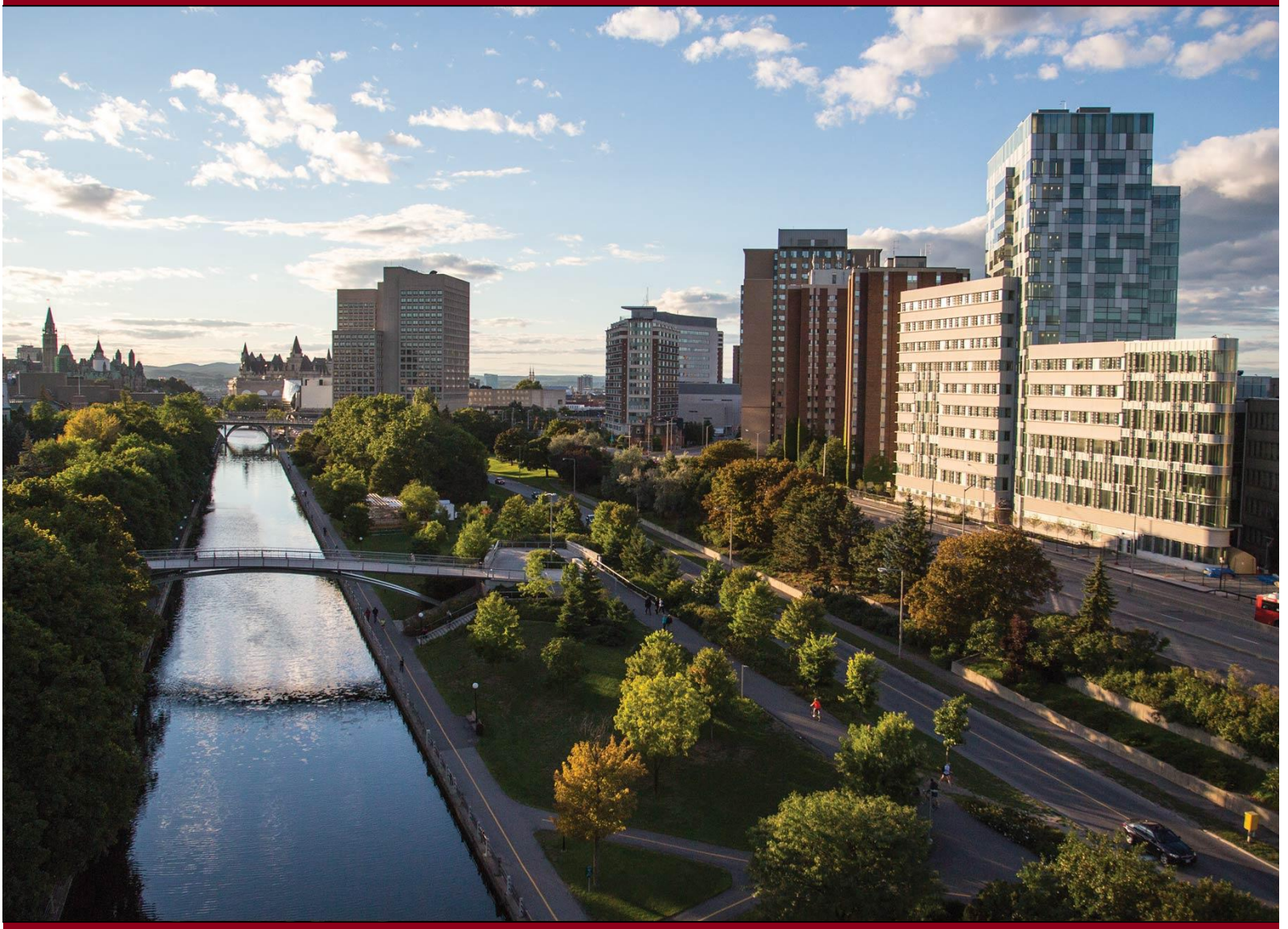
26th Annual CSBBCS Conference

Canadian Society for Brain, Behaviour, and Cognitive Science



University of Ottawa | School of Psychology

June 24th – 26th, 2016

Visit www.CSBBCS.org for more details

CSBBCS SCSCCC

uOttawa

Welcome to CSBBCS 2016!

Welcome to CSBBCS 2016! As head of the organizing committee for the 26th Annual meeting of The Canadian Society for Brain, Behaviour and Cognitive Science, it gives me great pleasure to welcome you to the University of Ottawa 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 promote our scientific disciplines. This year's meeting is also an opportunity for the School of Psychology to celebrate its 75th anniversary and for the Faculty of Social Sciences to celebrate its 60th! We hope you will find time to lift a glass and celebrate this auspicious occasion with us.

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 the School of Psychology, the Faculty of Social Sciences, Pearson Clinical Canada, the Lowertown Brewery, and the University of Ottawa Brain and Mind Research Institute. 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,
Charles A. Collin,
Head of the CSBBCS 2016 Organization Committee
Professor, School of Psychology, University of Ottawa

Facebook: Canadian Society for Brain, Behaviour, and Cognitive Science
Twitter: `@OfficialCSBBCS`
Instagram: `@officialCSBBCS`

Program Booklet Credits

General content:	2016 Organizing Committee
Abstracts:	Their respective authors
LaTeX-code:	Denis Cousineau  Marc-André Goulet 
LaTeX-code based on an earlier version by:	Timo Kluck, Infty Advies (www.infty.nl) & MLC Inc.

Organizing teams

A conference of this size cannot be successful without the help of a large array of people. We would like to acknowledge the help of the following persons.

CSBBCS Executive

- Jean Saint-Aubin (President), Université de Moncton
- Randall Jamieson (Past-Elect), University of Manitoba
- Peter Graf (Secretary/Treasurer), University of British Columbia
- Debra Titone (Member at Large 2015-2018), McGill University
- Glen Bodner (Member at Large 2014-2017), University of Calgary
- Chrissy Chubala (Member-at-Large/Associate 2014-2016), University of Manitoba

CSBBCS 2016 Organization Committee Chairs

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- Raphaëlle Robidoux

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- Kenneth Campbell
- Patrick Davidson
- Sylvain Gagnon
- Pierre Gosselin
- Nafissa Ismail
- Catherine Plowright
- Jean-Philippe Thivierge

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- Bradley Harding
- Jeremy Larcher
- Vincent Leblanc
- Elizabeth Nelson
- Philippe Vincent-Lamarre

Finance Committee

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- Raphaëlle Robidoux
- Heather Woods-Fry

Advertising, Merchandise & Graphics

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- Marc-André Goulet
- Laura Ziebell

Website & Communications

- Denis Cousineau (chair)
- Marc-André Goulet
- Joël Rathgaber

R Workshops Committee

- Angeline Tsui (chair)

Women in Cognitive Science-Canada Session Organizers

- Penny Pexman
- Debra Titone

Executive Symposium Organizer

- Glen Bodner
- Chrissy M. Chubala
- Debra Titone

UOttawa Conference Services

- Fiby Labib
- Kayla St-Jean

Contents

General Information

Location

The CSBBCS 2016 conference will be held in the Faculty of Social Science building (FSS), University of Ottawa, Ottawa, Ontario, Canada, www.uottawa.ca. The FSS building is located here. All major events of the conference will take place on the first floor, except for the Banquet and the poster sessions (see below). The list of conference rooms is as follows:

- **FSS Lobby (at the foot of the living wall)**: Welcome Area, Registration, information desk (see map)
- **FSS2005**: Symposiums
- **FSS1007**: Parallel session room 1
- **FSS1030**: Parallel session room 2 or Symposium
- **FSS1006**: Plenary room and Parallel session room 3
- **FSS4007**: Posters, Reception and Banquet

Banquet

The reception banquet will be held on Saturday, June 25th, in FSS 4007, from 7:30 PM to 9:30 PM. If you have not registered for the banquet, you may purchase a ticket at reception for 60$ (Faculty, post-doctoral fellow or other members) or for 30 $ (Students). Seating is limited. Tickets will be sold on a first-come first-served basis.

Saturday Night Jam Session

Following the banquet, and open to all. Come see your fellow scientists display their musical talents! Pierre Jolicoeur and others will entertain with a mix of blues and rock tunes. There will be a cash bar

Registration desk

The registration desk can be found in the lobby of the FSS building, 1st floor, next to the living wall. Opening hours: 8:00 a.m. to 7:00 p.m. On the opening day (Friday, June 24th), the registration desk will open at 1:00 p.m. and close at 7:00 p.m.

Internet Access

Wireless access is available to all attendees. Simply connect to the "guOttawa" wifi network. No password or login name is required.

Food at the Conference

We will be providing the following to attendees:

- Thursday the 23rd: R-Workshop attendees will be provided with breakfast, lunch and coffee breaks.
- Friday the 24th: Coffee breaks. Hors-d'oeuvres will be served at the WICS-C Mixer.
- Saturday the 25th: Breakfast, BBQ Lunch and coffee breaks for all attendees. Supper will be provided to reception banquet attendees.
- Sunday the 26th: Breakfast and coffee breaks for all attendees. A Pizza Lunch will be served for NSERC session attendees.

Places to Eat

For those wishing to eat off campus, the Byward Market area is a 10-15 minute walk North from the campus, and Elgin Street is a similar distance West. Both of these areas have many restaurants. Feel free to discuss with our staff at the registration desk for restaurant advice.

Presentation Guidelines

Talks

There will be three parallel talk sessions in rooms FSS1006, FSS1007, and FSS1030 on Saturday and Sunday, consisting of 15-minute slots for every talk (12 min. talk + 3 min. for discussion). It is recommended to respect the time alloted to offer everyone the opportunity to switch sessions in order to hear specific talks.

In all the rooms you will find the option to connect your own computer or tablet to the presentation equipment. In case you plan to use the local computer, please give your presentation in PDF or PowerPoint format to the technical room assistant before the session starts.

Vincent Di Lollo Early Career Award

The winner of the Vincent Di Lollo Early Career Award, Katherine Guérard of the Université de Moncton, will give a plenary talk on Friday, June 24th, from 5:15 p.m. to 6:15 p.m. in room FSS2005. Full description is given on page 17.

Two Pre-Conference Workshops on R

There will be two parallel workshops (one at beginner level, the other at advanced level) on R on Thursday, June 23rd, from 9:00 a.m. to 5:00 p.m. Please refer to http://csbbcs.org/2016/index.php/meeting/meeting/pages/view/r for details. Registration is on first come first serve basis. Fee is CAD $20, it covers tea/coffee and food (including breakfast, lunch, snacks).

Invited Symposia

There will be five invited symposia in room FSS2005 and one in room FSS1030. The first three are on Saturday, June 25th. The first begins at 1:30 p.m. titled "Fundamental processes in numerical cognition" (Chair: Jo-Anne Lefevre). The next is at 2:45 p.m., entitled "Cognitive and experiential factors in early mathematics learning" (Chair: Marcie Penner-Wilger). The third symposium will be at 4:00 p.m., entitled "The Missing Letter Effect: History, Models and Current Avenues" (Chair: Annie Roy-Charland).

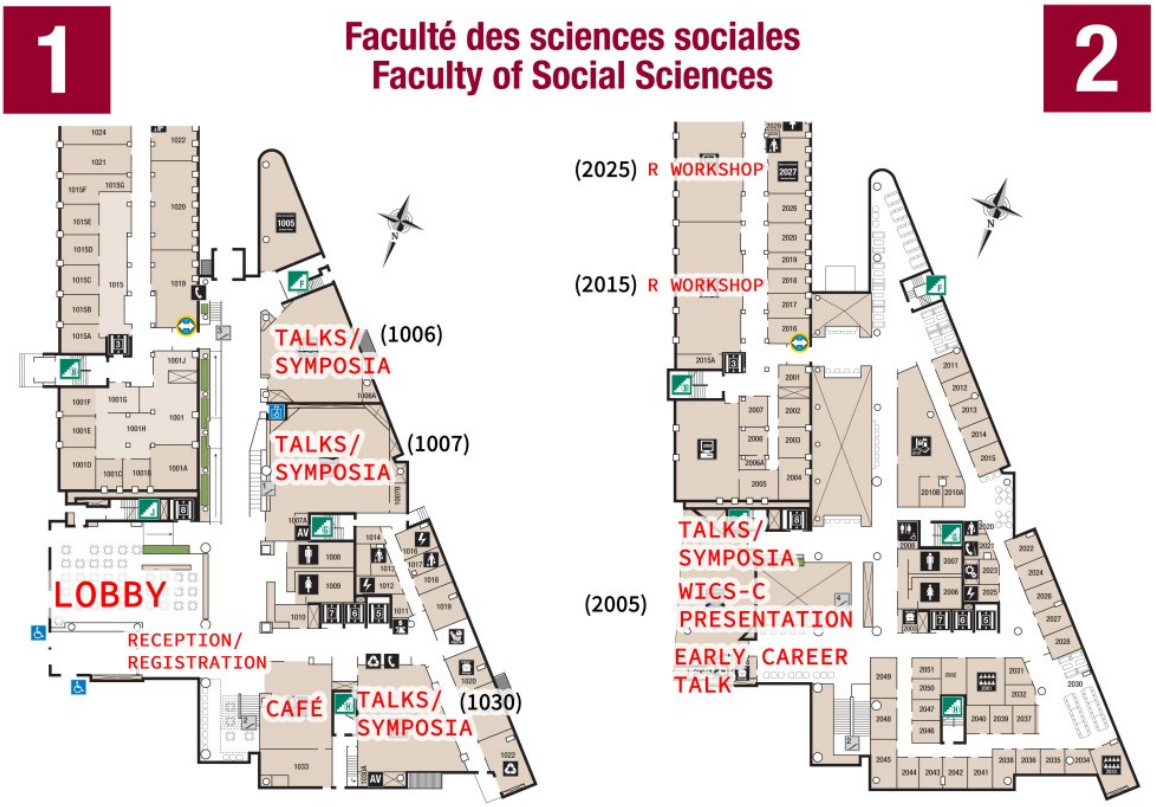
The last three invited symposia are on Sunday, June 26th. The first begins at 9:30 a.m., entitled "Categorization: Causes and Consequences" (Chair: Catherine Plowright) and spans two sessions. The second starts at 10:45 a.m., entitled "Visual Attention" (Chair: Sébastien Hélie). The last one starts at 1:15 p.m., entitled "Embodied and Embedded Cognition Symposium" (Chair: Evan Risko).

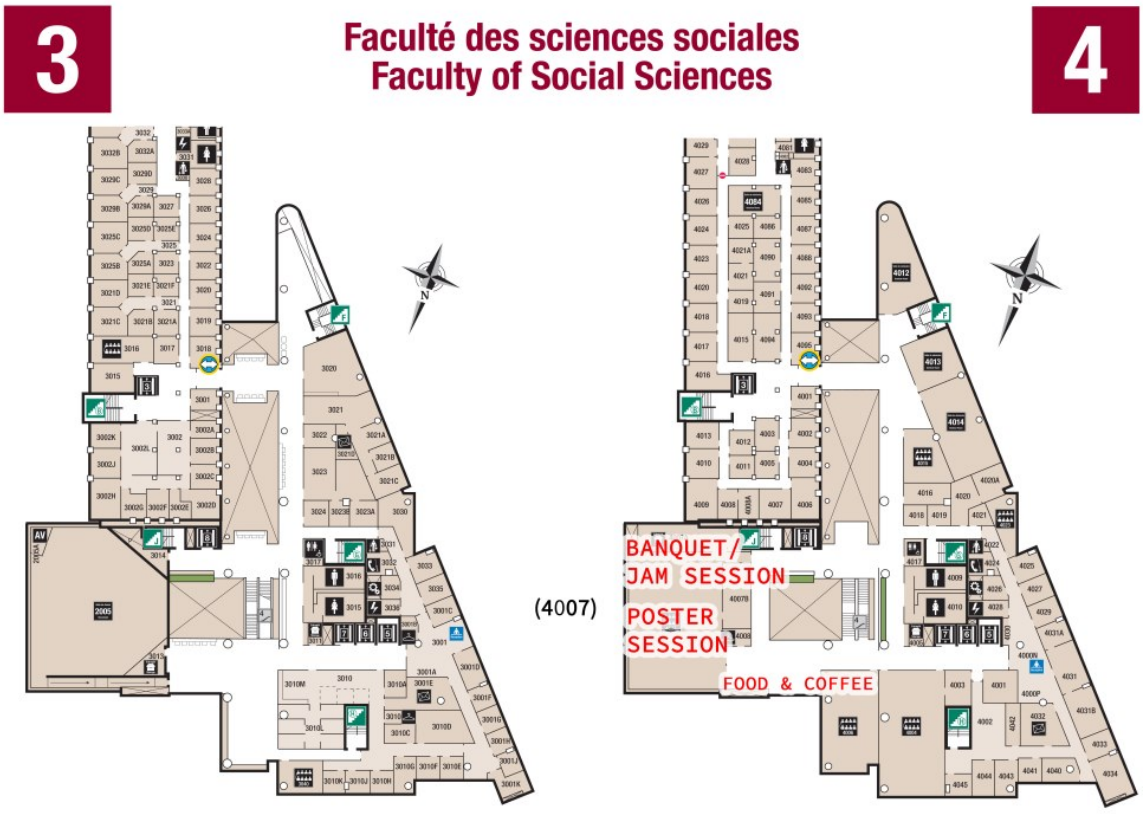
Posters

There are three poster sessions, all in room FSS4007. The first is held on Friday, June 24th, from 2:00 p.m. to 3:20 p.m. Posters can be installed any time prior to the session, and must be removed before the end of the day. Poster session 2 is held Saturday, June 25th, from 9:00 a.m. to 10:30 a.m. Posters can be installed at any moment in the morning but must be removed before 3:45 p.m. The last poster session is held Saturday, June 25th, from 5:00 p.m. to 6:30 p.m. Posters can be installed as early as 3:45 p.m., but must be removed before 6:30 p.m.

Please look up your poster ID in this program and attach your poster to the corresponding poster board. The size of the poster board is 1.20 m (width) × 1.20 m (height) (4' × 4').

Floor Plan


1
Faculté des sciences sociales
Faculty of Social Sciences
2
TALKS/ SYMPOSIA (1006)
TALKS/ SYMPOSIA (1007)
LOBBY
RECEPTION/ REGISTRATION
CAFÉ
TALKS/ SYMPOSIA (1030)
(2025) R WORKSHOP
(2015) R WORKSHOP
TALKS/ SYMPOSIA
(2005) WICS-C PRESENTATION
EARLY CAREER TALK


3
Faculté des sciences sociales
Faculty of Social Sciences
4
(4007)
BANQUET/ JAM SESSION
POSTER SESSION
FOOD & COFFEE

Our sponsors

We are grateful to our sponsors, whose contributions have helped build the CSBBCS 2016 meeting. The organizing committee thanks them for their generosity.

The Brain and Mind Research Institute

The **University of Ottawa Brain and Mind Research Institute (uOBMRI)** is Ottawa's largest collection of basic researchers and clinician scientists that are focused on brain and mind related health.

The uOBMRI helps orchestrate research in a collaborative and innovative fashion by overcoming the barriers that exist between research at the basic and clinical levels. It does so by helping to coordinate the research efforts of its members across 6 uOttawa faculties, 5 resident hospitals, 6 affiliated networks and 5 local research institutes.

For more information, please visit: **uOttawa.ca/brain**

uOttawa | Institut de recherche sur le cerveau / Brain and Mind Research Institute

Pearson Clinical Assessment

Pearson

PEARSON is the global leader in clinical and educational assessments, providing a wide range of assessment tools and intervention solutions for ability, achievement, occupational therapy, personality, behaviour, speech and language, health and well-being.

Pearson's Cogmed Working Memory Training is an evidence-based computerized training program designed to improve attention by effectively increasing working memory capacity through systematic training.

Visit **www.PearsonClinical.ca** to learn more about Cogmed, and many other assessments and interventions.

The University of Ottawa's School of Psychology

In fulfilling its mission and vision, the School brings together the various fields of fundamental and professional psychology in pursuit of common objectives. Through its openness to other disciplines, its desire to develop strategic directions to meet the future needs in psychology and its commitment to bilingualism at all levels along with the exceptional experience it provides to students and a commitment to the community, the School of Psychology serves as a national and international reference in psychology.

To learn more about the School, visit https://socialsciences.uottawa.ca/psychology/

School of **Psychology**

The University of Ottawa's Faculty of Social Sciences

The Faculty of Social Sciences (FSS) celebrated its 60th anniversary in 2015.

The FSS comprises nine departments, schools and institutes, which offer undergraduate, masters and doctoral programs in both English and French. With its 10,000 students, 260 full-time professors, and wide array of programs and research centres, the Faculty of Social Sciences plays a key role at the heart of the University of Ottawa. Its graduate students are supervised by excellent researchers and undertake cutting-edge research in the Faculty's masters and Ph.D. programs.

To learn more about the FSS, please consult https://socialsciences.uottawa.ca/

The Canadian Institutes of Health Research (CIHR)

CIHR's mandate is to excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian health care system. The Institutes create a number of funding and dissemination opportunities with the aim of providing quality information to Canadians. They also focus on encouraging cutting-edge research with potential for long-lasting, positive changes to the nation's health.

CIHR targets key research areas to improve them even further, while also allowing under-developed domains of interest to grow and foster new opportunities for researchers and the general public. Their main goal is to promote the translation, transfer, and dissemination of academic knowledge to those who would benefit from it the most.

To learn more, please visit http://www.cihr-irsc.gc.ca/e/7263.html

Faces of the Future

Young scientists are shaping the future of psychology, both through their innovative research and their commitment to community and academic involvement. Here are a few of the University of Ottawa's most promising graduate students, with an overview of some of their key accomplishment…so far!

Audrey-Ann Deneault & Myriam Beaudry: Organizers of the Interdisciplinary Conference in Psychology

The Interdisciplinary Conference in Psychology (ICP|CIP) is a Canadian peer-reviewed conference organized by students in psychology at the University of Ottawa. Its primary mission is to promote interdisciplinary research related to the field of psychology and to make research more accessible to the general public. By including the perspectives of diverse disciplines, we strive to open up new directions of investigation. In 2016, ICP|CIP celebrated an important milestone: its fifth anniversary!

Myriam Beaudry is a second year PhD student in experimental psychology and holder of a Vanier Canada Graduate Scholarship (SSHRC) and a Fondation Baxter & Alma Ricard scholarship. Her research in social and organizational psychology focuses on inter-organizational collaboration, particularly in the context of risk management and resilience. Her work examines how factors such as trust shape collaborative processes and outcomes. She is involved in ICP|CIP because she strongly believes in the importance of interdisciplinarity and knowledge mobilization in fostering innovative and socially relevant research.

Audrey-Ann Deneault is a first year PhD student in experimental psychology. Her research is funded by the Fonds de recherche du Québec – société et culture (FQRSC). It examines children's attachment to their parents and interactions within the family. Audrey-Ann's main work focuses on the validation of a measure of attachment at the preschool age to better qualify the child-parent relationship. She is also interested in the cognitive aspects of reading development in children. Audrey-Ann believes that ICP|CIP gives a unique opportunity to foster interdisciplinary research for students and researchers.

ICP CIP
INTERDISCIPLINARY CONFERENCE IN PSYCHOLOGY
CONFÉRENCE INTERDISCIPLINAIRE EN PSYCHOLOGIE

Nathalie Freynet: The 1 in 5 Initiative

I am a student in clinical psychology at the University of Ottawa. I have chosen my program of study because it allows me to deepen my understanding of human behaviour, both through research and clinical work.

In 2015, with the help of colleagues working in psychiatry, counselling, and clinical psychology, I created the 1 in 5 Initiative, a student initiative that offers students in mental health-related fields the opportunity to share their academic and clinical knowledge with the community in both official languages. The Initiative 1/5 aims to help reduce stigma pertaining to mental illness and facilitate access to resources for mental health. Since its inception, Initiative 1/5 has developed an interactive workshop that educates people regarding the signs and symptoms of psychological illness, how to access to psychological resources, active listening, and self-care for caretakers. This popular workshop has been offered numerous times to the student population and in the community. The Initiative has also participated in a range of public awareness campaigns using social media, and plans to broaden its reach through mini-conferences and the distribution of information kits on campus.

Angeline Sin Mei Tsui: The Statistics Club

Angeline Sin Mei Tsui is a graduate student with research expertise in infant language development at the University of Ottawa. Currently, she is the Chair of the Statistics club, inviting professors and senior graduate students to talk about different statistical analyses (e.g. meta-analysis, Bayesian modeling). In addition, she is in charge of organizing regular R workshops for graduate students, which are well received in University of Ottawa and Carleton University. Angeline is also the organizer for a pre-conference event on the R software as part of the 26th Annual Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS). For this event, she organizes two parallel one-day workshops, hoping to encourage wider usage in R.

The Statistics Club is a student-led organization that focuses on providing insightful and interactive workshop on statistics to its members. The mission of the club is to make this knowledge accessible and easy to learn for researchers. The club offers regular bimonthly meetings to discuss various cutting-edge techniques, such as Bayesian statistics, hierarchical linear regression, and meta-analysis. We also have regular R workshops because of the increasing importance of learning this statistical software. In 2016, the club aims at further disseminating the value of statistics to a broader audience, thus we are organizing and supporting the 26th CSBBCS pre-conference R workshops. .

Sheida Rapibour: BrainBuddies Outreach

Sheida Rabipour is a PhD candidate in the Cognitive Neuroscience stream. Her research centres on the evolution of cognitive functions (e.g., attention, working memory, reasoning ability) through approaches such as computerized cognitive training and non-invasive brain stimulation. Aside from her academic contributions, Sheida is devoted to sharing scientific knowledge with the public.

Sheida recently founded *BrainBuddies* as an outlet through which she and her peers engage the community in dynamic discussions about topics related to brain function and mental health. BrainBuddies is a knowledge-translation organization led by students with a shared interest in brain function, cognitive health, and psychological wellbeing. Members aim to raise awareness by giving interactive presentations and workshops to the general public, including kids, youth, families, and seniors. BrainBuddies' ultimate goal is to engage the public in interesting and educational discussions about psychology, neuroscience, and related topics while providing students the opportunity to teach what they have learned to the community.

BrainBuddies is proud to work with a number of community partners, including the uOttawa *Brain and Mind Research Institute,* the Ottawa chapter of the *Society for Neuroscience*, and *Let's Talk Science*, with whom they are developing a brain series for kids.

BrainBuddies is devoted to reaching out to the community on different platforms. In addition to local events, members regularly post updates and blogs to the website, **brainbuddies.net**, as well as on facebook (BrainBuddiesOutreach) and Twitter (@BrainBuddies_UO).

Pre-Conference Workshops on R

There will be two parallel workshops (one at beginner level, the other at advanced level) on R on Thursday, June 23, from 9:00 a.m. to 5:00 p.m. Please refer to the following information for details. Registration is on first come first serve basis. Fee is CAD $20, it covers tea/coffee and food (including breakfast, lunch, snacks).
Organizer: Angeline Sin Mei Tsui

Thursday, 9:00 am
VNR2025
Chair: Angeline Sin Mei Tsui

Workshop 1 (Beginner level): Introduction to R. Michael Chan-Reynolds, *Trent University* ■ R is a software environment for statistical computing and graphics (http://www.r-project.org/). It is quickly becoming the de facto software for analyzing data in psychology because it is flexible, powerful and free!

The objective of the workshop is to introduce R. Participants will be expected to have some expertise in statistics applied to psychological research (See Part 3 below for a list of the tests that we will discuss), but no previous knowledge of R is required.

The course format will be a mixture of instructions and exercises with hands-on examples using data sets in R. It is recommended that you bring your own data sets to the workshop, so that you can apply what you learn to your research.
Requirements: You must bring your own laptop (Windows, OSX or Linux) and have R version 3.2.3 (or more recent) installed: cran.rstudio.com/; as well as RStudio version 0.99.491 (or more recent): www.rstudio.com/products/rstudio/download/.

Thursday, 9:00 am
VNR2015
Chair: Angeline Sin Mei Tsui

Workshop 2 (Advanced level): Using R for Structural Equation Modelling. Katie Collins, *University of Ottawa* ■ Structural equation modelling (SEM) is an advanced yet common statistical technique in psychology. It describes a specialized group of multivariate analyses in which the covariances between observed variables are explained and explored through relationships at the latent variable level. Given the popularity of SEM, a number of software programs have been developed for performing these types of analyses. The purpose of this workshop is to work through both simple and more advanced SEM analyses using the free and open source software, R. Participants should already be familiar with SEM. Topics covered will likely include model syntax, model identification, generating path diagrams, confirmatory factor analysis, model comparison, multi-group analyses, mean structures, and measurement invariance. Additional or fewer topics of interest may be covered, depending on time constraints.

Program at a Glance

Thursday June 23rd

TIME	EVENT	LOCATION
9:00AM – 5:00PM	R Workshop – beginner	VNR 2025
	R Workshop – advanced	VNR 2015

*Includes breakfast, lunch and coffee breaks

Friday June 24th

TIME	EVENT	LOCATION
1:00PM – 7:00PM	Registration (also available Saturday and Sunday)	Lobby of FSS
2:00PM – 3:20PM	Poster Session 1	FSS 4007
3:30PM – 5:00PM	Women In Cognitive Science session + Mixer	FSS 2005 & Lobby of FSS
5:15PM - 6:15PM	Early Career Award Talk	FSS 2005
7:30PM - night	Student Party (contact Brad Harding: bhard024@uottawa.ca)	Lowertown Brewery (73York St.)

THURSDAY & FRIDAY JUNE 23–24

26th annual meeting – Ottawa, Ontario

TIME	EVENT	LOCATION
9:00AM – 10:30 AM	Poster Session 2 & Breakfast	FSS 4007
10:30AM – 12:30PM	Executive Symposium (Org. by Glen Bodner)	FSS 2005
12:30PM – 1:30PM	BBQ Lunch	Place Université (FSS Courtyard)
1:30PM – 2:30PM	Symposia & Papers 1 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
2:45PM – 3:45PM	Symposia & Papers 2 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
4:00PM – 5:00PM	Symposia & Papers 3 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
5:00PM – 6:30PM	Poster Session 3	FSS 4007
7:30PM – 9:30PM	Reception / Dinner / Award Ceremony	FSS 4007
9:30PM – 11:55PM	Saturday Night BBCS Jam Session	FSS 4007

SATURDAY JUNE 25TH

26th annual meeting – Ottawa, Ontario

SUNDAY JUNE 26TH

TIME	*EVENT*	*LOCATION*
9:30AM – 10:30 AM	Symposia & Papers 4 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
10:45AM – 11:45AM	Symposia & Papers 5 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
12:00PM – 1:00PM	Pizza Lunch & NSERC session	FSS 1006 & FSS Lobby
1:15PM – 2:15PM	Symposia & Papers 6 (4 parallel sessions)	FSS 1006, 1007, 1030 & 2005
2:30PM – 4:00PM	CSBBCS business meeting	FSS 1006

26th annual meeting – Ottawa, Ontario

FRIDAY June 24rd, 2016

Time	Room: FSS1006	Room: FSS1007	Room: FSS1030	Room: FSS2005
2:00 p.m.		Poster session 1 (Room: FSS4007)		
3:15 p.m.		intersession		
3:30 p.m.		Women in Cognitive Science session + Mixer (Room: FSS2005)		
5:15 p.m.		Vince Di Lollo Early Carreer Award (Room: FSS2005)		
7:30 p.m.		Student party (Location: the Lowertown)		

SATURDAY June 25rd, 2016

Time	Room: FSS1006	Room: FSS1007	Room: FSS1030	Room: FSS2005
9:00 a.m.	Poster session 2 + Breakfast (Room: FSS4007)			
10:30 a.m.	**Titone:** Executive Symposium (Room: FSS2005)			
12:15 a.m.	BBQ lunch: Place Université courtyard			
1:30 p.m.	**Campbell:** Dope-distracting effects of long-term marijuana use ...	**Besner:** Reading aloud: Stages redux	**Blais:** Visual strategies underlying the recognition ...	**Merkley:** Developmental differences in the role of ordinality ...
1:45 p.m.	**Cole:** Size matters: Geometry and visual cues ...	**Jamieson:** A computational analysis of learning and ...	**Boutet:** Can differences in the use of holistic and spatial ...	**Marghetis:** The role of space in complex mathematics: Stable ...
2:00 p.m.	**Calic:** A theory of individual differences in creative ...	**Johns:** The combinatorial power of experience	**Estephan:** Measuring the time course of spatial frequency ...	**Sowinski:** Subitizing, counting, ANS, & symbolic quantitative skills: ...
2:15 p.m.	Withdrawn	**Mewhort:** Assessing TSD's distributional assumptions: A tutorial ...	**Fiset:** Mapping the impairment in decoding static facial ...	**Campbell:** Adult addition by "compacted counting": Does the ...
2:30 p.m.	intersession			
2:45 p.m.	**Drouin:** The age-related associative memory deficit ...	**Harding:** Does stimuli onset type matter? Dynamic ...	**McMullen:** Holistic face processing in children and adults along ...	**Jimenez Lira:** Predictors of early numeracy skills in canadian and ...
3:00 p.m.	**Gallant:** Metacognitive predictions of forgetting: The influence ...	**LaPointe:** Perceptual blurring, attentional boost, and ...	**Royer:** What can individual differences in face recognition ...	**Susperreguy:** Home numeracy and numeracy skills in Chilean ...
3:15 p.m.	**Oliver:** Repeated tip-of-the-tongue states in older adults ...	**Hamm:** Comparing attention and attribute based illusory ...	**Chen:** Do adults really use automatic counting to solve very ...	**Lafay:** Impairment in arabic- and spoken-number processing ...
3:30 p.m.	**Krishnamoorthy:** Electrophysiological indices of attention and ...	**Drisdelle:** Examining visual spatial attention using response-locked ...	**Reynolds:** The role of syntax in task set reconfiguration ...	**Penner-Wilger:** More than just memory: Finger gnosis predicts ...
3:45 p.m.	intersession			
4:00 p.m.	**Dixon:** Evidence for replication success and failure.	**d'Entremont:** Investigating the neural signature of inhibitory ...	**Capozzi** Prior observation in group interactions modulates ...	**Saint-Aubin:** What a simple letter detection task can tell us ...
4:15 p.m.	**Jones:** Decision contamination in the wild: Sequential ...	**Driscoll:** Swipe right or swipe left? The effects of response inhibition ...	**Chubala** The emergence of coordinated group behaviours in ...	**Roy-Charland:** Reading ability and syntactic processing ...
4:30 p.m.	**Martin:** Multiple feature dimensions compete for visual ...	**Klein:** Interference between implicit and explicit timing tasks	**Civile** Power, objectification and ethnicity.	**Raney:** Using letter detection to explore high-level ...
4:45 p.m.	**Morgan:** Understanding the mechanisms behind the perception of ...	**McCormick** Exogenous eye movements and inhibition of return: Is ...	**Pereira** Functional fractionation of the default network ...	**Healy:** Examining misses in reading aloud repeated ...
5:00 p.m.	Poster session 3 (Room: FSS4007)			
7:30 p.m.	**Reception and Award ceremony** (Room: FSS4007)			
9:30 p.m.	CSBBCS Jam Session (Room: FSS4007)			

SUNDAY June 26th, 2016

Time	Room: FSS1006	Room: FSS1007	Room: FSS1030	Room: FSS2005
9:00 a.m.	Breakfast (Room: FSS4007)			
9:30 a.m.	**Babineau:** Contextual knowledge, statistical cues and syllabic ...	**Dunn:** On the inferential basis of effort avoidance		**Sturdy:** Category perception in songbirds: Moving ...
9:45 a.m.	**Carson:** How do readers process noun number?: The battle ...	**Fenesi:** Sweat so you don't forget: How aerobic exercise ...		**Phillmore:** Songbirds as objective listeners: Zebra Finches ...
10:00 a.m.	**Dwivedi:** Language processing as heuristic first, algorithmic second	**Fiacconi:** What does the heart know? The role of visceral ...		**Harnad:** Category learning and the origins of language
10:15 a.m.	**Gullifer:** Context of bilingualism shapes intrinsic functional ...	**Ghilic:** Move to the beat: Do beat gestures influence ...		**Perez Gay:** Perceptual effects of learning a new category-changes
10:30		intersession		
10:45 a.m.	**Klammer:** My, what deceptive features you have! Perceptual ...	**Wammes:** Creating a vivid recollection-based memory ...	**Hélie:** System-specific effect of visual masking in perceptual ...	**Vonk:** Categorization and picture recognition ...
11:00 a.m.	**Nichols:** Effects of proficiency and age of acquisition on ...	**Meade:** Drawing as an encoding tool: Benefits in both ...	**Cousineau:** The fast-same phenomenon is a priming effect is a ...	**Xu:** Categorization in bumblebees
11:15 a.m.	**Tsui:** Learning two languages at once: the benefit of ...	**Scheerer:** The role of auditory feedback for speech ...	**Kingstone:** Social presence and human attention	**Blumenthal:** Representational similarity analysis of category-related ...
11:30 a.m.		**Blair:** Effects of combined attention on early visual ...	**Blanchette:** The influence of processing strategies on threat detection ...	**Ziebell:** Categorization of emotional facial expressions ...
11:45 a.m.	Pizza lunch and NSERC session (FSS 1006 and FSS Lobby)			
1:15 p.m.	**Driscoll:** Response inhibition has social-emotional ...	**Aujla:** Unattended trials and sensitivity loss in ...	**Davis:** Selective attention, conflict, and memory ...	**Sidhu:** Embodied sound symbolism: The Ogo/Oho effect
1:30 p.m.	**Pennycook:** Atheists and agnostics are more reflective than ...	**Saryazdi:** Are we getting the whole picture? Exploring ...	**De Vito:** The affective consequences of moving working ...	**Matheson:** The search for embodied object representations
1:45 p.m.	**Rabipour:** Assessing expectations of cognitive training and ...	**Ptok:** Isolating stage-specific attentional mechanisms ...	**Harrison:** Using Stroop to investigate the spatial specificity ...	**Kingstone:** The embodiment of focus: The impact of posture ...
2:00 p.m.	**Thompson:** When fast logic meets slow belief: Evidence for ...	**Sheldon:** The state of retrieval: Factors that influence the ...	**Lindsay:** Recognition memory research bias: Item effects ...	**Risko:** On the opportunity to ofload: How does external ...
2:15 p.m.		intersession		
2:30 p.m.	**Business Meeting** (FSS 1006)			

CSSBCS 2016 Richard C. Tees Distinguished Leadership Award

This award recognizes extraordinary leadership and service to the CSBBCS community. This year's recipient is Dr. Penny Pexman of the University of Calgary.

