18 middle-aged parents (49.5 , 4.03) and 18 middle-aged non-parents (48.2, 4.73) for 25 songs popular over the last 5 decades. For each song, cued by short audio excerpts, participants rated familiarity and identified title, artist, year of popularity, use of playback media (e.g. radio, Internet), and with whom they had listened to the song (listening niche, Krumhansl, 2017). Young adults had significantly highest scores on all 4 knowledge measures for music of the last decade, whereas non-parents had lowest values, although

differences between the 2 middle-aged groups were not significant. However, their listening niches differed significantly: non-parents listened more with their co-workers than did the other 2 groups, parents listened more with family, and young adults listened more with friends. Media use also differed significantly, young adults preferring YouTube, parents, radio, and non-parents, television. All parents reported listening to music with their children who often directed parentsattention to music. In summary, the research provides new evidence of differing listening niches of parent and non-parent cohorts, with implications for acquiring more knowledge of popular music by middle-aged parents compared to non-parents.

P223 Auditory Processing Differences Between Formally Trained and Self-Taught Musicians. Emily Alexander, *Psychology Program, Grenfell Campus, Memorial University of Newfoundland*, Benjamin Zendel, *Faculty of Medicine, Memorial University of Newfoundland* ■ It is well known that musicians have enhanced auditory processing abilities compared to non-musicians. The goal of this research was to examine if self-taught musicians (ST) exhibit similar benefits to formally trained musicians (FT). Three groups of participants were recruited: FT, who received formal music training through a conservatory or private lessons; ST, who learned to play music informally; non-musicians (NM), who had little music experience. Three tasks were used to assess auditory processing abilities: the ability to understand speech in noise; the ability to detect tonal violations in a melody; the ability to automatically detect pitch oddballs while monitoring EEG. FT performed better on all tasks compared to the NM. For the speech-in-noise task, ST performed better than NM, and were similar to the FT. ST were better than NM at detecting a tonal violation in a melody, but were worse than the FT. Automatic processing of pitch deviants was assessed by calculating the amplitude of the mismatch negativity (MMN) evoked by a 25 cent oddball. The amplitude of the MMN was larger in FM compared to both ST and NM. These results suggest that music training type may impact the auditory processing benefits observed in musicians.

P224 Inter-individual differences between action and perception for the habitual subjective vertical. Nils Bury, *Centre for Vision Research, York University, Toronto, Canada; Institute of Physiology and Anatomy, German Sport University Cologne, Germany*, Laurence R. Harris, *Centre for Vision Research, York University, Toronto, Canada*, Otmar Bock, *Institute of Physiology and Anatomy, German Sport University Cologne, Germany* ■ Human spatial orientation is based on the weighting of three reference frames – gravicentric (gravity), allocentric (visual objects) and egocentric (long body axis). Most studies investigated the subjective vertical based only on perceptual tasks and explicitly instructed participants to orient using gravity. Here we analyzed differences between action and perception tasks and avoided any instruction of using a specific reference frame. Thirty-five participants were tested in four blocks [four body postures between 0° (upright) and -135° (pitched head-down) – randomized order]. Without visual surroundings, they performed a perception task: adjust a image of a tree in its pitch axis such that “leaves are at the top and roots are at the bottom”, and an action task: “move the index finger up and down on an imagined line. Responses were bimodally distributed within both tasks (either egocentric or gravicentric). 85.3% of participants remained in their preferred reference frame for both tasks. However, differences were found in the egocentric responses for the action task – some took long body axis, others sagittal axis as their reference frame. Concluding, the weighting of the habitual subjective vertical is highly individual and remains constant throughout action and perception tasks, however, the egocentric reference frame can be differently anchored.

P225 Effortful Processing in Estimation of Internally-Defined Durations. Michael Klein, *University of Waterloo*, Jennifer Stolz, *University of Waterloo* ■ Although our ability to estimate the

duration of temporal intervals is a popular topic of study, the majority of work in this area has focused on what we call externally-definedduration those that are defined by events that are not under our control (e.g. the appearance and disappearance of a stimulus on a computer screen). Equally important are durations that are under our control, such as the time taken to perform basic tasks, which we call internally-definedduration. We have previously demonstrated that although estimation of externally-defined durations interferes with performance on concurrent tasks, this interference is reduced or eliminated when durations are internally-defined, suggesting that the mechanisms underlying the two types of estimation are not the same. In the current work we distinguish between two potential explanations for this finding: is the estimation of internally-defined durations completely free of effortful processing, or is it simply the case that the effort is put on hold until after the interval has ended? We examine the pattern of interference between the two types of duration estimation with a secondary task that is performed just after the interval has ended to elucidate mechanistic differences between internally and externally defined duration estimation.

P226 Visual self-motion through a virtual environment is modulated by perceived body orientation relative to earth vertical. Meaghan McManus, *Centre For Vision Research, York University*, Laurence R Harris, *Centre For Vision Research, York University* ■ Perception of distance travelled through a virtual environment is underestimated when lying prone or supine, compared to standing. This could be due to visual and non-visual cues being in conflict. When visual cues to upright and the body's orientation in space are in conflict, this can result in a "visual reorientation illusion" (VRI), where vision dominates. We predicted that a structured visual scene in conflict with body orientation would create a VRI, and lead to greater underestimation in perceived distance travelled, compared to a starfield. Participants stood, or lay supine or prone wearing an HMD. A target was presented between 10 and 80 meters in front of them. Participants encoded target position and pressed a button. The target disappeared, and participants were accelerated toward it; they pressed button when they felt they had reached the remembered target location. Following each posture, participants verbally reported the perceived direction of upright.

Initial findings indicate when supine and prone with a structured visual scene, participants experienced a VRI, and also underestimated distance travelled. We predict this illusion will not occur with a starfield, and thus underestimation will be reduced. Our research suggests perceived self-motion is influenced by perceived body orientation in virtual environments.

P227 Effect of instructions on surround motion integration and the attentional blink. Jiali Song, *Department of Psychology, Neuroscience & Behaviour, McMaster University*, Jessica N. Cali, *Department of Psychology, Neuroscience & Behaviour, McMaster University*, Allison B. Sekuler, *Department of Psychology, Neuroscience & Behaviour, McMaster University; Rotman Research Institute, Baycrest Health Sciences; Department of Psychology, University of Toronto*, Patrick J. Bennett, *Department of Psychology, Neuroscience & Behaviour, McMaster University* ■ In dual task paradigms, performance in both tasks typically is worse compared to either task alone. Recently, surprising reports of dual task enhancement have gained attention. For example, Motoyoshi et al. (2014) found lower direction discrimination thresholds for Random Dot Kinematograms (RDKs) when a digit-identification RSVP task was administered simultaneously; however, we failed to replicate this effect (Cali et al., VSS 2016). According to the overinvestment hypothesis, a smaller and delayed attentional blink is observed when observers focused less during RSVP tasks (Olivers & Nieuwenhuis, 2006). We sought to explain our previous non-replication by manipulating task

instructions ‚Äì focus normally or focus less on both tasks. We measured RDK direction discrimination thresholds in a single task condition in which participants ignored an RSVP stream, and in a dual task condition in which participants identified 2 digits in a 6-item RSVP stream before reporting the direction of the RDK. When observers focused less, the attentional blink was delayed (replicating Olivers & Nieuwenhuis, 2006) and the dual task cost in RDK performance was smaller. Although these results do not fully account for our prior non-replication, they suggest that adjusting attentional focus can enhance motion integration of RDKs.

P228 Elusive boundary conditions of the attentional boost effect. Lisa Lorentz, *McMaster University*, Mitchell LaPointe, *McMaster University*, Bruce Milliken, *McMaster University* ■ The attentional boost effect (ABE) is the counter-intuitive finding in which a memorial benefit occurs under dual-task conditions (Swallow & Jiang, 2010). The typical task involves attending to a rapid stream of images or words, while simultaneously monitoring that stream for separate target/distractor stimuli. A manual response is required for the infrequent targets, but withheld for the frequent distractors. Interestingly, memory is better for items paired with a target signal (i.e., items that were presented together with a target that required a manual response) than for items paired with a distractor signal. Indeed, memory for items on target trials often matches or exceeds performance in a full attention condition. However, the specific parameters for producing the ABE are not well understood, with some studies reporting relatively large memory benefits (~20%) and others reporting much smaller benefits (<10%), or even none at all. In the current set of experiments, we evaluate the influence of intentionality on the ABE by comparing intentional and incidental encoding phases. We report evidence to suggest that intentionality can matter when measuring the ABE, but that its influence is contingent on other factors.

P229 Does Standing Improve Performance on the Stroop Task? Emilie E. Caron, *University of Waterloo* , Alyssa Smith, *University of Waterloo*, Brandon C.W. Ralph, *University of Waterloo*, Jonathan S. A. Carriere, *Bishop's University*, Derek Besner, *University of Waterloo*, Daniel Smilek, *University of Waterloo* ■ Standing desks are becoming increasingly popular and there is some evidence of health benefits associated with their use. Are there cognitive effects as well? Rosenbaum, Mama, and Algom (2017, Psychological Science, 28, 1864-1867) reported that different patterns of performance emerge when a cognitive task is completed while standing vs. while sitting. Specifically, their participants completed the Stroop task (naming the print-color of words that were either congruent or incongruent with their print colour) while sitting and standing. They reported that the Stroop effect (the difference in RT between congruent and incongruent trials) was smaller while standing than while sitting. Here we report an attempted replication of their study with the inclusion of neutral trials (coloured X's) to determine whether standing and sitting influences Stroop interference (i.e., incongruent trials vs neutral trials), facilitation (i.e., congruent trials vs. neutral trials), or both. First, performance was slower on incongruent trials than both congruent and neutral trials, with performance on congruent and neutral trials being roughly equivalent. Second, responses in all three conditions were faster while sitting than while standing. Critically, however, we failed to detect any influence of sitting vs. standing on the differences between congruent, incongruent and neutral conditions.

P230 Schema violations of sexuality: examining the moderating effect of gender on the N400 component with Event Related Potentials. Denis Vaillancourt, *Laurentian University*, Matthew Schurr, *Laurentian University*, Hudson Blue, *Laurentian University*, Emalie Hendel, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Previous research has demonstrated the sensitivity event related potentials (ERPs) have in relation to gender and sexuality schema violations, and recent

findings have been contradictory, given rise to the possibility that violating schemas of sexuality has no effect. Evidence has suggested sexuality schemas do not have an impact unless the underlying gender schema is also violated. The current study aimed to examine this contradiction in conjunction with ERPs in order to compare underlying cognitive processes between violations of gender and sexuality schemas. Participants (N=28) were presented with a semantic priming procedure in the form of word pairs and were instructed to identify whether pairs were a match or mismatch based on gender and sexuality stereotypes. The acknowledgement of a violation for both gender and sexuality schema violations were found, suggesting increased difficulty in accessing information contradicting the stereotyped prime. These results denote the ERPs sensitivity to gender and sexuality schema violations and may inform future research and development on the cognitive impact of stereotype violations.

P231 Emotional Expressivity and Exposure to New Culture. Anne Tseu, *Mount Royal University*, Bob Uttl, *Mount Royal University* ■ Cultures differ in emotional expressivity or the degree to which individuals express their emotions. However, there has been no research on how emotional expressivity changes as the result of engagement with a new mainstream culture, for example, when individuals from other cultures immigrate to live in a new culture. Main objectives of our study were to examine (1) the relationship between emotional expressivity and engagement with a new culture, (2) the relationship between emotional expressivity and personality, and (3) and the relationship between emotional expressivity and well-being. Undergraduate student volunteers completed online battery of measures including measures of emotional expressivity, social engagement, acculturation, Big 5 personality, and well-being. Our results show that both the length of time spent and social engagement with the new mainstream culture increased emotional expressivity. Moreover, emotional expressivity was correlated within North America and social engagement with extraversion, agreeableness and conscientiousness as well as with well-being.