Dr. Penny Pexman has a history of service and dedication to CSSBCS and research on brain, behaviour, and cognitive science including but not limited to her time as CSBBCS President, Chief Editor of the *Canadian Journal of Experimental Psychology*, a member of the NSERC grant selection committee, and co-establishing the Canadian chapter of *Women in Cognitive Science*. She is also a productive researcher who has generated 82 articles while serving her department and university in a variety of administrative roles.

CSSBCS 2015 Donald O. Hebb Graduate Student Awards

For the individuals who, in the opinion of the awards committee, have been judged to have presented the best paper or poster at the 2015 CSBBCS meeting.

Best Paper: David De Vito, University of Guelph, "Inhibitory devaluation of distractors that match the contents of visual working memory"

Best Paper (Honourable Mention): Jordynne Lydia Victoria Ropat, University of Western Ontario, "The Emergence of the Motor Network in the First Year"

Best Poster: Jeffrey Wammes, University of Waterloo, "The drawing effect: Evidence for reliable and robust memorial benefits"

Best Poster (Honourable Mention): Paul Seli, University of Waterloo, "Can People Strategically Mind-Wander?"

2015 CJEP Best Article Award

This award recognizes the best paper published in each calendar year in the *Canadian Journal of Experimental Psychology*. This year's recipients are Dr. Brendan T. Johns and Dr. Michael N. Jones for their paper titled "Generating Structure from experience: A retrieval-based model of language processing"

Generating Structure from experience: A retrieval-based model of language processing

Abstract: Standard theories of language generally assume that some abstraction of linguistic input is necessary to create higher level representations of linguistic structures (e.g., a grammar). However, the importance of individual experiences with language has recently been emphasized by both usage-based theories (Tomasello, 2003) and grounded and situated theories (e.g., Zwaan & Madden, 2005). Following the usage-based approach, we present a formal exemplar model that stores instances of sentences across a natural language corpus, applying recent advances from models of semantic memory. In this model, an exemplar memory is used to generate expectations about the future structure of sentences, using a mechanism for prediction in language processing (Altmann & Mirkovic, 2009). The model successfully captures a broad range of behavioral effects—reduced relative clause processing (Reali & Christiansen, 2007), the role of contextual constraint (Rayner & Well, 1996), and event knowledge activation (Ferretti, Kutas, & McRae, 2007), among others. We further demonstrate how perceptual knowledge could be integrated into this exemplar-based framework, with the goal of grounding language processing in perception. Finally, we illustrate how an exemplar memory system could have been used in the cultural evolution of language. The model provides evidence that an impressive amount of language processing may be bottom-up in nature, built on the storage and retrieval of individual linguistic experiences.

CSBBCS 2016 Vincent Di Lollo Early Career Award

This award recognizes the exceptional quality and importance of the contributions of a new researcher (within 10 years of receiving his or her PhD) to knowledge in brain, behaviour, and cognitive science in Canada. This year's recipient is Katherine Guérard of the University of Moncton.

Friday, 5:15 p.m.
FSS2005
Chair: Jean Saint-Aubin

TITLE: The role of the motor system in immediate retention. KATHERINE GUÉRARD, *University of Moncton* ■ Order retention has been studied extensively using the serial recall task in which participants are presented with series of items and asked to recall them in their presentation order. Despite the impressive number of studies on serial memory, the nature of the processes involved in retention is still hotly debated. One view of memory is conveyed by the Working memory model (Baddeley & Hitch, 1974), suggesting that retention relies on bespoke memory systems. Another view is inspired by theories of embodied cognition and suggests that retention depends on the recruitment of peripheral processes such as the planning of motor actions (e.g., Glenberg, 1997; Jones, Hughes, & Macken, 2006). Evidence that motor skills are recruited during immediate retention of different types of stimuli (objects, spatial locations, verbal items) will be presented. The role of the motor system in immediate memory will be discussed.

CSBBCS 2016 Donald O. Hebb Distinguished Contribution Award

This award is given to research who has made significant contributions to the study of brain, behaviour, and cognitive science.

This year's awardee is Dr. Stuss. Note that Dr. Struss is unable to give a lecture at this year's annual meeting.

Abstracts For Plenary Talks

Friday, 3:30 p.m.
FSS2005
Chair: Penny Pexman

Women in Cognitive Science - Canada.

CSBBCS is delighted to host the official launch of Women in Cognitive Science - Canada (WiCS-Canada; www.facebook.com/WiCSC, twitter.com/WiCSCanada).

WiCS-Canada is a national initiative to establish a Canadian chapter of the highly successful and NSF-funded US-based Women in Cognitive Science (WiCS; womenincogsci.org). Like WiCS, the objectives of WiCS-Canada are to support and encourage women who are interested in cognitive science careers, and to promote opportunities for networking, mentorship, and professional development, with a specific eye for issues of relevance to Canada. Meetings are open to women and men interested in diversity and related professional issues in our discipline.

In this inaugural session, WiCS-Canada co-founders will introduce the initiative, and lead a panel of distinguished Canadian women cognitive scientists who will reflect upon the following theme: "Hindsight is 20/20: What I wish I knew when I was starting out". The event will conclude with an informal networking session (including complimentary snacks, a cash bar and jazz trio).

WiCS-Canada is grateful for support from the Natural Sciences and Engineering Research Council of Canada (NSERC) and CSBBCS.

Schedule of events

3:30-3:35 Introduction to WiCS-Canada, Penny Pexman, Department of Psychology, University of Calgary, WiCS-Canada co-founder
3:35-3:45 Opening remarks on women in cognitive science, Joanna Renwick, Program Officer, Research Grants and Scholarships, NSERC
3:45-3:55 The status of women cognitive scientists in Canada - a look at some data, Debra Titone, Department of Psychology, McGill University, WiCS-Canada co-founder, WiCS officer
3:55-4:25 Panel on, "Hindsight is 20/20: What I wish I knew when I was starting out"
Distinguished Panelists: Jo-Anne LeFevre, Department of Psychology, Carleton University Caroline Palmer, Department of Psychology, McGill University Isabelle Peretz, Département de psychologie, Université de Montréal
4:30-5:00 Informal networking session, complimentary snacks, cash bar, & jazz trio provided

Friday, 7:30 p.m.
Lowertown Brewery Student Party
Chair: Brad Harding

Student party!

Student members of the CSBBCS! Make sure to come down to Lowertown Brewery on June 24th for a night of music, socialising and some specially brewed "BBCS Beer"! Located minutes away from the conference, in the heart of the Byward Market, Lowertown has fast become a staple of the Ottawa nightlife. With craft beer brewed onsite and fresh plates of your favourite comfort food, Lowertown Brewery is THE place to be on opening night! Special BBCS food and drink menus will be provided and brewery tours are available on-site.

Come enjoy the best of what Ottawa has to offer!
We welcome *all* who are interested in this topic (not just students) to attend!

Organizers: Brad Harding and Jenny Dao from Ottawa Venues.

Saturday, 10:30 a.m.
FSS2005
Chair: Debra Titone

Executive Symposium. Glen E. Bodner, *University of Calgary*, Chrissy M. Chubala , *University of Manitoba*, Debra Titone, *McGill University* ■ In recent years, the changing landscape of an increasingly global, technological, and urban society has encouraged researchers to "think outside the laboratory" by examining the many ways that our environments influence our brains and behaviours. This symposium showcases some of the latest research on how human cognition and its neural bases are modulated by real-world experiences and constraints. The talks explore cognition in the real world from several angles, including the neural mechanisms that shape decision making in domains such as public health and politics, the potential benefits of interactions with nature, and the consequences of resource scarcity (e.g., poverty).

Saturday, 10:45 a.m.
FSS2005

Art, politics and lunch: Neuroscience insights into how the brain makes tough decisions. Lesley Fellows, *McGill University* ■ Judgment and decision-making are central to human behaviour: Whether in the grocery store or the polling station, the choices we make can have major implications for our own health and well-being, and for society as a whole. Current public health challenges, including obesity and addiction, may stem from a mismatch between individual decision-making abilities and the often challenging environments those individuals face. One way to better understand decision-making is to study how it is carried out in the brain. My research aims to specify the component processes of value-based decision-making, and test the necessary contributions of frontal lobe subregions to these processes in humans with focal brain injury. I will review work showing that orbitofrontal cortex is critical for even very simple value-based judgments, and argue that this may relate to a role for this region in allowing value to influence attention. I will also show evidence that a second frontal region tracks the value of other options during deliberation, showing how attention can in turn influence momentary value assessment and choice. These studies remind us that we often stray from fully rational choices, and begin to show the neurobiological mechanisms that underlie both the foibles and strengths of human decision-making. A better understanding of decision mechanisms could help us design environments that promote more adaptive choices, by better matching decision demands to human decision-making capacities.

Saturday, 11:15 a.m.
FSS2005

Deconstructing nature and its benefits. Marc G. Berman, *University of Chicago* ■ It is anticipated that by 2050, 75% of the world will be living in cities. Having so many people living in such tight spaces could have adverse mental and physical health effects. In this talk, I will discuss theory and research showing

how interacting with more natural environments can be salubrious for psychological functioning. I will also show relationships between neighborhood greenspace metrics and health in a large urban population sample. I will close the talk with some future research directions examining how we can better quantify the positive impacts gleaned from nature and what visual features of nature may lead to these benefits. It is our hope that our research findings could be used to help improve urban living.

Saturday, 11:45 a.m.
FSS2005

Resource scarcity: Consequences and interventions. JIAYING ZHAO, *University of British Columbia*
■ Scarcity is an urgent and pervasive problem in the world: 1.4 billion people in extreme poverty (with less than $1.25 a day), 1.2 billion people live without electricity, and more than 780 million lack access to clean water. In this talk, I will examine how poverty, which is one of the most prevalent forms of scarcity, influences cognition and behavior. I will demonstrate that poverty not only means a lack of resources, but also presents challenging demands on the human cognitive system, resulting in attentional tradeoffs and impaired cognitive function. Such cognitive impairment can lead to suboptimal decision making, which further perpetuates the condition of poverty. In addition, people living in impoverished conditions may experience the stigma and stereotypes associated with poverty. To mitigate the cognitive burdens of poverty, I will examine how self-affirmation improves the cognitive function in low-income individuals, and also promotes their interest in public benefit programs. I'll outline a series of my past, current, and future projects in New Jersey, India, and Canada.

Abstracts For Symposia

Symposium abstracts organized by day and presentation order

Fundamental processes in numerical cognition

Saturday, 1:30 p.m.
FSS2005
Chair: Jo-Anne LeFevre

Fundamental processes in numerical cognition. Jo-Anne LeFevre, *Carleton University* ■ In the area of numerical cognition, a central question is how fundamental cognitive processes contribute to performance of more complex mathematical tasks. Various basic skills have been proposed as fundamental to learning mathematics, however, both theory and data are somewhat scarce. The presenters in this symposium will address this issue, variously considering subitizing, counting, magnitude, and order processes as indices of domain-dependent cognitive skills. These are controversial questions that the presenters will address using a variety of methodologies, for example, Merkley will discuss a training study with adults and children on ordering skills, whereas Campbell will explore the issue of whether adults continue to count when solving simple arithmetic problems. Sowinski will describe a comprehensive path analysis of how subitizing, counting, magnitude comparison, and ordering are related to arithmetic performance. Marghetis will describe the rote of automaticity of magnitude processing for adults solving algebraic equations. Together, these presentations address key questions about when and how fundamental numerical processes influence performance on mathematical tasks.

Saturday, 1:30 p.m.
FSS2005

Developmental differences in the role of ordinality in the formation of abstract symbolic representations. Rebecca Merkley, *University of Western Ontario*, Gaia Scerif, *University of Oxford* ■ In order to investigate the formation of symbolic numerical representations, we used an artificial learning paradigm. Adults (N = 35), 10-year-olds (N = 23), and six-year-old children (N = 42) were taught to attach numerical meaning to a set of novel symbols. Participants viewed the symbols consistently paired with non-symbolic arrays of the corresponding numerical magnitude. Half of the participants were randomly assigned to the 'order training' condition and repeatedly saw the symbols in order from smallest to largest, whereas the other half saw them in random order ('magnitude training'). Following training, participants performed a symbolic comparison task with the newly learned symbols. Results revealed a significant interaction between age group and training group on comparison accuracy. Adults and 10-year-olds performed equally well regardless of whether or not they were explicitly taught the order, whereas 6-year-olds did not perform above chance when not taught order. The current findings highlight the importance of ordinal information for young children's symbolic acquisition. Future work should explore the role of ordinal information in young children's acquisition of real numerical symbols as existing research has tended to focus primarily on cardinality.

Saturday, 1:45 p.m.
FSS2005

The role of space in complex mathematics: Stable grounding or soft-assembled skills? Tyler

Marghetis, *Indiana University*, David Landy, *Indiana University*, Robert L. Goldstone, *Indiana University* ■ What role does space play in complex mathematics? One proposal is that space grounds the semantics of number (Restle, 1970; Lakoff & Núñez, 2000; Hubbard et al, 2005), with automatic number-space associations supplying a foundation for higher mathematics. For instance, in the SNARC effect (Dehaene et al, 1993), numbers prime motor responses: "higher" numbers facilitate higher responses; "lower numbers, lower responses (Ito & Hatta, 2004). However, studies have failed to find correlations between the SNARC effect and advanced mathematical skills (e.g., equation verification; Cipora & Nuerk, 2013), raising the possibility that spatial-numerical associations are epiphenomenal. Another possibility is that, rather than playing a unitary, stable role, spatial processes are soft-assembled to support a variety of functions (e.g., calculation, Knops et al, 2009, Marghetis et al, 2014; algebraic precedence, Landy & Goldstone, 2007). To investigate the task-specificity of spatial-numerical associations, we presented participants with algebraic equations (e.g., x + 2 = 5); participants either solved the equation or found the largest/smallest number. Equations were displayed with Graspable Math (GraspableMath.com), which allows terms to be dragged around with a mouse as if they were objects. In both conditions, greater numbers were clicked higher than lesser numbers. In the Solving task, however, this spatial deflection was dampened, suggesting that spatial-numerical associations are situational and task-specific. We interpret this as a process of "semantic bleaching," in space is redeployed from representing magnitude to encoding algebraic relations.

Saturday, 2:00 p.m.
FSS2005

Subitizing, counting, ANS, & symbolic quantitative skills: What predicts mathematics performance in adults? Carla Sowinski, *Carleton University* ■ The present research explored the relative contribution of subitizing, counting, approximate number system (ANS), and symbolic quantitative skills as predictors of adults' mathematical outcomes. Symbolic quantitative skills were the strongest predictors of all mathematical outcomes requiring exact calculation or access to the symbolic number system, i.e., arithmetic fluency, speeded addition, calculation knowledge, and symbolic number line performance. Subitizing uniquely predicted arithmetic fluency. Counting was not a strong predictor of any outcome. ANS predicted symbolic and nonsymbolic number line tasks, only. The results will be discussed in the context of core quantitative systems and symbol grounding hypotheses.

Saturday, 2:15 p.m.
FSS2005

Adult addition by "compacted counting": Does the evidence add up? Jamie I. D. Campbell, *University of Saskatchewan*, Yalin Chen, *University of Saskatchewan* ■ In the last few years, researchers have proposed on the basis of diverse experimental evidence that educated adults solve simple addition problem (e.g., 3 + 2) using a fast, automatic counting procedure. This stands in contrast to the long-held view that adults usually have memorized the small addition facts and solve them by associative fact retrieval. We critically review the evidence that has been offered to support the "compacted counting" hypothesis and present evidence that raises doubts about its validity.

Cognitive and experiential factors in early mathematics learning

Saturday, 2:45 p.m.
FSS2005
Chair: Marcie Penner-Wilger

Cognitive and experiential factors in early mathematics learning. Marcie Penner-Wilger, *King's University College at Western University* ■ Researchers in this symposium will discuss their work on the cognitive and experiential factors that influence children's early numeracy learning, with data from three countries (Canada, Mexico, Chile) and three languages (English, French, Spanish). Two of the presenters will discuss the relations between children's early numeracy skills and their early home and preschool environments. Jiménez Lira will describe similarities and differences in the early numeracy learning of three- and four-year-old Mexican children, and compare them to Canadian children. Susperreguy will discuss similar work with four- and five-year-old children in Chile. Lafay will describe a study in which she found that Canadian French-speaking children with

dyscalculia performed more poorly on symbolic number processing tasks than typically developing children. Penner-Wilger will explore the relations between finger gnosia and early mathematics for English-speaking five- and six-year-old Canadian children. Taken together, these papers provide a broad picture of children's early symbolic number processing skills in an important age range. Symbolic number skills are a key factor in the transition from early and informal numeracy knowledge to school-based mathematical tasks.

Saturday, 2:45 p.m.
FSS2005

Predictors of early numeracy skills in canadian and mexican preschoolers. Carolina Jimenez Lira, *Carleton University* ■ Research has found that children's developing math skills are related to their home and school numeracy experiences. The existing research has mainly been conducted in North America and Europe including children aged 5 or older. In the present study we examined and compared the relations between parental expectations, reported frequency of home and preschool or daycare numeracy practices and early numeracy skills in four-year-old Canadian (N = 45) and Mexican (N = 57) children. Children in both countries completed 10 numeracy measures that included a) counting and cardinality, b) the mappings among verbal number words, written Arabic digits, and non-symbolic quantities, c) verbal number comparison, and d) a test of overall early numeracy skills. Parents and teachers completed questionnaires about academic expectations and numeracy practices. Children's classrooms were examined for the presence of visual numeracy artifacts. Overall, Canadian children outperformed their Mexican peers on all measures. In both countries, parental expectations were related to the frequency of engaging in home numeracy practices. The relationship between home and preschool or daycare numeracy practices and children's performance on the numeracy assessments differed between the two countries. Canadian parents' and teachers' reported frequency of engaging in numeracy activities, and the presence of classroom numeracy artifacts were related to different outcome measures. In contrast, Mexican children's performance on the numeracy outcomes was only related to maternal education and marginally related to numeracy artifacts.

Saturday, 3:00 p.m.
FSS2005

Home numeracy and numeracy skills in Chilean preschoolers. Maria Ines Susperreguy, *Pontificia Universidad Católica de Chile* ■ Despite the growing evidence of the link between home numeracy and numeracy skills in children (Ramani et al., 20015; LeFevre et al., 2010; Skwarchuk et al., 2014), there is scarce evidence as to whether these links are found in preschool children coming from developing countries. Moreover, to our knowledge there are no studies that have looked at the relations between numeracy practices at home and children's outcomes in Spanish-speaking countries. Accordingly, the aim of this study was to investigate how numeracy practices and academic expectations predict children's numeracy outcomes in a Chilean sample. Participants were 83 typically-developing Chilean preschool-aged children (average age 63,3 months, DS=4,9) and their primary caregivers. Primary caregivers completed an adapted Spanish version of the questionnaire developed by Skwarchuk et al. (2014) about academic expectations and home numeracy practices. Numeracy measures included four tasks: Give- N task, verbal counting, early number identification, and the Applied Problems subtest of the Spanish version of the Woodcock Johnson (Muñoz-Sandoval et al., 2005). Exploratory factor analyses were performed to analyze the questionnaire. Three factors emerged and accounted for formal and informal numeracy practices. Correlations and linear regression analyses were employed to evaluate the connections between numeracy activities and children's outcomes. As expected, the results show that home numeracy practices are a significant predictor of children's numeracy outcomes, although there were differences with regards to the contribution of the home numeracy practices in explaining children's outcomes. The results are analyzed in terms of their comparability with those found in studies previously conducted with children in developed countries.

Saturday, 3:15 p.m.
FSS2005

Impairment in arabic- and spoken-number processing by children with developmental dyscalculia. Anne Lafay, *Université Laval* ■ The performance of 24 French-Quebec 8-9-year-old children with developmental dyscalculia (DD) in Arabic and spoken number recognition, comprehension and production tasks designed to assess symbolic number processing was compared to that of 37 typically developing children (TD). Children with DD were less successful than TD children in every symbolic numerical task, including recognition of Arabic and spoken numbers.

These results thus suggested that this deficit of symbolic number recognition could compromise symbolic number comprehension and production.

Saturday, 3:30 p.m.
FSS2005

More than just memory: Finger gnosis predicts children's numeracy, despite controlling for visuo-spatial span. Marcie Penner-Wilger, *King's University College at Western University*, Sheri-Lynn Skwarchuk, *University of Winnipeg*, Carla Sowinski, *Carleton University*, Jo-Anne LeFevre, *Carleton University* ■ Finger gnosis or "finger sense", indexed by the ability to distinguish which fingers have been lightly touched without visual feedback, reliably predicts numeracy in children (Penner-Wilger et al., 2007, 2009) and adults (Penner-Wilger et al., 2014, 2015) across a range of numeracy outcome measures. It has been argued, however, that the relation may reflect visuo-spatial short-term memory, rather than finger gnosis ability per se. This rival hypothesis was not supported in adults (Penner-Wilger et al., 2015), but here we examined it in Grade 1 children, using data from two separate Canadian developmental studies (N = 119 and N = 146). For each set of participants, a separate multiple regression was performed predicting numeracy skills, measured using the KeyMath Numeration subtest (Connolly, 2000). The Numeration subtest covers concepts such as quantity, order, and place value. In both sets of participants, finger gnosis and visuo-spatial span, measured using a computerized Corsi-block test, each predicted unique variance in children's numeracy skills. Importantly, the relation between finger gnosis and numeracy held for both sets of participants, despite controlling for visuo-spatial span. Thus, consistent with our adult findings, both sets of developmental data demonstrate that the relation between finger gnosis and numeracy is robust and does not simply reflect visuo-spatial short-term memory. One possible explanation for the relation between finger gnosis and numeracy, grounded in neural reuse, is that the two tasks use overlapping neural substrates (Penner-Wilger & Anderson, 2008, 2013).

The Missing Letter Effect: History, Models and Current Avenues

Saturday, 4:00 p.m.
FSS2005
Chair: Annie Roy-Charland

The Missing Letter Effect: History, Models and Current Avenues. Annie Roy-Charland, *Laurentian University* ■ Understanding reading is a central question for psychology, with major societal implications. Over the last five decades, a simple letter detection task has been used as a window on the psycholinguistic processes involved in reading. When readers are asked to read a text for comprehension while marking with a pencil all instances of a letter, they miss some of them in a systematic way known as the missing-letter effect. More specifically, readers miss more letters in function words, such as conjunctions and prepositions, than in content words, such as nouns or verbs and in frequent than in rare words (e.g., cost vs. cyst). In celebration of the 50th anniversary of this effect launched by the publication in 1966 of Corcoran's paper in Nature, the current symposium brings together some of the main researchers in this field. In this symposium, evidence from studies that emphasize neuroimaging, eye movement, rapid serial visual presentation, and auditory passages will be reviewed. As will be seen, the missing-letter effect captures a wide variety of cognitive processes involved in reading including lexical activation, attention, extraction of phrase structure, etc. The main theoretical models that have been put forward to explain the effect will be discussed by the proponents of the two major models.

Saturday, 4:00 p.m.
FSS2005

What a simple letter detection task can tell us about cognitive processes in reading and listening. Jean Saint-Aubin, *Universite de Moncton*, Raymond M. Klein, *Dalhousie University* ■ Understanding reading is a central question for psychology, with major societal implications. Over the last five decades, a simple letter detection task has been used as a window on the psycholinguistic processes involved in reading. When readers are asked to read a text for comprehension while marking with a pencil all instances of a letter, they are more likely to miss the

letter when it is embedded in function than in content words. This pattern of errors is known as the missing-letter effect. Here, we review evidence from studies that emphasize neuroimaging, eye movement, rapid serial visual presentation, and we present new data with auditory passages. More specifically, one group of participants read two texts for comprehension while searching for a target letter and another group listened to the narration of the same texts while listening for the corresponding target letter's phoneme. The ubiquitous missing-letter effect was replicated and extended to a "missing-phoneme effect". As will be shown, the missing-letter effect captures a wide variety of cognitive processes including lexical activation, attention, extraction of phrase structure, etc. To account for the large database generated by studies of the missing-letter effect, we advanced an attentional disengagement (AD) model, rooted in how attention is allocated to and disengaged from lexical items during reading, which applies equally to listening.

Saturday, 4:15 p.m.
FSS2005

Reading ability and syntactic processing revisited. Annie Roy-Charland, *Laurentian University*, Danielle Huot, , Marie McLaughlin, , Jean Saint-Aubin, ■ The relationship between reading ability and syntactic processing was examined with a simple letter detection task. A total of 156 Anglophones read two equivalent forms of the Nelson-Denny Reading Test: one version was used to assess reading skills and the letter detection task was implemented in the other version. Within models of text parsing, serial modular models include a hierarchical succession of treatments where syntactic processing precedes semantics. This class of models predicts that good readers, exhibiting superior comprehension, should be better at syntactic processing. In a letter detection task, syntactic processing is captured by more omissions for target letters embedded in function than in content words; an effect known as the missing-letter effect. Therefore, good readers should exhibit a larger missing-letter effect than poor readers; a larger difference between omissions for function and content words. Within constraint-based models, syntax and semantics can be processed in parallel, allowing good readers to bypass syntactic processing to ensure better semantic-based comprehension. Consequently, the missing-letter effect based on syntactic processing should be smaller for good than for poor readers. Results of the current study are in agreement with constraint-based models in which syntax and semantics are treated in parallel, allowing good readers to seemingly bypass syntactic processing to ensure better semantic-based comprehension.

Saturday, 4:30 p.m.
FSS2005

Using letter detection to explore high-level text processing. Gary E. Raney, *University of Illinois at Chicago*, Andriana Christofalos, *University of Illinois at Chicago*, Felix Pambuccian, *University of Illinois at Chicago*, Joanna C. Bovee, *University of Illinois at Chicago* ■ Our goal is to show how we have used the letter detection task to explore higher-level text processing. Three studies will be described. In the first study participants read easy and difficult texts while completing the letter detection task. We found a larger MLE for difficult texts than for easy texts. This appears to reflect an increase in attention directed towards content words when reading difficult texts. In the second study participants read texts in their first language (L1) or a non-proficient second language (L2) while performing letter detection. We found a standard MLE when reading in L1 and a reversed MLE (larger error rate for content words than function words) when reading in the non-proficient L2. This appears to reflect reduced ability to process the meaning of the L2 texts. In the third study participants read texts containing familiar and unfamiliar metaphors while performing letter detection. For metaphors of the "X is a Y" format (e.g., the lawyer is a shark), we found fewer letter detection errors in familiar than unfamiliar metaphors and fewer errors on the target word (lawyer) than the vehicle word (shark). This results are interesting because error rates were larger for words that require more attention and take longer to process. These studies demonstrate that the letter detection task can be used to explore a variety of text and reader characteristics that go well beyond the word level.

Saturday, 4:45 p.m.
FSS2005

Examining misses in reading aloud repeated words: Explanations from models of the missing letter effect. Alice F. Healy, *University of Colorado Boulder*, Tessa K. Zangara, *University of Colorado Boulder* ■ This study examined a novel task in which participants read aloud passages shown 2 words per line on a computer screen. There were 4 different passages, all of which included unrelated sentences, with each sentence containing 1 test word. The passages differed only in the text type (prose, scrambled) and in the identity of the test word (the, one). The word the is a common function word, whereas one

is a less common content word. The test word was repeated in half of the sentences at the end of one line and at the start of the next line. Many more misses in reading aloud occurred on the than on one, especially for prose passages; almost all misses involved repeated words. These results were explained in terms of the Guidance-Organization (GO) model of reading and the Attentional-Disengagement (AD) model, both of which have been proposed for the missing letter effect in the letter detection task. Specifically, it is concluded that reading aloud is influenced by post-lexical structural and attentional processes that are sensitive to word function.

Categorization: Causes and Consequences

Sunday, 9:30 a.m.
FSS2005
Chair: Catherine Plowright

Categorization: Causes and Consequences. Catherine Plowright, *Ottawa University* ■ This symposium focuses on an evolutionary approach to categorization. The problem-solving nature of categorization is illustrated in a variety of species, both vertebrate and invertebrate, in a variety of ecologically relevant tasks. The individual presentations will focus on neurocognitive mechanisms and evolutionary consequences. Comparisons are invited in a discussion at the end.

Sunday, 9:30 a.m.
FSS2005

Category perception in songbirds: Moving from perceptual to functional. Christopher Bisset Sturdy, *University of Alberta*, Kimberley A. Campbell, *University of Alberta*, Jenna V. Congdon, *University of Alberta*, Allison H. Hahn, *University of Wisconsin*, Neil McMillan, *University of Alberta*, Erin Scully, *University of Alberta* ■ Category perception is an important and common phenomenon that has been demonstrated in every species tested to date. Our studies of songbird category perception started with bioacoustical descriptions of the vocal signals used by our study species, aimed to establish some sense of order in the apparent chaos of songbird vocal communication signals, and were used to provide a framework of possible perceptual categories produced and perceived by birds. From these initial descriptive, structural studies we used operant conditioning to uncover the mechanisms underlying these perceptual categories. The combination of bioacoustics and operant conditioning studies illuminated: (1) how one might simplify and understand songbird communication signals, (2) whether birds agreed with human-based classifications, and (3) the mechanisms underlying how birds perceived these signals. From these initial studies, we moved to questions that were aimed more at understanding functional acoustic categories used by birds or whether songbirds could use abstract, conceptual knowledge. This renaissance started with studies that determined how birds discriminated between species, and then moved into understanding more functional categories, and ultimately conceptual representation. In this talk I will describe the progression that our research program has taken, provide an update, and finally close with what we believe this research area still has to offer us in the future.

Sunday, 9:45 a.m.
FSS2005

Songbirds as objective listeners: Zebra Finches (Taeniopygia guttata) can discriminate infant-directed song and speech in two languages. Leslie S. Phillmore, *Dalhousie University*, Jordan Fisk, *Dalhousie University*, Simone Falk, *Ludwig-Maximilians-Universität München*, Christine D. Tsang, *Huron University College at the University of Western Ontario* ■ Infant-directed speech and infant-directed song are two modes of communication that have very similar features however infants can discriminate between these two types of "musical speech", showing a preference for song over speech (Tsang et al in press). This preference was maintained even when the stimuli were not in an infant's native language (i.e. Russian stimuli for English-speaking babies; Tsang & Falk, in preparation). We wondered if these results could be extended to non-human listeners, in a species to which acoustic stimuli are extremely important: the songbird. We presented male and female zebra finches, Taeniopygia guttata, with the same Russian and English stimuli used in the infant studies, and used an operant paradigm to ask birds to discriminate simultaneously between song and speech in both languages. Birds easily learned the discrimination of both Russian

and English song and speech, and transferred the learning to new stimuli not heard during training. There were no differences between languages or between male and female birds. Finally, we presented birds with stimuli that were difficult to label as song or speech by adult humans to see if they could accurately categorize these ambiguous sounds. Our results support the idea that infant-directed song and speech stimuli are discriminable regardless of native language as finches are unbiased listeners for these stimuli.

Sunday, 10:00 a.m.
FSS2005

Category learning and the origins of language. Stevan Harnad, *Université du Québec à Montréal*, Fernanda Perez Gay, *UQAM & McGill*, Philippe Vincent-Lamarre, *Université d'Ottawa* ■ To categorize is to do the right thing with the right kind of thing. All mammals can learn some categories and nonhuman primates are able to learn many - perhaps most or all - of the categories that humans can learn directly by sensorimotor ltrial and error and corrective feedback. This is learning by induction. But humans are the only species that can learn categories another way too: by verbal instruction. Language allows the arbitrary names of categories to be combined into subject/predicate propositions that define or describe further categories, including increasingy abstract categories that cannot be learned by direct sensorimotor induction. I will describe the features of (human) sensorimotor induction learning in the lab, the added adaptive advantage conferred by the mental lexicon and verbal instruction, and how it might have evolved from pantomime and gesture. It is very hard to pinpoint precisely what cognitive capacity great apes lack that prevents them from being able to do likewise.

Sunday, 10:15 a.m.
FSS2005

Perceptual effects of learning a new category - changes in event related potentials and similarity judgements. Fernanda Perez Gay, *McGill University and Université du Québec à Montréal*, Stevan Harnad, *McGill University and Université du Québec à Montréal* ■ Categorical Perception (CP) is the phenomenon in which the categories we learn affect our perception, making members of the same category look more alike (compression) and members of different categories look more different (separation). CP effects are well known for inborn categories (colors, phonemes, facial expressions), but learned CP effects are of particular importance because most of our categories are learned rather than inborn. To test for CP effects induced by learning, we trained human subjects to sort samples of unfamiliar stimuli into two categories by trial and error. Some subjects succeeded in learning and some did not. The subjects rated pairs of stimuli for similarity before and after the category training. We recorded EEG during the training, comparing changes in Event Related Potentials (ERPs) in successful learners and non-learners and tested their correlation with changes in their pairwise similarity judgement (SJ) scores. We found significant differences in learners ERPs when comparing the trials before and after learning in both early occipital (150-220 ms) and late parietal (500-800 ms) components; these changes were absent in non-learners when comparing the first half vs. the last half trials. We also found significant within-category compression and between-category separation effects for the learners in the SJ scores changes -separation being more prominent. The separation effect was significantly correlated with the changes in peak and amplitude of the early component. These results provide further evidence for the emergence of CP effects as a result of learning a category.

Sunday, 10:45 a.m.
FSS2005

Categorization and picture recognition in American black Bears (Ursus americanus). Jennifer Vonk, *Oakland University* ■ Much data has been gathered regarding the ability of non-humans (animals henceforth) to categorize natural stimuli. Less information is available regarding the mechanisms by which animals parse stimuli into categories. Stimuli is often presented in the form of two-dimensional images, most recently on touch-screen computers. Categorization tasks may involve match-to-sample, go no-go, or multi-alternative forced-choice paradigms. Each of these types of tasks have been used to show proficient categorization on the part of animals ranging from pigeons to great apes. In our lab we have found the performance of American black bears (Ursus Americanus) to rival that of great apes tested in the same tasks. However, we are less certain as to whether the bears view two-dimensional stimuli as representations of their corresponding real-life objects and whether they use features rather than holistic representations to aid them in these tasks. I will present data suggesting that they do detect correspondences between real objects and photos presented on a computer touch-screen, and that they may not attend merely to simple features when categorizing abstract natural stimuli. We propose that the flexible diet and foraging challenges presented to black bears are responsible for their superior categorization abilities.

Sunday, 11:00 a.m.
FSS2005

Categorization in bumblebees. Vicki Xu, *University of Ottawa*, Catherine Plowright, *University of Ottawa* ■ This study examines the use perceptual categorization in bumblebees (Bombus impatiens) and addresses (1) whether bees are capable of grouping of different stimuli, and (2) whether foraging decisions on a stimulus change based on group membership. Twenty bees from each of four colonies underwent discrimination training of stimuli placed in a radial maze. Bees were trained to discriminate between two pairs of stimuli through differential reward, each pair consisting of an artificial flower and its corresponding photograph. Following discrimination training, one stimulus from each pair (either the object or the photo) was removed. The predictive reward values of the remaining stimuli were switched for one group of bees but stayed the same for another. Subsequent testing on the removed stimuli revealed a shift in preferences for the switched group. For instance, if the unrewarding flower became rewarding, then its photo was also treated as having improved in reward value, even though the bees had been trained to avoid it. The value of each item in a group need not be learned anew: the perceptual categorization of stimuli enables rapid reactions to changing conditions.

Sunday, 11:15 a.m.
FSS2005

Representational similarity analysis of category-related recognition-memory signals in the human medial temporal lobe. Anna Blumenthal, *University of Western Ontario*, Bobby Stojanoski, *University of Western Ontario*, Chris Martin, *University of Toronto*, Rhodri Cusack, *University of Western Ontario, University of Cambridge*, Stefan Köhler, *University of Western Ontario, Baycrest Centre* ■ Neuropsychological studies in patients and functional neuroimaging work have established that perceptual representations of complex objects in the visual ventral stream are shaped by semantic category membership. Whereas the categorical structure of these representations has been well characterized in the context of perceptual tasks, much less is known about the organization of corresponding memory signals, specifically in the medial aspects of the temporal lobe (MTL), which includes the perirhinal, parahippocampal, and entorhinal cortices, as well as the hippocampus. In the current study, we used high resolution fMRI, in combination with multi-voxel pattern analysis, to examine representational similarities in distributed patterns of activity in the MTL during memory judgements for images of real-world objects. Specifically, participants performed a continuous recognition memory task on visually presented objects from 12 different categories, which were matched for recognition accuracy. On each trial, their task was to determine whether the object presented was new (1st presentation) or had been encountered before (2nd presentation). Preliminary results show evidence for category-specific representations across the different structures that comprise the MTL. This suggests that category structure is differentially preserved in recognition-memory signals in MTL structures, offering support for the notion that its influence extends beyond perceptual representation.

Sunday, 11:30 a.m.
FSS2005

Categorization of emotional facial expressions in humans with a history of non-suicidal self-injury: An examination of behavioural responses and facial electromyography. Laura Ziebell, *University of Ottawa*, Charles A. Collin, *University of Ottawa*, Madyson Weippert, *University of Ottawa*, Mikhail Sokolov, *Carleton University* ■ Emotions occur when something meaningful to a creature's goals is at stake. They trigger responses that tend to assist survival. In social animals, such as humans, accurate emotion categorization is important for appropriate social functioning, including appropriate reflection of others' emotions. Inaccuracy in emotion categorization or reflection can lead to inadequate social behaviour, commonly seen in various psychiatric disorders. Non-suicidal self-injury (NSSI) is a psychiatric symptom involving deliberate self-inflicted injury of one's body, without intent to die. Difficulties in social interactions are reported by individuals who exhibit NSSI, which may be related to their emotion categorization skills. Participants (17-24yrs) with a history of NSSI and healthy controls viewed videos of faces changing slowly from neutral to a prototypical expression of sadness, disgust, surprise, fear, anger or happiness. They were told to stop each video as soon as they felt they recognized the emotion presented, thus indicating the minimum intensity of expression needed for categorization. They were then asked to categorize the expression. Minimum emotion intensity, accuracy, and RT were the behavioural DVs of interest. In addition, we measured the degree to which participants automatically reflected the presented emotions via facial electromyography, which measures subtle reflexive flexion of the facial muscles. NSSI participants showed significant differences compared to controls in their ability to categorize various emotional expressions, as well as in how they reflected expressions.

Visual attention

Sunday, 10:45 a.m.
FSS1030
Chair: Sébastien Hélie

Visual Attention. Sébastien Hélie, *Purdue University* ■ Visual attention plays an important role in how we perceive the world. For instance, it binds features to objects and allows those objects to be identified and selected in cluttered scenes. In this symposium, we present results from behavioral and neuroimaging studies on the various effects of visual attention in category learning, target detection, social interaction, and visual search. The first presentation (Helie) focuses on the effect of visual attention on the mental representations used by the different category learning systems. New behavioral and fMRI data will be presented suggesting that visual noise induced by masking affects hypothesis-testing and procedural learning systems differently. The second presentation (Cousineau) explores the similarities and differences between the redundant-attribute detection task and the "same"-"different" task. These tasks differ on a number of task demands, and empirical results isolating the effect of each task demand will be presented to facilitate the integration of previous findings obtained with these tasks. The third presentation (Kingstone) focuses on the effect of visual attention in social interactions. Humans have a marked interest in other people, but that desire to acquire social information is modulated by the knowledge that one's eye movements can signal information to others. The results of empirical studies exploring the role of gaze in social interactions will be presented. Finally, the last presentation (Blanchette) will focus on visual search performance of police officers. The results show a superiority for threatening stimuli which can be modulated by inducing different processing strategies.

Sunday, 10:45 a.m.
FSS1030

System-specific effect of visual masking in perceptual categorization. Sébastien Hélie, *Purdue University* ■ There is much evidence suggesting that category learning relies on at least two different brain circuits, one for verbal categorization centered around the lateral prefrontal cortex and another, non-verbal circuit centered around the basal ganglia. Because verbal and non-verbal categorizations are processed by different circuits, they may receive different perceptual representations. To explore this possibility, we explore the effect of target duration on verbal and non-verbal categorization using backward masking to interrupt visual processing. With categories equated for difficulty for long and short target durations, intermediate target duration shows an advantage for verbal categorization over non-verbal categorization. A follow-up used integration masking with the same stimuli, categories, and masks with a varying level of mask opacity. Low mask opacity yielded similar results to long target duration while high mask opacity yielded similar results to short target duration. Importantly, intermediate mask opacity produced an advantage for verbal categorization over non-verbal categorization, similar to intermediate target duration. These results suggest that verbal and nonverbal categorization is affected differently by manipulations affecting the signal-to-noise ratio of the stimuli. Verbal categorization may be more robust to low signal-to-noise ratio while the information used in non-verbal categorization may be less robust to lower signal-to-noise ratio. An fMRI experiment using integration masking suggests that visual areas V1-V4 are the main brain areas responsible for de-noising the stimuli in verbal categorization, and shows that BOLD signal does not change as a function of signal-to-noise ratio in brain areas associated with the category learning systems.

Sunday, 11:00 a.m.
FSS1030

The fast-same phenomenon is a priming effect is a pop-out effect. Denis Cousineau, *Université d'Ottawa* ■ The Same-Different task is a simple task in which participants must decide if two stimuli (S1 and S2) presented in close succession are "same" or "different". A simple model suggests that processing goes through all the attributes to locate at least one mismatching attribute (resulting is a "different" response) or until all attributes are found to be matching (resulting in a "same" response). Yet, contrary to what this model predicts, "same" responses are consistently faster than "different" responses, even for those

stimuli that are entirely different. This was coined the "fast-same phenomenon". The only serious attempt to explain this phenomenon was Proctor (1981). He assimilated this effect to a priming effect. Indeed, S1 and S2 being identical, S1 can be seen as a primer for S2. We present two experiments that support this view. The fast-same phenomenon could be also assimilated to a pop-out effect seen in visual search. In studies of automaticity of visual search for letters, consistency of mapping and training are necessary. We present one experiment where, in the absence of training, the fast-same phenomenon is not present. A "different" response is made in the presence of at least one mismatching attribute. Yet, on many trials, more than one mismatch is present. Thus, the improvement in RT with the number of mismatches can be assimilated to a redundant attribute effect. We present one experiment that supports this view. The Same-Different task is a simple task but it is located at the junction of many speeded-responses tasks so that any concept developed to explain the present results should map onto the theories of these other tasks.

Sunday, 11:15 a.m.
FSS1030

Social presence and human attention. Alan Kingstone, *University of British Columbia* ■ Attention research can be surprisingly anti-social. In the lab, research participants are routinely isolated and tested with simple images that serve as proxies for real objects, people, and situations. In this talk I will describe studies illustrating that human attention can change dramatically "in the wild" where people are in the presence of other people. Indeed, so powerful is this effect that attention, cognition, and performance can be affected profoundly by the implied social presence of another, even when a camera or an eye tracker induces it. At the core of this work is the notion that cognition and performance are shaped by the context in which they operate, and as the world is largely a social one, a more complete theory of attention should emerge from research that introduces social variables from everyday life.

Sunday, 11:30 a.m.
FSS1030

The influence of processing strategies on threat detection in police officers. Isabelle Blanchette, *Université du Québec à Trois-Rivières*, Alexandre Williot, *Université du Québec à Trois-Rivières* ■ Emotional stimuli, including threatening stimuli, are detected more efficiently in the visual environment than neutral stimuli. This threat superiority effect, often thought to be automatic, has an adaptive value in general, but may be especially important in certain professions such as policing. In this study, we investigated whether the threat superiority effect can be modulated by induced processing strategies in police officer. Forty nine police officers performed a visual search task where they had to detect a discrepant stimulus (threatening or neutral target) among neutral distractors. On every trial, they also had to answer a question related to the target. This question was used to induce a more emotional or semantic processing strategy. In the visual search task, threatening targets were detected faster than neutral targets, and this threat superiority effect was amplified when an emotional processing strategy was induced. Results show that threat detection can be modulated by strategic factors and open the possibility of using induced strategies to improve attentional processing in police officers.

Embodied and Embedded Cognition Symposium

Sunday, 1:15 p.m.
FSS2005
Chair: Evan Risko

Embodied and Embedded Cognition Symposium. Evan F. Risko, *University of Waterloo* ■ Attention in cognitive science has recently turned to trying to provide a deeper understanding of the embodied and embedded nature of human cognition. While researchers have approached this problem from a variety of angles, at its core is a desire to understand how cognitive processes are shaped by the body and its interaction with the physical environment. This symposium will feature researchers at the cutting edge of this effort. Talks will cover research investigating embodied cognition across a number of traditional domains in cognitive psychology including object identification, language processing, attention, and visual perception.

Sunday, 1:15 p.m.
FSS2005

Embodied sound symbolism: The Ogo/Oho effect. David Michael Sidhu, *University of Calgary*, Penny Marion Pexman, *University of Calgary* ■ The relationship between form and meaning in language is mostly arbitrary, but there are demonstrations that particular phonemes seem associated with particular kinds of meanings (i.e., sound symbolism). One way of explaining sound symbolism is in terms of an overlap between the articulatory features of phonemes, and meanings with which they are associated (e.g., high front vowels, articulated with a small vocal tract, are associated with small shapes). Here we tested a novel sound symbolic effect, hypothesized to exist based on the articulatory features of the phonemes involved. In particular, we hypothesized that because stop consonants (e.g., /g/) involve a greater amount of tactile experience as they are articulated than do fricatives (e.g., /h/) or approximants, stop consonants would be associated with concreteness. In Experiment 1 we found that participants rated nonwords containing stop consonants (e.g., ogo) as better labels for concrete referents, and nonwords containing fricative or approximant consonants (e.g., oho) as better labels for abstract referents. In Experiment 2 we explored the real world implications of this association, and found that it affects preferences for brand names. Participants preferred nonwords containing stop consonants as labels for relatively more tangible products (e.g., packing crates), and nonwords containing fricatives or approximants as labels for less tangible products (e.g., air freshener). Together these results support embodied articulatory experience as a mechanism for sound symbolism.

Sunday, 1:30 p.m.
FSS2005

The search for embodied object representations: What is embodied and when is it used? Heath E. Matheson, *University of Pennsylvania*, Sharon L. Thompson-Schill, *University of Pennsylvania* ■ Does motor experience influence object representations? Theories of embodied cognition propose that we recognize tools by reactivating sensorimotor representations of the properties of tools and their use. Behavioural and imaging research has provided much evidence that these embodied representations are activated during cognitive tasks including recognition, naming, imaging, language, and creative object use. However, it remains unclear exactly what aspects of embodied experience are represented and exactly what types of tasks elicit them. I will present results from an ongoing training study in which embodied experience is explicitly manipulated. Different groups of participants were told they had been selected for an archeological dig on Mars. One group was trained to use 3-D printed novel tools; the other was trained to provide verbal instructions on how to store the tools. The two groups both completed two behavioral tasks across multiple sessions. Behavioural tasks were designed to reveal motor specific contributions of action representations to cognitive tasks including tool recognition. Importantly, in both tasks, the effects of manipulation experience were not motor specific, suggesting that these tasks do not rely on embodied object representations in the way predicted from theories of embodied cognition. I will offer suggestions about which cognitive tasks actually rely on embodied representations and which do not. Further, I will discuss ongoing fMRI study exploring representational differences between the two groups and speculate about which aspects of embodied experience are represented in the brain.

Sunday, 1:45 p.m.
FSS2005

The embodiment of focus: The impact of posture on cognitive state, and vice versa. Alan Kingstone, *University of British Columbia*, Joseph D. Chisholm, *University of British Columbia*, Evan F. Risko, *University of Waterloo* ■ Different body postures, in particular, sitting upright versus slouching, are thought to reflect different states of cognitive focus. Yet, contrary to an embodied cognition framework the present talk reports that different postures do not produce a change in cognitive focus. Only by instructing participants to adopt a posture associated with a focused or unfocused cognitive state did an association between performance and posture emerge. The data indicate that changes in one's body do not necessarily yield a reliable change in one's cognitive state, even when (a) those changes in body are reliably perceived by others as inducing a change in cognitive state, and (b) changes in cognitive state lead to robust changes in the body. Rather than influencing one's cognitive state, we suggest that leaning behavior may reflect the embodiment of one's cognitive state.

Sunday, 2:00 p.m.
FSS2005

On the opportunity to offload: How does external access to answers influence our reliance on internal processes? Evan F. Risko, *University of Waterloo*, Dave McLean, *University of Waterloo*, Michelle Huh, *University of Waterloo*, Amanda

FERGUSON, *University of Toronto* ■ An important aspect of understanding the embodied and embedded nature of human cognition involves understanding how we use our body and objects in our physical environment to help us think. One potentially critical difference between relying on our body (e.g., our hands) and relying on objects in the environment (e.g., the Internet) is that the latter are not always present. This raises an important question with regard to how the mere presence of the opportunity to offload might influence internal processing. To begin to examine this issue we asked, across a series of experiments, how easy access to answers located externally (e.g., via the Internet) might influence how much we are willing to rely on our internal problem solving tools to arrive at a desired answer. Results suggest that individuals become less likely to rely on internal processing in the presence of easy access to answers located externally. Discussion will focus on potential mechanisms underlying these effects and the implications with respect to the distributed nature of our day-to-day cognitive lives.

Abstracts For Talks

Abstracts organized by day, session, and presentation order

Regular Session 1(a)

Saturday, 1:30 p.m.
FSS1006

Dope-distracting effects of long-term marijuana use: The emotional attentional blink buzz. Darren Wade Campbell, *Nipissing University*, Camille E. P. Gray, *Nipissing University*, Adam James Bennett McLandress, *Nipissing University*, Sandra Stewart, *Nipissing University*, Ralph Dell'Aquila, *Northern Ontario Mental Wealth Centre* ■ The unnaturally intense emotional experience associated with drug abuse is proposed to contribute to the addiction process, in part, through the development of exaggerated reward-related associations. There is emerging evidence that marijuana-related stimuli result in exaggerated attentional biases. The Emotional Attentional Blink (EAB) represents an sensitive test of cue-related attentional bias. This study investigated marijuana-related attentional capture relative to prototypically positive and neutral images in a sample of long-term marijuana users and non-users. Forty-nine cannabis users and 56 non-users completed this study. Participants identified whether an image was rotated left or right in a series of images presented on a computer screen. There were four types of distractor images: THC-specific (smoking), general positive (food), control (vehicle) and scrambled (pixilated). The outcome was mean number correct responses for each distractor type. We conducted a Repeated Measures ANOVA with repeated factors of distractor type and participant group. We found support for our hypothesis with a significant Group by Distractor Type interaction. Long-term users showed significantly more errors to marijuana-related images relative to neutral or scrambled images while non-users did not show this difference. Both groups showed significant and comparable distraction by generally positive images. Results indicate that marijuana-related images capture the attention of long-term users in a relatively automatic manner. Long-term marijuana users did not show reduced attentional capture to positive images. This is evidence of an intensified emotional response. Our next step is to examine the duration of emotional reactions.

Saturday, 1:45 p.m.
FSS1006

Size matters: Geometry and visual cues in foraging by rats. Mark Cole, *Huron University College (UWO)* ■ After 20 trials, rats learned to find a peanut buried in the bedding in one corner of a rectangular box. The other three corners each had an inaccessible peanut to control for odor cues. All four walls of the box were faced with visually-distinctive panels. One was black (B), one white (W), one horizontally black-and-white striped (HBWS), and one vertically black-and-white striped (VBWS). The corner containing the peanut had specific geometric properties. For half of the rats it was long-wall-left-short-wall-right (lwlswr); for the other half of the rats it was short-wall-left-long-wall-right (swllwr). The peanut corner also had unique visual cues. For all rats, the left wall was HBWS and the right wall was W. Then the wall panels were rotated 900 clockwise for an additional 20 trials. The peanut corner continued to have the same unique visual properties (HBSW wall on the left and W on the right) but different geometric properties. For the formerly-lwlswr rats, the peanut corner was now swllwr; for the formerly-swllwr rats, the peanut corner was now lwlswr. After this shift in wall panels, all the rats used the visual cues in preference to the geometric cues, making their first dig in the HBSW-W corner. These findings were different from those reported by Cheng (1986) who moved small distinctive visual cues located in the corners and found that the rats often followed the geometry instead of the visual cues.

Saturday, 2:00 p.m.
FSS1006

A theory of individual differences in creative responses to paradoxical situations. Goran Calic, *Purdue University*, Sébastien Hélie, *Purdue University* ■ This study explores how paradoxes - which are contradictory, yet interrelated elements of a situation - interact with an individual's cognition to produce responses that are both original and useful, or creative, as the term is used here. Organizational life is rife with paradoxes and the ability to resolve such tensions creatively can determine an organization's fate. Despite frequent references to the average positive effects of paradox on creativity, individual variance remains undeveloped. Developing a theory of differences in individual responses to paradox seems especially crucial in the face of evidence that dissimilarities exist in how individuals process information, that not all individuals experience paradoxes equally, and that variance among individuals matters much more in organizational performance than is generally assumed. We use a computer simulation of creative problem solving to build a theory of differences in individual responses to paradox. Findings reveal a non-obvious relationship. Baseline differences in the two cognitive indicators of creativity, search breadth and intellectual risk-taking, affected how creatively simulated agents responded to a paradox treatment. To highlight some of our findings, we discover that: creative agents, those high on both indicators, were less creative in the treatment than in control condition, while those low and moderate on both indicators benefited most from the treatment. In summary, this study suggests that if organizational leadership seeks to increase creativity in situations of paradox, it should not always look to the most creative individuals, because creativity in non-paradoxical conditions does not predict creative performance in paradoxical conditions.

Saturday, 2:15 p.m.
FSS1006

Withdrawn....

Regular Session 1(b)

Saturday, 1:30 p.m.
FSS1007

Reading aloud: Stages redux. Derek Besner, *University of Waterloo*, Serje Robidoux, *Macquarie University* ■ We report simulations with a localist computational model that, taken together with data from skilled readers, suggest the need for a hybrid model in which some contextually driven staging along the lexical route is needed.

Saturday, 1:45 p.m.
FSS1007

A computational analysis of learning and heuristic inference. Randall K. Jamieson, *University of Manitoba*, Chrissy M. Chubala, *University of Manitoba*, Matthew J. C. Crump, *Brooklyn College*, Samuel D. Hannah, ■ Retrospective revaluation refers to learning about un-presented but implied cue contingencies. For example, after learning that each of the cue compounds AB, BC, and CD predict a common outcome (AB+, BC+, CD+ training), learners judge each element (A, B, C, D) as an equally good predictor of the outcome. If, however, the learner later observes that A alone predicts the outcome (A+ training), they re-evaluate and judge A and C as good predictors but elements B and D as bad predictors. There are two main explanations of retrospective revaluation. According to a propositional account, the learner stores knowledge about the AB+, BC+, CD+ contingencies in a propositional network; when A+ training follows, the learner uses ad hoc abductive reasoning to update the network so it matches the observed facts. According to an associative account, a learning rule is applied to update the associative strength of the un-presented but implied cues. Unfortunately, both accounts have problems: the propositional account is insufficiently defined to force a clear prediction and the associative method requires complicated assumptions. We present an alternative memory-based account that explains learning as a corollary of the storage and retrieval of experiences from memory. The theory predicts retrospective revaluation as well as peoples' judgements about simple conditionals. We present the framework as a productive tool that can be used to relate and think about the relationship between data and ideas from the study of human memory, associative learning, and heuristic inference.

Saturday, 2:00 p.m.
FSS1007

The combinatorial power of experience. Brendan T. Johns, *University at Buffalo*, Randall K. Jamieson, *University of Manitoba*, Matthew J. C.

Crump, *Brooklyn College*, Michael N. Jones, *Indiana University*, Douglas J. K. Mewhort, *Queen's University* ■ Recent research in the artificial grammar literature has found that a simple exemplar model of memory can account for a wide variety of artificial grammar results (Jamieson & Mewhort, 2009, 2010, 2011). This classic type of model has also been extended to account for natural language sentence processing effects (Johns & Jones, 2015). The research reported here extends this work to account for sentence production, and demonstrates that the structure of language itself provides sufficient power to generate syntactically correct sentences, even with no higher-level information about language provided to the model.

Saturday, 2:15 p.m.
FSS1007

Assessing TSD's distributional assumptions: A tutorial. Douglas J. K. Mewhort, *Queen's University*, Harinder Aujla, *University of Winnipeg*, Kevin D. Shabahang, *Queen's University* ■ We are accustomed to checking distributional assumption in ANOVA and like statistical procedures. By contrast, checks on the distributional assumptions postulated by Detection Theory are seldom reported. Detection Theory's measure of discriminability is based on the difference in the means of two Gaussian distribution, one for target trials and one for foil trials. To compute an empirical ROC curve, subjects are asked to indicate their confidence in each YES/NO decision by assigning it to a confidence bin. We extend the standard procedure by asking subjects to use a computer's mouse to indicate both the primary YES/NO decision, in terms of the mouse position relative to a central point on a horizontal line, and to indicate their degree of confidence in terms of the distance from the central point. TSD's method for calculating an empirical ROC maps the confidence values onto the decision axis. Hence, the empirical distributions of confidence values obtained using the computer's mouse should map onto the evidence distributions Detection Theory postulates for the Target and Foil trials. Under the Gaussian assumptions on which Detection theory is based, the ratio of the variances for the confidence distributions is distributed as F, providing a straightforward test for Detection Theory's equal-variance assumption. A standard Q-Q plot will reveal whether unequal variance reflects skewed distributions. We will report Monte-Carlo simulations to illustrate the suggested tests.

Regular Session 1(c)

Saturday, 1:30 p.m.
FSS1030

Visual strategies underlying the recognition of static and dynamic facial expressions. Caroline Blais, *Université du Québec en Outaouais*, Daniel Fiset, *Université du Québec en Outaouais*, Camille Saumure Regimbald, *Université du Québec en Outaouais*, Frédéric Gosselin, *Université de Montréal* ■ Previous studies have revealed that dynamic facial expressions are better recognized (e.g. Ambadar et al., 2005), and are processed in partially different brain areas (e.g. Schultz & Pilz, 2009), than static expressions. Despite these findings, and the fact that facial expressions of emotion are dynamic in nature, most researches on the visual strategies underlying the recognition of facial emotions have used static stimuli. Here, we present a series of experiments that aimed at comparing the visual strategies used with both kinds of stimuli, in terms of ocular fixation patterns, utilization of the information contained in different facial areas, and utilization of spatial frequency information. The results indicate that different ocular patterns are used with static and dynamic facial expressions. Namely, local features such as the eyes and mouth are more fixated during the recognition of static than dynamic expressions. These different fixation patterns are not linked to the utilization of different facial areas, but are linked with the utilization of different spatial frequencies with both kinds of stimuli. More specifically, the recognition of dynamic facial expressions relies on the utilization of lower spatial frequencies. Together, these results show that the visual strategies underlying the recognition of dynamic and static stimuli are different.

Saturday, 1:45 p.m.
FSS1030

Can differences in the use of holistic and spatial frequency information explain changes in face perception across the lifespan? Isabelle Boutet, *University of Ottawa*, Bozana Meinhardt-Injac, *Johannes Gutenberg University* ■ Development is accompanied by improvements in face perception from childhood to young adulthood followed by decreased performance in late adulthood. In the present study, we examined whether there are age-related differences in the reliance on holistic and spatial frequency information across the lifespan. Participants

from four age groups (children: 12 years-olds; young adults: 23-33 years-olds; middle-age adults 50-60 years-olds; older adults: 61-82 years-olds) completed the context congruency task (Meinhardt-Injac, et al. 2010) with faces and control objects in full, high and low spatial frequencies (SF). Our results reveal significant age-differences in children and in older adults, but not in middle-age adults. Significant congruency effects were found in all age groups with upright faces, but not with control objects. Moreover, SF filtering did not affect the strength of the congruency effect, suggesting that LSF and HSF can be used for the extraction of holistic information across the lifespan. Finally, our results corroborate previous findings in showing that older adults are more prone to making "same" responses than other age groups. Faces in HSF and LSF were both associated with a stronger same response bias compared to FSF faces in all age groups. Taken together, our results suggest that holistic information, spatial frequency information, and response bias are unlikely candidates to explain age-differences in face perception.

Saturday, 2:00 p.m.
FSS1030

Measuring the time course of spatial frequency use for face recognition from East to West. Amanda Estephan, *Université du Québec en Outaouais (UQO)*, Camille Saumure Regimbald, *Université du Québec en Outaouais (UQO)*, Daniel Fiset, *Université du Québec en Outaouais (UQO)*, Dan Sun, *Hangzhou Normal University*, Ye Zhang, *Hangzhou Normal University*, Marie-Pier Plouffe-Demers, *Université du Québec en Outaouais (UQO)*, Caroline Blais, *Université du Québec en Outaouais (UQO)* ■ Easterners allocate their attention more broadly and integrate more the peripheral elements of a scene or a face than Westerners. Relying on the peripheral visual field entails the use of lower spatial frequencies (SF). In a recent study we found that Chinese participants made a better utilization of low SF whereas Canadians made a better utilization of high SF during face identification. Here, we investigate the time course of the SF utilization across cultures. Our method consisted in creating sequences of random SF filters, meaning that the SF available to the participant varied through time within one trial. On each trial, a randomly filtered face, either Asian or Caucasian, was presented for 300ms, followed by a robust mask. Participants (21 Canadians; 25 Chinese) had to recognize its identity among eight identities of the same ethnicity learned beforehand. Multiple regression analysis on the SF sampled and the participant's accuracy was used to create group classification images showing the SF tuning across time of Westerners and Easterners for Caucasian and Asian faces separately. We replicate our previous findings suggesting that Westerners make more use of higher SF (¿11 cycles per face (cpf) for Caucasian faces, 20.7 to 29 cpf for Asian faces; Zcrit= 3.51, p¡ 0.025) than Easterners, whereas Easterners make more use of lower SF (5 to 8.7 cpf for Caucasian faces, 1 to 7.7 cpf for Asian faces; Zcrit= -3.51, p¡ 0.025) than Westerners. Most importantly, we show that this cultural difference occurs within 40 ms of information extraction.

Saturday, 2:15 p.m.
FSS1030

Mapping the impairment in decoding static facial expression of emotions in prosopagnosia. Daniel Fiset, *Université du Québec en Outaouais*, Caroline Blais, *Département de Psychologie*, Jessica Royer, *Département de Psychologie*, Gabrielle Dugas, *Département de Psychologie*, Anne-Rapheëlle Richoz, *University of Fribourg*, Roberto Caldara, *University of Fribourg* ■ Prosopagnosic patients show impaired processing of the eye region in face identification. Since this area is also important for other face processing tasks, it raises the question of whether prosopagnosics' deficit in eye processing is task-specific (i.e. face identification) or if they generalize to facial expression recognition (e.g. Adolphs et al., 2005). To address this question, we tested PS, a case of acquired prosopagnosia with lesions sparing the neural substrates dedicated to expression recognition. In Exp. 1, PS and normal observers categorized neutral, happy and fearful faces while using Bubbles (Gosselin & Schyns, 2001). Strikingly, PS consistently used only the mouth to categorize these expressions, even for fear in which the eyes are highly diagnostic for normal observers. In Exp. 2, PS's performance was compared to that of control participants using a homemade version of the facial expression megamix. Compared to control participants, PS's performance was altered for all of the tested expressions (all p's ¡ 0.007), except for happiness and disgust. Interestingly, a control group who only had access to the mouth area showed a performance pattern highly similar to PS. In Exp. 3, PS was tested in a facial expression categorization task while she was explicitly instructed to look at the eye area, and while she was forced, via a gaze-contingent paradigm, to look at the eye area. In both cases, her performance remains impaired. These results suggest that prosopagnosia is associated with a general, selective deficit impinging on the representations of the eye region.

Regular Session 2(a)

Saturday, 2:45 p.m.
FSS1006

The age-related associative memory deficit: The effect of strategies and type of material. Héloïse Drouin, *University of Ottawa*, Patrick Davidson, *University of Ottawa* ■ Young adults often outperform older adults on tests of associative memory, however, the conditions under which this occurs are not yet clear. Two factors that may influence the magnitude of age-related deficits are 1) the level of demands on self-initiated processes and 2) the type of material or domain to be encoded. In this series of three experiments, we studied these two factors concurrently by varying the intensity of the demands on self-initiated processes across experiments, and by directly comparing performance on two types of associative memory within experiments. A total N of 97 young adults and 94 older adults studied lists of object-pairs and object-location pairs under intentional conditions. Demands on self-initiated processes were manipulated by increasing the number of foils at test (Experiment 1: 4AFC, vs. Experiment 2 & 3: 20AFC), and by providing strategy instructions in Experiment 3. In all three experiments, we found that young adults outperformed older adults on object-object memory, but not on object-location memory. For both young and older adults, object-object, but not object-location memory, was significantly correlated with effective strategy production. Furthermore, we found that there was no significant age difference in the number of trials encoded with an effective strategy on both memory tests. This remained true even when demands on self-initiated processes increased. However, we found in all three experiments that young adults had greater strategy effectiveness. Our findings suggest that not all associations are equally affected by aging.

Saturday, 3:00 p.m.
FSS1006

Metacognitive predictions of forgetting: The influence of aging and emotion. Sara N. Gallant, *Ryerson University*, Lixia Yang, *Ryerson University* ■ Being able to accurately predict what we will later remember allows us to adapt our learning strategies and improve performance. Such awareness of how our memory operates is referred as metamemory. There are instances, however, where it may be more favourable to forget previously learned information in favour of more relevant and up-to-date material. Prior research has shown that young adults are aware of the dynamics of forgetting: they can accurately predict not only what information they will remember but also what they will forget (Friedman & Castel, 2011). This study sought to determine how this knowledge changes as a function of both age and emotion. Young and older adults completed an item directed forgetting task for positive, negative, and neutral words, each cued as to-be-remembered (TBR) or to-be-forgotten (TBF). After each cue, participants provided a judgment of learning (JOL) by predicting how likely they would be to remember TBR and TBF words. A later recognition task assessed participants' memory for all words, regardless of the cue. Recognition performance was consistent with the directed forgetting effect with higher memory for TBR relative to TBF words. In addition, participants' JOLs showed a similar pattern of results, with higher predictions of remembering for TBR than for TBF items, an effect that did not vary with age or emotion. These findings suggest that both young and older adults are similarly able to adjust their metacognitive predictions by taking into account the relevance of information (i.e., TBR or TBF) during learning.

Saturday, 3:15 p.m.
FSS1006

Repeated tip-of-the-tongue states in older adults. L. Kathleen Oliver, *McMaster University*, Karin R. Humphreys, *McMaster University* ■ Older adults experience more tip-of-the- tongue (TOT) states than young adults (e.g. Burke, MacKay, Worthley, & Wade, 1991). We also know that TOT states in younger adults can be shown to reoccur for individual words, despite being told the correct answer (Warriner & Humphreys, 2008). This is referred to as an error learning effect. It is currently unclear as to what extent older adults with and without dementia exhibit error learning. This study elicited TOTs from older adults across retirement homes in the Hamilton, Ontario area, from the same definitions a week apart. Cognitive impairment was measured using the Montreal Cognitive Assessment (MoCA). We measured the tendency for TOT states to repeat; we also examined whether or not age and/or MoCA scores can predict error learning in our TOT task. This provides information about whether or not older and/or cognitively impaired adults can learn during a TOT state and how spoken-word production changes across the lifespan.

Saturday, 3:30 p.m.
FSS1006

Electrophysiological indices of attention and cognitive control after mindfulness training. Swapna Krishnamoorthy, *McMaster University*, John G. Grundy, *York University*, Judith M. Shedden, *McMaster University* ■ Few electrophysiological studies examine the effects of mindfulness training on neural indices of enhanced attention and cognitive control. Of these few, large discrepancies in experimental design have led to conflicting results. Here, we address this discrepancy by introducing a novel active control condition (guided visual imagery meditation) to isolate the direct effects of mindful attention regulation on cognitive control. We examine changes to stimulus and response-locked event-related potentials (ERPs) during the digit Stroop task after two weeks of daily mindfulness or active control training. Although mindful and control groups did not differ behaviourally, large group effects emerged electrophysiologically at the P1, N1, N2, P3, ERN and Pe, revealing important differences in early visual attention, conflict detection, stimulus categorization and error processing. These findings are discussed in terms of the cognitive control processes that vary as a function of mindfulness attention regulation.

Regular Session 2(b)

Saturday, 2:45 p.m.
FSS1007

Does stimuli onset type matter? Dynamic versus static deblurring. Bradley Harding, *University of Ottawa*, Denis Cousineau, *Université d'Ottawa* ■ Stimulus integration is central to cognition and while we can posit that it is a dynamic process, many cognitive paradigms force specific moments in time where participants can answer. Evidently, this may create results that are not representative of actual mental processes and models of these processes may likewise be biased. For this reason we developed a paradigm where we could compare stimuli integration types (static vs. gradual presentation) in order to see if participants benefited from a less jarring and smoother stimuli onset. We used a variation of the same-different task (Bamber, 1969) where stimuli are usually abruptly and sequentially presented. Results show that all mean RT for the dynamic condition took place after the gradual onset was completed which indicates that stimuli are fully presented on-screen when participants make their decision (they were explicitly instructed to make a decision as soon as they could discern the stimuli). However, using the static condition as a baseline, we can posit that the decision making process begins much before the dynamic stimuli finishes its deblurring process and that participants begin treating information as soon as it becomes available.

Saturday, 3:00 p.m.
FSS1007

Perceptual blurring, attentional boost, and recognition memory. Mitchell Reid LaPointe, *McMaster University*, Tamara M. Rosner, *McMaster University*, Javier Ortiz-Tudela, *Universidad de Granada*, Bruce Milliken, *McMaster University* ■ Memory performance can be enhanced for stimuli that are perceptually degraded at encoding compared with stimuli that are intact (e.g., Rosner, Davis, & Milliken, 2015). This finding might be thought of as a desirable difficulty effect, wherein difficulty at encoding leads to improved performance on a later memory test. In a seemingly unrelated line of research, studies have shown that under specific conditions of divided attention, responding to a secondary task can improve memory performance on the primary task (e.g., Swallow & Jiang, 2010). This finding has been labelled the attentional boost effect. It seems possible that a similar attentional mechanism could produce both of these findings; specifically, an up-regulation of attention that translates into stronger memory encoding. In the present set of experiments, we combined these two manipulations to investigate whether these effects share the same underlying mechanism. If so, then perceptual degradation and attentional boosting might produce redundant influences on memory encoding. These redundant influences on performance would produce an interaction between these two factors, with the attentional boost manipulation leading to an attenuation of the effect of perceptual degradation. We found no evidence for such an interaction.

Saturday, 3:15 p.m.
FSS1007

Comparing attention and attribute based illusory line motion. Jeff P. Hamm, *The University of Auckland, Auckland, New Zealand* ■ If two boxes are present and one of them flashes shortly before a bar appears between them, the bar will appear to emerge from the flashed box. Exogenous visual attention is thought to play a role in generating this illusion. The flash captures attention, which then sets up a gradient of prior entry benefits. The bar is presented along this

gradient, replicating the onset pattern of a moving bar. However, attention cannot explain why motion is perceived without a flash if the two boxes are of different colours or heights and the bar that appears matches the colour or height of one of them. In these attribute priming situations the bar appears to emerge from the matching box. The current study uses an individual differences approach to compare attention priming illusions with attribute priming illusions. If the illusions are related by a common mechanism, requring a common explanation, then those who show large flash illusions should show large colour and shape illusions. In one experiment colour based illusions are combined with flash based illusions and the data indicated that attribute priming and attention priming illusions are unrelated. A second experiment found that individuals who showed large colour illusions also showed large shape illusions, but neither of these were related to the flash illusion. The conclusion is that exogenous attention may account for the flash illusion, but a different explanation is required to explain the attribute priming illusions.

Saturday, 3:30 p.m.
FSS1007

Examining visual spatial attention using response-locked event related potentials shows differences in post-attentional processing. Brandi Lee Drisdelle, *Université de Montréal*, Gregory West, *Université de Montréal*, Pierre Jolicoeur, *Université de Montréal* ■ Our visual system is often subjected to a high-density stream of stimulation, which overloads the capacity of downstream processing systems. Visual spatial attention therefore responds to a need to be selective and distribute resources based on importance. In electrophysiology, the N2pc is an event-related potential (ERP) with a posterior negative and contralateral scalp distribution relative to the side of the visual field where attention is deployed. Most N2pc research segments data by time-locking to the onset of the search array. The goal of the present study was to observe the disengagement of visual spatial attention as well as subsequent mechanisms by instead time-locking segmentation to the motor response. The task was a simple visual search where subjects identified a lateralised pop-out target among distractors, allowing us to compare the N2pc time-locked to stimulus onset (S-N2pc) and to the motor response (R-N2pc). We demonstrate that it is possible to observe neuronal activity following the engagement of attention using the R-N2pc. Indeed, the scalp distributions of both the S-N2pc and the R-N2pc demonstrate a similar pattern of activity at posterior sites. We also separated trials by long and short response times (RT) and observed a shorter delay between the onset of the R-N2pc and the motor response for short RTs, which likely reflects the duration of post-visual spatial attention cognitive processes.