P232 Cross-Modal Emotion Perception: A Validation Study. Misha Sokolov, *Carleton University, Department of Psychology*, John Logan, *Carleton University, Department of Psychology* ■ Emotion perception research often implicitly assumes that results found with a particular stimuli set, in a specific modality, using a unique paradigm will retain external validity. We attempted to validate this assumption by subjecting a group of participants (n = 89) to perceptual tasks in 3 modalities (visual, auditory (AU), and speech perception/production (SP)). For the visual modality we utilized 3 paradigms: dynamic facial expressions of 1500ms duration (SV); static images with 150ms duration (SI); and dynamic emotions where participants select a minimum threshold for identification (LV). For SP we utilized a standardized set of emotional words, and collected speech onset, frequency, and amplitude changes from baseline. We hypothesized that all measures would significantly associate, with a moderate effect size or greater. As expected, we observed a moderate to strong association between the AU accuracy and SV ($r = .43$, $p < .01$), SI ($r = .57$, $p < .01$), and LV ($r = .45$, $p < .01$), and within the visual perception tasks. No significant associations were observed with SP. However, exploratory analysis showed that speech production will significantly associate if perception scores are converted to Inverse Efficiency Scores. Results are discussed in terms of underlying cognitive structures.

P233 Recognition memory for affective and neutral stimuli: A small-scale meta-analysis. Kaitlyn Fallow, *University of Victoria* ■ Studies investigating the role of emotion in recognition memory have variously suggested beneficial, detrimental, and null effects of emotion on memory performance (e.g., Bennion, Ford, Murray, & Kensinger, 2013). While some of the inconsistency in this literature may be attributable to oft-ignored

response bias effects (Dougal & Rotello, 2007), such findings have also been mixed. Data presented here are the preliminary results of an ongoing meta-analysis aimed at synthesizing the existing research on old/new recognition for emotional versus neutral stimuli. Results thus far suggest small but significant overall differences in both hit and false alarm rates, with both tending to be higher for emotional than neutral stimuli. Findings were less conclusive for analyses based on reported measures of sensitivity and response bias, but the latter analysis in particular was limited by the relatively small number of articles in the sample that included any such measure. Moderator analyses point to both emotional valence (positive vs. negative) and stimulus type (e.g., words vs. pictures) as variables that may prove important to understanding why results in this literature have varied so widely.

P234 Relation between working memory and implicit learning in the contextual cueing paradigm. Chao Wang, *McMaster University*, Smruthi Venkateshan, *McMaster University*, Suganya Gnanakumaran, *McMaster University*, Bruce Milliken, *McMaster University* , Hong Jin Sun, *McMaster University* ■ We examined the relation between implicit learning and working memory (WM) through two paradigms investigating (1) whether implicit learning and WM share the same resource and (2) whether the performances of these two tasks correlate across participants. Implicit learning was examined in a contextual curing paradigm in which participants gradually improve their efficiency of visual search for repeated scenes compared to novel scenes, possibly due to learning of spatial relation between target and distractor layout. Three types of WM tasks were used in our study testing memory of (1) relation between object location and identity, (2) relation between object shape and color, and (3) object color. In the first paradigm, for each trial, participants first viewed the WM stimulus, then performed a visual search task in a scene consisting of target letter T and distractor Ls, then made old/new judgement for the WM stimulus presented earlier. The results showed that CCE remained relatively intact regardless the type of WM tasks. The second paradigm showed little correlation between the magnitude of CCE and the accuracy of WM task when these two tasks were performed separately. These results suggested a lack of relation between implicit learning and working memory.

P235 The Efficacy of Concept Mapping for Long-Term Knowledge Retention. Ellen MacLellan, *McMaster University*, Bruce Milliken, *McMaster University*, Joseph Kim, *McMaster University* ■ In a simulated classroom study, we investigated the relative efficacy of concept mapping and practice testing with respect to long-term knowledge retention. The results suggest that concept mapping is as effective as practice testing, but only when the concept mapping activity involves active retrieval. Moreover, the results depend on the nature of the test, such that learning gains are most apparent when the study and test conditions match. We further investigated the conditions under which concept mapping is most effective. Here we found that learning gains surpass that of practice testing, but only under conditions in which participants were given explicit guidance in constructing an accurate concept map.

P236 Some limits of the repetition decrement and spacing effects. Robert Collins, *McMaster University*, Bruce Milliken, *McMaster University* ■ The repetition decrement (RD) effect is a counter-intuitive effect whereby recognition memory for a word seen twice can be better than for a word seen once (Rosner, Lopez-Benitez, D'Angelo, Thomson, and Milliken 2018, Collins, Rosner & Milliken, 2018). Recent evidence indicates this RD effect is related to the spacing effect (Collins & Milliken, under review; see also Ebbinghaus, 1885): Spacing word repetition by a few minutes was sufficient to reverse the RD effect, resulting in a repetition benefit compared to words seen once and a spacing benefit relative to words repeated immediately. The deficient processing (Hintzman, 1974) of

immediately repeated words provides a compelling account of both effects. The current poster presents research that further probed the limitations of the RD effect using methods informed by research on the deficient processing theory. Specifically, we tested whether RD effects are present with: Intentional learning, subvocal target naming, semantic priming, and perceptual priming. We also explored the time course of the transition from RD effects to repetition benefit effects using a variable lag/spacing procedure. The results indicate the RD effect is broadly limited by the same factors that affect the spacing effect, providing further evidence that the two effects are fundamentally linked.

P237 "Did you study “ate” or “eight”? Homophone lures do not reduce the production effect in a 2AFC recognition task". Jonathan Fawcett, *Memorial University of Newfoundland*, Taylor Blanchette, *University of Calgary*, Julia Rose, *Memorial University of Newfoundland*, Glen Bodner, *University of Calgary* ■ The production effect occurs when items read aloud are better remembered than items read silently. This effect has been attributed in part to a distinctiveness heuristic strategy whereby participants use their memory for having said items aloud at study to help them discriminate between targets and lures in a recognition task. In our experiments, participants studied items aloud or silently (e.g., “ate”). At test, each studied item was paired with a homophone (e.g., “eight”) or an unrelated word (control condition; e.g., “chair”). The target and lure had identical phonology in the homophone condition, thus preventing participants from using memory for production to complete the 2AFC task. The production effect was very similar in the homophone and control conditions, in both within-subject and between-subject designs. This finding challenges the generality of the distinctiveness heuristic account. Memory for production is not the sole basis of the production effect.

P238 Producing a Word as “Elvis” is No More Memorable Than Reading It Silently. Rachelle Wakeham-Lewis, *Memorial University of Newfoundland*, Jason Ozubko, *SUNY Geneseo*, Emily Buchanan, *Memorial University of Newfoundland*, Jonathan Fawcett, *Memorial University of Newfoundland* ■ The production effect refers to the finding that items read aloud are better remembered than items read silently. One explanation for this effect is that production results in a distinctive representation that facilitates retrieval. This implies that the magnitude of the production effect should be greater for more distinctive forms of production. We tested this account by modifying a standard production task to include distinctive voices. During the study phase, a series of words were presented, each preceded by an image instructing participants to read the word silently, to read the word aloud in their own voice, or to read the word aloud as one of three characters (Elvis, Dracula, or Kermit the Frog). Participants were later tested for their memory of the studied items using confidence ratings. Contrary to the predictions of the standard distinctiveness account, our findings show that reading items aloud in a character’s voice eliminates rather than augments the production effect.

P239 Interactive processes in an instance-based model of memory. Evan T. Curtis, *University of Manitoba* ■ Memory performance improves as a function of the match between processing at study and test. In a classic and well-cited work, Jacoby (1983) demonstrated an important double dissociation. Conceptual processing at study resulted in high performance on an explicit memory test but low performance on an implicit memory test. Perceptual processing at study results in the opposite pattern. I simulate the double dissociation in ATHENA, an instance-based model of memory. I assume that stimulus representations are composed of perceptual and contextual features, and that different incidental study tasks favour the encoding of some features over others. I also assume that different memory tests require the use of some features and not others. The model successfully produces the double dissociation. The

simulations provide a formalization of the conclusion that different types of processing influence later performance by highlighting features that are either more or less in subsequent memory tests. Further, in conjunction with previous work, I conclude that the empirical regularity emerges from the same mechanisms that underlie other well-known regularities (e.g., the production effect).

P240 The Impact of Perceptual Fluency on Cue Familiarity and Feeling of Knowing Judgments. Michelle A. Dollois, *University of Guelph*, Andrew Clarke, *University of Guelph*, Christopher M. Fiacconi, *University of Guelph* ■ Feeling of knowing (FOK) judgments reflect the subjective likelihood that one can later recognize information that cannot be recalled presently. FOKs are typically measured following study of paired associates, where one member of the pair later serves as a cue for the recall of the second member (target). One proposed basis for FOK judgments is the assessment of the familiarity of the cue item. Prior exposure to cues, but not targets has been shown to increase FOK ratings, suggesting that FOKs are inferred from the perceived familiarity of the cue. The present work examines the extent to which assessment of cue familiarity in an FOK task is related to the familiarity process that informs standard item-recognition memory decisions. To this end, we asked whether perceptual fluency, known to selectively enhance familiarity-based recognition judgments, has parallel effects across FOK and item-recognition tasks. Using a masked repetition priming manipulation, we replicated previous findings showing that increases in perceptual fluency lead to greater endorsement of targets and lures in an item-recognition task. However, enhancing the perceptual fluency of test cues did not influence FOK ratings. These results are inconsistent with a simple correspondence between the two forms of familiarity assessment.

P241 Metamemory in an Immediate Serial Recall Task. Kaiden Stewart, *University of Waterloo*, Connor Gaspar, *University of Waterloo*, Tim Dunn, *Leeds School of Business, University of Colorado Boulder*, Evan Risko, *University of Waterloo* ■ The ability to accurately assess our memory accuracy is important across a number of domains (e.g., education). While there is a long history of research investigating metamemory, it has typically been restricted to long-term memory. In the present investigation, we set out to investigate metamemory in the context of an immediate memory task. Participants were auditorily presented strings of letters and asked to recall the string in the order presented, then asked how many letters they think they recalled in the correct order. In Experiment 1, participants were overconfident and the amount of overconfidence increased as set size increased. Experiment 2 sought to replicate these results using a more stringent approach to ensuring participants were clear about the criterion on which they were being assessed - and thus what their metacognitive judgments should address. With these controls in place, participants were still overconfident, but overconfidence no longer increased as a function of set size. Possible mechanisms and implications will be discussed.

P242 Factors That Influence Earwitness Confidence. Kelly Thiessen, *University of Manitoba*, Jason Leboe-McGowan, *University of Manitoba*, Doug Alards-Tomalin, *University of Manitoba*, Emily Baron, *University of Toronto*, Launa Leboe-McGowan, *University of Manitoba* ■ Witness testimony is one of many methods that the justice system uses as evidence in a criminal investigation. Several researchers have examined the reliability of eyewitness testimony, but earwitness testimony has not receive the same attention. Police use earwitness testimony when there are limited visual cues at the crime scene, such as a dark environment or communication over the telephone. To assess the legitimacy of earwitness testimony, it is necessary to examine the biases that occur on behalf of the earwitness. The current study manipulated both the pitch and the emotional tone of the voices in the earwitness lineup. The content

of the original target conversation was also manipulated to include criminal, neutral, or vulnerable content. Participants listened to a conversation, completed a distraction task, and then listened to a lineup of six voices. For each voice, participants rated their confidence on whether the voice was the target voice in the original target conversation. Results suggest that participants are biased by characteristics of voices within the lineup. This research has implications for future earwitness research as well as how police interpret earwitness testimonies.