Regular Session 2(c)

Saturday, 2:45 p.m.
FSS1030

Holistic face processing in children and adults along the autism spectrum as measured by the Complete Composite Face Test.. Patricia Ann McMullen, *Dalhousie University*, Stephanie Dunsworth, *Dalhousie University*, Shannon Johnson, *Dalhousie University*, Charles A. Collin, *University of Ottawa* ■ The development of holistic face processing in individuals with and without Autism Spectrum Disorder (ASD) was investigated using the Complete Composite Face Task (CCFT). Is holistic processing intact in individuals with ASD and if not, is the difference qualitative or quantitative? The performance of children (mean age=14 years) and adults (mean age= 32.6 years) with ASD (N=28) was compared to that of typical children (mean age 12.4 years) and adults (mean age = 23.8 years) (N=28). Analyses of Variance using d prime as the dependent measure and correlations between the age and degree of holistic processing in individuals were performed. ANOVAs indicated that the two adult groups did not differ overall. Nor did the two child groups. A Congruency variable, thought to measure holistic processing in CCFT, was greater for Adult ASD participants than for typical adults and child ASD participants. Correlation analyses indicated that holistic processing in typical participants did not change with age. In contrast, holistic processing in the ASD participants increased with age (r= 0.73). Holistic processing was evident in adults but not in children with ASD. In contrast, typically developing children showed evidence of holistic processing that was qualitatively unchanged from that demonstrated in adulthood, with some quantitative improvement. Interestingly, there was more holistic processing in adults with ASD relative to typical adults suggesting there may be a qualitative difference between the two groups. Holistic processing across the lifespan may be both quantitatively delayed and qualitatively different across the life span in ASD.

Saturday, 3:00 p.m.
FSS1030

What can individual differences in face recognition ability tell us about the visual strategies used to process faces? Jessica Royer, *Université du Québec en Outaouais*, Caroline Blais, *Université du Québec en Outaouais*, Daniel Fiset, *Université du Québec en Outaouais* ■ In recent years, the interest in individual differences in face processing ability has skyrocketed. Indeed, these differences are useful in better understanding the perceptual and cognitive mechanisms involved in face processing. We recently demonstrated that the best face recognizers tend to require less facial information in order to accurately recognize faces (Royer et al., 2015), but the exact visual information used in this task remains unknown. The present work directly investigates this question: Fifty participants completed a 10 choice face identification task using the Bubbles method (Gosselin & Schyns, 2001) as well as six tasks measuring face and object recognition or perception ability. The individual classification images (CIs) obtained in the bubbles task were weighted using the z-scored performance rankings in each face or object processing test. Our results first show that the utilization of the eye region is correlated with performance in all three face tasks, (p

Saturday, 3:15 p.m.
FSS1030

Do adults really use automatic counting to solve very simple addition problems? Yalin Chen, *University of Saskatchewan*, Jamie I. D. Campbell, *University of Saskatchewan* ■ Whether educated adults use an automatic counting procedure or direct memory retrieval to solve single-digit addition problems (e.g., 3 + 2) is hotly debated. Automatic counting proponents have proposed a fast, automatic "next-token-next-value" algorithm whereby the first operand is converted into an analogical representation one step at a time (e.g., four steps for the operand 4), followed by sequential conversion of the second operand. Each step takes time, which could explain why response time (RT) increases with sum of the operands even for very small additions (e.g., 4 + 2). In the present study, the two operands were presented in a sequential order (e.g. 2 + then 3) and RT measurement began with the presentation of the second operand. The counting theory predicts that RT should be determined by the magnitude of the second operand because encoding of the first operand would be completed before timing began. Instead, the results showed that sequential and simultaneous operands presented a similar RT pattern, challenging the counting theory. The findings are consistent with the retrieval hypothesis, however, because arithmetic fact retrieval cannot begin until both operands are encoded.

Saturday, 3:30 p.m.
FSS1030

The role of syntax in task set reconfiguration when naming numerals and number words. Michael Reynolds, *Trent University*, Natalie Ford, *Trent University* ■ Two naming experiments examine whether the cognitive system is reconfigured when switching between naming Arabic numerals (e.g., 4) and number words (e.g., four). Insight into whether numerals and number words were being processed differently was inferred by comparing response times on switch (A -¿B and B-¿A) and non-switch (A-¿A and B-¿B) trials. In Experiment 1, numerals and number words ranged from 1 to 9, and therefore did not differ syntactically. In Experiment 2, numerals and number words ranged from 11 to 19, and therefore could differ syntactically (e.g., fourteen / 14). Costs to switching notations were not observed for single-digit numbers, but were observed for multi-digit numbers. This finding is consistent with numerals and number words being named in the same way until processes involved in recognizing syntax are used.

Regular Session 3(a)

Saturday, 4:00 p.m.
FSS1006

Evidence for replication success and failure. Peter Dixon, *University of Alberta* ■ Replication is central to science, but we have poor tools for deciding whether a replication attempt was successful or not. Many of the intuitive approaches are either flawed or ineffective, and I describe some of the problems with these extant methods. As an alternative, I propose an approach based on a "good-faith" interpretation of the original research in which it is assumed that that the researchers were statistically competent and knew something about the effect being investigated. Based on this assumption, one can contrast two models of the data from a replication attempt: Is the effect of interest zero or is it as large as one might infer the researchers expected given the design of the original

research? Comparing these two models allows one to decide whether the evidence from the experiment is clearly for replication, clearly against replication, or indeterminate. The approach is applied to the database of replications recently discussed by the Open Science Collaboration.

Saturday, 4:15 p.m.
FSS1006

Decision contamination in the wild: Sequential dependencies in Yelp review ratings. Michael N. Jones, *Indiana University*, David Vinson, *University of California, Merced*, Rick Dale, *University of California, Merced*, Michael Mozer, *University of Colorado* ■ Current judgments are systematically biased by prior judgments. Such biases occur in ways that seem to reflect the cognitive system's ability to adapt to the statistical regularities within the environment. These cognitive sequential dependencies have been shown to occur under carefully controlled laboratory settings as well as more recent studies designed to determine if such effects occur in real world scenarios. In this study we use these well-known findings to guide our analysis of over 2.2 million business review ratings from Yelp. We explore how both within-reviewer and within-business (across reviewer) ratings are influenced by previous ratings. Our findings suggest that current ratings are influenced in systematic ways by prior ratings. This work is couched within a broader program that aims to determine the validity of laboratory findings using large naturally occurring behavioral data. We discuss the development of theoretical models to "decontaminate" human review ratings.

Saturday, 4:30 p.m.
FSS1006

Multiple feature dimensions compete for visual attention: Testing Boolean map theory using a summary statistics paradigm. Matthew Martin, *Concordia University*, Aaron Johnson, *Concordia University* ■ Visual attention researchers have distinguished multiple feature dimensions that can guide attention, including colour, orientation, and size. It is known that features within a dimension can compete for visual attention. Some theories, such as Boolean Map Theory, claim that features of different dimensions can be attended to simultaneously without competition for attention. Here we tested this hypothesis using a summary statistics paradigm. Participants were presented with a set of rectangles that vary in colour, orientation, and size. Stimuli were presented for 200ms, followed by a 600ms visual mask. On each trial, participants were prompted to report the majority colour, orientation, or size of the stimuli. Depending on the block condition, participants must attend to one, two, or three of the visual features present in the set. In some blocks only one feature would be prompted for the entire block, whereas in other blocks, one of a possible set of two or three features would be prompted for reporting. We found that when the number of feature dimensions required to encode is increased, psychophysical performance (as measured by accuracy) decreases with number of attended features. Further, reaction time increases with number of attended feature dimensions. This is contrary to some claims in the literature, including Boolean Map Theory, which would predict that multiple feature dimensions can be attended to simultaneously without a decrease in performance.

Saturday, 4:45 p.m.
FSS1006

Understanding the mechanisms behind the perception of psychology as unscientific. Lindsay Morgan, *Carleton University*, Gina Hernandez, *Carleton University*, Tess Walsh, *Carleton University*, Demi Plagianakos, *Carleton University*, Guy Lacroix, *Carleton University* ■ Research has demonstrated that psychology is typically perceived to be less scientific than the other sciences (e.g., Lilienfeld, 2010). Still, the cognitive mechanisms that underlie this phenomenon remain poorly understood. The aim of this study was to examine the possibility that semantic associative networks evoked for the concept science are such that the natural sciences (e.g., biology, chemistry, physics) are closely related to science, whereas psychology is not. Different paradigms were used, such a discrete free association (Nelson et al., 2004), feature listing (Rosch & Mervis, 1975), and a same-different task (Shin & Nosofsky 2002), to examine these differences in relatedness. Preliminary results suggest that psychology does induce semantic associates that exemplify the scientific method, but it did not lead participants to perceive psychology as a science. Thus, it is possible that there exists a common misconception that science is defined by its object of study rather than its methodology.

Regular Session 3(b)

Saturday, 4:00 p.m.
FSS1007

Investigating the neural signature of inhibitory cuing effects elicited by multi-modal stimuli. Ghislain d'Entremont, *Dalhousie University*, Alexander Jones, *Middlesex University*, Mike Lawrence, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ Inhibition of Return (IOR) is a behavioural phenomenon wherein one is slower to respond to targets that are presented at a previously cued location. Early work looking at the event-related potential (ERP) components of IOR using electroencephalography (EEG) suggested that P1 reductions might be an electrophysiological marker of IOR. However, the observation of P1 reductions with and without IOR, and vice versa, made the role of P1 in IOR unclear. We hypothesized that P1 component reductions, and, more generally, early ERP component modulations, are the result of repetitive stimulation along an input (sensory) pathway, not IOR. To test this hypothesis, the neural signature of IOR was investigated in a multi-modal cueing paradigm using all possible pairings of touch and vision. IOR (slower responses to targets in a previously cued location) was obtained in all 4 conditions. In the visual modality, P1 cueing effects were not observed. However, in the tactile modality, an early component (defined as the N80/P100 complex) showed a robust reduction on the cued side, but only following tactile cues. Overall, these results support the hypothesis that repetitive sensory stimulation may be driving the early ERP component modulations originally thought to be indicative of IOR.

Saturday, 4:15 p.m.
FSS1007

Swipe right or swipe left? The effects of response inhibition on the motivational incentive for approach or avoidance of sexual stimuli. Rachel L. Driscoll, *University of Guelph*, Keelia Quinn de Launay, *University of Guelph*, Mark J. Fenske, *University of Guelph* ■ Sexual images from which a motor-response has been withheld are subsequently rated as less attractive than the targets of response. This reduction in the hedonic value of motivationally-relevant stimuli is accompanied by a reduction in the motivational incentive to seek and obtain views of such items. These effects are thought to reflect the affective consequences of response inhibition. Here, we first presented erotic images of participants' preferred and non-preferred sex in a Go/No-go response-inhibition task to investigate whether the motivational consequences of prior inhibition are limited to a reduction in the capacity of sexually-appealing stimuli to elicit behavioural approach, or also include an increase in the capacity of sexually-unappealing stimuli to elicit behavioural avoidance. Subsequent changes in motivational incentive were measured by presenting noise-obscured erotic images in a key-pressing task in which different keys resulted in the visibility of image becoming either enhanced (approach) or further impaired (avoidance). Participants generally key-pressed to obtain better views of preferred-sex images and to prevent viewing non-preferred images. Prior inhibition of preferred-sex images significantly reduced the frequency of approach-related key-presses for preferred items, whereas prior inhibition of non-preferred images significantly increased the frequency of avoidance-related key-presses for non-preferred items. In contrast to accounts that posit a global reduction in behavioural expression following motor-inhibition, our results suggest that inhibition modifies representations of stimulus value.

Saturday, 4:30 p.m.
FSS1007

Interference between implicit and explicit timing tasks. Michael David Klein, *University of Waterloo* ■ Implicit timing occurs when overt duration estimates are not required but temporal information is still helpful to task performance, such as when one must quickly press a key in response to a stimulus appearing after some time interval. When the time between the beginning of a trial and the presentation of a stimulus (i.e. the "foreperiod") is varied, responses are faster on trials with longer foreperiods (i.e. the "foreperiod effect"). The foreperiod effect is likely caused by controlled processes that operate during the foreperiod to increase preparedness to respond. When implicit and explicit timing tasks are performed concurrently, longer foreperiods are also associated with shorter explicit estimates, suggesting that the two types of tasks compete for similar resources during the foreperiod. However, it is not clear exactly which processes must compete for resources. We aimed to test whether the source of interference is those processes that increase preparedness to respond. If these processes mutually interfere with explicit timing, then concurrent explicit timing should result in a reduced foreperiod effect relative to a single task condition. Results show that this was not the case; explicit timing increased response times equally for all foreperiods, suggesting that explicit timing instead competes with some other process such as monitoring for the onset of a stimulus.

Saturday, 4:45 p.m.
FSS1007

Exogenous eye movements and inhibition of return: Is environmental context essential for the maintenance of IOR? Colin Roderick McCormick, *Dalhousie University*, Ralph S. Redden, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ Inhibition of return (IOR) functions by inhibiting orienting back to previously attended and disengaged-from locations and through this process we are more likely to attend to new areas. The mechanisms and properties of IOR are explored in this study, specifically looking at whether background maintenance is essential for viewing IOR generated by exogenous eye movements. A modification of Klein and MacInnes (1999) "Where's Waldo?" search experiment is used to do this. But instead of allowing self-generated eye movements (in the service of searching for Waldo) we guided the participant's oculomotor behaviour with a sequence of salient fixation stimuli. The reaction times to orient to the final saccade were recorded using an eye tracker. There were six different and equiprobable locations of the target on the screen at varying degrees away from the previous fixation, or the fixation two before. There were 3 background conditions: 1) a Waldo picture that remained present for the whole trial; 2) a Waldo picture that was removed at the time of the appearance of the final target; 3) the series of eye movements was made on a blank background. Results reflect those of Klein and MacInnes (1999) in that participants were slower to respond to targets at locations that were previously disengaged from compared to targets at previously unviewed locations, but only in trials where the background remained consistent (conditions 1 and 3). Implications of this study for understanding IOR are discussed.

Regular Session 3(c)

Saturday, 4:00 p.m.
FSS1030

Prior observation of group interactions modulates later social attention: Group followers are not followed. Francesca Capozzi, *McGill University*, Cristina Becchio, *University of Torino*, Cesco Willemse, *University of East Anglia*, Andrew P. Bayliss, *University of East Anglia* ■ Group interactions are pervasive in our everyday life, and by observing them we can grasp information about the identities composing the group, e.g. about their social influence. Can this information affect social attention responses to the identities composing the group in later encounters? To investigate this, we created a two-step paradigm composed by two tasks. The first task, the "learning phase", was an adaptation of the gaze-cueing procedure with three identities displayed: in the leader condition, one of the three identities ('leader') always turned her gaze first, followed by the other two faces ('group'). In the follower condition, one of the identities ('follower') always turned her gaze as second, following the group. Thus, participants could learn that some individuals were consistently 'leaders' and others 'followers' of others' attention. In the second task, the "test phase", 'leaders' and 'followers' were presented in a standard gaze-cueing procedure. Results of the "test phase" showed that, while the 'leaders' caused a typical gaze-cueing effect, the 'followers' did not elicit reliable gaze-cueing. Whereas previous literature suggested that others' gaze cannot be ignored, our data show that the perceived (in-)ability of individuals in directing group attention toward elements of the environment strongly modulates gaze following responses to them: individuals uninformative to group attention are ineffective social attention directors in later encounters. Thus, the role played in previous group interactions modulates the relative weight assigned to others' gaze: followers' gaze can be ignored.

Saturday, 4:15 p.m.
FSS1030

The emergence of coordinated group behaviours in the absence of communication: Evidence for scale-invariant learning principles. Chrissy M. Chubala, *University of Manitoba*, Randall K. Jamieson, ■ The ability to organize behaviour in response to the constraints of a dynamic environment (i.e., learning) is critical to the survival of living organisms, humans included. Accordingly, much work in psychology has focused on the mechanisms of learning within the individual. However, less research has examined learning in cooperative groups of individuals. We approached this question by having groups of undergraduates solve a learning task in coordination with one another, but without any communication. In the task, participants were trained to match group-level numeric targets (e.g., "five of you respond") by making independent decisions about whether or not to respond on a given trial. The group then received feedback (e.g., "the group was two over the target on that trial") and continued its attempts until the target was reached. We show that group-level performance held striking similarities to known effects in individual learners, such as 1) standard learning curves over

the course of training, 2) transfer of learning to untrained numeric targets, and 3) relearning after the disruption of one or more individuals' responding. Patterns of individual behaviour suggested that participants independently developed unique roles or strategies. Thus, the behaviours of individual learners dynamically shaped both one another and the performance of the group-as-learner. We argue that the work provides evidence for scale-invariance of learning phenomena. In our view, this novel task has potential as a tractable model for examining the emergence of coordinated learning in complex systems.

Saturday, 4:30 p.m.
FSS1030

Power, objectification and ethnicity. Ciro Civile, *McMaster University*, Sukhvinder S. Obhi, *McMaster University* ■ In contemporary society, objectification is usually thought of as a male behaviour inflicted upon women. However, this notion risks confounding the gender of the perpetrator, with the fact that men often hold more social power than women. Experiment 1, investigated whether power itself was associated with objectification in processing sexualized male and female targets. We adopted the inversion effect paradigm in the context of an old/new recognition task. We operationalized objectification as the lack of an inversion effect, indicating object-like featural processing (a large inversion effect with face/body stimuli is traditionally interpreted as a marker of configural processing). Results showed that Caucasian male and female participants primed to high-power showed a lack of inversion effect for Caucasian opposite gender targets. These results provide the first evidence to date that high-power women and men adopt object-like featural processing style when viewing sexualized opposite gender targets. Experiment 2, explored objectification of men and women of other ethnic groups. Caucasian male and female participants were primed to high-power before engaging in the same task used in Experiment 1, but this time involving sexualized targets of Caucasian and Asian men and women. Participants showed the previously reported (Experiment 1) reduced inversion effect for Caucasian opposite gender targets, but not for Asian opposite gender targets. We discuss our results in the context of the extant literature on power and with reference to media stereotyping of Caucasians and Asians.

Saturday, 4:45 p.m.
FSS1030

Functional fractionation of the default mode network is associated with real-world mind wandering behaviours. Effie J. Pereira, *McGill University*, Lauri Gurguryan, *McGill University*, Jelena Ristic, *McGill University* ■ Recent connectivity analyses suggest that the brain's default mode network (DMN) is organized into three functionally segregated clusters, reflecting core processes, social processes (i.e., the dorsal-medial prefrontal subsystem), and memorial selection (i.e., the medial temporal lobe subsystem). However, it remains unexplored how this functional fractionation may map onto real-life behaviours. To address this question, we measured instances of mind wandering and their associated behaviours in the real-world by conducting experience sampling with 43 participants over five consecutive days. This procedure identified 170 different behaviors that were associated with mind wandering. In order to map these behaviours onto the proposed function of the social DMN subsystem, we asked 110 volunteers from Amazon Mechanical Turk to rate each behaviour on a social-solitary and an active-passive continuum. Cross-comparisons of data indicated greater proportions of mind wandering during passive behaviours and during solitary relative to social activities. Greater awareness of mind wandering emerged in solitary relative to social behaviours. These data provide some of the first insights into the real-world behaviours that may be associated with the functional specificity within the DMN, and further suggests a dissociation between executive and social mental processes.

Regular Session 4(a)

Sunday, 9:30 a.m.
FSS1006

Contextual knowledge, statistical cues and syllabic constraint in toddlers' word segmentation. Mireille Babineau, *Université du Québec à Montréal*, Rushen Shi, *Université du Québec à Montréal* ■ Previous studies showed that preverbal infants can already use statistical cues to segment words when the unit of statistical computation is the syllable. Our study investigated whether infants can use statistical cues to segment sub-syllabic units. In French, liaison consonants are prefix-like units at the syllabic onset of vowel-initial words (e.g., /z/ in ces amis "these friends" [se.zami]). We tested French-learning 24-month-olds in a preferential looking task.

In Experiment 1, infants were familiarized with sentences containing variable liaison-identical onset consonants in pseudo-nouns (e.g., ces zonches "these zonches", un nonche, petit tonche). These phrases were homophonous with real liaison phrases (e.g., ces /z/onches). The low transitional probability between 'onche' and the preceding materials predicted vowel-initial segmentation (e.g., onche). When infants were tested with the consonant-initial interpretation (e.g., 'zonche' versus a novel z-initial word), no discrimination was obtained. When tested with the vowel-initial interpretation (e.g., 'onche' versus a novel vowel-initial word), discrimination was observed (p=.025), suggesting that they used the sub-syllabic statistical cues. Experiment 2 further tested whether infants' use of sub-syllabic statistics applies generally to all consonants. Familiarization sentences were the same, except that the pseudo-nouns contained unambiguous variable onset consonants (e.g., ces guonches, un vonche, petit chonche). During test, infants only showed a consonant-initial interpretation (p

Sunday, 9:45 a.m.
FSS1006

How do readers process noun number?: The battle between surface frequency and grammatical number. Robyn Carson, *University of Ottawa*, Alain Desrochers, *University of Ottawa*, Riley Boyes, *University of Ottawa*, Cameron Kraft, *University of Ottawa*, Julia Guerra, *University of Ottawa* ■ Readers are sensitive to surface frequency - how often a word appears in a particular form (e.g., singular or plural). When making lexical decision tasks, readers: 1) recognize nouns with a high singular surface frequency faster when they are singular; and 2) recognize nouns with a higher plural surface frequency at equal speeds, regardless of whether they are singular or plural (New et al., 2004). The present experiment investigates whether these results extend to a number decision task. Participants were 98 undergraduate students (88 female) with a mean age of 18.74 (SD = 2.29). During the experiment, they selected which pronoun, "This" or "These", should precede singular and plural nouns. A post-experimental questionnaire captured response strategies. Mixed-method ANOVAs were used to analyze the data. Overall participant accuracy was 98%. Participants were 65 ms faster at responding to plural nouns than singular nouns, F (1, 96) = 27.97, p = .000, η_p^2 = .226. No other effects approached significance, p ¿ .822. Thus, our results differ dramatically from the lexical decision results; surface frequency had no impact on number decisions. To gain a better understanding of this result, individual response patterns and questionnaire data were examined. Interestingly, self-report strategies were inconsistent with behavioural data (RTs). Consequently, questionnaire responses could not explain the four response patterns that emerged. In conclusion, our results demonstrate that surface frequency is not always accessed when written words are being processed. Additionally, readers seem unaware of how they actually process noun number.

Sunday, 10:00 a.m.
FSS1006

Language processing as heuristic first, algorithmic second. Veena D. Dwivedi, *Brock University* ■ Language comprehension requires integration of information derived from world-experience and grammar. Nevertheless, how these different sources of information interact is debated, especially with respect to their time course. The present work suggests that language processing requires both heuristic and algorithmic processing streams, where the heuristic processing strategy precedes the algorithmic phase. This claim contrasts with recent accounts in the ERP language literature, which propose that these two streams operate in parallel. However, I suggest that evidence supporting the parallel processing model could be artefacts of Event Related Potential (ERP) language methodology. The proposal is based on three self-paced reading experiments in which the processing of two-sentence discourses was investigated, where context sentences exhibited quantifier scope ambiguity. Experiment 1 demonstrates that such sentences are processed in a shallow manner. Experiment 2 uses the same stimuli as Experiment 1 but adds questions to ensure deeper processing. Results indicate that reading times are consistent with the lexical-pragmatic interpretation of number associated with context sentences, whereas responses to questions are consistent with the algorithmic computation of scope. Experiment 3 shows the same pattern of results using stimuli exhibiting a different lexical-pragmatic bias. These results suggest that for certain constructions, language processing is superficial and deeper processing sensitive to structure only occurs if required. Implications for recent studies of scope ambiguity are discussed.

Sunday, 10:15 a.m.
FSS1006

Context of bilingualism shapes intrinsic functional connectivity. Jason W. Gullifer, *McGill University*, Xiaoqian Chai, *McGill University*, Irina Pivneva, , Veronica Whitford, *The University of Western Ontario*, Shari Baum, *McGill University*, Denise Klein, *McGill University*, Debra Titone, *McGill University* ■ Bilingualism has been linked to

neurocognitive benefits relative to monolingualism. Recently, the evidence for bilingual advantages has been questioned. While there are many positive results, there are also instances of null results in the literature (see Baum & Titone, 2014, for a review). Green and Abutalebi (2013) propose the adaptive control hypothesis, which may provide insight into these inconsistencies. Accordingly, cognitive control recruitment in bilingualism depends on the interactional context of language usage. Bilinguals who live and work in contexts where both languages are used, i.e. dual-language context, must shift attention and negotiate cross-language competition more frequently compared to bilinguals who spend their time using primarily one language in each context, i.e. single-language context. Thus, dual-language contexts are predicted to promote greater neurocognitive benefits compared to single-language contexts. To investigate this prediction, we measured functional resting-state (RS) connectivity on a sample of L1 French - L2 English bilinguals (N=27). RS analysis assesses activation of brain networks when participants are not completing an overt task. We computed RS connectivity as a function of mixed-language usage over interactional contexts. Preliminary results show greater connectivity between left dorsolateral prefrontal cortex (implicated in language control), bilateral precentral gyri (PCG) and right superior temporal gyrus (STG) for speakers who reported greater mixed use. Consistent with the adaptive control hypothesis, dual-language contexts tune networks related to engagement/disengagement of motor sets (PCG) and resolution of lexical competitors (rSTG).

Regular Session 4(b)

Sunday, 9:30 a.m.
FSS1007

On the inferential basis of effort avoidance. Timothy Lee Dunn, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ■ The notion that individuals adapt their behaviors in ways that attempt to minimize the effort needed to reach a goal is pervasive. Though an intuitive hypothesis, there is a lack of deep understanding of how this process unfolds. Thus, in the current set of experiments we addressed the question of how individuals select specific courses of action within the context of effort avoidance. To achieve this, we compared three theoretical claims with regard to the information on which effort-based decisions are made. Specifically, we contrasted accounts suggesting that this information is (1) based on time, (2) based on demands on executive control, and (3) based on the product of an inference based on effort cues. Using a variant of the demand selection task we generated conditions that pitted a less time consuming, and executive control demanding task with a salient effort cue (i.e., stimulus rotation) against a more time consuming and executive control demanding task with a less salient effort cue (i.e., probability of a task switch). According to time and executive control based accounts, the critical variable driving effort based decisions is the relative difference in terms of time and demands on executive control between potential courses of action. This is not what we observed. The salient effort cue appeared to dominate effort-based decisions consistent with the idea that effort based decisions are largely based on inferences over available effort cues. Results are discussed within an inferential framework of effort avoidance.

Sunday, 9:45 a.m.
FSS1007

Sweat so you don't forget: How aerobic exercise breaks facilitate learning. Barbara Fenesi, *McMaster University* ■ There is growing evidence that acute bouts of physical activity can boost executive function and attention. Previous research has shown that incorporating as little as ten minutes of coordinative exercises during a school lesson improves student attention during instruction. In this study, we examined whether several acute exercise breaks (5mins each) compared to cognitive breaks (playing a computer game) during an educational lecture among university students improved memory of presented information and promoted more focused attention. Preliminary results show a significant advantage of exercise breaks in promoting memory and attention compared to cognitive breaks. This is particularly important during academic lectures given that student attention often decreases as the duration of a lecture increases, which consequently hinders memory of the lecture content. This study also has implications for workplace settings, where sporadic 10min breaks during the workday have also been shown to improve employee health and work productivity.

Sunday, 10:00 a.m.
FSS1007

What does the heart know? The role of visceral autonomic feedback in shaping recognition

memory. Christopher M. Fiacconi, *University of Western Ontario*, Erika L. Peter, *Queen's University*, Sawayra Owais, *University of Western Ontario*, Stefan Köhler, *University of Western Ontario* ■ The idea that bodily signals play a role in shaping mental experiences is central to many theories of emotion. Here, we examined the extent to which such signals may also contribute to feeling states that occur in association with cognitive processing. Specifically, we asked whether visceral autonomic feedback that arises from individual heartbeats informs recognition memory judgments and experiences. To investigate this issue, we used a methodological approach borrowed from the emotion literature that leverages the well-established phasic variation in afferent baroreceptor-mediated feedback that occurs across the cardiac cycle (i.e., interval between heartbeats). Following exposure to novel faces during an encoding phase, we synchronized the presentation of test items in a recognition-memory task to distinct phases of the cardiac cycle and probed whether the difference in afferent signaling across these phases influences participants' recognition decisions and experiences. As predicted, faces presented during cardiac systole (i.e., when visceral feedback is maximal) were more likely to be endorsed as 'old' relative to presentation during cardiac diastole (i.e., when afferent feedback is minimal). This pattern was present for targets and lures and held regardless of whether the faces had a fearful or a neutral expression. Moreover, by soliciting participants' phenomenological experience on each trial, we also found that this effect is specifically tied to feelings of familiarity, and was absent for trials on which participants recollected pertinent contextual information. The current findings identify the functional role of a specific autonomic channel in feeling states that pertain to memory experience.

Sunday, 10:15 a.m.
FSS1007

Move to the beat: Do beat gestures influence teaching perceptions? Irina Ghilic, *McMaster University*, Amy A. Pachai, *McMaster University*, Marina Sadik, *McMaster University*, David I. Shore, *McMaster University* ■ Gesturing is ubiquitous in verbal communication - everybody moves when speaking. Hand, arm, and torso movements augment the spoken word. When preparing for a lecture, or a presentation, how much time and thought do lecturers devote to the movement of their hands? Body language and movement throughout a lecture are not often taken into consideration when creating or rehearsing a lecture. Gestures are acutely understudied in an educational context; they are mostly researched within a multisensory perception paradigm. Beat gestures are the most commonly studied gestures, as they heavily influence spoken communication (Biau & Soto-Faraco, 2013; Leonard & Cummins, 2011). These hand flicks achieve a high velocity and contain abrupt starts and stops. The gestures can be restricted to pointing a single finger, or as expressive as moving the entire torso. Beat gestures may contain little semantic content on their own, but when accompanied by speech, they emphasize specific words and help disambiguate the narrative. Our research project aimed to explore the role of beat gestures, and speaker movement in general, in an academic setting. Using motion capture technology, we investigated the variation in beat gestures between seven different presenters, and evaluated the influence of beat gesture quantity on an audience's perceived difficulty, understanding, clarity, engagement, and interest in the presentation narrative.

Regular Session 5(a)

Sunday, 10:45 a.m.
FSS1006

My, what deceptive features you have! Perceptual interference during on-line referential interpretation. Chris Klammer, *University of Toronto*, Craig Chambers, *University of Toronto* ■ How efficiently is perceptual and conceptual information coordinated during visually-situated spoken language processing? We examine this question using cases where perceptual information mismatches conceptual knowledge for linguistically-described objects (i.e., a candle resembling a lightbulb). Listeners (N=24) followed instructions relating to real objects (e.g., "Tap the small box"). On critical trials, displays contained four items, including two size-contrasting exemplars in the target category (two boxes). In the Two-Contrasts condition, the remaining two objects were also a size-contrasting pair (small and big lightbulb), whereas in the One-Contrast condition, they belonged to distinct categories (small lightbulb and big candle). Finally, in the Visually-Deceptive condition, these objects perceptually resembled those in the Two-Contrasts condition but were conceptually identical to those in the One-Contrast condition because participants were aware of deceptive objects' actual

identity (small lightbulb and a candle resembling a big lightbulb). Eye-movements measured at the adjective ("small") showed listeners identified targets (small box) faster in the One-Contrast compared to the Two-Contrast condition. This reflects listeners' assumption that, in the former, only the target would be named with an adjective (the small lightbulb alone would instead likely be named "lightbulb"), whereas the two referential candidates for "small" in the Two-Contrasts condition would delay interpretation until the noun. Strikingly, eye-movements in the Visually-Deceptive condition matched the Two-Contrasts condition, suggesting immediate referential hypotheses were generated primarily using appearance and not reality knowledge. Results are discussed in relation to findings showing the opposite bias in other tasks using the same materials (Mozuraitis et al., 2015).

Sunday, 11:00 a.m.
FSS1006

Effects of proficiency and age of acquisition on grammatical gender processing in second language speakers. Emily S. Nichols, *University of Western Ontario*, Scotia McKinlay, *University of Western Ontario*, Melanie L. Russell, *University of Western Ontario*, Marc F. Joanisse, *University of Western Ontario* ■ A central topic in bilingualism research is the extent to which second-language (L2) learning is influenced by the similarity of grammatical features in one's first language (L1). The present study examined this by using event-related potentials (ERPs) to examine French L2 grammatical gender processing in native English speakers. Of interest was how individual differences in L2 proficiency and age of acquisition (AoA) influence ERP markers of grammatical processing. EEG was recorded in 20 L2 English-French speakers while reading French sentences that were grammatically correct, contained a grammatical gender violation, or contained a word order (grammatical structure) violation. Results were compared to 20 native French speakers performing the same task. A stepwise procedure determined the independent contributions of each factor to a linear mixed effects model with violation condition, electrode, and L1/L2 group as fixed effects and AoA and proficiency as continuous effects. Significant proficiency × condition and AoA × condition interactions predicted Left Anterior Negativity (LAN) amplitude, with structure violations driving the proficiency effect and gender violations driving the AoA effect. Significant proficiency × condition, group × condition, and AoA × condition interactions predicted P600 amplitude, with gender violations driving all three effects. The different effects of AoA and proficiency between grammatical gender and structure violations indicate that while it is possible for L2 speakers to acquire novel grammatical rules, this process is different to learning grammatical rules that are present in L1.

Sunday, 11:15 a.m.
FSS1006

Learning two languages at once: the benefit of bilingualism. Sin Mei Angeline Tsui, *University of Ottawa*, Alia K. Chamberlain, *University of Ottawa*, Lucy C. Erickson, *University of Maryland, Carnegie Mellon University*, Erik D Thiessen, *Carnegie Mellon University*, Christopher T. Fennell, *University of Ottawa* ■ Statistical learning, the ability to track statistical properties of the input, is thought to be a fundamental skill in effective language acquisition. In bilingual environments, learners must track different statistical sets in the input in order to segment each language successfully. Past studies suggested that adults were able to segment two artificial languages only when provided with strong contextual cues (e.g. differently gendered voices or faces). However, when we hear two languages in reality, the languages are not always spoken by two distinct individuals. Here, we explore whether other contextual cues in a single individual's speech (e.g. accent) can facilitate adult segmentation of two artificial languages and if learners' prior language experience (i.e. monolingual/bilingual status) influences performance. Twenty-five French-English bilinguals and 12 English monolinguals participated in the speech segmentation task. Participants were first exposed to two artificial languages presented in either a Canadian English or French accent. At test, they completed a force-choice word recognition task to assess if they successfully segmented words from the two speech streams. Participants also completed a language background questionnaire. Our results showed that bilinguals segmented one of the languages successfully [t(24) = 3.26, p ¡ 0.01], but monolinguals did not succeed in either language [ps ¿ 0.2]. Accent is thus a potential cue for bilingual speech segmentation. The bilingual advantage may be driven by extensive French-accented exposure in learners' language environment. The relationship between performance in the task and different aspects of bilingual experiences (e.g. language proficiency, age of acquisition) will be discussed.

Regular Session 5(b)

Sunday, 10:45 a.m.
FSS1007

Creating a vivid recollection-based memory trace through drawing. Jeffrey D. Wammes, *University of Waterloo*, Melissa E. Meade, *University of Waterloo*, Myra A. Fernandes, *University of Waterloo* ■ There are many empirically tested encoding strategies that will lead to an enriched later memory trace. Our previous work demonstrated that drawing a picture of to-be-remembered information is a reliable method through which one can get a massive and reliable boost to memory performance in free recall tasks. In the current work, we sought to test the notion that drawing confers its benefit to memory performance through creating a rich and vivid recollection of the encoding context. In Experiments 1 and 2, we demonstrated that for both pictures and words, items that were drawn at encoding were recognized more often than words that were written out. Moreover, participants' 'source memory' (that is, their memory for whether the word was drawn or written) was superior for drawn relative to written items. In Experiment 3, we used a remember know paradigm to demonstrate again that drawn words were better recognized than written words, and that this was driven by a greater proportion of recollection-, rather than familiarity-based responses. Lastly, in Experiment 4 we implemented a response deadline procedure, and showed that when responses were speeded, thereby reducing participants' capacity for recollection, the benefit of drawing was substantially smaller than when responses were not speeded. Taken together, the findings from this line of experiments converge on the idea that drawing improves memory as a result of providing vivid contextual cues which can be later called upon to aid retrieval.