P243 Memory for temporal context in temporal lobe epilepsy. Daniella Ladowski, *University of Western Ontario*, Younghyun Choi, *University of Western Ontario*, Alenka Bullen, *University of Western Ontario*, Stefan Kohler, *University of Western Ontario*, Mary Pat McAndrews, *University of Toronto*, Janice Chen, *Johns Hopkins University,* Nargess Ghazaleh, *University of Western Ontario*, Jorge Burneo, *University of Western Ontario*, Seyed Mirsattari, *University of Western Ontario* ■ The role of the hippocampus in temporal aspects of memory, such as sequencing and duration estimation, is well-established. However, few investigators have considered the potential utility of a measure of temporal memory in the study of clinical populations with medial temporal lobe dysfunction. We asked participants with temporal lobe epilepsy and demographically matched healthy controls to watch a brief, engaging movie clip and subsequently perform a memory test for the content of the movie. Participants also completed several standardized tests of memory. Temporal aspects of memory for the movie were derived from a free and probed recall task (e.g., producing details out of sequence, providing temporally specific vs. indefinite details) and from a timeline judgment task (e.g., judging the temporal position of still frames along a timeline, putting two still frames in the correct order). Overall, larger group differences were observed on temporal-memory measures compared to standardized measures. In addition, temporal-memory measures were stronger predictors of clinical-group membership than standardized measures. These findings support the integration of temporal-memory measures into clinical assessments of medial temporal lobe functioning.

P244 Chronic cannabis use and cannabis-related problems: Do individual differences in cognitive capacity alter the relationship? Tayler Sullivan, *Nipissing University*, Taylor Vaillancourt, *Nipissing University*, Kayla Greenman, *Nipissing University*, James Donovan, *Nipissing University*, Kirstin Loates, *Nipissing University*, Darren Campbell, *Nipissing University* ■ Some chronic cannabis users experience negative consequences while others do not. One interesting proposal is the cognitive buffer hypothesis; people with higher cognitive capacities experience fewer cannabis-related life problems. Thirty-seven young adults, primarily post-secondary students, were chronic cannabis users ranging intermediate to heavy. Usage was measured by self-reports examining age of onset, lifetime usage, and past 30-day frequency. We measured crystallized verbal intelligence with the NAART pronunciation test and working-memory through forward digit-span. Participants were divided into low and high memory capacity and verbal intelligence groups by performance. We assessed cannabis-related life problems with a 21 item questionnaire. The groups had comparable levels of cannabis usage and related problems. For low cognitive capacity groups there was a non-significant association between lifetime usage and related problems, whereas high cognitive capacity groups had a significant positive correlation. Our study contributes novel findings to understudied areas of cannabis-related problems and cognitive capacities. The findings contradict the cognitive buffer hypothesis. We propose high-capacity users are over-confident in their capability to overcome cannabis-related effects. Future studies could ask friends and family to examine participants cannabis-related problems, avoiding reliance of self-report.

P245 The Role of Within-Person and Context

Variability on Face Learning. Rebekah L. Corpuz, *University of Regina*, Chris Oriet, *University of Regina* ■ We investigated whether increased variability leads to better retention of a target face. Previous research suggests that increasing variability had no effect on memory for a target presented a few minutes later. In the real world, however, the time between when we first encounter a face and when we need to be able to identify it can be much longer. We hypothesized that increasing variability, then, might help to establish a more durable representation of a face. To test this, participants were randomly assigned to one of four conditions: a) no variability (still image), b) low variability video (little to no change in target's appearance and context), c) high variability video (several changes in the target's appearance and context), d) control (no video). Participants completed a sorting task 15 minutes and 5 days after viewing the target identity. Hit rates were similar in the no variability and high variability conditions, and higher than in the low variability condition. False alarms were rare, and similar across conditions. Recognition accuracy did not decrease over 5 days. The results suggest two factors influenced face learning in this task: 1) variability in context; and, 2) opportunity to attend to the target's invariant facial features.

P246 Please Empathize! Observed pain intensity and explicit instructions to empathize modulate response facilitation. Carl Michael Galang, *McMaster University*, Sukhvinder Obhi, *McMaster University* ■ Previous research has shown that observing another in pain leads a general response facilitation in the form of faster reaction times. The current study extends this research by exploring how bottom-up processes, in the form of perceived pain intensity, and top-down processes, in the form of explicit instructions to empathize, influences response facilitation after pain observation. To do so, participants watched videos of a hand getting stabbed by a needle vs. a Q-tip. To manipulate bottom-up processes, participants saw videos of the needle either deeply piercing vs. shallowly pinpricking the hand. To manipulate top-down processes, half the participants were explicitly told to empathize with the person in the video, while the other half were told to simply watch the video. The results suggest that the explicit instructions to empathize exclusively affected reaction times after watching the needle shallowly pinprick the hand. Specifically, the speeding of reaction times found in previous research was attenuated. No such modulation was found when the needle deeply pierced the hand, suggesting that top-down processes only have an effect when the perceived pain intensity is low. We discuss these results in light of previous work on the social cognitive neuroscience of empathy and pain observation.

P247 The Biasing Effects of Unclaimed Prize Information: Investigating the Harms and Reducing the Bias. Alexander Walker, *University of Waterloo*, Madison Stange, *University of Waterloo*, Derek Koehler, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Mike Dixon, *University of Waterloo* ■ Previous research has demonstrated the undue influence of unclaimed prize information (i.e., the number of prizes still available to be won) on peoplesjudgments in scratch card gambling scenarios. When presented in its typical, isolated form, unclaimed prize information lacks utility for the gambler hoping to maximize their likelihood of monetary gain. However, individuals feel more likely to win, report more excitement to play, and prefer to hypothetically purchase games with greater numbers of unclaimed prizes. We further this line of research by manipulating the presence of unclaimed prize information, examining the effects of including this information in scratch card gambling scenarios. Results show that the inclusion of unclaimed prize information results in participants reporting an increased likelihood of winning, perceived excitement, urge to gamble, and hypothetical purchases compared to when unclaimed prize information is omitted. Additionally, we attempted to elucidate the mechanism driving unclaimed prize information

bias by simultaneously presenting intuitively appealing informative information (i.e., payback percentage). Overall, this series of experiments attempts to reveal the biasing effects of unclaimed prize information, expose its potential harms, and reduce individualsreliance on this uninformative information when making decisions in scratch card gambling.

P248 Not all scientists agree: exploring scientific dissent on belief and policy support. Ethan Meyers, *University of Waterloo*, Martin Turpin, *University of Waterloo*, Michal Bialek, *University of Waterloo*, Jennifer Stolz, *University of Waterloo*, Jonathan Fugelsang, *University of Waterloo*, Derek Koehler, *University of Waterloo* ■ Scientific consensus has been used as an argument to convince the public that if X many scientists believe something exists, so should they. However, previous research has found that providing consensus that suggests any amount of dissent can undermine support for policy (Aklin & Urpelainen, 2014). We sought to further explore the effect that providing consensus has on belief and policy support and whether it varies as a function of political ideology. Participants read a vignette describing a possible pollutant in a water supply. They were provided with one of six percentages of scientist consensus that thought the pollutant was real. Belief in the pollutant's existence and support for new policy to tackle the problem were assessed. We found that the greater the consensus level, the more belief there was that the pollutant was real, regardless of political ideology. However, support for policy to tackle the issue did not vary across conditions. There was also no interaction between policy support and political ideology, although there was a negative correlation between conservativism and policy support. Our results suggest that providing scientific consensus may impact beliefs held about an issue but lead to no differences in support for policy creation.

P249 Meta-analysis of North American Adult Reading Test: Verbal intelligence scores are declining. Bob Uttl, *Mount Royal University*, Julie Porter, *Mount Royal University*, Hannah Storrs, *Mount Royal University*, Jeremy Trenchuk, *Mount Royal University*, Daniel Millar, *Mount Royal University* ■ A wealth of evidence shows that scores on various intelligence tests were rising at a fast rate during most of the 20th century (Flynn Effect). Most recently, a number of studies reported that these increases in intelligence scores have reversed and intelligence scores are on a decline since approximately 1990s (Dutton, van der Linden, & Lynn, 2016). To examine whether performance on North American Adult Reading Test (NAART; Blair & Spreen, 1989) is also on a decline, we searched PsycINFO, MEDLINE, and Google Scholar for research articles reporting NAART scores for healthy adults. Our results show that NAART scores have not been rising but declining since 1990s.

P250 The Relationship Between Political Orientation and Bullshit Detection in Canadian Politics: Results from a Pilot Study. Rick Mehta, *Acadia University*, Autumn Rafuse, *Acadia University* ■ The relationship between cognitive variables and their association with political decision making has been studied extensively in the context of American politics; most of this research has focused on factors associated with endorsement of conservative stances. Little research has been conducted within a Canadian context that has been dominated by liberal/progressive stances since 2015. To address this issue, a pilot study was conducted as part of a larger study that assessed the Bullshit Receptivity (BSR) scale. University students were administered two versions of the BSR: the original version that asked them to rate the profoundness of various statements and a modified version (BSR-M) that asked them to classify the same statements as bullshit or not bullshit. Participants also stated their political orientation. The statement of interest was "Because it's [2017]" the rationale that Prime Minister (PM) Justin Trudeau provided for a major decision made early in his tenure. No relationship was found between political orientation and profoundness ratings, but a relationship was found

between political orientation and ratings provided on the BSR-M. The majority of conservatives (87.5%), moderates/classic liberals (82.1%), and "other" (66.2%) classified the PM's statement as bullshit; only 55% of liberal/progressives rated the same statement as bullshit.

Friday, July 6

Poster Session 3

P301 Less Text Improves Poster Appeal. Peter Graf, *University of British Columbia*, Thu (Rosie) Tran, *University of British Columbia*, Yoojeen Ahn, *University of British Columbia*, Natasha Pestonji-Dixon, *University of British Columbia* ■ The poster is a typical method for conveying research at conferences, and guidelines for designing effective posters are readily available. However, most guidelines have never been validated. To investigate which poster dimensions are conspicuous for conference attendees (aka. "research shoppers"), we asked participants -- UBC undergraduate psychology students -- to rate the dissimilarity between all possible pairs of 20 posters. The posters were selected from 2017 psychology research conferences. The participants also rated the overall appeal of each poster. A multi-dimensional scaling analysis of the dissimilarity data revealed a 3-dimensional model which accounted for about .75 of the data dispersion. The first dimension seems related to the text heaviness of posters, and the second dimension seem related to their color saturation (ie. amount/diversity of colors used). The appeal ratings were significantly correlated with postersposition on the first dimension only; posters with less text were rated as more appealing.

P302 Using the Hebb Legacy to Integrate Psychological Science. Raymond Klein, *Dalhousie University*, Richard Brown, *Dalhousie University* ■ The birth of our relatively young science has been described (Boring, 1950) as the product of a marriage between physiology and philosophy. Whereas we might be described as an incredibly successful offspring we are presently experiencing something of a disintegrating identity crisis. As proposed by Posner & Rothbart (2004, 2007) the framework advocated by D. O. Hebb (1949), in the "Organization of Behavior: A Neuropsychological Theory", and other works, can provide the foundation for the integration of our discipline and the framework for averting this crisis. Hebb (1949) proposed that synaptic change is the basis of neural activity (which we now call the "Hebb synapse") and developed the idea of a "cell assembly" or neural network to account for the ability of the brain to retain information in the absence of sensory stimulation. Hebb sought to explain psychological concepts.

P303

P304 The Efficacy of Paroxetine and Transcranial Direct Current Stimulation (tDCS) as Antidepressant Treatments in Adolescent and Adult Rats. Shannon Waye, *Memorial University*, Joshua Conway, *Memorial University*, Lucas Walters, *Memorial University*, Francis Bambico, *Memorial University* ■ Olfactory bulbectomy (OBX) is a rodent model of depression that results in behavioural and neurochemical changes that are reversible with antidepressant treatment. However, in human adolescents, antidepressant drugs often prove ineffective and may worsen symptoms (Vitiello et al., EOP, 2016). A potential solution is transcranial direct current stimulation (tDCS), a non-invasive brain stimulation technique that uses a weak, scalp-penetrating electrical current to induce plasticity. We developed a rodent model of tDCS and found that it decreased passivity and anhedonia-like behaviour in the forced swim test and fruit-loop consumption test in adult rats. In adolescent OBX rats, we are currently investigating whether use of paroxetine results in worsening of depressive-like symptoms. We will then test if tDCS administered during adolescence can reverse these effects, and if this is achievable with tDCS alone or

with adjunct paroxetine treatment. Finally, we will examine whether the antidepressant-like activity of tDCS is linked to its capacity to reverse stress hormone overproduction and increase the growth-stimulating protein BDNF by collecting blood and extracting the hippocampus for ELISA analysis. Based on previous studies, we expect that both OBX surgery and paroxetine treatment will increase passivity and hyperactivity in adolescent rats, and that tDCS will reverse these effects.

P305 Can the FEO Ameliorate the Deleterious Effect of Circadian Rhythm Disruption in an Animal Model of Social Jet Lag? Leanna Lewis, *Memorial University of Newfoundland*, Jillian Cleary, *Memorial University of Newfoundland*, Kayla Viguers, *Memorial University of Newfoundland*, Abigail Newman, *Memorial University of Newfoundland*, Taylor Cassell, *Memorial University of Newfoundland*, Karen Jones, *Memorial University of Newfoundland,* Christina Thorpe, *Memorial University of Newfoundland* ■ Students often shift their weekend sleep and wake times, resulting in differences between weekday and weekend sleep schedules, or "social jet lag (SJL)". SJL disrupts the light-entrainable oscillator (LEO). The current study investigated the interaction between the LEO and the food-entrainable oscillator (FEO) by implementing a novel animal model of SJL, the "student light manipulation (SLM)". To determine the impact of SJL on learning and memory, retention and acquisition were investigated. First, while receiving one (FEO access) or many (no FEO access) meals per day, rats were trained on hippocampal-dependent (HD) and hippocampal-independent (HI) tasks under a 12:12 light-dark cycle, and then exposed to a period of SLM. There were no retention differences between SLM and control rats, yet rats with FEO access retained the HD tasks better than rats without FEO access. Next, while receiving one or many meals per day, rats were exposed to the SLM while being trained on HD and HI tasks. There were no differences in acquisition between SLM and control rats. However, rats with FEO access acquired the HD task faster than rats without FEO access. Such findings indicate the need to further investigate the role of the FEO in learning and memory.

P306 Bilateral Lesions to the Lateral Mammillary Nucleus Impair Spatial Learning in Rats. Marie-Ann Wasef, *Memorial University of Newfoundland*, Abigail Nixon, *Memorial University of Newfoundland*, Shannon Waye, *Memorial University of Newfoundland*, Rebecca Bungay, *Memorial University of Newfoundland*, Christina Thorpe, *Memorial University of Newfoundland*, Darlene Skinner, *Memorial University of Newfoundland* ■ To navigate successfully an animal must have knowledge of its location and directional heading. These two components of navigation are well represented in a spatial network in the mammalian brain that contains place cells, grid cells, and head direction (HD) cells. It has been suggested that the HD signal originates sub-cortically in the reciprocal connections between the dorsal tegmental nucleus (DTN) and the lateral mammillary nucleus (LMN). Lesions to the LMN or DTN have been shown to disrupt HD cell firing in downstream structures, such as the anterior dorsal nucleus of the thalamus and the postsubiculum. Lesions to the DTN have also been shown to produce severe impairments in directional heading on a foraging task and in directional learning in a water maze. In the present study, rats with bilateral electrolytic lesions of the LMN were compared to sham controls on a battery of spatial tasks that involve directional heading. LMN-lesioned rats were impaired, relative to sham controls, on water and dry-land versions of the direction problem, a foraging task, and a spatial discrimination on a radial arm maze. These results build on previous behavioural and cell-recording research and demonstrate the importance of the HD system to spatial learning.

P307 Speed and Accuracy Trade-off on the Spatial Orientation Test. Xing Huang, *University of New Brunswick*, Daniel Voyer, *University of New Brunswick* ■ The present study explored a potential

explanation of sex differences in map reading as resulting in part from a speed-accuracy trade-off effect. Accordingly, 217 participants (102 males and 115 females) were randomly assigned to one of six timing conditions (in seconds per item): 5, 10, 15, 30, 45, and 60. They completed each of the 30 items on the Spatial Orientation Test in their assigned timing condition. In this test, participants are required to locate in a road map the target area represented in a larger scale aerial photograph. Results produced the expected speed-accuracy tradeoff, with performance improving as allotted time increased. A significant male advantage was also found in all conditions except at 5 seconds. The most crucial finding was that females achieved asymptotic accuracy performance at a much lower level than did men. The findings therefore suggest a sex difference in level of ability rather than speed of processing, similar to what has been reported in similar studies with mental rotation.

P308 Updating Perceived Distance during Self-Motion. Jong-Jin Kim, *York University*, Laurence Harris, *York University* ■ As we move, we need to update the relative distance to other objects in the environment. Errors in updating could lead to errors in perceived distance and, because of size/distance invariance, to errors in perceived size. Participants viewed a vertical rod presented on the ground plane at a fixed distance between 2 and 10m away from them in a simulated virtual-reality scene. They judged whether the visual rod appeared longer or shorter than a physical reference rod held in their hands. The reference rod was held either vertically or horizontally, while stationary or with optic flow simulating forward or backward self-motion. Viewing was either monoscopic or stereoscopic. Results shows the visual rod generally needed to be longer than the physical rod to be judged as equal to its size, but shorter when viewing monoscopically compared to stereoscopically. Holding the reference rod horizontally, visual rod was perceived longer compare to when it was held vertically. However, there were no significant differences observed in perceived rod size due to optic flow. Interpreting the perceived distance resulting from the perceived size, we conclude that our ability to update the distance of an object moving with us appears robust during forward and backward self-motion.

P309 The representation basis of non-spatial facilitation and Inhibition of Return effects. Brett A. Cochrane, *McMaster University*, Bruce Milliken, *McMaster University* ■ The non-spatial Inhibition of Return (IOR) effect reflects slower identification for repeated color targets than for alternating color targets provided that an event intervenes between consecutive targets (Spadaro, He, & Milliken, 2012). The intervening event is critical to these non-spatial IOR effects, as responses are faster rather than slower for repeated targets (i.e., the facilitation effect) when the intervening event is removed. Here, we explore the representational basis of the facilitation and non-spatial IOR effects. Participants performed a discrimination task in which they identified a first target by key-press, vocally responded to an intervening event, and then identified a second target by key-press. The second target was always a green or red color patch, while the first targets' relevance to the second varied across experiments. We found that the non-spatial facilitation and IOR effects critically depended on the representational overlap of targets across trials – showing that intervening event modulated these effects for imagined and perceptual representations, while conceptual color and extraneous representations produced an effect resembling IOR regardless of the intervening event. The findings here support a dual processing account of the non-spatial facilitation and IOR effects.

P310 Mind wandering and temporal focus in task switching. Lydia Jiang, *University of Alberta*, Peter Dixon, *University of Alberta* ■ Subjects performed a go / no-go task in which they responded to a given target colour. However, stimulus presentation was subject initiated, so that we could use time the next trial as a measure of the time to reject a foil. The target colour changed predictably every twelve

trials, and (residual) switch cost was observed: Response time increased on the first trial of each series when the target changed. Interestingly, the slow down consisted solely of slower rejections of the stimulus that was a target in the previous series, suggesting that the previously required detection response to that stimulus needed to be inhibited. However, this inhibition was only observed for subjects who reported being off task; on-task subjects showed no such increase in response time. The results support the view that mind wandering decreases temporal focus, so that prior trial episodes are available during the performance of the current trial.

P311 Global verses Local Control in an AB Task. Ellen MacLellan, *McMaster University*, David I. Shore, *McMaster University*, Bruce Milliken, *McMaster University* ■ Cognitive control is often measured using a limited number of standard procedures (i.e., Stroop, Simon and Flanker tasks). The results suggest that the implementation of cognitive control is sensitive to irrelevant contextual features, such as where stimuli appear (e.g., Crump, Gong & Milliken, 2002). The purpose of the experiments reported here was to investigate the possibility of location-specific contextual control in an attentional blink (AB) task. We have previously investigated the extent to which the allocation of attentional recourses to T1 encoding is driven by either the actual or the perceived difficulty of T1 encoding, dependent on the block-wide context in which T1 is presented (MacLellan, Shore & Milliken, 2017). Here, we investigated the extent to which the allocation of attentional resources to T1 encoding may be governed by local, location-specific control. The results suggest that the magnitude of the AB can be modulated as a function of the global experimental context, but not as a function of location within experiments, even when participants are explicitly informed that stimulus presentation location is predictive of trial type.

P312 Attentional Bias and Tolerance Threshold Level to Mess and Uncleanliness. Adéle Gallant, *Université de Moncton*, Myléne Lachance-Grzela, *Université de Moncton*, Annie Roy-Charland, *Université de Moncton* ■ Aiming to explain how couples share household tasks, authors introduced an integrative theoretical model that proposes a notion of a tolerance threshold (Alberts et al., 2011). They argued that an unequal sharing of tasks could be explained by the fact that the tolerance thresholds for cleanliness and order of two partners are different. This study investigated whether self-reported comfort levels and visual processing of rooms with different levels of cleanliness and order vary in function of individualstolerance thresholds levels. A total of 27 participants answered questionnaires measuring their tolerance threshold and observed a series of images, each with one of six levels of cleanliness, while their eye-movements were measured. Results revealed that regardless of their tolerance threshold, participants rated the images similarly for their comfort levels. However, the viewing times required to do so varied as a function of threshold. More precisely, participants with higher thresholds viewed images longer for multiple moderate levels of uncleanliness (i.e., levels 3, 4, and 5) than individuals with lower threshold only took longer for one moderate level (i.e., level 3). Results suggest that when faced with intermediate levels of cleanliness, individual with lower tolerance for uncleanliness are less hesitant in their judgments.