Sunday, 11:00 a.m.
FSS1007

Drawing as an encoding tool: Benefits in both younger and older adults. Melissa E. Meade, *University of Waterloo*, Jeffrey D. Wammes, *University of Waterloo*, Myra A. Fernandes, *University of Waterloo* ■ In our recent work (Wammes, Meade, & Fernandes, 2015), we have demonstrated that drawing pictures, relative to writing words, at encoding can benefit later memory performance in young adults. In the current study we sought to replicate and extend the drawing effect to older adults, with the expectation that drawing would serve as an effective form of environmental support at encoding by providing rich perceptual and somatosensory information. We demonstrated that drawing benefits memory performance to a greater extent in older than younger adults (Experiment 1), and provides a larger memorial benefit than elaborative encoding for both age groups (Experiment 2). Additionally, our findings suggest that drawing results in a memorial benefit through enhanced recollection, possibly as a result of the rich perceptual information provided by pictorial information (Experiment 3). Overall, the results of this study indicate that drawing is a highly valuable form of environmental support that can significantly enhance memory performance in older adults.

Sunday, 11:15 a.m.
FSS1007

The role of auditory feedback for speech motor control in toddlers. Nichole E. Scheerer, *Wilfrid Laurier University*, Danielle S. Jacobson, *Wilfrid Laurier University*, Jeffery A. Jones, *Wilfrid Laurier University* ■ Children produce relatively fluent speech despite the fact that their vocal tract undergoes dramatic changes as they develop. Auditory feedback plays an important role in the acquisition and maintenance of the sensorimotor mechanisms that support vocal motor control. Recently, MacDonald and colleagues (2012) reported that toddlers' speech motor control system "suppresses" the influence of auditory feedback. This conclusion was based on the observation that exposure to changes in the auditory feedback regarding the formant frequencies of toddlers' vocalizations did not elicit reciprocal modifications to their speech, as was observed for older children and adults. This lack of auditory-feedback-based error correction before 4 years of age is not parsimonious with most theories of speech motor control. For this reason, we exposed toddlers to brief perturbations to the fundamental frequency (perceived as a change in pitch) of their auditory feedback, while they vocalized a vowel sound. The toddlers compensated by changing their fundamental frequency in the opposite direction to the manipulation, producing significantly different responses to upwards and downwards perturbations. These results represent the first empirical demonstration that toddlers use auditory feedback to regulate their ongoing vocalizations. In light of the previous findings, these results also suggest that toddlers may be more sensitive to the postural properties of their auditory

feedback, such as fundamental frequency, relative to the phonemic properties, such as formant frequencies.

Sunday, 11:30 a.m.
FSS1007

Effects of combined attention on early visual cortical processing: An ERP investigation. Christopher David Blair, *McGill University*, Jelena Ristic, *McGill University* ■ Task-relevant symbols (i.e., arrows) often engage automated and endogenous control processes in a combined, i.e., additive manner. Using EEG, here we investigated if this behavioral effect is mirrored in visual cortical processing, as indexed by the P1 event-related (ERP) component. Automated, endogenous, and combined effects were elicited using cuing tasks in which spatially uninformative arrows, spatially informative shapes, and spatially informative arrows served as cues. Participants detected peripheral targets presented after short (250-450ms) or long (450-650ms) cue-target time delays while their electrocortical activity was recorded from 64 electrodes. Behavioral results replicated past reports indicating reliable effects in each condition, with the combined case producing attentional effects that approximated an additive sum of isolated automated and endogenous processes. Target-related P1 amplitude modulation mirrored these behavioral data at the short cue-target times. However, at the long cue-target times, the combined condition yielded P1 amplitudes that resembled an underadditive combination of automated and endogenous components. This suggests that both automated and endogenous attention affect early visual target processing quickly but that prolonged behavioral effects likely reflect higher stages of neural processing.

Regular Session 6(a)

Sunday, 1:15 p.m.
FSS1006

Response inhibition has social-emotional consequences for individual faces. Rachel L. Driscoll, *University of Guelph*, Elizabeth M. Clancy, *University of Guelph*, Mark J. Fenske, *University of Guelph* ■ Withholding a motor-response from a visual stimulus in a response-inhibition task results in its affective devaluation. This effect - repeatedly obtained using different affective (e.g., how likeable? cheerful?) and social-emotional (e.g., how trustworthy? attractive?) judgments across a variety of stimuli (e.g., abstract patterns, faces, bodies, etc.)- has been taken as evidence that inhibition impacts the assessment and encoding of stimulus-associated value. Here we investigate the extent to which such changes in value can be linked to specific stimulus identities. Whereas previous studies required participants to make a Go/No-go decision based on a semantic or perceptual feature shared by an entire category of stimuli, participants in our experiment made this decision based on the specific identity of individual faces. Participants first studied a set of unique face-name pairs to learn the depicted individuals' identities. Each face was then presented with the studied name or a novel name in a modified Go/No-Go task. One of two motor-responses was prepared based on whether the name matched the face's identity, but participants had to wait for a signal (Go/No-go) to determine whether to execute the response. Each face (without names) was then rated for trustworthiness in a subsequent affective-rating task. Previously inhibited (No-go) faces were rated as significantly less trustworthy than non-inhibited (Go) faces, providing clear evidence that the social-emotional consequences of response inhibition can be linked in memory to specific individuals as well as to broader groups.

Sunday, 1:30 p.m.
FSS1006

Atheists and agnostics are more reflective than religious believers: Four empirical studies and a meta-analysis. Gordon Pennycook, *University of Waterloo*, Robert M. Ross, *Royal Holloway, University of London*, Derek J. Koehler, *University of Waterloo*, Jonathan A. Fugelsang, *University of Waterloo* ■ Individual differences in the mere willingness to think analytically has been shown to predict religious disbelief. Recently, however, it has been argued that analytic thinkers are not actually less religious; rather, the putative association may be a result of religiosity typically being measured after analytic thinking (an order effect). In light of this possibility, we report four studies in which a negative correlation between religious belief and performance on analytic thinking measures is found when religious belief is measured in a separate session. We also performed a meta-analysis on all previously published studies on the topic along with our four new studies (N = 15,078, k = 31), focusing specifically on the association between performance on the Cognitive Reflection Test (the most widely used individual difference measure of analytic thinking) and

religious belief. This meta-analysis revealed an overall negative correlation (r) of -.18, 95% CI [-.21, -.16]. Although this correlation is modest, self-identified atheists (N = 133) scored 18.7% higher than religiously affiliated individuals (N = 597) on a composite measure of analytic thinking administered across our four new studies (d = .72). Our results indicate that the association between analytic thinking and religious disbelief is not caused by a simple order effect. There is good evidence that atheists and agnostics are more reflective than religious believers.

Sunday, 1:45 p.m.
FSS1006

Assessing expectations of cognitive training and non-invasive brain stimulation using the expectation assessment scale. Sheida Rabipour, *University of Ottawa* ■ Cognitive enhancement interventions such as computerized cognitive training and non-invasive brain stimulation are increasingly used to maintain or rehabilitate cognitive function among researchers, clinicians, and individual consumers. Nevertheless, these techniques remain highly controversial due to uncertainty regarding their mechanisms of action. A major limitation in the extant literature is the lack of a measure of participants' expectations, which can influence the degree to which they improve over an intervention (i.e., the placebo effect). We created a questionnaire to measure the perceived effectiveness of cognitive enhancement interventions at baseline and following exposure to separate, brief messages implying that such programs have either high or low effectiveness. Based on knowledge gleaned from advertising and other sources in the real world, people are relatively optimistic about such interventions. However, whereas reading a brief positive message can increase reported optimism, reading a brief negative message can decrease it. Our data indicate that perceptions of cognitive enhancement interventions are malleable to at least some extent, and may vary depending on individual factors. Moreover, expectation ratings significantly differed when asked to respond according to what they believed the researchers might expect (i.e., demand characteristics). Our analyses demonstrate high reliability in responses across all measured conditions. Assessing expectations before, during, and after cognitive enhancement interventions will likely prove useful in future studies. Our questionnaire can serve as a reliable, easily-incorporated tool to assess the face validity of cognitive training and non-invasive brain stimulation, and to account for expectations in studies measuring the effectiveness of such interventions.

Sunday, 2:00 p.m.
FSS1006

When fast logic meets slow belief: Evidence for a parallel processing model of belief bias. Valerie Anne Thompson, *University of Saskatchewan*, Dries Trippas, *Max Planck Institute for Human Development*, Simon J. Handley, *Macquarie University* ■ Belief bias is a ubiquitous phenomenon whereby conclusions are judged on the basis of whether they are believable, regardless of the quality of the evidence or arguments that support them. A widely accepted explanation is that a fast, belief-based evaluation of the conclusion pre-empts a working-memory demanding logical analysis. Two experiments contrasted this view to an alternative in which belief-based and logic-based processing are initiated in parallel (e.g., Sloman, 2014). Participants solved deductive reasoning problems of varying degrees of difficulty and were asked either to decide whether the conclusion was valid or to decide whether the conclusion was believable. On half of the trials, believability and validity conflicted. Contrary to the received view, judgments of believability were sometimes slower than judgments of validity, depending on the complexity of the logical judgments. Similarly, the degree to which judgments of validity were impacted by judgments of believability and vice versa also depended on logical complexity. These data are not consistent with a model in which an analysis of believability and logic proceeds serially, and instead, they suggest a) that the analysis of logic and believability proceeds in parallel and b) that the degree to which the processes interfere with each other depends on their relative complexity (Handley & Trippas, 2015).

Regular Session 6(b)

Sunday, 1:15 p.m.
FSS1007

Unattended trials and sensitivity loss in vigilance tasks. Harinder Aujla, *University of Winnipeg*, Brendan T. Johns, *University of Buffalo*, Kevin D. Shabahang, *Queen's University*, Douglas J. K. Mewhort, ■ In vigilance tasks, measures of sensitivity, such as d', decrease as the number of trials increase. The traditional view is that the decrement reflects a loss of attention or a loss of perceptual sensitivity. Thomson, Besner and Smilek (2016, Psycho-

logical Review) recently have argued that the decrease is an artifact of the way sensitivity is measured. They propose that true sensitivity is constant, but that it is disguised by a floor effect in False Alarms. They conclude that the apparent (measured) decrease in sensitivity is the result of a conservative criterion shift. We show, via Monte-Carlo simulation of the vigilance situation, that the decrease in apparent sensitivity is consistent with increasing inattention across the vigil and argue that their evidence for a criterion shift is, itself, an artifact of their procedure.

Sunday, 1:30 p.m.
FSS1007

Are we getting the whole picture? Exploring differences in the processing of clipart versus photographs. Raheleh Saryazdi, *University of Toronto*, Craig Chambers, *University of Toronto* ■ Eyetracking methodologies involving "visual worlds" are increasingly used in studies of real-time language processing. These studies employ either photographic or clipart as stimuli, with convenience/availability typically serving as the only reason for choosing a particular image type. However, developmental work has shown that our understanding of abstracted images is learned and not innate. Further, adult studies have demonstrated effects of perceptual detail (colouring/texture) on aspects of visual cognition. These outcomes motivate the current study, which explores whether image type (clipart/photograph) affects the course and nature of on-line processing. We developed a new stimulus set (200) by digitally transforming photographs into clipart analogues. On each trial, listeners viewed an array of four objects and clicked on the image relating to the last word in a recorded sentence ("Jamie will move the banana"). Image type was manipulated across blocks. Results (N=30) showed reliable differences in eye-movement patterns before sentence onset, with comparatively more efficient visual processing with photographs (e.g., inspection of more scene areas, co-occurring with shorter fixation durations). After sentence onset, eye-movement measures (and mouse click latencies) reflected the influence of well-known psycholinguistic variables (lexical frequency, semantic activation). However, image type did not have any reliable effect on linguistic processing. This pattern clearly demonstrates that effects of image type are strongly associated with early visual processing. Apart from their theoretical relevance, these findings have methodological implications for pre-/post-sentence measures in "visual world" studies and experimenters' choice of the delay interval between the onset of visual and auditory stimuli.

Sunday, 1:45 p.m.
FSS1007

Isolating stage-specific attentional mechanisms of desirable difficulty. Melissa Jeanine Ptok, *McMaster University*, Sandra Jean Thomson, *St. Thomas University*, Sara Ahmed, *McMaster University*, Alexandra Scione, *McMaster University*, Karin R. Humphreys, *McMaster University*, Scott Watter, *McMaster University* ■ The "desirable difficulty" effect in memory is described by situations where increased difficulty during initial task performance produces better encoding, leading to an eventual memory benefit at later test. A number of studies have attempted to produce these effects, with mixed success. Generally, studies have conceptualized "difficulty" as a task-general property, with no strong prediction of what particular task elements should produce this desirable difficulty benefit. From stage processing models of single and dual-task performance, we propose that memory-enhancing difficulty manipulations should strongly depend on inducing additional cognitive control at particular processing stages. Across several experiments, we initially demonstrate priming and interference effects using congruency prime manipulations at different stages of information processing, showing typical reaction time priming effects on task performance. We show that inducing difficulty via semantic incongruency priming at a semantic categorization stage leads to improved later memory for these stimuli. In contrast, inducing difficulty via response incongruency priming at the response selection stage leads to relatively worse memory for these stimuli (a typical dual task interference effect). We discuss a single simple model of limited-capacity cognitive control allocation that accounts for and predicts where and when desirable difficulty effects will occur.

Sunday, 2:00 p.m.
FSS1007

The state of retrieval: Factors that influence the way we remember. Signy Sheldon, *McGill University* ■ When we remember a past event, the cues we used to remind us of that experience can influence the processes that we engage for remembering. This suggests that memories can be constructed differently depending on these cues. In this talk, I will discuss the way events constructed with broad conceptual details are different from events constructed from specific perceptual details. I will present both behavioural and neuroimaging data to support the hypothesis that these forms of retrieval are supported by different episodic memory mechanisms. First, I will

present behavioural evidence to show that cuing memories via conceptual event themes versus perceptual spatial cues resulted in different types of memories being recalled. Second, I will present neuroimaging work that indicates that conceptually versus perceptually-guided retrieval recruits functionally distinct regions and networks of the hippocampus, the brain structure critical for memory. Finally, I will show that these distinctions relate to trait differences in memory style. Together, the presented findings suggest that remembering is a malleable act that is influenced by a number of factors at retrieval.

Regular Session 6(c)

Sunday, 1:15 p.m.
FSS1030

Selective attention, conflict, and memory: When conflict does and does not enhance memory performance. Hanae Davis, *McMaster University*, Ellen MacLellan, *McMaster University*, Tamara M. Rosner, *McMaster University*, Maria C. D'Angelo, *Rotman Research Institute, Baycrest*, Bruce Milliken, *McMaster University* ■ Two recent studies reported a potential link between the experience of conflict in selective attention tasks and encoding processes involved in remembering (Krebs, Boehler, De Belder & Egner, 2015; Rosner, D'Angelo, MacLellan & Milliken, 2015). In both of these studies, recognition was superior for incongruent than for congruent selective attention items. However, memory performance has also been shown to be better for unusual than common items in a wide variety of memory studies (McDaniel & Bugg, 2008). Here, we were interested in whether the memory benefit for incongruent selective attention items shares empirical properties with the family of effects in the memory literature that report better memory for unusual than common items. If so, such results would suggest that selective attention demands might be thought of as requiring "unusual" encoding operations, which in turn enhances memory at test. The specific empirical aim was to examine the contribution of experimental context and the type of memory task on the memory benefit for incongruent over congruent selective attention items. The results are discussed in the context of models of cognitive control, but also the item-specific versus relational processing distinction common in the memory literature.

Sunday, 1:30 p.m.
FSS1030

The affective consequences of moving working-memory representations to an accessory state. David De Vito, *University of Guelph*, Gavin N. Petrie, *University of Guelph*, Mark J. Fenske, *University of Guelph* ■ Representations in visual working memory are maintained in an active state (i.e., target of thoughts/actions) or an accessory state (i.e., held for later use). Moving items into an accessory state is thought to require inhibition. If this is true, then items moved into an accessory state should show lingering aftereffects typical of cognitive inhibition. Growing evidence, for example, suggests that stimulus inhibition typically results in affective evaluations that are more negative than those of non-inhibited stimuli. We therefore combined working-memory and affective-evaluation tasks to examine whether conditions requiring working-memory representations to be moved into an accessory state subsequently result in increasingly negative affective evaluations of the memorized items. In each trial, participants first memorized two stimuli and, after a delay, searched for one of the items (active) in a visual array, while maintaining the other item (accessory) in memory for a subsequent search. Affective evaluations of the stimuli from the working-memory task revealed that prior accessory items received more negative ratings than prior active items. Findings are discussed within a theoretical framework in which cognitive operations that enhance or suppress stimulus representations have affective consequences for the associated items. These results converge with prior findings indicating that the affective consequences of attentional prioritization of stimuli represented in working memory are similar to those for stimuli present in the external environment.

Sunday, 1:45 p.m.
FSS1030

Using Stroop to investigate the spatial specificity of visual working memory representations. Geoffrey W. Harrison, *Queen's University*, Daryl E. Wilson, *Queen's University Attention Lab* ■ An emerging framework suggests that visual working memory (WM) relies on the recruitment of sensory regions to represent its content. However, it remains unclear whether the process of sensory recruitment engages activity for specific retinotopic locations or is more spatially global. Recently, Kiyonaga and Egner (2014) demonstrated that holding a colour word in memory while responding to the

colour of a perceptual target produced nearly identical patterns of interference compared to a perceptual Stroop task. They argued that their results support a spatially specific version of sensory recruitment - such that visual WM representations rely on the same representational resources as those used to process external visual input. To test the spatial specificity of WM, we compared a standard perceptual Stroop paradigm with a WM version in which the target and distractor could be presented in either the same, or different, locations. In Experiment 1, this location manipulation impacted Stroop interference for the perceptual version such that interference was eliminated in the different location condition; whereas for the WM version, Stroop interference was significant in both the same and different location conditions. In Experiment 2, in the WM version, memory for the colour word was not tested-just memory for its location. Nonetheless, the results from Experiment 2 replicated those of Experiment 1. These experiments support the conclusion that at least in terms of spatial information, perceptual and WM representations do not rely on the same neural machinery.

Sunday, 2:00 p.m.
FSS1030

Recognition memory research bias: Item effects. D. Stephen Lindsay, *University of Victoria*
■ There is a large literature reporting experiments in which undergrad subjects study a list of garden-variety words and are later tested on an equal mix of studied and nonstudied words for which they make old/new recognition judgments. On average, response bias in such studies is neutral. Studies in my lab have shown some categories of stimuli inspire undergraduate subjects to respond conservatively. For example, if the stimuli are scans of obscure masterwork paintings, the vast majority of undergraduates exhibit conservative response bias. That is, when subjects err it is more often that they fail to endorse a studied item than that they falsely endorse a non-studied one. Our most recent studies have examined response bias for individual items and found large and consistent item effects. Our findings suggest that subjects' modulate their criteria for endorsing an item as old based on their beliefs regarding its memorability.

Abstracts For Posters

Poster abstracts are listed by location number. The location number refers to the board where it can be found. Poster sessions are all in room FSS4007.

Poster session 1

(# 1)

An ERP investigation of the effect of Mindfulness Martial Arts on visual attention in adolescents with ADHD. Annabel Sibalis, *Ryerson University*, Melissa Edwards, *Ryerson University*, Trish McKeough, , Louis Schmidt, *McMaster University*, Sid Segalowitz, *Brock University*, Karen Milligan, *Ryerson University* ■ Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder, affecting 3-5% of youth worldwide. While stimulant medication is currently the most common treatment for ADHD, side effects and non-compliance rates, particularly during adolescence, have prompted the search for alternative treatments. Integra Mindfulness Martial Arts (MMA) is a 20-week mindfulness meditation-based group therapy for youth with ADHD and co-occurring learning disabilities (ADHD+LD), encompassing meditation, yoga, and cognitive behavioural therapy within an engaging martial arts program. The current study investigated the neural outcomes associated with MMA via electroencephalography (EEG) for 45 youth aged 11-17 with ADHD+LD. Pre- to post-treatment changes in event-related potentials (ERPs) known to index attention were examined for both a treatment group who attended MMA (N=23) and controls (N=22). From pre- to post-treatment, the treatment group showed a significant increase in amplitude for the N170 ERP component, known to reflect perceptual processing during Flanker computer tasks $F(1,43)=5.18$, $p=.028$. Such a change indicates that the treatment group showed marked improvement in ability to attend to and process relevant visual information, in comparison to the control group. While very little research on mindfulness has examined the N170 component, this increase in amplitude after mindfulness-based therapy is consistent with what has been seen for individuals with bipolar disorder. The implications of this finding for ADHD treatment options, as well as how future research can further investigate visual attention and processing in ADHD will be discussed.

(# 2)

Emotion recognition and psychopathic traits: Can perception of emotion be improved through brief training in individuals high in psychopathy? Angel Mackenzie, *Carleton University*, John Logan, *Carleton University* ■ Psychopathy is a disorder of personality, characterized by shallow affect, callous manipulation, and a lack of empathy. Psychopathy can also be measured as a continuous trait within the general population. Psychopathy is associated with reduced processing of emotional stimuli, including emotion in faces, imagery, and spoken language (Blair, Mitchell, & Blair, 2005). One theory of psychopathy proposes that individuals high in psychopathy suffer from a deficit in emotion-processing which restricts their affect; however, these individuals are able to convey the outward appearance of appropriate emotion as a result of learned response to social stimuli. Numerous studies have demonstrated improvements of speech perception (non-native phonemes) of second language learners through brief training sessions (Logan et al., 1991; Bradlow et al., 1996). The aim of the current study was to explore whether improvements in perception of affect in spoken language could be observed following a brief training session, and whether training improvements were associated with psychopathic traits. A sample of undergraduate students were split into high and low psychopathy groups based on their scores on the Self-Report Psychopathy scale (SRP-III). Participants were required to categorize the emotion of spoken words varying in emotional

affect during a pre-test, a training session with feedback, and a post-test, with comparisons between pre- and post-test categorization accuracy and high versus low psychopathy.

(# 3)

Attention styles and creative potential: An ERP exploration. Naba Ahsan, *Carleton University* ■ On relationships between creativity and attention, one side maintains that defocused attention aids creative processing (Eyesenck, 1995), while opposing literature suggests creative individuals should display focused attention (Necka, 1999). Zabelina et al. (2015) found that focused attention, as indexed by the P50 EEG/ERP component (which reflects early sensory gating), is associated with higher performance in open-ended, or divergent, creativity tasks. It has been suggested that different attentional styles enhance performance on different creativity tasks, but pairings remain unconfirmed. Creativity research distinguishes between two distinct forms of creativity - divergent thinking, being multiple responses to an open-ended problem, and convergent thinking, being a single, correct response to a close-ended problem. To date, no study has correlated divergent and convergent thinking task performance with an early sensory gating measure of attention. In this study, we replicate Zabelina et al. (2015) and introduce two additional experimental conditions in order to investigate associations between attentional styles and creativity tasks. We measure participants' attentional style using the P50 ERP component in a two-tone paradigm. We then administer the Abbreviated Torrance Test for Adults (ATTA) and the Compound Remotes Associates (CRA) task to measure participants' divergent and convergent thinking abilities. We also administer a counting task as a control condition. If attentional styles interact with creativity and non-creativity task performance, we expect to observe a difference in the correlations between P50 responses and ATTA performance and between P50 responses and CRA performance, thereby associating task performance with attention type.

(# 4)

Cross-modal anchoring and context effects on magnitude judgments. Doug W. Alards-Tomalin, *University of Manitoba*, Jason P. Leboe-McGowan, *University of Manitoba*, Todd A. Mondor, *University of Manitoba*, Launa C. Leboe-McGowan, *University of Manitoba* ■ Previously (Alards-Tomalin et al., 2015) we found that symbolic number magnitude (1, 9) interfered with sound intensity judgments. In the current study, we examined: 1. whether analogous interactions occur when judging the magnitude of non-symbolic numbers (numerosities), and sound intensity. And 2. How manipulations to the experimental context (e.g., task order and task probability) moderate these interactions. The results indicated that numerosity biased sound intensity judgments when numerical quantitative differences were salient; and sound intensity biased numerosity judgments when the number discrimination task was more difficult. The results are supportive of a cross-modal anchoring interpretation.

(# 5)

Chronset: an automated tool for detecting speech onset. Blair Armstrong, *BCBL & University of Toronto*, Fédéric Roux, *BCBL & University of Birmingham*, Manuel Carreiras, ■ The analysis of speech onset time has a long-standing tradition in experimental psychology and permits to quantify the effects of a stimulus on the timing of a spoken response. Yet, the lack of accurate automatic methods forces many researchers to rely on time-intensive manual or semi-automatic techniques to measure such effects. Here we present Chronset, a fully automated tool that estimates speech onset on the basis of multiple acoustic features, which we make publicly available online at http://www.bcbl.eu/databases/chronset. Using regression analyses and machine learning optimization techniques, we show that the present approach is robust against differences in two languages and speaker populations, and extracts speech onset latencies that are near identical with human observations ($r2 = 0.97$). The present findings demonstrate a novel approach for the automatic extraction of speech onset time that provides a substantial improvement over previously reported techniques.

(# 6)

Can you see the crime unfold in your mind? The effect of grammatical aspect on attribution of criminal intent. Philip Micheal Aucoin, *Queen's University*, Angela Rae Birt, *Mount Saint Vincent University* ■ The way individuals interpret language is greatly affected by what is referred to as grammatical aspect. Recently, a study by Hart and Albarracín (2011) reported that behaviour described using an imperfective aspect (e.g., what someone was doing) was more likely to be judged as intentional and imagined in greater detail compared to when a perfective aspect was used (e.g., what someone did). Because these findings have clear implications for legal decision-making, we attempted a large-scale direct replication through the Registered Replication Report (RRR) initiative. In our lab's replication, participants read a

vignette describing a crime with either perfective of imperfective aspect. Following this, all participants answered questions regarding how they interpreted the events described in the vignette. We found that grammatical aspect did not have an effect on participants' ratings of an individual's criminal intentionality, nor did it affect the detail in which they were able to imagine an individual's actions. Furthermore, because this experiment was conducted as part of a larger-scale replication effort, our results were compared to those reported by an additional 12 labs that also performed a direct replication. A meta-analysis of all the data indicated no effect of grammatical aspect on intentionality (d between 0 and -0.24) or imagery (d = -0.08). Finally, we discuss potential rationalizations for the inconsistencies between our results and those reported originally by Hart and Albarracín (2011).

(# 7)

Simulated multitasking performance not affected by fatigue and sleep deprivation: An eye-tracking study. Kurt Bangs, *Laurentian University*, Sebastian Caballero, *Laurentian University*, Glenn Legault, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ These studies examined the effects of sleep deprivation on performance of a computerized multitasking simulator. Participants (mean age = 20.53) responded to a computerized multitasking test using eye tracking technology. In the first experiment, participants (n=31) were randomly assigned to one of 3 experimental conditions. Group 1 was trained on the multitasking simulator in the morning and was tested 12 hours later. Group 2 was trained at night and returned for testing 12 hours later after a normal night of sleep. Group 3 was trained at night and underwent supervised sleep deprivation in the laboratory. The second experiment had participants (n=31) trained as those in Group 3; however, 15 subjects were tested using a version of the multitasking simulator that was modified to draw the participants attention to subtasks which, if not attended to, would result in decreased performance scores. Results showed that sleep deprivation had little impact on performance for the multitasking simulator. Data analysis for eye tracking in experiment 1 revealed a main effect of trial sessions and greater variance in the sleep deprived condition. Experimental conditions trained at night showed greater performance scores on the multitasking simulator irrespective of sleep-deprivation. Groups trained at night performed better early on, whereas the condition trained in the morning took longer to establish the appropriate strategies. Experiment 2 revealed no differences in performance between the versions of the task. These studies suggest that the multitasking simulator used was not sensitive to the effects of sleep deprivation.

(# 8)

Does the plausibility of the sentences influence recall in reading span? Laura Beaudin, *McMaster University* ■ Previous ERP research has shown that the semantic relationship between a verb and its arguments can be so strong that readers perceive semantically anomalous sentences to be syntactically ill-formed (Kim & Osterhout, 2004.) In the current study, we used a novel variant of the reading span task to determine if this effect can also be found in a behavioural task and to examine if semantic plausibility affects verbal working memory (WM) capacity. The reading span paradigm requires that participants read a set of sentences and memorize a word for each. At the end of the set they have to recall all the words. This task has been used to test for the interaction between the WM system and language processing. Earlier reading span studies have shown that WM capacity is affected by syntactic manipulations but the potential effect of semantics on WM has been minimally studied. In our study, participants read anomalous (The meal was devouring the children) and control (The meal was devoured by the children) sentences and memorized words presented inside or after the sentences. The results showed poorer recall for words presented with sentences with an anomalous agent-verb relationship. We also found effects of memory word placement such that participants had higher recall when the memory word was placed outside the sentence compared to within the sentence. We interpret our results as showing that syntactic repair interferes with memory processes.

(# 9)

Use of primitive defense mechanisms predicts unawareness of deficits in patients with chronic moderate to severe traumatic brain injury (TBI). Zorry Belchev, *University of Toronto*, Neta Levy, *University of Haifa*, Itamar Berman, *University of Haifa*, Hila Levinzon, *University of Haifa*, Dan Hoofien, *Hebrew University of Jerusalem*, Asaf Gilboa, *Rotman Research Institute at Baycrest, University of Toronto* ■ Unawareness of deficits following traumatic brain injury (TBI) is typically considered to have a neurological basis, reflecting dysfunctional metacognitive, multimodal neurocognitive processes. It is often suggested that impaired awareness could additionally be due to psychological coping mechanisms. Differentiating the contributions of neurological and psychological causes of un-

awareness is challenging because the presumed consequence of both is the same: decreased awareness of the repercussions of injury. We examined how different factors predict unawareness, including 1) psychological defense mechanisms (Denial, Projection, Identification), 2) neurological damage (injury severity), and 3) personality (Narcissism). Unawareness was measured using the Patient Competency Rating Scale (PCRS), comparing patient with clinician reports on different functional domains. Importantly, we used injury-independent measures of the general proclivity to use specific defense mechanisms across contexts using the Thematic Apperception Test. The main findings revealed that primitive defense mechanisms (e.g., Denial) predicted unawareness in abilities related to self-identity and personality (interpersonal and emotional domains), with no additional contribution of injury severity. Unawareness for these abilities may primarily be affected by defensive style, whereas reduced awareness in abilities more independent of identity (ADL) may reflect a combination of injury-related and psychological factors. Unawareness of deficits can significantly hinder rehabilitation of brain injuries, and improper introduction of this knowledge to patients may result in resistance and slower recovery rates. Using TAT-based evaluations may help inform clinicians and therapists of patients' coping tendencies, unbiased and independent of neurological damage, and help provide more effective rehabilitative initiatives by incorporating appropriate behavioural support and therapy.

(# 10)

Sparse coding provides an efficient representation of the sensory environment. Nareg Berberian, *University of Ottawa*, Zoya Aamir, *University of Ottawa*, Sébastien Hélie, *Purdue University*, Sylvain Chartier, *University of Ottawa* ■ Bidirectional Associative Memories (BAMs) are artificial neural networks that can learn and recall various types of associations. Although BAM models have shown great promise at modeling human cognitive processes, these models have often been investigated under conditions where stimuli are densely represented using a bipolar coding scheme. However, research has shown that dense representations are energetically costly given that various stimulus representations need to be detected, processed and analyzed on a daily basis. Instead, biological networks work on minimizing energy expenditure by encoding sparse features that maximize information representation. This work extends this line of search by assessing the representational capacity of the network's coding scheme under both sparse and dense features. It suggests that BAM models can improve learning capacity and recall performance in a sparse encoding paradigm, especially under noisy representations of sparse features. The results show that the content of the information represented should be chosen with care. A network that encodes sparse features will strongly activate a relatively small subset of units. As a result, this coding scheme will alleviate noisy representations of sparse features by reducing the risk of unwanted interference of simultaneously presented stimuli. In turn, the network will extract incoming representations from the environment more efficiently and improve the network's memory capacity for recall. Overall, this work provides a strategy for artificial neural networks that seek to maintain valuable processing resources, especially under constraints of noisy representations of stimulus features.

(# 11)

L'impact du contexte sémantique sur l'identification du genre grammatical des mots. Jasmine Boulet Beaudin, *Université d'Ottawa*, Alain Desrochers, *University of Ottawa*, Charles A. Collin, *University of Ottawa* ■ Les présentes études visent à examiner les facteurs sémantiques qui influencent la justesse et la latence des réponses dans une tâche d'identification du genre grammatical de noms inanimés et animés. Le participant voit défiler à un écran une séquence de mots accompagnés par une image (homme, femme ou dessin abstrait) un par un et doit identifier le genre des mots. Dans la première étude, la tâche consiste à indiquer si chaque mot doit être précédé des articles indéfinis UN ou UNE. Dans la seconde étude, une seconde session est ajoutée où le participant doit choisir entre les étiquettes MASCULIN ou FÉMININ. Les résultats indiquent que : a) les noms masculins amÃ¨nent des réponses plus justes; b) il y a un effet d'interaction entre le genre du mot et le type d'étiquette pour la justesse des réponses, les mots masculins étant plus justes avec les étiquettes "un-une" et les mots féminins étant plus justes avec les étiquettes "masculin-féminin"; c) les étiquettes "un-une" favorisent des réponses plus rapides; d) il y a une interaction entre la classe sémantique du nom et le contexte sémantique mot-image, les noms animés ayant des réponses plus rapides lorsqu'il y a congruence mot-image et plus lentes lorsqu'il y a incongruence mot-image. Ces résultats donnent à penser qu'il existe encore beaucoup d'informations peu connues sur les phénomènes afférents à l'identification visuelle des mots en cours de lecture et que d'autres recherches sont nécessaires pour éclaircir l'influence de facteurs sémantiques.

(# 12)

Children's sensitivity to suffixation. Derrick Bourassa, *University of Winnipeg*, Rebekah Bowe, ■ An important aspect of spelling development in English is knowledge of derivational suffixes (e.g., al, as in regional). The present study examined sensitivity to derivational suffixation among third graders. Analyses revealed that performance varied as a function of linguistic complexity. These findings underscore the heterogeneity of spelling development, and point to the need for further analyses of children's sensitivity to the various complexities that exist in the English language.

(# 13)

Underestimation in function learning: Anchoring or X-Y similarity. Mark Brown, *Carleton University*, Guy Lacroix, *Carleton Univerity* ■ Function learning tasks examine how people learn the relationship between a continuous predictor variable (X) and a continuous criterion variable (Y); the X-Y relationship being defined by some mathematical function (e.g., linear, quadratic, etc.). Participants are trained on a subset of X-Y pairs then tested on new X values that are within the training range (interpolation), as well as above and below the training range (upper and lower extrapolation, respectively). An intriguing pattern found in previous studies is that people tend to under-estimate Y in the lower extrapolation region for positive linear functions. Kwantes and Neal (2006) propose that underestimation occurs because people anchor their responses at the point X=0, Y=0. When the true function has a positive y-intercept, anchoring at zero will pull responses down, resulting in underestimation. However, an alternative explanation is that people's estimates of Y are affected by the similarity of X and Y. In other words, there may be a bias toward the identity function (X = Y). We conducted an experiment to test these competing explanations by manipulating the sign of y-intercept. If people anchor at the point X=0-Y=0, linear functions with a positive y-intercept will be underestimated and functions with a negative y-intercept will be overestimated. In contrast, the identity function explanation predicts underestimation in all conditions. Results suggest that underestimation is better explained by anchoring at the point X=0-Y=0 rather than an identity function bias. Implications for computational models of function learning are discussed.

(# 14)

Using tools in virtual reality. Melanie A. B. Buset, *Carleton University* ■ Using Tools in Virtual Reality, Melanie Buset, Human Computer Interaction, Carleton University, This work examined the joint effects of tool type (pointer vs. cutter) and line distance (extrapersonal: space beyond arm's reach vs. peripersonal: space within reaching distance) on a Virtual Reality (VR) line bisection task. Gamberini et al. (2013) reported that tool type interacted with distance. Specifically, line bisection performance was unaffected by distance when a virtual cutter was used. However, line bisection performance was worse when the line appeared in extrapersonal space than when it appeared in peripersonal space when a virtual pointer was used. One explanation for this finding is that a cutter mentally extends the participant's reach, thereby bringing distant objects into peripersonal space. In the current experiment, a horizontal line was displayed on an upright whiteboard in a VR environment, which was rendered on an Oculus Rift DK2. The whiteboard appeared in either peripersonal or extrapersonal space. Participants used a hand-held controller to manipulate the position of a virtual laser beam and pressed a button when the beam bisected the line. In the cutting condition, the line split at the bisection point and the two pieces fell. Nothing happened to the line following a bisection response in the pointer condition. We did not replicate Gamberini et al.'s Tool x Distance interaction. Possible explanations for this failed replication will be discussed in the context of how the visual rendering of virtual tools can impact the perception of extrapersonal and peripersonal space.

(# 15)

Quantifying corticotectal projections to the superior colliculus that underlie orienting behaviours in the cat. Blake Edward Butler, *University of Western Ontario*, Nicole Chabot, *University of Western Ontario*, Stephen Lomber, *University of Western Ontario* ■ The superior colliculus (SC) is a midbrain structure central to orienting. Patterns of projections from sensory cortices to the SC have received much attention. However, published work is limited to qualitative appraisals; while some have attempted to quantify corticotectal projections, results are largely limited to studies within a single modality, and are spread across a number of species. Thus, the capacity to draw meaningful conclusions for any given species is limited. With this in mind, we examined projections to the SC from visual, auditory, somatosensory, motor, and limbic cortices in the cat via retrograde pathway tracers. As anticipated, the majority of cortical inputs to the SC originate in visual cortex, with each field implicated in visual orienting behavior making a substantial projection. Within the auditory modality, only the auditory field of the anterior

ectosylvian sulcus (fAES) makes a significant projection, while no area involved in somatosensory orienting shows significant inputs. The projection from fAES is of particular interest, as it represents the only bilateral cortical input to the SC. This detailed, quantitative study allows for comparisons across modalities in the cat. This is important, as the cat has long served as an essential animal model for the anatomy and function of both the auditory and visual systems. Differences in the patterns of projections to the SC across modalities inform how orienting behaviours are influenced by feedback from these sensory cortices.

(# 16)

Testosterone rapidly increases aggressive behavior in dominant and impulsive men. Justin M. Carré, *Nipissing University*, Amber L. Videto, *Nipissing University*, Triana L. Ortiz, ■ Although traditional wisdom suggests that baseline levels of testosterone (T) promote aggressive behavior, decades of research have produced findings that have been largely weak and inconsistent. However, more recent correlational research indicates that acute changes in T concentrations within the context of competition positively map onto variability in human aggression. The present experiment extends this work by examining whether acutely increasing T concentrations through pharmacological challenge potentiates aggressive behavior in men. Also, we examine whether T's effects on aggressive behavior depend on variability in two important individual difference factors - trait dominance and trait self-control. In a double blind, placebo-controlled, between-subject design, healthy adult men (n = 121) were administered either T or placebo, and subsequently engaged in a well-validated decision making game that measures aggressive behavior in response to social provocation. Results indicated that T caused a sharp increase in aggressive behaviour, but only among men scoring relatively high in trait dominance and/or low in trait self-control. These findings are the first to demonstrate that T can rapidly (within 60 minutes) potentiate aggressive behavior, and highlight the important role of personality traits in moderating effects of T on human aggression.

(# 17)

The compounding costs of cognitive demand and hearing loss. Stefania Cerisano, *McMaster University*, Shannon O'Malley, *McMaster University*, Jeff Crukley, *Starkey Canada*, Karin R. Humphreys, *McMaster University*, Scott Watter, *McMaster University* ■ Sensory hearing loss and decline in fluid processing capacity are both common with normal aging. The need for increased deliberate attention and concentration for understanding speech most likely competes for a share of a decreasing pool of available cognitive resources, and may suggest other cognitive and psycholinguistic methods could augment typical stimulus-enhancing hearing aid approaches. Our initial work explores these ideas using healthy young participants with simulated hearing loss and imposed additional cognitive loads. Participants performed an auditory word recognition task with varying difficulty (added pink noise, four-talker babble, and simulated hearing loss, at varying intensities), along with a secondary variable-difficulty manual tracking task to manipulate resource/capacity limits. We discuss tradeoffs and interactions of particular kinds of noise versus simulated sensory loss under increasingly limited attentional capacity, where we can simultaneously assess real-time tracking error and variability as an index of attentional work in listening, along with rates and types of errors in spoken word recognition performance. We compare these data with measures of working memory capacity and subjective ratings of listening difficulty. Future directions, including work with older participants and possible cognitive approaches to this problem will be discussed.

(# 18)

Exploring the attentional disengagement model; how gender schemas impact the missing letter effect. Justin A. Chamberland, *Laurentian University*, Annie Roy-Charland, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Two studies were conducted to further examine the attentional disengagement (AD) model of the missing letter effect. Recently this model was tested using another reading phenomena. Gender schema research has suggested the amount of attention engaged on the text is increased if the information is against their stereotypical mental schema (ex. female mechanic), compared to when the text coincides with their stereotype (ex. male mechanic). When schemas were manipulated within a letter detection task, individuals were more likely to omit a target letter in schema congruent sentences than those that were schema incongruent. Further, there were more omissions for male target words than female target words. The current study sought to explore this further in two studies. The first study was conducted to determine if the gender effect observed in the previous study was the result of frequency or gender schemas. To do this, a gender nonspecific word ('their') was used in place of the previous gender specific words ('his' and 'her'). Results suggest that the findings in the previous study may have been

due to frequency, and not gender effects. In the second study, the effects of this schema phenomenon were explored on the word immediately after the gender specifying word. Results suggest that schemas likely did not impact letter detections in the subsequent word. These two studies will be discussed further in relation to the prior study and the AD model.

(# 19)

Can the processing of facial expressions in a binocular suppression task tell us anything about theories of emotion and aging? Carl Cipriano, *Nipissing University*, Nicole Robitaille, *Nipissing University*, Graham Albert, *Nipissing University*, Marlena Pearson, *Ryerson University*, Mitch Timson, *Nipissing University*, Mark Wachowiak, *Nipissing University*, Dana Murphy, *Nipissing University* ■ Do we perceive certain positive emotional facial expressions more efficiently as we age? The Socioemotional Selectivity Theory of Aging suggests that older adults demonstrate a positivity bias when confronted with emotional stimuli (such as emotional faces). Threat Advantage Theory, on the other hand, proposes that people, regardless of age, perceive negative emotional facial expressions more easily because they indicate potential threats. In this research, we used a binocular suppression paradigm (i.e., when a highly visible image presented in one eye keeps the gradually appearing image in the other eye out of perceptual awareness until that image is sufficiently visible) to determine if facial expressions will reveal the accuracy of these different theories. Younger adults (18 to 29) and older adults (age 60+) completed a binocular suppression task in which a highly visible masking stimulus was presented in one eye while two images (one a face, the other a scrambled face) gradually appeared in the other eye. Three quarters of the faces had emotional facial expressions (happy, sad, or angry) while other faces were neutral. We used the time required to identify the location of the face as our measure of the time required to break from binocular suppression. We predicted that participants' reaction time would differ according to the facial expression presented on each trial. While some faces did appear to break from binocular suppression significantly faster than other faces, the emotional expression portrayed had little influence on participants' reaction times.

(# 20)

Episodic prospective memory, depression, and anxiety. Kelsey Cnudde, *Mount Royal University*, Bob Uttl, *Mount Royal University*, Laura Grant, *Mount Royal University* ■ Several theories of prospective memory predict that depression and anxiety reduce prospective memory performance. However, studies investigating the relationships between depression and prospective memory, and between anxiety and prospective memory arrived to inconsistent conclusions. Accordingly, we examined the relationship between depression, anxiety, and episodic prospective memory in two large sample studies. Episodic prospective memory was measured by reliable continuous measures, depression by Beck Depression Inventory, and anxiety by Beck Anxiety Inventory. The results showed that depression and anxiety had only minimal, nonsignificant relationships with episodic prospective memory.

(# 21)

Event-files can passively prime visual search, unless you mess with them. Brett Cochrane, *McMaster University*, Bruce Milliken, *McMaster University* ■ Maljkovic and Nakayama (1994) found that pop-out search performance is more efficient when a target colour repeats rather than switches from one trial to the next, an effect named Priming of Pop-out (PoP). In Cochrane et al. (under revision), we found that visual imagery can reverse the PoP effect such that participants respond faster for a colour in visual imagery relative to a colour repeated across trial. Further, we found that on trials when participants reported 'strong visual imagery' there was no evidence that PoP had any impact, thus refuting claims that PoP effect is due to passive and automatic feature activation. In a recent series of experiments we have investigated the additive nature of visual imagery and the PoP effect. We found that the PoP effect and visual imagery can additively benefit performance as long as visual imagery does not influence the event-file binding driving the PoP effect.

(# 22)

Key-note variability in singing of university élite athletes. Annabel Joan Cohen, *University of Prince Edward Island*, Eric A. Da Silva, *University of Prince Edward Island*, Kyle Dutton, *University of Prince Edward Island*, Bing-Yi Pan, *Concordia University* ■ Forty university élite student athletes (24 females) sang the song Brother John (FrÃ¨re Jacques) after 3 contexts: presentation of the melody in the key of C; learning a new song in the key of Eb, and telling an original story. The data were collected via the AIRS Test Battery of Singing Skills (Cohen, 2015) on-line version (Pan & Cohen, 2012). The pitch of the 10 tonic (key) notes in the 32-note song was measured using Praat (by experimenters ED & KD). Variability of

the 10 tonics in each song was taken as a measure of vocal control and musical understanding. The mean SD of 7.35 Hz (SE 0.96; 5.41 - 9.30, 95% confidence interval) for athletes exceeded that of non-musicians (5.05) and musicians (2.71) obtained previously in our laboratory. The athletes' music training history was rated by 3 musically-trained judges. Athletes also completed a short test of music theory, sightreading, and song recognition, scored out of 10, mean 2.78 (SD 2.15) (average for musicians was 9.55 and non-musicians 0.25). The SD of the pitch of tonics for athletes was inversely correlated with music test scores and to a lesser extent with the mean rating of musical experience. As a group, the élite athletes had more music training than our untrained musicians, yet they performed more like the non-musicians than musicians suggesting the importance of musical immersion as opposed to general motor training for singing skill.

(# 23)

The search for a long-term negative repetition effect. Robert Collins, *McMaster University*, Nina Dabic, *McMaster University*, Patrick Scopa, *McMaster University*, Bruce Milliken, *McMaster University* ■ Rosner, López-Benítez, and Milliken (2014, BBCS) reported an ironic effect in recognition memory. Using a study phase involving a trial-to-trial priming method, they reported better recognition for items presented once (not-repeated targets) than items presented twice (repeated targets) in the priming task; a Negative Repetition effect. Collins, Rosner, and Milliken (2016, under revision) examined this effect further using various encoding tasks, and determined it depends on memory for the prime being poor. When prime memory was poor, a Negative Repetition effect was observed, whereas good prime memory produced an intuitive Positive Repetition effect. Here, we examined this effect further to determine whether it occurs when items are repeated across separate blocks of trials, rather than trial-to-trial as in our prior work. Participants completed an incidental study phase consisting of two study lists. All of the items in the first study list appeared in the second study list, along with an equal number of new items. In Experiment 1, the task participants completed for the first list varied across conditions: (1) Divided Attention; (2) Rapid Serial Visual Presentation (3) Reading With Focused Attention. Across these conditions, memory sensitivity for repeated targets was always as good as or better than memory for not-repeated targets. In Experiment 2, we used a hybrid trial-to-trial and blocked within-subject contrast to better compare processing of the prime across temporal intervals. Together, the experiments reveal a complex interaction between repetition, temporal spacing, and recognition memory.

(# 24)

The effect of alcohol on executive function and theory of mind. Samantha Cote, *Bishop's University*, Andrea Drumheller, *Bishop's University*, Adrianna Mendrek, *Bishop's University* ■ Alcohol has widespread effect on cognitive processing and the brain. This include deficits in executive function associated with the prefrontal cortex (PFC). The ability to recognize and infer mental states in others, known as theory of mind (TOM), is also associated with the PFC, but almost nothing is known about alcohol's effects on TOM in social drinkers. The only existing study linking TOM to acute effects of alcohol did not include a proper control of experimental environment or measures of intoxication. Thus, the purpose of the present study was to investigate how alcohol affects TOM and executive function to address the limitations of previous studies and further our understanding of social behaviour in intoxicated individuals. Participants came into the laboratory two times and received either one alcoholic drink or placebo in the counterbalanced order. Then participants completed two tasks known to assess TOM and empathy (the Faux Pas task & Reading the Mind in the Eyes - RME), as well as two tests of executive function (the Stroop task and the Digit span task). It was hypothesised that alcohol would decrease ability to recognize Faux Pas and mental states in the RME task, and increase the reaction times in the Stroop and Digit Span tasks. Findings suggest that alcohol is not inducing deficits in TOM, and may in fact be facilitating it.

(# 25)

Sex differences in the effects of nicotine on mood and cognitive processing. Janie Damien, *Bishop's University*, Nicholas van den Berg, *Bishop's University*, Ahisha Jones-Lavallée, *Bishop's University*, Samantha Cote, *Bishop's University*, Ryan Lundell-Creagh, *Bishop's University*, Jacob D. Gerlofs, *Bishop's University*, Adrianna Mendrek, *Bishop's University* ■ The existing evidence suggests that nicotine improves cognitive function, especially attention and working memory, in abstinent smokers. However, the effects of nicotine on cognition and mood in non-smokers are less clear. Furthermore, gender differences in nicotine's effects have not been adequately addressed. Thus, in the present study we investigated the effects of nicotine on mood and cognitive processing in non-smoking men and women. Participants (25 women and 16 men) aged 18 to 39

(M = 22.71 SD =4.68) were tested on two separate occasions. During each session they received either a 4mg nicotine gum or a placebo gum in a counterbalanced order. The cognitive function was assessed with the N-Back Task (working memory), Paper Folding Task (visuo-spatial processing), Bower Word Pairing Task (associative learning), and Reading the Mind in the Eyes Task (emotion recognition). The analysis revealed that nicotine eliminated women's advantage on the associative learning task under placebo condition. Specifically, men's performance ameliorated while women's performance deteriorated in the nicotine condition relative to placebo. Nicotine administration was also associated with decreased level of friendliness at the end of the testing session in both sexes. Nicotine did not have any effect on working memory, visual processing or emotion recognition. Further studies with multiple nicotine doses and hormonal measures should clarify these results.

(# 26)

False alarm rates in facial recognition: The effects of modeling old adult vision in young adults. Karolina Daniel, *University of Ottawa*, Isabelle Boutet, *University of Ottawa*, Charles A. Collin, *University of Ottawa* ■ When performing facial recognition tasks, healthy older adults have a tendency to think they have seen faces that they have not seen before. This higher rate of false alarms has not been observed in younger and middle aged adults. One proposed explanation for this is perceptual deterioration; in particular, older adults have reduced contrast sensitivity for middle and higher range spatial frequencies. Our aim was to model this aspect of older adult vision in young adults to see if they exhibit a similar increase in false alarm rates. Using the average contrast sensitivity function for 80 year-old individuals at threshold, upright and inverted images of faces and chairs were filtered to approximate the perceptual deterioration experienced by older adults. Undergraduate students were tested on their ability to recognize filtered and unfiltered images using an old/new recognition task. Chairs and inverted faces acted as controls. Results showed significantly higher rates of false alarms for filtered images overall, but the effect was not face specific. Analysis of criterion location indicated that this was not due to a change in response bias. These results suggest that lower contrast sensitivity in older adult vision affects recognition of both faces and other complex objects and is not responsible for their higher false alarm rates with faces. Follow-up studies will examine other hypotheses that might explain this phenomenon.

(# 27)

Can we be trained to differentiate between enjoyment and masking smiles with Micro-expressions training tools? A comparison of METT-2 and 3.. Tamara Davidson, *Laurentian University*, Mélanie Perron, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ Smiles can reflect enjoyment but can also be produced to mask negative emotions. Masking strategies are not always perfect and traces of the negative emotion can leak. Adults perform close to chance level when asked to judge the authenticity of the expressions. This study examined if individuals can improve in the judgment of the authenticity of masking smiles when exposed to emotional facial training. Participants underwent training using either the Micro-expression Training Tool (METT-2.0), the revised version METT-3.0, or were in a control group. Before and after training, participants judged the authenticity of smiles and identified the concealed emotion if they felt the smile was non-authentic. Results revealed no difference between groups on the judgement task. Participants judged the enjoyment smile as the happiest, fear smiles as the least happy and the smile with anger brow smile as less happy than the enjoyment smile but happier than the other masking smiles. When identifying the masked emotion, a three-way interaction between groups, smile types and testing sessions. The control group did not show improvement in the identification of any of the emotions. Participants trained on the METT-2 showed an improvement for the identification of fear and a marginal improvement for disgust. Participants trained with the METT- 3 showed a marginal improvement in the identification of anger in the brow and in the mouth. While the METT trainings do not help improve on the judgement of smiles, they do make modest contribution in the identification of the negative emotions masked.

(# 28)

Semantic deficits for verbs in Alzheimer's disease: Evidence from action naming and sentence production. Roberto G. de Almeida, *Concordia University*, Caitlyn Antal, *Concordia University*, Nancy Anton, *Concordia University*, N. P. Vasavan Nair, *McGill University* ■ Several studies have found category-specific semantic deficits in Alzheimer's disease (AD). However, the range of categories that might be affected selectively is still an open question-with most cases showing a classical superordinate living/nonliving dissociation. In the present study we investigated how concepts labeled by different syntactic and semantic classes of verbs might be affected in AD. Verbs belonging to the class of lexical causatives

(peel), which is hypothesized to be semantically complex (multiple internal predicates: x CAUSE y BECOME) and structurally complex (two arguments) was contrasted with verbs of perception (hear), which are structurally complex (two arguments) but semantically simplex (one predicate: x PERCEIVE y), and with verbs of motion (walk) which are semantically and structurally simplex (x MOVE; one argument). These verbs also differ with regards to thematic roles assigned to arguments, with perception verbs being the least canonical because they lack an Agent role (de Almeida & Manouilidou, 2015). Probable AD patients (N=4) and healthy controls (N=11) named events and states depicted in short video clips. In addition, they generated sentences related to the depicted events and states. For both tasks, preliminary results indicate a category-specific deficit: probable AD individuals show greater impairment for perception verbs both in naming and sentence production. These results were also obtained with a task involving static scenes (Fiez & Tranel, 1997). We suggest that verbs are affected selectively in AD due to thematic assignment, not semantic-template complexity.

(# 29)

Thematic roles in psychological verbs: Eye-tracking evidence for thematic hierarchy. Roberto G. de Almeida, *Concordia University*, Marta Cerejo Fernandes, *Universidade de Lisboa and Concordia University*, Armanda Costa, *Universidade de Lisboa* ■ Verbs that assign the Agent role to the noun phrase in the subject position (e.g., The boy photographed the thunder) are taken to be canonical by the parser. Psychological verbs (e.g., fear/frighten, like/please), however, allow for two basic thematic structures, none of which assigns the Agent role to the subject position. In the subject-experiencer form (The boy feared the thunder), subjects are Experiencers, thus yielding an atypical thematic structure such as Experiencer-Theme. In the object-experiencer form (The thunder frightened the boy) argument realization is non-canonical (Theme-Experiencer) with subject position occupied by the Theme, which is the least prominent in most thematic hierarchy proposals (e.g., Grimshaw, 1990; see Manouilidou & de Almeida, 2009, for review). In a study with Alzheimer's patients and healthy controls, Manouilidou, de Almeida, Nair and Schwartz (2009) found that patients have greater difficulty with psych-verb constructions than with typical (Agent-Theme) constructions. Moreover, they found that sentences with non-canonical argument realization (frighten: Theme-Experiencer) are more difficult than atypical ones (fear: Experiencer-Theme). The present study investigated the same phenomenon with a group 80 healthy young English speaking subjects, employing an eye-tracking paradigm. Preliminary data suggest a similar effect as that obtained with AD patients: canonical Agent-Theme sentences were read faster than Experiencer-Theme and Theme-Experiencer sentences, supporting the hypothesis that parsing is sensitive to thematic hierarchy.

(# 30)

Effects of stimulus and response characteristics on speeded dender decision. Audrey-Ann Deneault, *University of Ottawa*, Alain Desrochers, *University of Ottawa* ■ The present research investigated list-composition and word-frequency effects in the speeded assignment of inanimate French nouns to grammatical gender classes. ExperimentÂ 1 examined the processing difficulty of three distinct pairs of category labels for the selection of gender classes. ExperimentÂ 2 assessed list-composition effects associated with the processing difficulty of the stimulus words. Nouns of intermediate frequency of use were mixed with nouns of either low, intermediate or high frequency in the blocks of trials. ExperimentÂ 3 investigated list-composition effects associated with the processing difficulty of the response terms. An easy type of category labels (e.g., Un/Une) was mixed with either a hard type (i.e., Masculin/Féminin) or another easy type (e.g., Le/La) in the blocks of trials. The main results indicate that a) the mean latency of responses to the superordinate labels was about 200 ms longer than that to articles Un/Une or Le/La, which involved a similar level of difficulty; b) gender-class labels and word frequency contributed independently to response latency in gender decisions; c) response latency was influenced by the presence in the same list of other nouns that are more or less difficult to process; and d) response latency was also influenced by the presence in the same list of other response labels that were more difficult to process. The implications of these findings for visual word recognition and gender decision are discussed.

(# 31)

Object similarity impacts same/different judgements using visuo-haptic stimuli. Geneviève Desmarais, *Mount Allison University*, Melanie Louise Nadeau, *Mount Allison University* ■ Past studies have shown that when participants identify objects visually or haptically, object similarity influences object identification errors: similar objects are confused more often than dissimilar objects. Surprisingly, when participants were presented simultaneously with two different objects and asked to identify either the seen object or the grasped object, target-distracter

similarity failed to influence object identification performance. In order to evaluate whether object similarity could influence performance in a visuo-haptic task, healthy participants simultaneously saw an object and grasped another. On half of the trials, the two objects were identical, while on the other half they were different. Participants' task was to indicate whether the two objects were the same or different. An analysis of reaction times and error rates revealed that participants made 'different' decisions faster than 'same' decisions, though accuracy did not differ between the two conditions. Importantly, both reaction times and error rates to 'different' trials were affected by the similarity between the two objects: participants were faster and more accurate when the two objects were dissimilar than when the two objects were similar. Our results confirm that object similarity can impact object processing in a visuo-haptic bimodal task, and supports the notion that visual and haptic object processing rely on overlapping object representations.

(# 32)

Product placement within the Netflix series House of Cards. Joël Dickinson, *Laurentian University*, Margaret Osborne, *Laurentian University*, Brady Reive, *Laurentian University*, Christian LaForge, *Laurentian University*, Ann Pegoraro, *Laurentian University* ■ Product placement refers to the inclusion of commercial products within non-commercial settings. Research has typically focused on attempting to determine what characteristics make a product placement more effective and is often measured by explicit memory of the brands presented. Previous studies have had issues with comparisons and generalizability due to the lack of an objective and consistent use of an operational definition for factors such as prominence. This study aimed to validate a coding system developed by Concave Brand Tracking, which established and operationally defined five levels of visual prominence. Explicit memory was measured for each of the five levels of visual prominence to test the hypothesis that, as level of prominence increase so would memory. This hypothesis was supported. A second hypothesis tested the effect of mode of presentation on memory, indicating that when both audio and visual presentation of a product was present, memory would be better than for either mode alone. This hypothesis was also supported. Overall this study suggests both mode of presentation and level of prominence have an impact on viewer's ability to accurately remember exposure to product placement within the Netflix series House of Cards.

(# 33)

Undergraduates health judgement accuracy from facial photographs. Anna DiFilippo, *Nipissing University* ■ Anna DiFilippo 1, Graham Albert 1, Mikayla Jeffery 1, Steve Hansen 2 & Steven Arnocky 1, Department of Psychology, Nipissing University, Canada 1, Department of Physical and Health Education, Nipissing University, Canada 2, Introduction: The ability to others' immunocompetence can impact reproductive success. Purpose: To determine whether raters can accurately assess others' health from facial photographs. Hypothesis: Individuals will be accurate above chance at categorizing others' health and will take longer to respond (reaction time in ms) when face/word pairs are incompatible versus compatible. Methods: 72 participants (12 males, 60 females MAGE=19.59 SDAGE=1.77) completed a health judgement task. In each trial, participants were presented with a healthy or unhealthy face and either the word "healthy" or "unhealthy". They were asked to determine, as quickly and accurately as possible, whether the face and the word matched. Participants viewed 12 facial photographs (six healthy and six unhealthy) 20 times each. Results: Raters were sixty-percent accurate at rating the health of others, which was significantly higher than chance levels, $t(72) = 12.19$, p

(# 34)

Does long-term marijuana use alter IOWA gambling performance? James R. Donovan, *Nipissing University*, Kirstin A. Loates, *Nipissing University*, Sandra Hudd, *Nipissing University*, Darren Wade Campbell, *Nipissing University*, Ralph Dell'Aquila, *Northern Ontario Mental Wealth Centre*, Sandra Stewart, *Nipissing University* ■ Marijuana users are thought to be more sensitive to immediate gains and insensitive to future consequences when performing the IOWA gambling task (IGT). However, marijuana has become more widespread and different populations of marijuana users could produce different results on the IGT. In this study we demonstrate how our sample of long-term marijuana users show a distinctly different IGT performance pattern. Method. We recruited 14 male long-term marijuana users and nine non-users from the North Bay area. We contrasted our results with a publically available sample of similarly aged young adult controls performing the same IGT (N=35). All participants completed 100 trials of the IGT with each trial reflecting a card selection from one of four decks of cards. Overall, two of the decks have lower gains and smaller losses, while the other decks have higher gains but larger losses. We divided the 100 trials into 5 blocks of 20 card selections. Based on previous results, we expected to find a Group by

Block by Deck interaction with our THC group selecting riskier decks and a slower shift to the less risky decks. Results and implications. Unexpectedly, our marijuana users engaged in less risky selections and shifted quickly to the safer decks. We suggest that some populations of long-term marijuana users may be less effected, or more cautious in their decision-making than other populations. We also report on the decision-making processes underlying the IGT.

(# 35)

Mapping math anxiety: An SEM model of relations between math anxiety, cognitive predictors and arithmetic performance in adults. HEATHER DOUGLAS, *Carleton University*, JO-ANNE LEFEVRE, *Carleton University*, KELSEY MACKAY, ■ Three possible causal explanations for math anxiety have been identified a) a cognitive path, b) an attentional path and c) an experiential path. The cognitive path proposes early deficits in fundamental quantitative and spatial skills lead to poor performance and hence negative affect. In the attentional path, individuals' attentional limitations, specifically their susceptibility to distractions, lead to on-line performance difficulties that cause and exacerbate math anxiety. In an experiential path, negative experiences during math learning in both home and school environments, accumulate and lead to negative feelings and avoidance behaviors. While these causal paths are not mutually exclusive, the relative contribution of each type of cause to math anxiety may vary. In the present research, we focused on evidence for the cognitive path. Using structural equation modelling, we developed and tested two empirical models of relations among cognitive predictors (working memory, basic spatial skills and basic quantity skills), math anxiety, and arithmetic performance (simple fluency, complex fluency and procedural arithmetic). In the best-fitting model, math anxiety predicts arithmetic performance directly and indirectly through basic number skills. Spatial skills are unrelated to the math anxiety and arithmetic performance relation. Implications for the cognitive path hypothesis are discussed.

(# 36)

How evaluating a problem affects performance on a transfer problem. MARIO ENRIQUE DOYLE, *Memorial University*, KATHLEEN HOURIHAN, *Memorial University* ■ The ability to problem solve is a key skill that we use every day. One of the best strategies we can use to improve problem solving is analogical transfer. This strategy involves taking knowledge that was learned from a previous problem and applying it to a similar problem. However, previous studies have found it difficult to demonstrate the spontaneous use of analogical transfer. The present study attempted to investigate an interesting finding by Bearman, Ormerod, Ball and Deptula (2011), which was that evaluating a problem can actually negatively affect analogical transfer. During the study phase one group of participants were given instructions to evaluate three problems and their solutions, while a control group was instructed to summarize the problems and solutions. We then compared the performance of the two groups on their ability to solve a final problem, which had an analogous solution to one of the three study problems. Contrary to Bearman et al. (2011) we found that evaluation negatively affected solution rates. However, we did find that the evaluation group produced more extraneous information during the study phase than the control group. This suggests that the two groups differed in what they were doing during the study phase, but this did not affect their ability to transfer the appropriate information. A second experiment examined whether an incubation period influenced transfer problem solving accuracy.

(# 37)

How do tablet computers mitigate the video deficit effect? ADAM KENNETH DUBÉ, *McGill University*, RHONDA N. MCEWEN, *University of Toronto* ■ The video deficit effect is a well-known barrier to screen learning (DeLoache, 1990) but recent research suggests it may not occur on tablet computers because tablets respond to user input (i.e., provide contingency; Lauricella et al., 2010). This study investigates whether contingency alone is responsible for mitigating the deficit or whether the touch nature of tablet interactions is an essential factor. Forty adults studied word pairs (e.g., valley-hill) on an iPad in one of three conditions-video, touch control, and voice control-and completed recall and recognition tests. The three conditions differed in how the trial progressed from the presentation of an incomplete word pair (e.g., valley-?????) to a completed word pair. For video, the transition occurred automatically after one second (passive consumption akin to a video). For voice and touch control, the transition occurred once participants said "next" out loud or touched the screen (i.e., contingent). The results indicate that a video deficit does occur during passive tablet use, that contingency can mitigate the deficit, and that the modality matters. On recognition tests, there were no differences in accuracy among the touch, voice and video conditions (avg = 53%, 54% and 53%, respectively). On recall tests, the touch condition outperformed the video condition (M = 62%, 55%, respectively, p ¡ .05) but not the voice condition (M =

58%,p=.65), F=3.124, p=.04. Tablets literally place the video deficit 'under the thumb', or the finger, of the user.

(# 38)

Does shrinking the perceptual field of view affect horizontal tuning in face identification? Gabrielle Dugas, *Université du Québec en Outaouais*, Vincent Barnabé-Lortie, *University of Ottawa*, Jessica Royer, *Université du Québec en Outaouais*, Justin Duncan, *Université du Québec en Outaouais et Université du Québec à Montréal*, Caroline Blais, *Université du Québec en Outaouais*, Daniel Fiset, *Université du Québec en Outaouais* ■ The face inversion effect (FIE) is characterized by an important drop in recognition performance when faces are rotated by 180Â° in the picture plane. Pachai and coll. (2013) showed that inversion disrupts the processing of horizontal information (see also Goffaux & Dakin, 2010) and reported a significant positive correlation between horizontal tuning and the magnitude of the FIE. Recently, Van Belle & Rossion (2015) showed that face inversion reduces the size of the perceptual field of view (PFV). This offers an elegant explanation for the performance drop with inverted faces since a small PFV restricts feature extraction to only a few at a time; a proposition reminiscent of the holistic hypothesis. To reconcile these results, we measured orientation tuning for upright and inverted faces presented either in a gaze-contingent approach, or as a whole. The participants were first asked to complete a practice phase. In the second phase, images were randomly filtered in the orientation domain with orientation bubbles (Duncan et al., 2014) to reveal orientation utilization. The signal-to-noise ratio was adjusted so that the same performance level (55%) was obtained in both upright conditions. Congruently with what was observed for FIE, the signal-to-noise ratio was significantly higher when faces were presented through a small aperture than as a whole. Despite this effect, the small aperture condition is not linked to a decrease in horizontal tuning. Our results show that the smaller PFV associated with the FIE cannot explain the lack of horizontal tuning with inverted faces.

(# 39)

Error processing and sensitivity to feedback: A comparison of ADHD subtypes. Melissa Edwards, *Ryerson University*, Annabel Sibalis, *Ryerson University*, Marjory Phillips, *Child Development Institute*, Louis Schmidt, *McMaster University*, Sid Segalowitz, *Brock University*, Karen Milligan, *Ryerson University* ■ The FRN ERP component indexes emotional processing of performance feedback. Individuals with ADHD have impaired performance monitoring and are highly motivated by rewards. Research has demonstrated an increased sensitivity to reward loss in ADHD, with a larger FRN found in children ages 8-12 with ADHD compared to typically developing controls (van Meel et al., 2005). It is possible that the FRN may differ by ADHD subtype, given that ADHD-C have a more impulsive response style. Consistent with this, Gong (2014) has shown that individuals with ADHD-I have no FRNs in response to feedback loss in a gambling task, whereas individuals with ADHD-C have larger FRNs, particularly in response to large reward losses. No known studies, however, have explored the impact of subgroup on the timing of the FRN. In this study, we examined differences in sensitivity to unexpected negative feedback and latency of unexpected negative feedback in youth with learning disabilities (LD) and ADHD-I or ADHD-C using a Go/No-go paradigm. The FRN was measured following error feedback. Participants included youth ages 12-17 with an LD+ADHD-I (n=39) or an LD+ADHD-C (n=25). Results indicated a shorter FRN latency for ADHD-I compared to ADHD-C, suggesting a slower rate of processing information regarding reward loss in ADHD-C. No significant differences in the FRN amplitude were found. Results and future directions are examined using reward sensitivity theory of ADHD and possible moderating factors, including type of LD and task characteristics, such as reward salience.

(# 40)

Remembering with your fingers: Evidence for embodied cognition using the QWERTY keyboard. Tyler M. Ensor, *Memorial University of Newfoundland*, Aimée M. Surprenant, *Memorial University of Newfoundland* ■ According to theories of embodied cognition, concepts are understood through covert simulation of their sensorimotor attributes. So, the concept of "apple" could be understood through covert simulation of its appearance, taste, smell, and relevant motor actions (e.g., power grip, biting, and chewing). Although research from many disparate areas of psychology has been amassed in support of embodied cognition, one area that has been relatively neglected is human memory. Moreover, extant work attempting to extend the boundary conditions of embodied cognition to memory has been equivocal (e.g., Downing-Doucet & Guérard 2014; Pecher, 2013). Close examination of studies yielding positive and null results for embodied cognition reveals a critical difference: The to-be-remembered (TBR) stimuli used in studies producing null results have tended to have overlap in the effectors used to manipulate them,

whereas the TBR stimuli in studies finding positive results have had less effector overlap. Here, we skirt this limitation by using individual letters on the QWERTY keyboard as the TBR stimuli. Expert and novice typists were exposed to easy- or difficult-to-type letter sequences in a serial-recall task. Although novice typists showed equivalent memory for the easy- and difficult-to-type sequences, experts' memory performance was significantly better for easy- compared to difficult-to-type sequences. Results are consistent with theories of embodied cognition, and suggest that the motor system is recruited in memory tasks.

(# 41)

What sources of information are considered when self-reporting mind wandering? James Farley, *University of Alberta*, Peter Dixon, *University of Alberta* ■ Mind wandering research relies extensively on self-reports which are assumed to simply reflect whether or not any task-irrelevant thoughts immediately preceding a probe can be recalled. However, this explanation offers little theoretical framework for understanding how people introspect about, and report, mental states. It could be argued, for example, that virtually all intervals of time contain traces of task-irrelevant thoughts. We used a paradigm which produced descriptive data related to the thought processes associated with each report to gain further insight into how they are formed. A typical mind wandering self-report paradigm was used in which participants were stopped periodically throughout an experimental task and asked to report their level of task focus. Participants performed a dual-task which involved reading stories for comprehension while simultaneously engaging in a letter detection task (involving making one of two responses to each word, contingent on whether or not it contained a particular letter). Reporting participants provided explanations related to how each report was derived, using a combination of predefined items reflecting particular kinds of task-relevant and task-irrelevant thoughts, as well as open-ended responses. Confidence ratings associated with each report were also collected. Our results provide more context for understanding what sources of information people rely on when introspecting about, and reporting, mental states. We also consider the role of various individual difference measures in driving reports.

(# 42)

Validating Raney's vocabulary measure against the WAIS-III. Ryan Ferguson, *Laurentian University*, Joannie Quenneville, *Laurentian University*, Eric Papineau, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ Psychometric tests related to vocabulary assessments are, for most, restricted in their use by trained professionals and/or are costly. These restrictions limit their use, especially for research purposes. To circumvent these limitations, Gary Raney, from the University of Illinois at Chicago, created a measure for assessing vocabulary proficiency specifically for research purposes. The measure consists of 30 questions where the participant is given a target word (i.e., ascend), a list of 5 definitions, and are instructed to choose the best definition for each word. The purpose of the present study was to examine the validity of the new vocabulary measure alongside the highly standardized but protected test, the Wechsler Adult Intelligence Scale. More precisely, we examined if the score on the Raney vocabulary measure would predict results on the Verbal Comprehension Index (VCI) as well as for each subtest of the VCI. Results revealed that the Raney vocabulary measure significantly predicted the VCI (42.3% of the variance explained). Individual results revealed that the Raney vocabulary measure significantly predicted scores on the Comprehension subtest (33% of the variance explained) and on the Vocabulary subtest (32% of the variance explained). The current results are promising as the test would allow for greater accessibility for researchers who do not have access to restricted psychometric tests.

(# 43)

Improving the use of real world information when solving math word problems. Cheryll Lynn Fitzpatrick, *Memorial University of Newfoundland* ■ In the field of math word problem understanding, a subset of research investigates children's ability to consider real world knowledge when answering these questions. For example, if Johnny can run 100 m in 10 seconds, children have to realize that Johnny cannot continually maintain sprinting speed when asked how long it would take him to run 1 km. These problems have been studied in European and Asian countries, usually finding that elementary school children are perform poorly on them. The first goal of the present study was to replicate these findings in a sample of Grade 6 Canadian students. We found that these students did respond realistically at similar rates as the European children. The second goal was to test whether asking students to write their answers in the form of a sentence would increase the number of realistic answers. We found that those who had to respond with sentences gave significantly more realistic answers than the control condition. However, if we recode realistic understanding as showing any recognition that a problem might need realistic information (e.g., in their

comments), there was no difference between the control and experimental conditions. We also found that boys are responding with more realistic answers and experiencing less technical errors than girls. Overall, these results suggest that children rarely take real world information into account when solving word problems.