P313 Event-related potential and power spectral analysis of memory scanning during an auditory Sternberg task. Amour Simal, *Université de Montréal*, Pierre Jolicoeur, *Université de Montréal* ■ Using the event-related potential (ERP) technique alongside time-frequency analysis, we aimed to shed light on the activity associated with memory scanning in an auditory short-term memory (ASTM) Sternberg task. Using different load conditions (2, 4, or 6 tones) and a control condition without memory

load (white noises) we studied the activity elicited by the probe (a tone present or absent in the memory set). We observed a significant difference between the conditions with memory loads and without. With a memory load, a large positive component was visible at posterior electrode sites; while without memory load, there was a large negativity at frontal sites. Using difference waves, we found a negativity, overlapping the positivity, located more centrally, larger in over the left hemisphere and increasing with load. The observed negativity was also larger for incorrect responses, possibly reflecting a degree of response certainty. Spectral analysis revealed that theta activity decreased with an increasing memory load. Moreover alpha, beta, and gamma activity decreased for the memory condition but not for the control condition. Our results demonstrate differences in brain activity during memory scanning depending on the presence or absence of items in ASTM, modulated by memory load and certainty of response.

P314 Self-other Processing in Pain Observation: Evidence from Event-related Potentials. Michael Jenkins, *McMaster University* ■ To investigate the time-course of processing of observed pain, this study employed the event-related potential (ERP) EEG technique to track real-time differences in neural responses to painful and non-painful stimuli. Importantly, stimulus orientation was manipulated to examine the influence of self-other processing. Participants viewed painful or non-painful images (needle/Q-tip touching hand), upright or inverted, in intermixed trials. Participants categorised either the pain content (pain task), or orientation (orientation task), of the stimuli. EEG was recorded throughout both tasks, with ERPs analysed on the N2 component at Fz/FCz electrodes, and the P3/LPP component at CPz/Pz electrodes. In the pain task, N2 amplitudes were more negative generally, and showed an effect of pain only when upright. LPP mean amplitudes were more positive in this task, showing an effect of pain only when inverted. In the orientation task, no effects of stimulus type or orientation were observed on either component. These results suggest that early, automatic orienting to negative-valence stimuli (indexed by N2) only takes place during 'first-person' observation (upright hands). Later controlled stimulus processing (indexed by LPP) may compensate for a lack of early orienting in the case of 'third-person' observation (inverted hands) in order to facilitate recognition of others in pain.

P315 The impact of lifetime noise exposure on the cortical processing of sounds presented in noise. David Fleming, *Faculty of Medicine, Memorial University of Newfoundland*, Benjamin Zendel, *Faculty of Medicine, Memorial University of Newfoundland* ■ Exposure to environmental noise alters the sub-cortical processing of sound, impacting particularly on auditory nerve fibres involved in coding sounds in the presence of background noise. Young adults with higher levels of lifetime noise exposure exhibit reduced sub-cortical coding of amplitude-modulated (AM) tones presented in background noise. The goal of the current study was to examine cortical responses to AM tones in background noise and how they vary as a function of both lifetime noise exposure and the ability to understand speech in noise (SIN). AM tones (40Hz AM frequency) were presented at 3 carrier frequencies (1kHz, 4Khz, and 8Khz), and in 3 background noise conditions (no noise; quiet noise; loud noise). Increasing the level of background noise in the stimulus reduced the 40Hz phase locking value (PLV) measured at fronto-central electrodes. In the 1kHz carrier condition, there were negative correlations between the PLV in the loud noise condition and lifetime noise exposure, suggesting that noise exposure reduces the ability to track AM stimuli in noise. Curiously, we found positive correlations between PLVs and SIN thresholds. Ongoing analyses will further explore these relationships, and examine effects at the other presented carrier frequencies.

P316 Neural Correlates of Approachability Judgments for Novel and Familiar Faces. Kirstin

Loates, *Nipissing University*, Charley Sharkey, *Nipissing University*, Darren Campbell, *Nipissing University* ■ Social interaction depends on approaching and engaging others. Facial familiarity influences people's tendency to approach others, and several neural systems underlie this familiarity effect. To explore further the relationship between familiar versus novel faces and brain response, we experimentally manipulated facial familiarity and examined functional MRI brain responses. Twenty-five participants (14 female) received fMRI scans while evaluating the approachability of 36 novel and 18 familiarized faces. Using AFNI standard preprocessing steps and face-type contrasts, we controlled overall p-level with a voxel-wise p-value of 0.001 and a 20-voxel minimum cluster size. Novel faces compared to familiar faces produced stronger responses in brain areas related to visual and emotional processing. Specifically, the bilateral Fusiform Face Areas (FFA; visual processing) and the bilateral insula (emotional processing) had stronger activations when participants viewed novel faces.

P317 Relationship between Schizotypal Delusional Personality Features, Global/Local Processing, and EEG Frequency Bands. Ahmad Sohrabi, *University of Kurdistan and Carleton Cognitive Modeling Lab*, Atefe Mehri, *University of Kurdistan*, Omid Isanejad, *University of Kurdistan* ■ This study aimed at revealing the neural correlates of schizotypal personality features and global/local processing. Therefore, we focused on the cognitive index of personality in terms of perceptual processing and biases and EEG, to shed light on the neural correlates of schizotypy and delusion. A group of 22 university student participated in the experiment. We used a Navon task (global/local) for measuring perceptual processes. Also, for assessing the neural index of personality, we employed a Procomp-2 EEG instrument. The results showed a significant negative correlation between scores in schizotypal personality test and Delta, Theta, and Alpha, but the correlation was positive for Theta/Alpha. Moreover, a significant positive correlation was found between scores in Navon task (global/incongruent trials) task and Theta/Alpha and between Navon task and Delta, Theta, and Alpha. The current study showed a positive relationship between local processing and brain frequency bands, an a negative correlation between schizotypal features and brain frequency bands. Therefore, we may argue that individual with high schizotypal scores are having lower means in those tree major frequency bands. In sum, the result of this study revealed neural correlates of schizotypal personality features and top-down perceptual processing using Novon cognitive task and EEG signals.

P318 Inviting hallucinatory percepts during speech-listening to detect cognitive changes in early psychosis. Ana-Bianca Popa, *Western University, The Brain and Mind Institute*, Daniella Ladowski, *Western University, The Brain and Mind Institute*, Michael MacKinley, *London Health Sciences, Adult Mental Health*, Kara Dempster, *PGY-5 Resident, Department of Psychiatry, Schulich School of Medicine & London Health Sciences, Adult Mental Health*, Lena Palaniyappan, *Western University Department of Psychiatry, Schulich School of medicine & London Health Sciences, Adult Mental Health*, Ingrid Johnsrude, *Western University Department of Psychology, Brain and Mind Institute & Department of Communication Science and Disorders, National Centre for Audiology* ■ Treatment outcomes for people with schizophrenia are more favorable if such individuals can be identified early in the course of the disorder. Current detection methods lack specificity and do not make use of cognitive markers such as reality-monitoring deficits, which are particularly pronounced when stimuli are difficult to perceive. We presented individuals experiencing a first episode of psychosis (FEP) and matched control participants (CTL) with acoustically degraded meaningful and matched nonsense sentences (eg "The [building/research] had a [nest/goat] in its [roof/moon]") to examine the degree to which people reported words that were not actually presented. Intelligibility was measured as the proportion of words in the original sentence

reported correctly, and intrusion errors were counted when reported words were morphologically unrelated to words in the original sentence. ANOVA revealed that, as expected, intelligibility was higher at the more favorable SNR, and for meaningful sentences compared to nonsense sentences. Intelligibility did not differ between the groups and interactions involving Group were not significant. Intrusion errors were more frequent at the lower SNR, for nonsense sentences, and in the FEP group. These preliminary results suggest that our approach may hold promise for early identification of psychotic prodrome.

P319 Would You, Could You? A behavioural and TMS investigation of the role of manipulability in a divergent thinking task. Heath Matheson, *University of Northern British Columbia,* Emilio Tamez, *University of Pennsylvania*, Brittany Marsh, *University of Pennsylvania*, Branch Coslett, *University of Pennsylvania* ■ Human creativity is often assessed by asking participants to generate novel uses for common objects. The cognitive mechanisms underlying performance on this task, however, remain unclear. Recent research from embodied cognition suggests that simulations of bodily action might underlie this creative ability. Importantly, the responses in this task are open-ended, posing problems for studying its underlying mechanisms. In the present study, we developed a closed-ended version of the task called the "Would You, Could You" task. In this timed task, participants saw a visual object, read a description of how that object would normally be used or how it could be used creatively, and had to determine whether the description was sensical. In a behavioural experiment, we sought to determine whether the object's manipulability and the participants' imagery ability predicted performance under each context. We additionally provide preliminary results of a TMS study investigating the role of the SMG and hMT—two cortical regions implicated in selecting actions—in performing this task. We show that, while the object's manipulability does affect performance under different contexts, neither imagery nor the two brain regions of interest appear to influence responding.

P320 Driving the locus coeruleus: Relating pupil diameter and EEG metrics to performance on a naturalistic highway driving task. Andrew Reid, *University of Nottingham*, Marcel van Gerven, *Radboud University Nijmegen* ■ Typically, paradigms that target specific cognitive functions are designed as repetitive, static, and highly controlled presentations of sensory stimuli, whose objective is to reduce all sources of "nuisance" variance and focus on the process of interest. However, such simplistic paradigms may fail to sufficiently engage arousal and motivational systems, such as those subserved by noradrenergic and dopaminergic systems, to assess the role of these systems in motivation, decision making, adaptive learning, and cognitive control (see, e.g., Aston-Jones & Cohen, 2005; Cools, 2016). Here, we present an alternative approach for gauging cognitive function, which makes use of a continuous, naturalistic stimulus stream, in the form of a realistic 3D highway driving simulation. We present preliminary results from participants performing a continuous driving task simultaneous with eye tracking and 64-channel EEG. These indicate: (1) participants with more driving and gaming experience perform better on the task; (2) there is a robust pupil dilation response in response to cognitively demanding task situations (such as overtaking in traffic); and (2) this pupil response is related to performance on the task. Further analyses into the relationship of pupillometric and EEG metrics to task performance are currently ongoing.

P321 The Dual Mechanisms for Control Framework: Examining Cognitive Control and Autonomic Nervous System Activity. Michelle A. Dollois, *University of Guelph*, Mark J. Fenske, *University of Guelph*, Christopher M. Fiacconi, *University of Guelph* ■ Effortful cognitive processing has long been associated with changes in autonomic nervous system (ANS) activity. The ANS is thought to mobilize resources to accommodate

increased cognitive demands as witnessed in changes in heart rate (HR) and respiration. The aim of the present study is to examine these effort-related changes in ANS activity through the lens of the dual mechanisms for control (DMC) framework, which distinguishes between two modes of cognitive control. Proactive control requires active goal maintenance and sustained attention thus embodying aspects of cognitive effort previously shown to manifest in ANS measurements. Reactive control diverges in that does not require sustained preparation and attention, suggesting that the temporal profile of effort expenditure differs from that of proactive control. Using behavioural markers that index different control modes, we examine whether each mode has a unique autonomic signature that maps on to its associated effort profile. We modified the AX-continuous performance task to accommodate HR and breathing measurements and replicated past work on the DMC framework. HR and respiration data will be presented including analyses of how inter-individual differences in control mode preference are reflected in ANS measures, along with analyses probing the trial-by-trial link between behaviour and ANS activity.