(# 44)

Youth perceptions on anti-texting and driving advertisements: an eye-tracking approach. Victoria Foglia, *Laurentian University*, Dominique Leroux, *Laurentian University*, Jessica Dénommée, *Laurentian University*, Karine Turcotte, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ Texting and driving has become a prevalent public health issue, especially in youth. The current study recorded eye movements of young adults while viewing texting and driving prevention advertisements to determine the format that attracted the most attention. Thirty-three participants (Mean age 19) viewed three types of advertisements (non-driving related, general distracted driving and texting and driving specific) with three types of contents (text only, image only and text and image) while their eye movements were recorded. Participants also completed a survey evaluating their self-reported texting and driving behaviours. When comparing eye-tracking results for participants who self-report texting and driving with those who do not, no significant differences were observed. Results revealed an interaction of the types of advertisements and types of content on dwell time. More precisely, when ads comprised text only, participants spent more time viewing the texting and driving ads than the other types. For the texting and driving ads, participants spent more time viewing when they comprised text only and, more time when they comprised image only than both image and text. Regardless of the type of ads, when ads comprised both text and image, participants spent more time viewing the images than the text. Since viewing behaviour did vary whether participants text and drive or not, results do not provide clues to produce more effective ads for the target audience. Nevertheless, results suggest that in order to influence young adult's attention to texting and driving prevention advertisements, text-only display would be preferable.

(# 45)

Mind-wandering reports can differ based on experimental design (within- vs. between-participants). Noah David Forrin, *University of Waterloo*, Daniel Smilek, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ■ We present evidence that the type of experimental design–within-participant or between-participants–can yield strikingly different patterns of mind-wandering (MW) rates. Participants read eight passages that were either presented one sentence at a time (sentence format) or one page at a time (page format). A within-participant design (in which participants read four passages in each format), revealed significantly higher MW rates for passages presented in the page format. However, a concurrently run between-subjects experiment found no effect of passage format on MW. These results are interpreted in terms of distinctiveness theory (Hunt, 2006). Certain features (e.g., text length) stand out as distinct in a within-subject design, and may thereby strongly influence task engagement and MW. In a between-subjects design, however, these same features are not distinctively processed and may have a muted impact on task engagement and MW. An important implication of these results is that factors related to task difficulty may only affect MW reports in a within-participant design (in which the difficult dimension stands out), but not in a between-participants design.

(# 46)

Perceived social support, social interest and mental health: Testing a mediator model. Tsz Yin Fung, *Thompson Rivers University* ■ The relationship between social support and mental health has been well documented (Karnell, Christensen, Rosenthal, Magnuson, & Funk, 2007; Carpenter, Kristen, Fowler, Maxwell, & Andersan, 2010). Tang, Pu, and Yao (2009) suggestion that this relationship might be mediated by a third variable provides the basis for the current study. Specifically, we examine the mediating effects of social interest on perceived social support and mental health. Social interest is a key concept in individual psychology, and is defined as "a cooperative approach toward life and a striving for ideal community" (Adler, 1979, as cited in Ansbacher, 1992). Extending the application of social interest, we hypothesized that individuals with high levels of social interest have higher levels of perceived social support, and this high level of perceived social support in turn is associated with better mental health. Participants were 102 university students who completed measures of social interest, mental health, social desirability, and perceived social support. Using the Baron and Kenny's (1986) causal steps approach, a hierarchical linear regression was conducted to assess the mediating effects of social interest. The results indicate a full mediation effect of social interest on the relationship between perceived social support and mental health. In particular, we found that the relationship between perceived social

support and mental health became non-significant due to the mediating effects of social interest.

(# 47)

Word length, set size, and concurrent articulation. Andrew J. Gabel, *Memorial University of Newfoundland*, Ian Neath, *Memorial University of Newfoundland*, Aimée M. Surprenant, *Memorial University of Newfoundland* ■ The word length effect is the finding that lists of short (single syllable) words are better recalled in order than lists of long (multi-syllable) words. This effect is eliminated when presentation is accompanied by concurrent articulation. However, most studies use a closed stimulus pool in which each word appears multiple times during the the experiment. When an open stimulus pool is used, concurrent articulation does not remove the word length effect (LaPointe & Engle, 1990). Researchers argue that two different explanations of the word length effect are necessary, one for closed stimulus sets and one for open stimulus sets. We note two issues with this: (1) LaPointe and Engle did not equate the short and long words for frequency and (2) they did not conduct a test on the interaction. We first replicate LaPointe and Engle's results using their stimuli, but find a significant interaction between length and secondary task. A second study used a different set of stimuli in which the short and long words were equated for frequency and now we found not only an interaction but the abolition of the word length effect. We argue that a single explanation can accommodate all the results.

(# 48)

Cross-cultural differences in empathic sensorimotor resonance. Michael Galang, *McMaster University*, Katherine R. Naish, *McMaster University*, Amentha Rajagobal, *McMaster University*, Sukhvinder S. Obhi, *McMaster University* ■ Racism is partially conceived of as a lack of empathy towards members of a racial out-group. A possible neural index of 'empathy' is the reduction in corticospinal excitability (CSE) that is seen when an individual observes another person in pain. Early studies conducted in Italy found that this suppression of CSE (so-called 'empathic sensorimotor resonance') occurs only when individuals viewed someone of their own racial group. This finding could suggest a physiological basis for a lack of empathy towards racial out-groups; however, we must be cautious about generalizing such findings. The present study explored whether race differences in empathic sensorimotor resonance would be evident in Canada, a country that celebrates successful multiculturism as a part of its global brand. Participants observed videos of painful (e.g., needles) and non-painful (e.g., Q-tips) stimuli being applied to either light- and dark-skinned hands. Single-pulse transcranial magnetic stimulation (TMS) and electromyography (EMG) were used to assess corticospinal excitability in the participants' dominant hand while they watched the videos. Preliminary analysis suggests that in our Canadian sample, participants showed empathic sensorimotor resonance for both white and black hands. This finding emphasizes the importance of "cross-multicultural" research in which race effects are assessed and compared across different multicultural contexts.

(# 49)

Does positive equal negative? A test of the attentional bias in high trait anxiety. Jennifer Gallant, *Laurentian University*, Brigitte North, *Laurentian University*, Justin A. Chamberland, *Laurentian University*, Christian LaForge, *Laurentian University*, Ryan Ferguson, *Laurentian University*, Michelle Graham, , Carl Newton, , Joël Dickinson, *Laurentian University* ■ Previous research has demonstrated an attentional bias that exists among individuals with high levels of trait anxiety. This bias is said to have three manifestations. First, threat-related stimuli (e.g. fearful faces) are detected faster than non-threatening stimuli. Second, it is harder to disengage attention from a threat-related stimulus relative to a neutral stimulus. Finally, there is an allocation of attention towards areas opposite of the location of a threat once it has been detected. Two competing theories have been proposed to explain the nature of this bias: the threat-specific hypothesis, which states that individuals with high anxiety show an attentional bias to stimuli that signal potential threat, and the emotionality hypothesis, which posits that individuals with high anxiety show an attentional bias to emotional stimuli in general - whether positive or negative. The current study aimed to test these two theories by recording participants' eye movements when presented with happy, fearful and neutral faces in a free-viewing task. Results revealed that regardless of anxiety level, there was a larger proportion of time spent overall and a larger proportion of fixations on the happy faces, followed by fearful faces and then neutral. Further, an Emotion by Anxiety interaction trend ($p=0.103$) suggested that this pattern was especially likely in participants with very low and very high anxiety levels, compared to those with mid-range anxiety levels. These results appear to lend support for the emotionality hypothesis, and further testing is in progress to gain more power and solidify this interaction effect.

(# 50)

Examining the role of physiological arousal in the cumulative effects of subconcussive impact exposure in university athletes. CAITLYN GALLANT, *Brock University*, DAWN GOOD, *Brock University* ■ Repeated subconcussive impact exposure (SIE) over the course of an athletic season is sufficient to produce neurophysiological changes; yet, athletes who regularly endure subconcussions present no symptomatology or cognitive decrements (Abbas et al., 2011; Shenk et al., 2015). This implies that subconcussions have a cumulative effect contributing to injury over time until a clinically significant threshold is met (Talavage et al., 2014). The mechanism underlying the detrimental nature of subconcussion requires further investigation. To address this, we examined the relationship between SIE and physiological arousal. Electrodermal activity (EDA) was recorded for seventy-seven university students of varying athletic status (25 high-risk, 28 low-risk, and 24 non-athletes) prior to, and at the end of, their respective athletic seasons. Participants completed the Everyday Living Demographic Questionnaire (ELQ; Brock University, NCR Lab, 2008) and a composite index of SIE was created. SIE significantly predicted pre-, $F(1, 74) = 4.162$, p ¡ .05, and postseason EDA, $F(1, 59) = 8.965$, p ¡ .01); however, the effect was greater for postseason assessments, accounting for 13.2% of the variance (rpre-season = -.231, rpostseason = -.363). Additionally, high-risk athletes had greater SIE and were the only group to demonstrate a change in EDA from pre- to post-season, $t(16) = 2.07$, $p = .055$, indicating that sympathetic arousal may mediate the relationship between repeated subconcussion and neurophysiological changes. These results are consistent with research demonstrating reduced physiological arousal in those with mild head injuries (e.g., Baker & Good, 2014), and further illustrate the continuum of head injury severity.

(# 51)

The role of self-disclosure, responsiveness and similarity on liking. EMILY E. GIBSON, *Nipissing University*, COURTNEY L. RYAN, , JAMES R. DONOVAN, *Nipissing University*, DARREN WADE CAMPBELL, *Nipissing University* ■ Online communication is an increasingly common form of interpersonal communication, with unique limitations and opportunities. Self-disclosure, responsiveness, and similarity are considered important factors in determining relationship formation outcomes in face-to-face conversations. The relative importance of these factors in online conversations has yet to be determine. The current experiment examined online conversational outcomes based on the presence of self-disclosure, responsiveness, and similarity. Sixty-one undergraduate students (51 female, 10 male) rated conversational partner's interest or disinterest in their partner based on pre-recorded, naturalistic, online conversational exchanges. Each students rated four conversations, which contained between seven and twelve exchanges with approximately fifty words per exchange. Eleven trained raters (6 female, 5 female) rated these same exchanges for the presence or absence of self-disclosure, responsiveness, and similarity. To examine the influence of these latter factors on conversational interest levels, we used a multilevel regression analyses. Among the two positive conversations, we found that similarity was a significant (t =3.5, p

(# 52)

Measuring the effect of holistic treatment on response time using words, pseudo-words and non-words. MARC-ANDRÉ GOULET, *University of Ottawa*, DENIS COUSINEAU, *University of Ottawa* ■ Researchers often use strings of scrambled letters to measure discriminability. Letters are familiar stimuli for participants and easy to manipulate. Many models have been proposed to explain the results obtain in such studies. For example, the linear ballistic accumulator (Brown & Heathcote, 2008) suggests that response times and errors are the result of accumulators gathering information at a certain rate until a threshold is reached. A limit of these model is that it does not account for any holistic effect that some stimuli might carry. In this study, we compared response times and error rates when stimuli were words, pseudo-words (pronounceable) and non-words (unpronounceable). Current models suggest that no difference should be observed, as the complexity is kept constant among conditions (strings are always four letters long). Thirty-six participants were assigned randomly to three conditions where they completed a same-different task with (1) words and pseudo-words (most holistic condition), (2) words and non-words or (3) pseudo-words and non-words (least holistic). Preliminary results show that participants are faster in the second condition and slower in the first condition. Within the same condition, however, participants are quicker with more holistic stimuli. Hence, not only the degree of holistic treatment, but also the overall difference between the degrees of holistic treatment of all the stimuli impact response times. Current models are insufficient to explain differences caused by the type of treatment.

(# 53)

A Validation of the New Indigenous Implicit Association Task. Michelle Graham, *Laurentian University*, Justin A. Chamberland, *Laurentian University*, Taima Moeke-Pickering, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Schemas have been demonstrated to impact the speed of information processing as well as text comprehension. Schema-congruent information will be processed faster, while information that goes against our schemas is processed slower. The implicit association task (IAT) has been used in numerous studies to demonstrate this processing difference for such things as race, gender, and sexuality. Current IATs for Indigenous cultures use extreme stereotyped images. The current study aimed to validate a new IAT that consists of words thought to be strongly associated with Indigenous cultures in Canada. Results demonstrated that a majority of the words chosen fit into the anticipated categories (Indigenous or non-Indigenous). The Indigenous culture was primarily affected by colonization as its purpose was to be assimilated. To add, Indigenous people are constantly depicted in various forms through the media. The new IAT task will be beneficial for future research that aims to test moderators of cultural bias towards Indigenous peoples.

(# 54)

Wandering minds and dwindling grades: Temperament traits and academic performance predict rates of mind wandering. Lauri Gurguryan, *McGill University*, Effie J. Pereira, *McGill University*, Jelena Ristic, *McGill University* ■ There is a large interest in understanding the processes underlying 'mind wandering'. In this study, we assessed whether this mental ability relates to innate temperament traits and academic achievement. One hundred and twenty-five participants were recruited via Amazon Mechanical Turk and were asked to complete the Mind Wandering Questionnaire, which estimates rates of mind wandering, and the Adult Temperament Questionnaire, which assesses temperament along cognitive-attentional and motivational-emotional dimensions. They were also asked to indicate their academic achievement grades obtained during their most recent degree. Overall estimates of mind wandering (18%) were comparable to those reported in laboratory studies (24 -27%). Within cognitive-attentional domains, Effortful Control related negatively with proportion of mind wandering, such that those individuals with low effortful control reported higher proportions of mind wandering. Within motivational-emotional domains, Negative Affect related positively with proportion of mind wandering, such that those individuals higher in negative affect reported higher proportions of mind wandering. Furthermore, the traits of Negative Affect and Orienting Sensitivity in combination with individual academic performance reliably predicted proportion of mind wandering, with lower grades, higher negative affect, and lower sensitivity to the environment associated with increased instances of mind wandering. Together, these data demonstrate that mind wandering not only varies with individual temperament traits, but also appears to exert a quantifiable effect on functional achievement outcomes.

(# 55)

Relations between language ability and math skills for Chinese and English speakers. Feng Gu, *Carleton University*, Chang Xu, *Carleton University*, Katherine M. Newman, *Carleton University*, Jo-Anne LeFevre, *Carleton University* ■ This study aimed to examine the relations between language ability and math skills in Chinese-speaking and English-speaking adults. 68 English native speakers and 70 Chinese native speakers (N = 138) completed 2 language-related tasks (i.e., vocabulary and phonological awareness) in their native language and 3 non-linguistic math tasks. The three math tasks differed in their difficulty levels (i.e., simple, medium, difficult). The results showed that Chinese participants performed significantly better than English-speaking participants on all three math tasks. In addition, there was a significant predictive effect of language ability on the performance of the simple math task for Chinese-speaking participants, but not for English-speaking participants.

(# 56)

The effect of intergroup cooperation in video games on prejudice reduction: Does this effect differ between violent versus nonviolent games? Alexandra Ha, *Trent University* ■ Objective: Playing a violent video game cooperatively with an outgroup member has been found to reduce prejudice toward that outgroup. The goal of the current study was to examine whether the effect of intergroup cooperation in video games on prejudice reduction would be stronger when playing a nonviolent video game, compared to a violent video game. Method: Canadian students (n = 213) played a violent or nonviolent video game cooperatively with an outgroup member (an American student) and completed an intergroup attitude measure. Results: Participants' attitude ratings toward the partner's social group (students from the American university) do not differ in the violent or nonviolent video game conditions. Conclusion: The violent and nonviolent video games are both important intervention tools to reduce prejudice.

(# 57)

The uncanny valley: Do framing and familiarity effects alter affective responses? Andrew Stuart Hachey, *Carleton University*, Tyler Burleigh, *University of Guelph*, Dr. Jordan Richard Schoenherr, *Carleton University* ■ The Uncanny Valley (UCV) phenomenon describes the relationship between affective responses (e.g., eeriness) and perceived human likeness (Mori, 1970). Recent studies have suggested that familiarity effects might provide a better explanation of the UCV, i.e., novel stimuli are associated with higher eeriness ratings. Importantly, studies of processing loci have also claimed that depending on whether participants are assigned to a promotion (attain 95% accuracy) or prevention (avoid 5% errors) condition can affect the assignment of novel exemplars to existing categories. In the present study, manipulating both the frequency of training exemplars presented along a continuum as well as processing loci assignment changed affective ratings and categorization response accuracy, respectively. This suggests that the UCV can be understood in terms of familiarity effects rather than positing novel information processing mechanisms.

(# 58)

Differences in question answering style and motivational variables across profiles of conceptual and procedural understanding of fractions. Darcy Hallett, *Memorial University*, Felix Ayesu, *Memorial University*, Kyle Richard Morrissey, *Memorial University*, Aishah Bahktiar, *University of Victoria* ■ Previous research has found individual differences in the way children combine conceptual and procedural knowledge when solving fraction problems (Hallett, Nunes, & Bryant, 2010; Hallett, Nunes, Bryant, & Thorpe, 2012; Hecht & Vagi, 2012). These studies classified students into different clusters representing different profiles of relative strength in conceptual and procedural knowledge, finding that some students relied more on conceptual knowledge, some relied more on procedural knowledge, and some equally relied on both types of knowledge. These studies also found that these clusters would differ on overall fraction ability and other scores. The research reported here further explores differences between clusters regarding the amount of effort put into answering questions (i.e., reflected by amount of work shown and number of attempted questions) as well differences in motivational variables (e.g., math self-concept, attribution styles). We sampled 251 eighth graders (males = 107, females =144) in Newfoundland and assessed their cluster, motivational variables, number of questions attempted, and number of questions that showed work. Controlling for overall fraction skill, we found that the more procedural students were more likely to show their work on procedural questions. The more conceptual students were more likely to attempt conceptual questions than the other clusters. Amount of work shown and number of attempts were also related to motivational variables. Overall, the results demonstrate that these clusters reflect distinct learning styles of students learning fractions.

(# 59)

Electrophysiological correlates of situation model updating. Deanna C. Hall, *Wilfrid Laurier University*, Ferretti R. Todd, *Wilfrid Laurier University*, Murray Singer, *University of Manitoba*, Jeffrey P. Hong, *Wilfrid Laurier University* ■ This ERP research examined how discourse concepts are integrated into a situation model when they were previously explicitly mentioned (match), mentioned with a general term (general match), unmentioned in lieu of another concept (mismatch), or completely unmentioned (null). Passages were limited to two sentences in order to reduce the influence of decay on the activation of the discourse concepts. N400 amplitudes indicated that the mismatch and null target conditions were the most difficult to integrate, followed by the general match condition and then the match condition. Amplitudes to the null target concepts were more negative than for the mismatching target concepts at left-anterior and central-medial electrode sites. Furthermore, late positivity amplitudes showed a trend towards being most positive for the general match target concepts and least positive for matching target concepts. This indicates that updating general concepts so that they are more specific produces the most difficulty when updating the situation model. These results provide novel insight into how readers integrate concepts into situation models.

(# 60)

Multiple target search with Kanizsa figures. Natasha Hardy, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Previously we found that Kanizsa illusory contour (KIC) figures have high attentional demands when processed in an orientation-based standard visual search (SVS) task and a selective enumeration (enumeration with distractors) task. In contrast, Kanizsa real contour control (KRC) figures (composed of a real contour rectangle and the "pac-men" inducers) showed low attentional demands in the SVS task, but high attentional demands in a selective

enumeration task. We used a multiple target search paradigm to tease apart these findings. We used three types of figures in this experiment: plain rectangles (to determine a baseline), KRC figures, and KIC figures. The display size remained constant and the number of targets was manipulated (0-4). We measured reaction time and error rate to determine if there was at least one target (1-4), or no target in the display. We found that reaction time decreased only slightly as the number of targets in the display increased when searching for plain rectangles and KRC figures; indicating that searching for either type of figure makes minimal demands on attention. KIC figures were found much faster as the number of targets in the display increased, which is consistent with previous research showing that KIC figures are processed inefficiently. The results indicate that the high attentional demands required to selectively enumerate KRC figures is due to fundamental differences between enumeration and search in terms of measuring the attentional demands of processing complex figures, and not due to processing multiple targets.

(# 61)

Can multitasking function as a desirable difficulty? Brittany Harris, *St. Thomas University*, Sandra Jean Thomson, *St. Thomas University* ■ The present research examines the effect of multitasking on short-term and long-term retention of information. Previous research has shown that making an encoding or retrieval task more difficult for the learner can improve long-term retention, which makes such difficultiesdesirable (Bjork & Bjork, 2011). Because multitasking makes encoding and retrieval of information more difficult, it is possible that multitasking is a desirable difficulty, and, therefore, may be beneficial for long-term memory. The present study consisted of two parts. During an initial learning phase, participants read short passages. Immediately following each passage, they either restudied the passage or attempted to recall the passage. The recall task occurred under full or divided attention (multitasking) conditions. Participants then completed 'Judgments of Learning' surveys to self-assess their memory of the passages. After 48 hours, participants returned and attempted to recall each of the passages. If multitasking functions as a desirable difficulty, dividing attention on the immediate recall task should impair performance on this task compared to the full attention condition, but will subsequently lead to better performance compared to full attention on the delayed recall task. However, the results do not support the notion that multitasking is a desirable difficulty, and do not replicate past research related to the testing effect. Judgments of learning results demonstrate participants' perceptions of the effects of multitasking on memory. These findings inform our understanding of multitasking during recall, and have implications for the types of difficulties that may be considered desirable.

(# 62)

Task modulates the N170 amplitude inversion effect. Ali Hashemi, *McMaster University*, Matthew V. Pachai, *Ecole Polytechnique Fédérale de Lausanne*, Joshua DePellegrin, *McMaster University*, Alexander Elliott, *McMaster University*, Patrick J. Bennett, *McMaster University*, Allison B. Sekuler, *McMaster University* ■ The face inversion effect (FIE) is characterized by impaired identification of inverted but not upright faces. The FIE is often studied using electroencephalography (EEG), as the N170 event-related potential is sensitive to inversion. Compared to upright faces, the N170 to inverted faces is always delayed and often larger in magnitude, a finding repeatedly replicated since its initial discovery two decades ago. However, several experiments from our lab have resulted in an N170 FIE driven by a smaller, not larger, amplitude to inverted faces. While investigating this discrepancy, we noted that our EEG studies often use n-AFC identification tasks, compared to other studies primarily using simpler tasks such as orientation discrimination. The task differences are worth acknowledging since the processes underlying face identification presumably are more complicated than those underlying face orientation discrimination. We hypothesized that the different FIEs on N170 amplitude may be caused by different task demands. We used a within-subject design to manipulate Task (identification vs orientation discrimination) and Face Orientation (upright vs inverted). For the orientation discrimination task, the N170 was larger for inverted faces; however in the identification task, N170 amplitude was, as predicted, smaller for inverted faces. These results suggest that careful consideration of the tasks used to study the N170 is required; given that the behavioural FIE is explained by how observers use facial information, it seems natural to use tasks that demand the use of facial information when studying brain activity.

(# 63)

The oculomotor system and multidimensional priming arrays. Tariq A Hassan, *Dalhousie University*, John Christie, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ Rapid eye movements (saccades) are believed to be governed by a collection of interacting neural networks known as the oculomotor system. One brain structure in the

evolutionarily primitive portions of this system that has been heavily implicated in generating saccades is the superior colliculus (SC). Work using multiple simultaneously presented targets has suggested that the SC drives saccades to the center of gravity (CoG) of targets close together, but selects individual targets at greater stimulus dispersions. However, recent work used a priming-based approach, which briefly presented primes (50 ms) followed immediately by an single target, to show that the SC drives saccades to the CoG regardless of stimulus dispersion. This finding is credited to reduced recruitment of top-down decision making processes thought to have confounded prior investigations. Here we expand on this work by allowing for a far greater number of prime configurations. This change has allowed us to examine the types of configurations capable of overriding SC-driven CoG saccades. In particular, we observed robust inhibition emerging from primes close to the target. Additionally, we also explored primes of two colors, only one of which matched the color of the target. This was designed to test the capability of the oculomotor system to produce a color-selective saccade program, for which we were able to find exciting, although counterintuitive, evidence. Implications for models of the oculomotor system will be considered.

(# 64)

Emotional and behavioural problems and executive function in children with epilepsy. Sarah A. Healy, *Trent University*, Nancie Im-Bolter, *Trent University*, Janet Olds, *Children's Hospital of Eastern Ontario (CHEO)* ■ Children with epilepsy are significantly more likely to have emotional and/or behavioural problems than their typically developing peers; with prevalence rates of 28.6% and 6.6%, respectively. In typically developing children, researchers have found a strong association between executive function and emotional and behavioural problems. Despite research that consistently shows executive function deficits in children with epilepsy, few researchers have looked at the potential association between executive function and emotional and/or behavioural problems in this population. When executive function is assessed as a potential risk factor, researchers often look at executive function in general as opposed to looking at the distinct, validated components of executive function (i.e., shifting of mental sets, inhibition of prepotent responses, updating of working memory). Therefore, we investigated emotional and/or behavioural problems and executive function in 42 children with epilepsy (M = 14.5 years; 43% males). Results from standard regressions show that executive function is positively and significantly related to internalizing problems, externalizing problems, and total problems in this population, accounting for up to 69

(# 65)

Math achievement and executive function in children with epilepsy. Sarah A. Healy, *Trent University*, Nancie Im-Bolter, , Janet Olds, ■ Children with epilepsy are more likely to show difficulties in mathematical achievement than their typically developing peers, with some studies suggesting prevalence rates as high as 26%. Researchers have suggested that executive function (especially updating of working memory) may be an important predictor of math ability in typically developing children. Despite studies suggesting that executive function may be impaired in children with epilepsy, executive function is not often assessed as a possible risk factor for low math achievement in this population. Furthermore, when executive function is assessed as a correlate for low mathematical achievement in children with epilepsy, results have been mixed with some studies finding a significant association and others failing to do so. In the current study, we investigated math achievement and specific components of executive function in 19 children with epilepsy (M = 16.7 years; 53% males). When controlling for other components of executive function (shifting of mental sets and inhibition of prepotent responses), updating of working memory was significantly related to both math and math fluency composite scores. Furthermore, when controlling for certain epilepsy variables, working memory remained a significant predictor of math achievement. These findings suggest that problems with working memory may place children with epilepsy at risk for underachievement in math.

(# 66)

Investigating children's processing of negated language. Alison Heard, *University of Calgary*, Sarah Lozie, *University of Calgary*, Penny Marion Pexman, *University of Calgary* ■ Recent research with adult participants has lead to the development of two main theories to describe the process by which negation is understood. The first theory states that processing negation does not involve additional mental representation, beyond those required to process affirmative statements. The second theory claims, instead, that processing negation involves mentally representing the negated content (e.g., an open window for the sentence "The window is not open"), followed by its rejection, and finally the mental representation of the actual state of affairs (e.g., a closed window). In the

present research we investigated which of these theories is the best description for how negation is processed by 5-year-old children, who are just becoming proficient in understanding negation. We used a variant of the visual world paradigm called the Shopping Task wherein participants listen to a puppet indicate which of two items they desire. The task is to select the intended item and place it into the shopping cart. Across trials, the puppet uses both negated (The next item is not candy) and affirmative (The next item is candy) sentences to indicate their wants. We measured children's eye gaze and reaction time. Results showed that children took longer to process negated statements, consistent with a two-stage model of negation understanding.

(# 67)

Effects of socially-based ensemble music training on children's executive functions: ERP evidence. Nina Hedayati, *Carleton University*, Kylie Schibli, *Carleton University*, Amedeo D'Angiulli, *Carleton University* ■ Objectives: We examined the effect of participation in OrKidstra, an ensemble social music program run by The Leading Note Foundation, on children's ability to attend selectively, evaluate and exert cognitive control in an auditory Go/No-Go task, as reflected by children's Event-Related Potentials (ERPs). Methods: Sixteen children (eight in OrKidstra and eight in a comparison group; four males per group; ages 9-12 years) from low family socioeconomic status (SES) completed a pediatric hearing test followed by a standard version of the auditory Go/No-Go task using pure tones at 1100 and 2000Hz. Accuracy, reaction times, and concurrent high-density tone-locked ERPs were measured. Results: Accuracy, errors, and reaction times for the Go/No-Go task were not significantly different between groups. However, children in the OrKidstra group had significantly higher auditory discrimination for tones at 500, 1000, and 2000Hz. ERP analysis showed that compared to the other group, the OrKidstra group generally had earlier but smaller N200 and P300 peaks, and larger prefrontal late positive potentials (P600-950), which are waveforms associated with auditory perception, stimulus evaluation, and response control, respectively. Conclusions: The data suggest that, relative to the comparison children, the OrKidstra children show faster and more efficient neural processing (unconfounded by motor response) associated with perception, evaluation, and inhibition to auditory stimuli. This study highlights the importance for socially-based musical intervention programs targeting low SES children.

(# 68)

The effects of perceptual fluency, schema congruency, and sexuality on attribute ratings. Emalie Hendel, *Laurentian University*, Rebekah Hovi, *Laurentian University*, Justin A. Chamberland, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Previous literature on schema congruency has largely found that schema non-congruency is associated with less positive attribute ratings. However, one recent study found the opposite effects where schema non-congruency was associated with more positive ratings. A potential reason for their opposing results was that this study analyzed the schema non-congruent stimuli of "a sensitive man" and "an assertive female" as one group and did not examine for differences according to gender; however previous literature has stated that schemas are entrenched different according to gender. The purpose of this study was to replicate this previous study that supported a positive affect for schema non-congruency to determine whether this potential gender confound was responsible for the inconsistent results, while also looking to see if manipulating perceptual fluency (how easy something is to read) could mitigate this negative impact, particularly for sexuality schemas. Despite previous robust effects, fluency did not impact attribute ratings. We suggest that this is potentially because the schemas for sexuality are too entrenched. Congruency did impact attribute ratings, and in almost all cases individuals who were schema congruent for sexuality were rated as more positive than those who were schema non-congruent, suggesting that gender did play a role in previous findings.

(# 69)

Is psychology a science? A multi-method approach to studying the representation of science. Gina Hernandez, *Carleton University*, Demi Plagianakos, *Carleton University*, Lindsay Morgan, *Carleton University*, Tess Walsh, *Carleton University*, Asma Al Amri, *Carleton University*, Guy Lacroix, *Carleton University* ■ Research has shown that people are skeptical of psychology's status as a science (Lilienfeld, 2012). The goal of our experiments was to determine whether people's judgments about science are rooted in the way people process categorical information. We explored this possibility in three experiments. In Experiment 1 (N = 70), a free listing task determined that the "hard" sciences (biology, chemistry, and physics) were listed earlier and more frequently, making them more "typical" sciences. In Experiment 2 (N = 109), a feature-listing task found that "difficult" and "important" were the most representative features of the prototype of science, none of

which were generated for psychology. Finally, in Experiment 3 (N = 143), same different judgments were analyzed using multidimensional scaling. The results showed that psychology was semantically different from the typical sciences along two out of three dimensions. Our studies suggests that categorical processes are in fact contributing towards psychology's "unscientific" status.

Poster session 2

(# 1)

Long-term marijuana use on Stroop performance: More than just a Blunt effect. Camille E. P. Gray, *Nipissing University*, Victoria G. L. Steadman, *Nipissing University*, Chenoa B. Godin, , Sandra Stewart, , Ralph Dell'Aquila, , Darren Wade Campbell, ■ Long-term cannabis use is associated with select cognitive impairments, including inhibitory deficits. Standard Stroop measures of inhibitory function do not show these marijuana-related deficits. Using a modified Stroop with marijuana-specific words, this study investigated long-term marijuana use on inhibition and attentional bias. We predicted users would show increased reaction times and lower response accuracy. Method. This study consisted of 12 male cannabis users and 9 male non-users. The average duration of THC use was 3.9 years (SD= 2.0) and a mean of 2.0 grams (SD= 2.0) consumed per week. A list of both neutral and cannabis-related words was printed in 4 different font colours. In the first condition, participants were instructed to name the colour of the word and in the second condition, name the word itself. The outcome measures were the number of naming errors and the total time taken. Results. Marijuana users made more colour-naming errors (M = 5.92, SD = 3.09) than non-users (M = 3.78, SD = 1.92). We also found that with higher levels of marijuana use, male marijuana users made fewer marijuana-specific naming errors. Discussion. Results showed preliminary support for Stroop-related alterations associated with long-term marijuana use. It also was noteworthy that higher levels of marijuana use were associated with fewer marijuana-related word naming errors. Data collection is ongoing and future studies will include a larger sample size, an objective measure for responses and a varied distribution in word presentation.

(# 2)

Electrophysiological correlates of visual perspective switching. Jeffrey P. Hong, *Wilfrid Laurier University*, Todd R. Ferretti, *Wilfrid Laurier University* ■ Research on event representation has highlighted the phenomenological characteristics of visual perspective use. Reports indicate that represented events routinely feature a high proportion of representation from both the first-person (field) and third-person (observer) perspectives. Further evidence indicates that any given representation of an event may feature both perspectives, to varying degrees (Rice & Rubin, 2009). This task necessitates switching between the two perspectives. The current study represents a first step into investigating the electrophysiological correlates underlying perspective switching. Short sentences were used to cue participants to imagine themselves participating in various activities, while scalp potentials were recorded using EEG. During each event, participants imagined from the first or third-person perspective and switched to the other perspective. Slow-cortical potential amplitudes indicate that greater cognitive effort is required to switch from the first to the third-person perspective than vice-versa. This divergence in cognitive requirements is apparent immediately following perspective-cue processing and is topographically distributed across scalp areas, but is largest over occipital and parietal locations.

(# 3)

A comparison of engagement within the attention trip and the attention network test. Emily Howes Vallis, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ The Attention Network Test (ANT) is a frequently used stimuli task that measures the networks of attention (Fan et al, 2002). However, prior research has cautioned against using this test with specific populations due to possible boredom effects (Ishigami & Klein, 2014). The Attention-Trip (A-Trip) is a video game inspired task designed by the Klein lab to measure the networks of attention (Klein et al., 2011). No previous literature has compared the ANT and the A-Trip in the context of participant engagement. The primary objective of this study involved utilizing two subtests of the User Engagement Scale (O'Brien, 2010) to compare the ANT and the A-Trip tasks. The objective was achieved by administering both the ANT and the A-Trip to the same sample of 28 participants recruited through Dalhousie University. After each task was performed participants completed a version of the User Engagement Scale in response to the task that was just completed. Results show that participants reported the A-Trip to be more engaging

in comparison to the ANT. Both the ANT and the A-Trip generated typical attention network scores in all three attentional networks (alerting, orienting, and executive function).

(# 4)

Reference frames in map reading. Xing Huang, *Unviersity of New Brunswick*, Daniel Voyer, *University of New Brunswick* ■ This study explored allocentric and egocentric reference frames in map-reading by using a newly designed Self-Spatial Orientation Test (SSOT). We also examined the correlations between this new test and other spatial measures. Forty males and 55 females completed the SSOT, along with the Landscape Perception Test (LPT), the Spatial Orientation Test (SOT), the Spatial Anxiety Scale (SAS) and the Spatial Self Confidence Scale (SSCS). All tests were completed on computers. The SSOT was the central part of the study and it allowed coding of four different types of items defined by the combination of two independent variables: frame of reference (FoR), reflecting an allocentric (aerial) or egocentric (ground level) views; and perspective change (either a change or no change in perspective). On the SSOT, results showed significantly faster and more accurate responses on items requiring no perspective change compared to those that did. Participants were also faster to respond to allocentric than to egocentric items. On accuracy, results also showed that egocentric items were more accurate when no perspective change was required but the reverse pattern occurred when a change was required. Significant sex differences were found on the SOT, the SSCS and the SAS. Moreover, significant correlations were found between the SSOT and other measures except for the SAS. The egocentric items with and without perspective change significantly correlated with the LPT. Implications of these results for the psychometric measurement of frames of reference are discussed.

(# 5)

Investigation of fetal adversity's influence on behavioral activation and inhibition systems. Alaa Ibrahim, *McGill University*, Roberta Dalle Molle, *McGill University*, Laurette Dubé, *McGill University* ■ Fetal adversity has been shown to have a negative impact on person's development, mental and physical health. It is well documented that children with atypical birth weight (low or high), which reflects fetal adversity, are at higher risk to develop chronic diseases. Moreover, children with atypical birth weight have more externalizing and internalizing problems, which may contribute to the development of chronic diseases. This study aims to examine children with normal and abnormal birth weight for gestational age and their individual differences in biological predisposition in terms of endophenotypes for environmental responsiveness using the Behavioral Inhibition system and Behavioral Activation systems (BIS/BAS) scales. 572 parents of children aged between 6-12 years completed the adapted parental version of the scales. Out of 572 participants, respectively had low (SGA), normal (AGA) and high (LGA) birth weight for gestational age; 424, 78 and 70. Analyzing the results separated by sex we observed that SGA females had lower BAS reward scores compared to LGA females (p=0.027) and had almost lower scores than AGA females (p=0.071). The results remain significant after controlling for BMI and age. There were no differences in males and no differences in the other BIS/BAS scales. Fetal adversity seems to influence Behavioral Activation System to reward in a sex-specific manner. The results showed that in females lower birth weight is associated to lower responsiveness to reward cues, which can contribute to altered behaviors related to the reward system (e.g eating behavior).