P322 Using temporal order judgements to explore spatial attention after stroke. Jasmine Aziz, *Dalhousie University*, Stephanie Jones, *Acadia University*, Chris Cowper-Smith, *Dalhousie University*, Emily Papsin, *Dalhousie University*, Joshua Salmon, *Dalhousie University*, Shaun Boe, *Dalhousie University,* Gail Eskes, *Dalhousie University* ■ Temporal order judgement (TOJ) tasks are commonly used to study spatial attention biases. Patients with right-hemisphere stroke often have difficulty responding to stimuli on the left, which could be related to failure to attend to a side of visual space (extrapersonal space deficit; ESD) and/or a side of their body (personal space deficit; PSD). Most TOJ tasks do not evaluate these deficits independently. This study aimed to distinguish between ESD and NSD in stroke patients using a visual TOJ task localized to the hands. Shapes (square, circle) with attached light emitting diodes (LEDs) were positioned on each hand and participants indicated which LED turned on first by naming the shape. To differentiate ESD from NSD, participants completed this task twice, either with their hands crossed or uncrossed in front of their body. Right-hemisphere stroke patients were less accurate at judging left-leading stimuli when their hands were uncrossed (i.e., when their left hand was on the left side). This effect was not seen in the crossed condition on either side, or in left-hemisphere stroke patients or healthy controls. Our results suggest that spatial biases due to right hemisphere stroke arise from a combination of deficits in personal and extrapersonal reference frames.

P323 Neural Correlates of the Production Effect: An fMRI Study. Aaron Newman, *Dalhousie University*, Jonathan Fawcett, *Memorial University of Newfoundland*, Glen Bodner, *University of Calgary*, Brandie Stewart, *Dalhousie University*, Kyle Roddick, *Dalhousie University*, Angela Lambert, *University of Calgary,* Olave Krigolson, *University of Victoria* ■ Memory for materials read aloud is often better than memory for non-produced materials—a phenomenon dubbed the production effect. This effect has been explained with reference to the relative distinctiveness of produced items (due to sensorimotor activation), though alternative accounts suggest greater attention directed towards produced items. Little is known concerning the neural mechanisms underlying the production effect. We had adults perform a typical production task while being scanned with fMRI. In the study phase, words were presented, each with an instruction to either produce aloud, read silently, or read silently while saying the word “check” (control condition). In the test phase studied words were interleaved with novel (foil) words in a recognition test. The production effect was replicated behaviourally (aloud > silent = control). During encoding, stronger activation was observed for aloud than other conditions in motor, somatosensory, and auditory cortical regions,

consistent with a distinctiveness account. At test, the only area consistently more activated by aloud words was in a region of the left parietal lobe associated with attentional control. These findings provide a nuanced account whereby production generates stronger memory traces during encoding due to increased sensorimotor processing, but at test produced items draw greater attention than non-produced items.

P324 P600: A response to syntactic violations or learning? Fareeha Rana, *McMaster University*, Hanan Yousuf, *McMaster University*, John Connolly, *McMaster University*, Elisabet Service, *McMaster University* ■ Event-Related Potentials (ERPs) are brain responses recorded to target stimuli. In language research, two ERPs feature prominently: (1) the N400, a negative potential elicited 400 milliseconds (ms) after presentation of semantically anomalous stimuli (Kutas & Van Petten, 1994); (2) the P600, a positive potential elicited 600 ms post semantically/syntactically anomalous stimuli (Van Herten, Kolk, & Chwilla, 2005). Although the P600 has been recorded in response to both semantic and syntactic violations, it is considered mainly as a component of syntactic reanalysis. Previous studies reporting P600 effects presented stimuli that were syntactically invariant in a consistent manner (for example, garden path sentences). The current study explores the role of the P600 as a component of learnability and expectation rather than one that is specifically language related. Participants were presented with sentences one word at a time as EEG was recorded. Sentences were either congruent (control), or incongruent, where the sentence-final word was the direct opposite of what the participant would expect (e.g., hot instead of cold). We hypothesise that initially, incongruent sentences will elicit N400s, but as the experiment progresses and expectancy builds, these N400s will change to P600s as the participant is able to anticipate the ending of the sentence.

P325 Managing Ambiguity: An Eye-Tracking Study of the Relationship between Executive Function and L2 Homograph Processing. Pauline Palma, *McGill University*, Veronica Whitford, *University of Texas at El Paso*, Debra Titone, *McGill University* ■ Ambiguous words, such as homographs (e.g., chest = 'torso' or 'furniture'), have been the topic of many psycholinguistics studies. The Re-Ordered Access Model (Duffy et al., 1988) predicts that sentential context influences ambiguity resolution. However, it is unclear whether this model extends to bilinguals, for whom cross-language activation might influence ambiguity resolution (see Schwartz et al., 2008). Moreover, it is unclear whether individual differences in executive function also play a role (e.g., Mason & Just, 2007). Here, we conducted an eye-movement reading study investigating whether individual differences in executive function (assessed by a non-linguistic Simon task) modulate how French-English (n = 47) bilinguals process homographs embedded in sentential contexts. Homographs were either uniquely-English or had a subordinate meaning that was also an English-French cognate (e.g. cabinet: dominant meaning = 'kitchen cabinet'; subordinate meaning = 'governmental body', which overlaps with French). We found that French-English bilinguals reading in their L2 did not exhibit slowing when reading cognate-homographs in sentences biasing the subordinate meanings. Moreover, greater executive function facilitated the processing of uniquely-English homographs. Thus, we found evidence that the subordinate L1 meanings of within-language homographs are co-activated during L2 reading, and that individual differences in executive function modulate bilingual homograph processing.

P326 Effects of Familiarity on Auditory Distance Perception: The effects of interpersonal voice familiarity on auditory distance perception of human speech under reverberant conditions. Ozgen Demirkaplan, *Memorial University*, Huseyin Hacihabiboglu, *Middle East Technical University* ■ Objectives: Auditory distance perception is a multidimensional phenomenon. Familiarity with the sound source is known to have an important

effect on the distance perception as one of the cognitive cues. An auditory distance perception research to investigate the relationship between interpersonal voice familiarity and auditory distance perception is reported in this study. Methods: The subjective experiment involves a binaural listening task where different source distances between 0.5 and 16 meters were simulated. Participants (6 male, 6 female) are composed of different-gender couples who are only familiar with their partners for at least two years but are completely unacquainted with the members of the other five couples. Each participant listened and judged the distance of five different speech utterances from their partner (F0, familiar voice), the spectrally most similar stranger (F1, similar voice) and the spectrally most dissimilar stranger (F2, unfamiliar voice). Conclusion: The results indicated that interpersonal familiarity affects auditory distance perception positively for the Familiar (F0) and Unfamiliar (F2) conditions. For further investigation, the study also revealed an interesting result may point out that other cognitive factors alongside the interpersonal familiarity (e.g. the semantic feature of the speech) can be as effective as acoustic cues on the enhancement of auditory distance perception.

P327 How aggressive is a shark lawyer? Comparing the intensity of the figurative meaning of noun-noun metaphors, X is Y metaphors and similes. Juana Park, *University of Alberta*, Faria Sana, *Athabasca University*, Christina Gagne, *University of Alberta*, Thomas Spalding, *University of Alberta* ■ Several psycholinguistic studies on figurative language compared X is Y metaphors (Lawyers are sharks) and their corresponding similes (Lawyers are like sharks), assuming that both figures of speech convey the same meaning, differing only in the cognitive mechanisms involved in their comprehension. However, the assumption that metaphors and similes share the same interpretation may be incorrect. Our goal is to examine whether the format in which a figurative expression is presented has an impact on the intensity of the intended meaning. We compared three types of expressions: X is Y metaphors, noun-noun metaphors (shark lawyer) and similes. Participants read figurative phrases presented in one of these three possible formats, followed by a statement that conveyed either the salient (Lawyers are aggressive) or the non-salient (Lawyers are constantly moving) meaning of the expression. Their task was to rate on a 0-100 scale how much they agreed with each statement. We hypothesize that: 1) ratings will be highest for the noun-nouns because the novelty and ambiguity of this format allow richer interpretations (shark lawyer can be interpreted as a hybrid between a shark and a lawyer) 2) the ratings will be lower for non-salient properties because of their lack of conventionality.

P328 Are all near-misses created equal? The effect of scratch card game structure on outcome reactivity. Madison Stange, *University of Waterloo*, Michael Pinnau, *University of Waterloo*, Mike J. Dixon, *University of Waterloo* ■ A near-miss is an outcome that falls just short of a jackpot win. Although they are monetary losses, scratch card near-misses lead to increases in physiological arousal and the urge to continue gambling. However, only one type of scratch card near-miss has been experimentally investigated, despite a wide range of game types available for purchase. Undergraduate participants (N = 65) played two different custom scratch card games, and experienced four outcomes within each game type. One card emulated a "match three" game (e.g. match three symbols to win a prize). The other mimicked a "number matching" game (e.g. match a "lucky" number to a number in the matrix to win). All participants experienced two losing outcomes, one winning outcome, and one near-miss outcome in each game type. Participantsphysiological arousal (skin conductance and heart rate) and subjective reactions were measured following each outcome. We hypothesized that if participants were sensitive to near-miss outcomes regardless of the game

structure, they would show increased reactivity within both game types. Overall, results suggested that participants reacted to near-misses differently than regular losses in both game types. Thus, across different game platforms near misses appear to be especially arousing, frustrating and disappointing, yet motivating.

P329 The Influence of Irrelevance: Examining the Impact of Irrelevant Magnitudes on Task Relevant Magnitude Estimations. Rylan Waring, *University of Guelph*, Lana Trick, *University of Guelph* ■ This study investigates whether magnitude information that is task-irrelevant influences people's value estimations of task relevant magnitudes. Past research has demonstrated that more-than/less-than judgements of task-relevant magnitude information are influenced by pieces of task-irrelevant magnitude information (e.g., a judgement of number of dots being influenced by the size of the dots), but little research has examined the influence of irrelevant magnitudes on magnitude estimations. 28 participants were asked to make either number or surface area estimations of dots. Participants saw a standard image, followed by a trial image, and were asked to provide numeric value estimates for the trial image based on how it compared to the standard image. Both the number and size of the dots in the second image were manipulated, and participant estimations were recorded. There was a significant interaction between task condition (number versus surface area judgement) and task-irrelevant magnitude value, wherein estimates of surface area were significantly higher when number (task-irrelevant) magnitude values were highest, and estimates of number were significantly lower when surface area (task-irrelevant magnitude) values were highest. This suggests that irrelevant magnitude information can impact primary magnitude estimations, and that this impact may differ based on which magnitude is being estimated.

P330 Explaining Biased Beliefs about Global Economic Inequality. Kathleen Daly, *Memorial University of Newfoundland*, Martin Day, *Memorial University of Newfoundland* ■ Why don't many developed countries, including Canada, give more to reduce global inequality? One possibility is that people have biased views of the distribution of global wealth. In this research we sought to 1) establish whether biased views of inequality exist, 2) determine ideal levels of inequality, and 3) explain these beliefs. Just-world beliefs and the extent to which one identifies with humanity may partially explain how much global inequality someone thinks exists and how much they want to exist. We recruited 181 American residents and compared perceptions of global economic inequality to objective rates. We also measured participantsgeneral belief in a just world and identification with all humanity. Results showed that people's views of global inequality are biased: they largely underestimate the gap between wealthy and poor countries, and prefer much more equality. Just-world beliefs were related to underestimations of global economic inequality and lower desires to reduce the economic gap. Higher identification with humanity was related to more accurate estimates of inequality and stronger desires to decrease wealth in the world's richest countries. Though additional research is necessary to determine causality, this research demonstrates a novel connection between individual traits and biased attitudes toward global economic inequality.

P331 Evaluating effort: A dissociation between online subjective effort ratings and performance measures. Michelle Ashburner, *University of Waterloo*, Evan Risko, *University of Waterloo* ■ Effort is a central construct in our mental lives yet our understanding of the processes underlying our perception of effort are limited. Performance is typically used as one way to assess effort in cognitive tasks (e.g., tasks that take longer are generally thought to be more effortful); however, Dunn and Risko (2016) reported a recent case where such "objective" measures of effort were dissociated from subjective measures (i.e., self reports of effortfulness). This dissociation occurred

when participants either made their effort ratings after the task (i.e., reading rotated arrays of words) or without ever performing the task. This leaves open the possibility that if participants made their subjective effort ratings closer in time to the actual experience of performing the task (e.g., right after a given trial) that these ratings might better correspond to putatively "objective" measures of effort. To address this question, we replicated Dunn and Risko (2016) with an additional online effort rating (i.e., an effort rating made right after each trial). Results indicated that participant's online ratings still diverged from performance measures. Implications of this study for extant accounts of the perception of cognitive effort will be discussed.

P332 The Mismatch Effect and Measuring Implicit Mental Illness Stigma: The Influence of Schema Incongruence on Reaction Time in Undergraduate Students. Nicole Harris, *Laurentian University*, Denis Vaillancourt, *Laurentian University*, Emalie Hendel, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Mental illness is associated with cognitive schemas representing negative stereotypes. The IAT has been used to evaluate these cognitive schemas of mental illness, however the categories used are confounded by the comparison of mental vs. physical illness. These target categories are not contrasting concepts due to the high comorbidity of conditions. The purpose of this study was to address such confounds, and examine the influence of schema incongruence with level of contact (LOC). Forty-one post-secondary students were tested with an IAT and asked to sort attribute terms into the novel target categories, clinical and nonclinical population. It was anticipated there would be an IAT effect, with an implicit bias to associate mental illness with negative attributes. Results indicated a main effect of congruency, but with participants responding significantly faster in the incongruent condition. No main effect of LOC was found. With a primarily non-clinical sample, these findings suggest a bias for faster responding to self-consistent emotions. This may relate to previous findings of a positive correlation between age and acceptance of negative affect. Future research is requisite to investigate such assumptions, and add to the limited understanding of implicit mental illness stigma and influence of schema violations on cognitive processing,

P333 Judgments of Problem Solvability During a Water Jug Task. Ian Newman, *University of Saskatchewan*, Valerie Thompson, *University of Saskatchewan* ■ How does one determine whether to persevere or give-up during problem solving? In some cases, the optimal decision is to disengage from the problem to allocate resources more efficiently, particularly when the problem is unsolvable. Identification of unsolvable problems is not always straightforward, but there is some evidence that in some cases, reasoners can quickly and accurately identify whether a problem is solvable or not. Meta-reasoning research is in its infancy and there is a dearth of investigation into Judgments of Solvability (JoS). We measured initial and repeated JoS (up to 13 total) during a water jug task, which required reasoners to move water between three jugs to reach a goal state. These problems varied in difficulty; one-third of the items were unsolvable. We found that initial JoS was not correlated with time spent solving the problem, but second JoS (made 15 second after the initial JoS) was positively correlated with the amount of time allocated to the problem. By this second JoS, reasoners reported higher JoS for problems they went on to solve correctly than items they eventually gave-up on. Reasoners also solved easy items more often than hard items but did not give up earlier on easy items than impossible items.

P334 The Effect of a Concurrent Task on Function Learning. Mark Brown, *Carleton University*, Guy Lacroix, *Carleton University*, Jessica Walker, *Carleton University* ■ When people learn discrete categories, engaging in a concurrent task interferes with the ability to learn verbalizable rules. However, the effect of a secondary task when learning concepts representing relationships

between continuous variables (i.e., function learning) has not been addressed. To explore this issue, we had participants learn how to predict the level of a criterion variable (Y) based on the level of a predictor variable (X). The X-Y relationship was either linear or quadratic and participants were trained either with or without a concurrent memory task. After training, participants estimated Y for new X values within, and outside the training range (interpolation and extrapolation, respectively). Results suggest that the secondary task reduced accuracy for the quadratic more than in the linear function. However, extrapolation of the quadratic function was poor, regardless of training condition. A follow-up experiment used an inverted V-shaped function. Again, the secondary task slowed learning. However, a closer look at the transfer data suggests that participants either discovered the correct rule, or not. Results are discussed in terms of rule-learning and exemplar memory processes in function learning.

P335 Preschoolers speaker-specific interpretations of emotional prosody during online language processing. Justine Thacker, *University of Calgary*, Craig Chambers, *University of Toronto*, Susan Graham, *University of Calgary* ■ We examined whether children would adjust their use of emotional prosody as a cue to reference as a function of speaker reliability. Using a between-subjects design, 4- and 5-year-olds (n=224) were introduced to one of four possible speakers: (1) Reliable Speaker who demonstrated congruent use of linguistic and affective cues; (2) Unreliable Speaker who demonstrated incongruent use of these cues; (3) Unreliable Speaker who children were additionally told "says things in a strange way"; or (4) Unreliable Speaker who expressed unusual opinions. Test trials consisted of displays containing pairs of objects from the same category, but that differed in terms of their association with negative or positive emotional prosody (broken doll/intact doll), and were accompanied by referentially ambiguous instructions ("Look at the doll") spoken in either a positive- or negative-sounding voice. Results indicated that children in the Reliable Speaker condition directed a greater proportion of looks to the negative object during negative emotional prosody trials (M=.68), compared to positive emotional prosody trials (M=.52), $p<.001$. In contrast, there was no effect of emotional prosody in any of the Unreliable Speaker conditions (ps>.28). This selectivity in response to different speakers provides compelling evidence that social-pragmatic reasoning underlies preschoolers' interpretation of emotional prosody.

P336 How children use testimony from inaccurate speakers. Erika Nurmsoo, *University of Kent*, Nora Franke, *University of Erfurt*, Sok Wa Lei, *University of Kent* ■ Previous studies on children's trust in testimony have shown that children prefer to learn and endorse information provided by previously accurate speakers (e.g. Koenig & Harris, 2015; Nurmsoo & Robinson, 2009). However, some researchers (e.g., Vanderbilt, Heyman & Liu, 2014) have also found that in the absence of conflicting testimony, children will trust inaccurate informants. This finding suggests that children don't simply disregard the inaccurate informant, but are willing to (possibly tentatively) learn from him or her. One possibility is that children learn from both speakers, but in some way 'flag' the inaccurate speaker's word as a speaker-specific term. Children are able to use partner-specific referential pacts, expecting a speaker to continue to use a given term (e.g., "horse", rather than "pony") when referring to an object, although they do not expect a new partner to also use this term (Koymen, Schmerse, Lieven & Tomasello, 2014; Matthews, Lieven & Tomasello, 2010). Do children learn inaccurate speakers' words as speaker-specific terms? We modified the standard trust in testimony paradigm (e.g., Koenig & Harris, 2005) to explore whether children would consider the speaker when determining the referent of a request. We presented 46 3- and 4-year-old children with videos showing two puppets (Cat and Dog) naming objects. In three history trials, one of the speakers consistently labeled familiar objects correctly (e.g., calling a book "a

book"), and the other consistently labeled them incorrectly (e.g., calling it "a flower"). Children were simply asked to repeat what the different speakers said. On each of two test trials, the videos showed the two puppets using the same word (e.g., "blicket") to label two distinctly different novel objects (e.g., Cat used it to refer to a red cylindrical object, and Dog used it to refer to a silver kitchen utensil). On Accurate trials, the puppet who was previously accurate then appeared, live (manipulated by the experimenter), and asked the child "could you give me the blicket?". Children could choose from an array of three objects, including both novel objects from the video and a third distractor object. On Inaccurate trials, it was the inaccurate puppet who appeared and asked for the "blicket". If children only learn from the accurate speaker, then regardless of who asks for the "blicket", the accurate speaker's referent should be chosen. If children learn from both, perhaps in the sense of learning a dialect, then they might choose the inaccurate speaker's object when he asks for the "blicket" but not otherwise. As expected, when the accurate puppet requested the object, children overwhelmingly selected the object that the accurate speaker had previously labeled. Interestingly, when the inaccurate puppet requested the object, children performed differently: They were significantly more likely to select the inaccurate puppet's referent than when the accurate speaker made her request. We discuss the implications of these findings for children's trust in testimony and social learning more broadly." Interestingly, when the inaccurate puppet requested the object, children performed differently: They were significantly more likely to select the inaccurate puppet's referent than when the accurate speaker made her request. We discuss the implications of these findings for children's trust in testimony and social learning more broadly.

P337 Prevalence and sex differences in innumeracy among undergraduate students. Bob Uttl, *Mount Royal University*, Kelsey Cnudde, *Mount Royal University*, Anne Tseu, *Mount Royal University*, Bethan McBreen, *Mount Royal University*, Kayla Jetko, *Mount Royal University* ■ Innumeracy, an inability to understand and to do basic mathematics, plagues a large proportion of the world's population. For example, Schwartz and Woloshin (2000) showed that substantial proportion of US adults cannot correctly answer three basic numeracy questions (Basic Numeracy Questions): convert 1% to 10 in 1,000, convert 1 in 1,000 to 0.1%, and determine how many hands in 1,000 coin flips. To examine innumeracy among undergraduate students in a mid-size undergraduate university in Canada, we administered Schwartz et al.s (1997) Basic Numeracy Questions to hundreds of undergraduate students along with another 18-item objective tests of basic mathematical knowledge. Our results show that substantial proportions of undergraduate students were unable to correctly answer Basic Numeracy Questions and that majority of participants were unable to correctly answer most of the items on the 18-item basic mathematical knowledge test. Moreover, women vs. men performed more poorly on Basic Numeracy Questions as well as on the 18-item objective test.

P338 Students don't like numbers: Replication and extension. Bob Uttl, *Mount Royal University*, Carmela White, *University of British Columbia Okanagan* ■ Uttl, White, and Morin (2013) reported that undergraduate students are not at all interested in taking quantitative vs. non-quantitative courses; students' interest in quantitative vs. non-quantitative courses was nearly 6 SDs below the mean interest in non-quantitative courses. To replicate and to extend this finding, we presented two large samples of undergraduate students with the same descriptions of 44 psychology courses and asked them to rate their interest in taking each course. Replicating previous results, we found that studentsinterest in quantitative vs. non-quantitative courses was extremely low. Extending the previous findings, we found that studentslack of interest in quantitative vs. non-quantitative courses generalized to other

majors.

P339 Understanding the relation between parentsmath anxiety and their perception of their interactions around mathematics homework. Bronwyn O'Brien, *University of Ottawa*, Michela DiStefano, *University of Ottawa*, Gerardo Ramirez, *University of California, Los Angeles*, Erin Maloney , *University of Ottawa* ■ In recent work, Maloney et al., (2015) reported that children with high math anxious parents, who frequently help them with their math homework, learn less math, and experience an increase in math anxiety over the school year. Here we investigated the possibility that high math anxious parents experience more negative interactions with their children, regarding their math homework, than low math anxious parents. 196 parents with children in grades 1 through 5 completed a series of questionnaires, online, assessing their math homework helping practices and math anxiety. Math anxious parents reported significantly "more frustrating", and "more stressful" homework helping interactions with their child, and also reported experiencing "more conflict" while helping with their child's math homework, in comparison to the low math anxious parents. There were, however, no differences with regard to the frequency with which high vs low-math anxious parents helped their children with their math homework. Findings from the current study suggest that one method of math anxiety transmission from parent to child might be through the high-stress, and conflict-ridden math homework environment experienced by math-anxious parents and their children.

P340 You're a novice, I'm an expert: Examining individual differences within the testing effect. Yichu Zhou, *University of Waterloo*, Colin M. MacLeod, *University of Waterloo* ■ Novice learners--people without prior knowledge of the topic at hand--experience high working memory load as they try to learn new information and integrate it with their existing knowledge. Learning strategies directed toward novice learners should therefore offer a high degree of guidance to reduce cognitive load during encoding. In contrast, for expert learners--people who already possess some related knowledge about the topic at hand--the same strategies may interfere with their integration process: too much guidance will reduce automatic processing and increase extraneous cognitive load. The current educational literature does not always account for these knowledge level differences. Recent evidence suggests that, relative to testing, simply restudying the information benefits encoding for novice learners whereas the opposite was true for expert learners (i.e. only expert learners showed a testing effect). Presumably, testing does not offer enough guidance for the novice learners. The present study aims to examine these results in the domain of computer programming. We predict that, after initial learning, novice learners will perform better on a subsequent test if they restudy the information relative to completing a practice test, whereas the opposite will be true for expert learners.

P341 Changes in attention following instructions to forget: Evidence from hand movement trajectories. Ian Palmer, *Dalhousie University*, Jennifer Swansburg, *Dalhousie University*, Tracy Taylor, *Dalhousie University*, Heather Neyedli, *Dalhousie University* ■ In an item-method directed forgetting task, words are presented one at a time, each followed by an instruction to Remember or Forget. A directed forgetting effect is revealed as better subsequent memory for Remember items than for Forget items. To test the hypothesis that attention is allocated differently to Remember and Forget words, we capitalized on the fact that hand movements initially curve towards an attended location. On each study trial a word was presented to the left or right, with a string of Xs in the mirror-opposite location. After the word display disappeared, a tone instructed participants to Remember or Forget the word. Participants then made a vertical reaching movement to displace

their right index finger from a position at the bottom centre of the computer touchscreen to the top centre. We measured the area between the position curves that defined movements on word-left trials and word-right trials. This area was smaller (less curvature towards the word) following instructions to Forget than following instructions to Remember. This result is consistent with the removal of attention from Forget item representations and demonstrates that trajectories can be used to reveal attentional processes that underlie the implementation of memory intentions.

P342 The Effects of Concussions on Source Memory: A Retrieval or Encoding Deficit. Akeila Gabriel, *Laurentian University*, Joel Dickinson, *Laurentian University*, Jennifer L. Tomes, *Mount Allison University*, Denis Vaillancourt, *Laurentian University* ■ In a recent study by Tomes and Miller (2015) it was found that concussed participants had equal recognition of words, but a reduced source memory for those words. No conclusion could be made for whether the deficit was due to encoding or recognition difficulty. The aim of the present study was to identify the source (get it) of the source memory deficit in concussed versus non-concussed participants. Participants (7 concussed, 6 control) completed a source memory task where they were given a list of 50 words (25 bolded and 25 italicized) to study. They were later presented with a list of 100 words (50 studied words and 50 new) and asked to make judgements as to whether each word was old(studied) or new. For words identified as old, participants were asked to make source judgements in which they would identify the word as being presented originally in bolded or italicized font. ERPs were recorded at both encoding and retrieval of this memory task. Results suggest differences at both encoding and retrieval for concussed versus non-concussed participants at P300 and N400, with data suggesting that concussed participants use more cognitive effort especially for italicized words.

P343 Production is in the Eye of the Beholder: A Pupillometric Investigation of the Production Effect. Jenny Tiller, *Memorial University*, Kathleen Hourihan, *Memorial University*, Jonathan Fawcett, *Memorial University* ■ The production effect refers to a pattern of superior memory performance for items read aloud compared to items read silently. This is often interpreted as the former being more distinctive, due to the incorporation of productive information into the memory trace. Other theorists have argued motivational or attentional factors may also contribute to the effect. The present experiment tests the latter theory, using pupil diameter to quantify mental effort during a typical production task. A sensorimotor control condition (saying 'check') was also implemented, to quantify the effort involved in general vocalization. Results revealed positive deflections for both the aloud and control conditions with the former peaking later and lasting longer. In contrast, pupil diameter reduced rapidly following instruction onset in the silent trials. The magnitude of this pupillometric production effect predicted the magnitude of the behavioral production effect observed in a later recognition test. These findings suggest that the production effect may be explained by both enhanced processing of the aloud items and by diminished processing of the silent items.

P344 Does Implicitly Activated Nonstudied Material Facilitate False Recall? A Test of the CLS Model's Predictions. Alexis Payne, *Mississippi State University*, Deborah Eakin, *Mississippi State University* ■ According to the Complementary Learning Systems (CLS) neural-network model, information can be retrieved via the hippocampus or the MTLC. In the model, the hippocampal component retrieves studied information during recall via pattern matching, and the MTLC component tracks how well a test item matches a previously studied item via a signal-detection process using familiarity. According to the CLS model, only information that matches a previously studied event should be recalled. However, the model does not make predictions about whether implicitly activated information present at the time

of study will be falsely recalled. Using a novel paradigm (Payne & Eakin, 2018), we tested the degree to which associative properties predicted high-confidence false recognition. Recognition was compared between studied cue-target pairs (e.g., FLANNEL-MATERIAL; HOSPITAL-NURSE), implicitly activated cue-target pairs (e.g., FLANNEL-CLOTH), non-implicitly activated cue-target pairs (e.g., HOSPITAL-PATIENT), and new pairs. Our results show that implicitly activated information led to a significant increase in high-confidence false alarms. Therefore, these data demonstrate a limitation of the CLS model's hippocampal component, providing insight into how false memories occur.

P345 Order recall in verbal short-term memory is influenced by orthographic neighborhood activation. Dominic Guitard, *Université de Moncton*, Jean Saint-Aubin, *Université de Moncton*, Marie Poirier, *City University (London)* ■ In short-term ordered recall tasks, it is well known that lexical factors have a large effect on the number of correctly recalled items and little impact on order recall. Contrary to this received view, the Activated Network (ANet) model (Poirier, Saint-Aubin, Mair, Tehan, and Tolan, 2015), proposes that the level of activation within the relevant long-term lexico-semantic networks impacts order recall. According to ANet, increasing the level of activation of an item within the relevant long-term lexico-semantic network would increase the probability of recalling the item and the probability of its migration toward the beginning of the list. This model was supported by manipulations involving semantic category and long-term associative links. Here, we tested those predictions by manipulating the orthographic neighborhoods of to-be-recalled items. The first or last 3 items of a 7-item list were orthographic neighbours of the target item in Position 5 or 3, respectively. As predicted, at recall, the target item in Position 5 migrated more toward the beginning of the list than control items. However, contrary to the predictions, the target item in Position 3 did not migrated more often toward the beginning of the list than control items. Implications for ANet are discussed.

P346 The modality of interference during encoding impacts object representations in memory. Logan Doyle, *Mount Allison University*, Geneviéve Desmarais, *Mount Allison University* ■ We investigated the nature of novel object representations by having participants learn to recognize eight objects haptically or visually and presenting one of four kinds of distractors during learning (haptic, verbal, visual, or no interference). Once objects could be identified flawlessly, participants performed a bimodal object identification task. We presented two objects simultaneously (one presented haptically and one presented visually) and required participants to identify either the haptically-presented or visually-presented object. Half the trials presented two copies of the same objects (congruent trials) and half the trials presented two different objects (incongruent trials). The analyses of reaction times revealed significant interactions between learning condition and testing modality, as well as interactions between testing modality, congruence, and the type of interference presented at encoding. Generally, as predicted, participants who learn to recognize objects visually performed better when identifying them visually. However, participants who learned to recognize objects haptically performed equally well in both identification modalities. Importantly, the amount of interference observed during incongruent trials depended on the modality of the distraction present during encoding. Our results are consistent with the notion that participants presented with a haptic input at encoding generate a visual representation of the haptically-presented object.

P347 Olfactory Working Memory: Quantitative and Qualitative Differences in N-Back Performance for High and Low Verbalisable Odours. Andrew Moss, *Bournemouth University*, Jane Elsley, *Bournemouth University*, Christopher Miles,

Bournemouth University, Andrew Johnson, *Bournemouth University* ■ In two experiments we examine the olfactory n-back advantage for high verbalisable odours (Jonsson et al., 2011). In each experiment participants are presented with a sequence of odours that have previously been identified as high or low verbalisable (Moss et al., 2016). After presentation of each odour, participants are required to provide a binary judgment with respect to whether the odour is the same as the item presented 2-odours previous. In Experiment 1, the n-back advantage for high verbalisable odours was unaffected by concurrent articulation, suggesting that the advantage cannot be explained by verbal re-coding/verbal rehearsal. Experiment 2 correlated n-back performance across different stimulus types. High verbalisable odour performance correlated with n-back for verbal and visual stimuli. This association was not found for low verbalisable odours. The findings suggest quantitative and qualitative differences between working memory for high and low verbalisable odours (consistent with Moss et al., 2018), with the former sharing working memory resources with that employed for verbal and visual stimuli.

P348 Re-examining the Relationship between Visual Working Memory and Mental Rotation. Biljana Stevanovski, *University of New Brunswick, Psychology*, Daniel Voyer, *University of New Brunswick, Psychology*, Petra Jansen, *University of Regensburg, Institute of Sports Science*, Anna Katharina Render, *University of Regensburg, Institute of Sports Science* ■ The current study re-examined the relationship between visual working memory and mental rotation processes, which had been previously examined by Hyun and Luck (2007). We extended our examination to consider sex differences in the relationship between these processes. In two experiments, participants performed a mental rotation task, a visual working memory task, or both tasks concurrently. In the mental rotation task, participants viewed a rotated letter and indicated the letter's orientation (canonical or mirror). In the working memory task, participants encoded the colours of 4 items (Experiment 1, object working memory) or the locations of 4 items (Experiment 2, spatial working memory). In contrast to Hyun and Luck, we observed interference between the mental rotation task and both of the visual working memory tasks, suggesting that both spatial and object working memory are involved in mental rotation. Different patterns of dual-task interference were observed as a function of sex: the interference effect was larger for women than men for the spatial working memory task, however, the interference effect was larger for men than women for the object working memory task. The results of both experiments are considered in terms of their implications for mental rotation and visual working memory.

P349 Unconscious influences on working memory using a novel paradigm: The in-back. Fatou Sarr, *University of Ottawa* ■ The extent and type of relationship between unconscious processes and WM is largely unknown. The goal of our studies is to further define how unconscious processing may alter WM performance using our novel task, the in-back. The in-back is a modified n-back task containing repeated sequences (RS). We hypothesized that participants will show increased accuracy scores and reduced response times, indicators of unconscious influences, to RS items. In all studies, male/female participants (18-25 years old) were recruited from the Univerisity of Ottawa. Pilot study (n=39) results revealed significant decreased reaction times during the trials for both random and RS, and significant improvements in accuracy exclusively in the RS condition. In study 2 (n=38), the in-back's difficulty was increased to reduce ceiling effects found in study 1, and the RS was increased in length and repetition to heighten the effects of unconscious influences. Study 2 revealed significant increases in accurracy exclusive to RS items in the absence of participant awareness, as indicated by questionnaire responses. To investigate stimuli differences, the current study (n=8) utilizes digits, unlike letters in study 1 and 2, and preliminary data has also shown significant

differences in accuracy. These results contribute to knowledge regarding WM performance.