(# 6)

Emotion and enumeration. Elizabeth Ann Infante, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Subitizing is the ability to "with a glance" enumerate 1-4 items; in this range, the increase in response time (RT) with each additional item (the RT slope) is only 40-100 ms. In contrast, enumeration of 5 or more requires an operation called counting, which is slower, and more effortful and error-prone than subitizing (RT slope = 250-350ms per item). One explanation for the four-fold difference in RT slopes between subitizing and counting is that subitizing employs a mechanism that allows 1-4 items to be selected at once. In contrast, counting requires a series of operations; participants first move the focus of attention to a specific group of items and then subitize the items within that group (putting the that number into working memory). They then switch the attentional focus to the next group of items, subitize that group, add the total to the running total in working memory and continue until all the groups of items are enumerated. Negative emotion reduces the scope of the attentional focus and slows attention switching; positive emotion has the opposite effects. Because counting is thought to require the attentional focus and switching attentional focus between groups, we predicted that emotional images would have greater effects on counting than subitizing. Participants were required to enumerate 1-9 items, when each display was preceded by

positive, negative or neutral images from the International Affective Picture System. Results are discussed in terms of the "broaden and build" theory of emotion.

(# 7)

The role of auditory feedback for sensorimotor control of speech in adults with autism spectrum disorder. Danielle S. Jacobson, *Wilfrid Laurier University*, Nichole E. Scheerer, *Wilfrid Laurier University*, Jeffery A. Jones, *Wilfrid Laurier University* ■ Communication and motor control deficits, including speech irregularities, are commonly observed in individuals with Autism Spectrum Disorder (ASD). Auditory feedback (AF) is important for monitoring and correcting for mistakes made during speech production. Previous research has suggested that poor speech motor control, indexed by increased vocal variability, is related to an increased reliance on AF during ongoing speech. Since individuals with ASD have been shown to demonstrate motor control deficits, the goal of this study was to investigate whether adults with ASD, relative to typically developed (TD) individuals, demonstrate increased vocal variability and if in turn this results in increased susceptibility to deviant AF during ongoing speech. To investigate this research question, individuals with ASD and TD individuals produced vocalizations, during which they were exposed to brief unanticipated AF perturbations that were one-semitone in magnitude. Changes in participant's fundamental frequency (F0) in response to the AF perturbations, as well as the standard deviation of the F0 of participants' unaltered voice were measured. The results of this study will aid in our understanding of speech motor control in individuals with ASD. The underlying cause of the communication deficits observed in adults with ASD are currently unknown. Therefore, it is important to determine the similarities and differences in the way that speech motor control is regulated in adults with ASD in comparison to TD adults.

(# 8)

The effects of altered auditory feedback on speech production in adults: A comparison of perturbation and sensorimotor adaptation paradigms. Danielle S. Jacobson, *Wilfrid Laurier University*, Nichole E. Scheerer, *Wilfrid Laurier University*, Jeffery A. Jones, *Wilfrid Laurier University* ■ Auditory feedback (AF) plays a crucial role in the acquisition and maintenance of fluent speech. AF allows speakers to monitor and correct for errors in their speech production, and also plays an important role in creating and sustaining the sensorimotor relationships that support vocal motor control. The importance of AF for these functions is typically investigated by exposing participants to brief unexpected changes to their AF as part of a perturbation paradigm, or by exposing participants to persistent and predictable changes to their AF as part of a sensorimotor adaptation paradigm, respectively. Although responses elicited from both the perturbation and adaptation paradigms have been used to assess the ways speakers process and use AF for speech motor control, it is currently unclear whether these responses are regulated in the same manner. To investigate this research question, we altered the fundamental frequency (F0) of speakers AF while they produced vocalizations in both a perturbation and an adaptation paradigm. Changes in the speakers' F0 in response to the AF manipulations in each paradigm were measured. Correlational analyses were then conducted to assess whether speakers' responses showed similar patterns across the two paradigms. The results of this study will further our understanding of how AF is utilized for online error correction, as well as for sensorimotor learning. More importantly, these results will establish whether AF is processed and utilized similarly for these processes.

(# 9)

The Bouba-Kiki effect and event related potentials: An electrophysiological approach to sound symbolism research. Jessica M. Johnson, *Laurentian University*, Jonathan P. Bridekirk, *Laurentian University*, Justin A. Chamberland, *Laurentian University*, Cynthia Whissell, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Sound-symbolism is a growing body of literature, demonstrating a natural expressiveness in language, contrary to the conventional thought that language is characteristically arbitrary. Early empirical studies demonstrated that nonsense words with round vowels (maluma, bouba) were more likely to be paired with round-shaped objects, whereas nonsense words with unrounded vowels (takete or kiki) were more likely to be paired with pointy objects. This universal ability to connect symbols to sounds has led to the psychological expenditure and further pursuit of sound-symbolism, crossmodal correspondences, synesthesia, and the evolutionary origins of language. In the present study, individuals completed an Implicit Association Test (IAT), which measured underlying implicit attitudes by investigating participants' automatic association between targets (abstract shapes/nonsense words being either smooth or jagged) and attribute (word categories being passive or active;

congruent or incongruent with shape/word). The current study explores the bouba-kiki/sound-symbolism effect by adopting the IAT methodology and including ERP to measure this phenomenon and the cognitive integration of the two separate modalities to make such inherit congruent/incongruent associations. For images, there was a significant interaction found between congruency and region of interest for the N400 component and for words, there was a significant interaction between congruency and region of interest for the N200 component These results will be discussed in relation to their support for the sound symbolism phenomenon.

(# 10)

Remembering more than you can say: Re-examining "amnesia" of object attributes. Melissa Kang, *Queen's University* ■ Recently, Chen and Wyble (2015) demonstrated that attentional selection of a target feature does not necessitate that that feature will be encoded into memory and reach awareness - a finding that challenges the notion of a tight link existing between attentional selection and working memory (WM). Their paradigm had participants use a unique colour (the selection attribute) to identify a target and report its location. After performing this colour-based singleton search task for several trials, participants failed to report the selection attribute (target's colour) on a subsequent 'surprise' trial-a finding they termed "attribute amnesia". The use of a surprise trial to assess information maintained in WM is problematic for two reasons. First, it provides only one trial of data per participant, and second, the surprising nature of the question may contribute to forgetting. To investigate whether a selection attribute is encoded into WM, we modified Chen and Wyble's paradigm to include a second shaped-based singleton search task. Critically, if the colour of an item during this shape-based singleton search matches the colour of an item being held in WM, that item will capture attention. Across two experiments, we replicated "attribute amnesia" for the target's colour on the surprise trial, but also demonstrated that the selection attribute influenced search performance during pre-surprise trials. Ultimately, this indicates that the attribute was held in WM, making it inconsistent with the claim that selection attributes are not encoded into memory.

(# 11)

Cognitive maps in pilots: A preliminary study. Mikayla Keller, *The University of Western Ontario*, Jennifer E. Sutton, *The University of Western Ontario* ■ While spatial skills are malleable and can be improved via targeted training (Uttal et al., 2013), evidence of improvement via experience in spatially-demanding careers is mixed. Sutton et al. (2014) showed that early-career civil aviation pilots formed more accurate cognitive maps of a novel virtual environment than matched controls. Understanding the layout of the environment is a critical aspect of safety in airplane navigation. The current study investigated whether increased flight experience was associated with greater cognitive map accuracy of a novel virtual environment. Twenty-three students enrolled in Commercial Aviation Management at the University of Western Ontario participated. Twelve of these students held a Private Pilot's Licence and one held an additional Commercial Pilot's Licence. Hours of flight experience varied from 0 - 260. Pilots explored a virtual environment, Silcton, and learned the locations of 8 buildings. Afterwards, they created a map of Silcton and estimated directions between buildings. Individuals holding at least a Private Pilot's Licence were significantly better at building a map of Silcton than participants without a licence in a one-tailed t-test, but the difference only approached significance in a two-tailed test. A linear regression model showed that map building accuracy was predicted by hours of flight experience, such that a greater number of hours was associated with increased accuracy. There was no difference for direction estimation scores based on licensure status. In summary, our preliminary findings suggest that as real-world experience flying a plane increases, cognitive map accuracy increases.

(# 12)

A computational model of memory for abstract associations. Matthew Alexander Kelly, *Carleton University*, Robert L. West, *Carleton University* ■ How do humans learn the syntax and semantics of words from language experience? How does the human mind discover abstract relationships between concepts? Computational models, such as LSA (Landauer & Dumais, 1997), HAL (Burgess & Lund, 1997), the Topics Model (Griffiths & Steyvers, 2007), and BEAGLE (Jones & Mewhort, 2007), can analyze a large body of text, such as all of Wikipedia or decades of newspaper articles, in order to derive representations of the meanings words in terms of each word's relationships to all other words in the language. While these models are sensitive to conceptual relationships (e.g., "tiger" and "stripes") and synonymy (e.g., "soar" and "fly"), these models have limited sensitivity to syntactic relationships (e.g., "book" and "door" are both nouns). The BEAGLE model shows some sensitivity to part of speech. We extend the BEAGLE model, developing a hierarchical holographic memory model. We define

orders of association to characterize how abstract the relationship is between a given pair of words or concepts. We hypothesize that the human sensitivity to part of speech and syntax relies on exploiting higher order associations between words. We show that our model is sensitive to arbitrarily abstract associations between words or concepts. Performance of the model is demonstrated using an artificial data set, and preliminary results with natural language are discussed.

(# 13)

Importance of interference in measuring mental attentional capacity. NAYOUNG KIM, *York University*, MARIE ARSALIDOU , *York University and National Research University Higher School of Economics, Moscow, Russia*, JUAN PASCUAL-LEONE, *York University* ■ Mental attentional (M-) capacity is the number of independent information units, or schemes, that an individual can hold and manipulate for a short period of time. This ability is limited, and improves over the course of normal development, reaching an upper limit of seven units in young adulthood. Tasks that contain a higher degree of interfering or misleading features improve assessment accuracy of mental attentional capacity in children, but adults perform similarly across high and low interference conditions. The relations between M-capacity and interference in different domains were investigated in 94 adults aged 20-30 years using visuospatial, verbal, and numeric M-tasks and the color-word Stroop, which assess inhibitory control. Results indicated that equal numbers of M-capacity scores from low and high interference conditions were equivalent with scores on an established M-task. These findings were consistent with previous studies and suggest that while the presence of task-irrelevant cues are a necessary component of M-capacity measures, measurement accuracy is not optimized under high interference contexts for adults. However, significantly slower reaction times and lower accuracy distinguished performance in high than in low interference tasks. Performance accuracy in high interference contexts predicted ability to voluntarily inhibit dominant irrelevant responses in relation to task demands.

(# 14)

Inducing multi-sensory percepts of illusory self-rotation in a stationary observer. RAMY KIROLLOS, *Carleton University*, OLIVIA LONGO, *Carleton University*, MATTHEW BROWN, *Carleton University*, CHRIS M. HERDMAN, ■ Illusions of self-rotation in a stationary observer can be induced via the visual and the vestibular/balance systems. Traditionally, a rotating drum apparatus is used to study visually induced self-rotation percepts (vection). In rotating drum experiments, the observer sits in a large cylinder that has alternating black and white vertical stripes that occupy the entire visual field. The drum and hence the stripes rotate, making the observer feel that s/he is rotating in the direction opposite to that of the stripes. Self-rotation percepts can also be induced via the vestibular system by blowing warm/cool air into the inner-ear (i.e., air caloric stimulation). We have developed a behavioural method to compare percepts of self-rotation in the visual and vestibular modalities. In E1, the rotating drum apparatus was replicated in virtual reality on a head-mounted display. The speed and direction of the virtual drum were manipulated. Participants indicated the magnitude and direction of the vection they were experiencing by rotating a knob that could spin infinitely in clockwise or counter-clockwise directions. Results from E1 indicated that faster drum rotation speeds produced greater vection magnitudes, but did not alter the amount of time required to induce the perception of vection. In E2, percepts of self-rotation were induced via the vestibular system by air caloric stimulation. Data from E1 and preliminary results from E2 were compared to determine the relative magnitude of self-rotation percepts in the visual and vestibular modalities.

(# 15)

The vision rhythm? Entrainment at multiple frequencies reveal differential interactions between neural oscillations and visual perception. SAYEED A. D. KIZUK, *University of Alberta*, ANKUR BANERJEE, *University of Alberta*, KYLE E. MATHEWSON, *University of Alberta* ■ Attentional biasing is needed to select relevant sensory information. Recently, it has been shown that alpha band (7-14 Hz) oscillations can serve attentional biasing functions via phase and amplitude changes which modulate neural activity and perceptual awareness in a pulsating inhibition. These pulses of inhibition can be entrained by bottom-up induction of temporal expectancies with repetitive visual stimuli, eliciting cyclic decrements in visual performance for stimuli appearing out-of-phase with the external rhythm. One outstanding question is whether these phase-dependent decrements in visual processing are specific to the alpha frequency. If so, it would suggest that alpha specifically reflects neural processes related to visual perception, whereas non-alpha oscillatory rhythms have functions unrelated to vision. We presented bilateral entrainers 4, 8.5, 12, 15, and 20 Hz, corresponding to Theta, Lo w Alpha, Alpha, High Alpha, and Beta. Oscillations in brain activity were entrained at each frequency, with increased phase-locking observed at all 5 frequencies. However,

the behavioural interaction with phase was present to a greater extent for the 12-Hz rhythm. These findings extend the recent findings on the dependence between alpha phase and visual perception, showing that this phase-dependency cannot be extended to non-alpha rhythms, and thus provide further evidence implicating alpha as a pulsating inhibition which serves to rhythmically inhibit visual processing.

(# 16)

Sex-based influences of pubertal LPS exposure on adult learning and memory. Daria Kolmogorova, *University of Ottawa*, Geneviève Legault, *University of Ottawa*, Nafissa Ismail, *University of Ottawa* ■ Puberty is a critical period of brain development and gonadal maturation, and it is particularly vulnerable to damage from stress. Stress-induced immune responses during the prenatal and postnatal periods have been shown to acutely affect brain structure and function. However, the enduring and sex-specific consequences of pubertal immune stressors remain unknown. Using a rodent model of learning and memory, this study examined the role of sex and sex hormones in the enduring cognitive effects of pubertal immune stress. Male (n= 20) and female (n= 20) CD-1 mice were shipped at three weeks of age and housed separately. Six-week-old (pubertal) animals were injected with either the bacterial endotoxin lipopolysaccharide (LPS; n= 20) or a saline control vehicle. Sickness and weight changes were then monitored for 48 hours. At nine weeks of age, half of the animals underwent gonadectomy (i.e. surgical removal of the gonads). Beginning at 10 weeks of age (adulthood), short-term and long-term learning and memory was assessed with the Barnes Maze and Morris Water Maze. Overall, males displayed significantly more sickness behaviours than females following LPS injection, although sex differences in weight changes were absent. Pubertal LPS exposure revealed varying effects on later learning and memory performance across sex and gonadal status.

(# 17)

Evidence for attentional momentum. Elisabeth Kreykenbohm, *Simon Fraser University*, Bertrand Sager, *Simon Fraser University*, Caitlyn McColeman, *Simon Fraser University*, Thomas M. Spalek, *Simon Fraser University* ■ Posner and Cohen (1984) provided evidence suggesting that mechanisms exist to facilitate searching by deterring observers from revisiting target-absent locations. Specifically, they found that responses were slower to targets presented at previously cued than uncued locations, a finding termed Inhibition of Return (IOR). Pratt, Spalek, and Bradshaw (1999) likened the IOR paradigm to that of tracking moving objects in our environment, which move consistent with the principle of momentum. Tracking could be facilitated if we generate expectations regarding future locations and bias attentional deployment to those locations. Implementing this strategy in the IOR paradigm should produce facilitation when targets occur in locations consistent with momentum (opposite facilitation effect, OFE). Consistent with this Attentional Momentum (AM) account, OFE was observed, but Snyder, Schmidt, and Kingstone (2001) suggested that OFE was unreliable and might be a consequence of eye movements. The present work examined this criticism in three experiments. Experiment 1 was a replication of Pratt et al. (1999) where observers were simply asked to keep their eyes at fixation while responding to peripheral targets. Experiment 2 had observers perform the same task while moving their eyes to each stimulus presented during the trial sequence. Experiment 3 was a replication of Experiment 1, with the addition of an eye-tracker to ensure that fixation was maintained. Consistent with AM, OFE was reliably observed in all three experiments, refuting Snyder et al.'s suggestion that OFE is an unreliable finding and that it is restricted only to situations where eye movements are involved.

(# 18)

Red light, green light: Understanding the perceptual qualities of alpha inhibition and the role of attention in entrainment. Jonathan William Perry Kuziek, *University of Alberta*, Kyle E. Mathewson, *University of Alberta* ■ Alpha oscillations, rhythmic neural activity fluctuating 8-12 times per second (Hz), modulates awareness and inhibits detection of visual stimuli. This inhibitory process is dependent on both high amounts of alpha activity and the precise moment a visual stimulus occurs during the alpha cycle. These alpha oscillations can be induced using an entrainment technique whereby visual stimuli are rapidly presented at 8-12 Hz, causing alpha to oscillate in a similar rhythm. Targets then presented in-time with entrainment are better detected than those out-of-time. However it is unclear if attention plays a role in modulating this entrainment process. The goal of the current research is to understand the role of feature attention in the entrainment of neural activity, specifically, can entrainment be isolated to a single set of distinct attended stimuli when multiple, competing entrainers are presented at the same spatial location but in counter-rhythm to the attended set. Data suggests entrainment can be actively manipulated by attending to certain stimuli while ignoring others; participants tend to be entrained by attended stimuli and

not by the competing stimuli or the combined rhythm of all presented stimuli. Brief visual targets presented in-rhythm of the attended set of entrainers are better detected than those presented out-of-rhythm of the attended set. These results suggest that attention can modulate the entrainment process, influencing detection of visual stimuli based on the rhythm of attended, rather than unattended, entrainers.

(# 19)

Raed caerfully: Unexpectedly poor spellers are prone to partial cue reading. Tru E. Kwong, *Mount Royal University*, Jessica J. Joseph, *Mount Royal University* ■ Unexpectedly poor spellers are individuals with below average spelling skills, but normal reading skills. One of the prevailing theories about this small but significant group is that they read using partial cues only (e.g., Ehri, 1986; Frith, 1980; Holmes & Castles, 2001). This study was aimed at testing this theory using orthographic matching tasks (judging pairs of letter strings as 'same' or 'different'). 85 university students completed tests of Word Reading, Sentence Comprehension, and Spelling, as well as an Orthographic Matching task that varied in terms of a) whether or not the letter string pairs matched, and b) whether or not the letter string pairs contained a real word. 13 participants met the criteria for unexpectedly poor spellers. These participants were compared with good spellers who were matched for reading ability, to control for the possibility that any differences found between the groups would be due to different reading ability. Although the two groups did not differ in terms of accuracy on the orthographic matching task, the good spellers were significantly faster in making judgments about all types of letter string pairs. This supports the idea of partial cue reading; the fact that the differences were seen even in cases of nonword strings eliminates the possibility that the results are an artifact of greater word knowledge among good spellers.

(# 20)

Effects of a warning on the resumption of an interrupted dynamic task. Katherine Labonté, *Université Laval*, Michaël Lévesque-Dion, *Université Laval*, Sébastien Tremblay, *Université Laval*, Francois Vachon, *Université Laval* ■ Operators working in extreme environments are often confronted with task interruptions. These interruptions can impair performance, thus representing a threat to public safety. Most of the tools designed to aid task resumption in such dynamic contexts are post-interruption solutions consisting of providing information about missed events following an interruption. Although pre-interruption solutions (e.g., warning an individual of an imminent interruption) have proven effective in static contexts, their beneficial impact on the resumption of dynamic tasks is not guaranteed since pre- and post-interruption situations can differ greatly. The present study therefore aimed at testing whether a pre-interruption warning could facilitate interruption recovery in dynamic settings. We employed a microworld simulating above-water warfare and compared task recovery following an interruption that could either be notified (8 s before it takes place) or not. Results revealed enhanced post-interruption decision accuracy and speed when providing foreknowledge of the imminent interruption. Moreover, warning participants of the impending suspension of their task resulted in fewer and longer fixations on the to-be-monitored display following the interruption, indicating a decreased need to undertake rapid visual search. Combined with the fact that after a notified interruption, participants made more fixations on elements of the display that were necessary for taking action, these findings suggest that warning participants of an interruption helps them prepare to execute their first post-interruption operations. Therefore, as with static contexts, a pre-interruption warning has the potential to support interruption recovery in dynamic settings.

(# 21)

First target processing throughout the period of the attentional blink: An event-related potential study. Hayley E. P. Lagroix, *Simon Fraser University*, Kevin M. D. Boyd, *Simon Fraser University*, Nadja Jankovic, *Simon Fraser University*, Aaron A. N. Richardson, *Simon Fraser University*, Vincent Di Lollo, *Simon Fraser University*, Thomas M. Spalek, *Simon Fraser University* ■ Perception of the second of two rapidly sequential targets (T1, T2) is impaired when presented up to 700ms after the first (attentional blink; AB). Virtually all studies of the AB have concentrated on T2. In the present work, we examined T1 processing throughout the period of the AB. It has been shown that T1 accuracy is lowest when it comes directly before T2 (Lag 1) and asymptotes close to a ceiling level set by the response scale at longer lags. In the present work, we use electrophysiological measures (event-related potentials; ERPs) to obviate ceiling constraints and to reveal the underlying neurophysiological mechanisms. The T1 and T2 stimuli each consisted of a digit (target) and a letter (distractor) presented either on the vertical meridian or on the horizontal meridian. When T1 was presented horizontally, T2 was presented vertically, and vice versa. T1 and T2 were presented at SOAs of 100, 300, or 700 ms (Lags 1, 3, and 7, respectively). Presentation of T1

elicited the conventional non-lateralized ERP components (e.g., P1, N1, P3) as well as lateralized components (e.g., N2pc). A pronounced activity lateralized to the T1 location was also recorded upon the onset of T2. This unanticipated result suggests that the location of T1 is maintained throughout the period of the AB, even though that information is irrelevant to performance of the T1 task.

(# 22)

The lateral septum and anterior hypothalamus work in tandem to regulate defensive burying. Steven J. Lamontagne, *Queen's University* ■ The lateral septum (LS) and anterior hypothalamus (AHA) are heavily inter-connected and independently implicated in behavioural defence regulation. The current study examined whether these two structures work in tandem to regulate rats' defensive responses toward a potential threat (as modelled in the elevated plus-maze) and a present, localizable threat (as modelled in the shock-probe burying test). A pharmacological disconnection technique was used: rats (n = 8) in the experimental condition received co-infusions of muscimol into one side of the lateral septum and contralateral anterior hypothalamus, and rats in the three control conditions received either contralateral infusions of saline (n = 9) into both structures or unilateral infusions of muscimol into one structure (LS, n = 8; AHA n = 6), combined with saline in the contralateral side of the other structure. Five minutes after their infusions, rats were tested in the plus-maze. One week later, they received a second infusion and were tested in the burying test. Co-infusions of muscimol into one side of the LS and the contralateral AHA significantly suppressed rats' shock-probe burying without altering their open-arm avoidance in the plus-maze. No behavioural effects were observed following unilateral infusions of muscimol into either structure alone. Together, these findings suggest that the LS and AHA work in a serial fashion to regulate rats' innate defensive behaviours toward threats that are present and localizable in their immediate environment but not toward potential threats that might or might not be present.

(# 23)

A bilingual advantage: investigating the effect of bilingualism on task switching. Nicole Irene Landry, *University of Ottawa*, Shanna Kousaie, *McGill University*, Rocio Lopez, *University of Ottawa*, Vanessa Taler, *University of Ottawa & Bruyère Research Institute* ■ Introduction: It is well known that bilinguals are able to switch between languages as they need, however, findings are mixed when it is investigated if language switching skills may generalize to other cognitive control tasks. The present study seeks to investigate the effects that bilingualism may have on non-linguistic task-switching. Methods: 46 younger adults (23 monolingual English and 23 French-English bilingual), and 35 older adults (26 monolinguals English and 9 French-English bilingual) have taken part in the present study. All participants underwent neuropsychological testing followed by a task-switching paradigm. Letter-number stimuli (e.g. A7) were presented, and participants made decisions about either the number (odd or even) or the letter (vowel or consonant) based on the cue presented prior to the stimulus (NUMBER or LETTER). Two non-mixed blocks and four mixed blocks were completed. Results: The behavioral results included measures of reaction time and accuracy. Data collection is ongoing; however, preliminary analyses suggest that there are effects of both age and bilingualism on task-switching, with bilinguals showing overall faster responses and smaller local switch costs than monolinguals. Furthermore, current data suggest that bilinguals were faster than monolinguals for mixed blocks only, and young and older participants show similar response times for switch trials whereas the young participants were faster than the older participants for repeat trials. Findings will be discussed with respect to the implications of bilingualism for task-switching and cognition more generally.

(# 24)

Embodiment in virtual reality. Robin M. Langerak, *Carleton University*, Kiah Prince, *Carleton University*, Chris M. Herdman, *Carleton University* ■ Virtual Reality (VR) technologies have become increasingly available and are able to visually immerse users in virtual environments. Although the visual rendering of VR environments is compelling, the technology that supports interaction with VR falls behind in terms of realism, thus limiting the user's sense of immersion. As such, the influx of VR technologies has been accompanied by motion-tracking systems that support bodily interaction in virtual environments. However, the question remains whether a users' sense of embodiment is altered in VR relative to the natural world. A variety of embodiment illusions (e.g., the rubber hand illusion) have been replicated in VR, demonstrating an embodied presence in virtual environments, but less is known about how the embodied mind interacts with VR. Embodied interaction was examined in an experiment that compared reaching movements in a virtual setting to those observed in natural settings. Participants viewed a virtual desk through a head-mounted display and used a

hand-held motion controller to reach for virtual targets displayed on the desk. The participant's hand was visually represented by a virtual cube that moved in tandem with the motion controller. The results showed that virtual reaches exhibited the same latency and accuracy characteristics as natural reaches, but post-experiment questionnaires and interviews revealed that participants felt control but not ownership over the virtual cube.

(# 25)

The 'Candy Crush' sweet tooth: How 'near-misses' in Candy Crush trigger increases in arousal, frustration, and urge to continue gameplay. Chanel Larche, *University of Waterloo*, Natalia Musielak, *University of Waterloo*, Mike J. Dixon, *University of Waterloo* ■ Like many forms of slot-machine games, the exceedingly popular smartphone game "Candy Crush" features near-miss outcomes. In slots, a near-miss involves getting two of the needed three high-paying symbols on the pay-line (i.e., just missing the big win). In Candy Crush, the game signals when you just miss getting to the next level by one or two moves. The goal of the present study was to examine whether players perceived Candy Crush near-misses as psychologically and physiologically distinct from regular losses. As such, near-misses were hypothesized to trigger increases in player's arousal, frustration and urge to continue play compared to regular losses. Sixty avid Candy Crush players were recruited to play the game for 30 minutes while having their Heart Rate, Skin Conductance Level, subjective arousal, frustration and urge to play recorded for three types of outcomes: wins (where they level up), losses (where they don't come close to levelling up), and near-misses (where they just miss levelling up). Near-misses were more arousing than losses as indexed by increased heart rate and greater subjective arousal. Near-misses were also subjectively rated as the most frustrating of all outcomes. Most importantly, of any type of outcome, near-misses triggered the most substantial urge to continue play. These findings suggest that near-misses in Candy Crush play a role in player commitment to the game, and may contribute to players playing for longer than intended.

(# 26)

The effects of valence on driving. Caroll Lau, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Emotion is thought to affect attention while driving. For example, the "broaden and build" model suggests that positive valence broadens attention leading to more fixations on peripheral stimuli, while negative valence narrows attentional focus. When driving, these influences on attention can determine how effectively one can detect hazards. However, recent studies on emotion and driving tend to confound valence and arousal. This study was designed to determine how positive and negative valence influences driving performance once arousal was controlled. Positive and negative valence emotions were created by using music in the major and minor keys. Arousal was controlled by ensuring that all of the music had the same (moderate) tempo. The prediction was that positive valence music would improve steering performance and significantly reduce braking response time (RT) for peripheral hazards but not central. There was no effect of valence on steering performance, but when it came to braking RT, there was a Hazard type (central, peripheral) X Music Valence interaction. When the participants' reported post-test arousal ratings were included as covariates in the analysis, the expected pattern emerged. In particular, the group that experienced the positive valence music had significantly faster RTs for both types of hazards. This study indicates that it is important not to confound valence and arousal because it seems they have interactive effects as it relates to driving performance.

(# 27)

What can the perceived word frequency ratings of older adults tell us about lexical representation? Anastasia Lazenkas, ■ Greater reading experience and larger vocabulary size are associated with weaker word frequency effects in the word recognition latencies of young adults. In older adults, however, the frequency effects are often found to be stronger despite their superior reading experience and larger vocabulary. This study explores the possibility that increased latencies are a result of older adults' weaker lexical representations. To examine this possibility we collected perceived (subjective) frequency ratings from the aging population and compared them to ratings previously obtained from a group of younger adults (Kuperman and Van Dyke, 2013). A group of neurologically normal, English-speaking, older adults was asked to rate, on a scale of 1 (never) to 7 (several times a day), how frequently they encountered a list of words. The list consisted of 500 words randomly selected to represent the entire range of objective corpus-based frequencies. Ratings obtained from the aging participants were analyzed for demographic differences, and were compared to frequency counts from the SUBTLEX corpus (Brysbaert and New, 2009), as well as to the ratings of the younger participants. Results indicate that subjective frequency ratings do indeed decrease with age, however, as was the case with the younger participants,

older participants who had more years of formal education gave consistently higher ratings than their counterparts with fewer years of education. We discuss implications of our findings for theoretical models of lexical access and cognitive aging.

(# 28)

Tied to emotions: Association with an emotional context boosts memory for foils. Christopher Lee, *University of Waterloo*, Myra A. Fernandes, *University of Waterloo* ■ Recent work suggests that when making recognition memory decisions, we re-enter the mode of processing initially engaged at encoding (Jacoby, Shimizu, Daniels, & Rhodes, 2005). New information (foils) present during recognition tests is believed to be encoded using the same processing mode and reaps the benefits on subsequent memory tests. We tested this claim by examining if foil words experienced alongside 'negatively-tinged' targets, compared to 'neutrally-tinged' targets, would later be better remembered. Participants studied sequentially presented target words in 2 distinct blocks. Each word was overlayed onto either a negative or neutral picture, creating a context valence. Shallow or deep encoding instructions for the target words was manipulated between-subjects. Following study, participants completed a recognition test for the words presented alone (Test 1), split into two blocks: one for words initially overlayed onto negative pictures, and one for words overlayed onto neutral pictures. Foils from these tests were then compiled into a final recognition test (Test 2). Test 1 showed the expected main effect of encoding instruction and context, such that words studied with 'deep' instructions or in a negative context were better recognized. On Test 2, memory for foils derived from the negatively-tinged, compared to the neutrally-tinged Test 1 block, was higher. This effect was present only when Test 1 words were studied with shallow encoding instructions. Results show that memory for foils differs depending on the emotionality of the processing mode in which they were encountered.

(# 29)

Gaze patterns elicited during configural and featural face processing. Chantal Lemieux, *University of Ottawa*, Isabelle Boutet, *University of Ottawa*, Marc-André Goulet, *University of Ottawa*, Charles A. Collin, *University of Ottawa* ■ We examined whether there is an association between eye movements and the processing of configural and featural information in faces. Gaze patterns were recorded while participants performed a same/different discrimination task on upright and inverted faces that differed with respect to configural information (e.g., by moving the eyes of an original face) or that differed with respect to individual features (e.g., by exchanging the eyes with those of another face). In Experiment 1, participants performed the configural and featural conditions randomly and naively, which was hypothesized to trigger a default scan path. In Experiment 2, participants were informed about the type of modification prior to each block of the task, which was hypothesized to trigger specific scan paths for configural vs featural modifications. Behavioral results showed the expected interaction with discrimination of configural modifications being more severely affected by inversion than discrimination of featural modifications. This expected effect was found to be more pronounced in Experiment 2. Eye tracking results for Experiment 1 show total fixation time to be indicative of scan paths being directed to the area of the face that had been modified, irrespective of modification type (configural vs. featural) and orientation. All other eye tracking measures (average fixation length and fixation count per second) demonstrated very few differences across conditions, suggesting a default-viewing pattern. Preliminary eye tracking analyses for Experiment 2 are still underway.

(# 30)

Paranormal belief reduction through education: A meta-analysis. Carrie A. Leonard, *University of Lethbridge*, Robert J. Williams, *University of Lethbridge*, John R. Vokey, *University of Lethbridge* ■ Pseudoscientific belief systems have been implicated in the use of risky/unproven alternative medicines such as homeopathic remedies for the treatment of Ebola. Some researchers have attempted to reduce paranormal beliefs, a sub-facet of pseudoscientific beliefs, through educational interventions. These interventions have typically focused on increasing both the understanding of the scientific process and critical thinking skills. Understanding the extent to which educational interventions reduce paranormal beliefs is the primary aim of this research. To achieve this aim, a comprehensive and systematic review of the academic literature was undertaken. A meta-analysis was then conducted including all research studies that utilized both pre- and post- tests of paranormal beliefs, reported data necessary for calculation of effect sizes, and were written in English. Aside from being of theoretical interest, understanding the relationship between topic-specific science based education and pseudoscience belief reduction has the potential to inform future interventions designed to mitigate the development of and/or reduce presently held paranormal beliefs.

(# 31)

Identifying gambling-specific erroneous cognitions. Carrie A. Leonard, *University of Lethbridge* ■ Gambling fallacies, a collection of gambling-specific cognitive errors, are common among gamblers. Interest in gambling fallacies is due, in large part, to their presumed etiological role in the development of problem gambling. To date there has been a lack of consensus as to the specific errors that constitute gambling fallacies and lack of agreement as to which instrument best captures them. The results of our large-scale review identified six primary gambling fallacies and 18 instruments that are available to measure them. An evaluation of these instruments revealed that most of these instruments have good internal consistency as well as adequate concurrent and external validity. Their primary limitation concerns inadequate content validity that is attributable to either, or both, insufficient coverage of the fallacies or inclusion of non-fallacious items such as problem gambling behaviours/tendencies. Of all instruments reviewed, the Gambling Fallacies Measure is the best overall instrument with excellent content, concurrent, discriminant, and external validity, and satisfactory test-retest reliability. Implications: The previously established strong relationship between gambling fallacies and problem gambling may be inflated due to the inclusion of problem gambling symptomatology in many gambling fallacy instruments. By extension, questions are raised regarding the efficacy of problem gambling intervention and prevention methods that focus on correcting fallacious thought. Based on these results, re-examination of these issues is warranted.

(# 32)

Examining metrics for the psychomotor vigilance test: A comparison of the ex-gaussian distribution function to more traditional measures. Geoffrey Lewington, *Saint Mary's University* ■ Among the more reliable effects of sleep deprivation is degraded vigilant attention. Perhaps the most widely used assessment of this effect is the psychomotor vigilance test (PVT), a robust and reliable gauge of behavioural alertness that measures response time (RT) to stimuli presented at varying inter-stimulus intervals. In recent years, attempts have been made to determine the most appropriate metric for use in PVT analyses. The present study reappraises ten of these metrics together with three novel measures derived from the ex-Gaussian distribution function, a function noted for its good fit to RT data. Results favour mean 1/RT (mean response speed) as a primary metric for the effect of sleep deprivation on vigilant attention over those of the ex-Gaussian function.

(# 33)

Awareness modulates covariation of attention and affect in a cueing task. Jingyu Li, *University of Regina*, Chris Oriet, *University of Regina* ■ Previous research has shown a correlation between the extent to which a stimulus is attended and affective evaluation of stimuli in cueing tasks. Devaluation is argued to result when stimuli are inhibited or ignored. However, it is unknown whether awareness of the cue modulates this relationship. In the present experiment, the location of a cue (a red outline box) was manipulated relative to the location of the subsequent target (a randomly-generated Mondrian pattern). On each trial, subjects completed a cueing task and made a subsequent affective evaluation of the target across three phases: fixed location cue, no cue, random location cue phase. Subjects reported their awareness of the cue. For those who were unaware of the cue, the cue facilitated responding in the fixed cue phase; when previously-cued stimuli reappeared in the previously cued location in the no cue phase, faster responses were accompanied by higher ratings. However, for subjects who were aware of the cue, the cue inhibited responding in the fixed cue phase, and this correlation disappeared. The results suggest that the benefits from the cue (i.e., facilitation and higher affective ratings) are the result of increased processing fluency, but these benefits are only realized for subjects unaware of the cue who are thus unable to actively ignore it. Awareness allows the cue to be actively ignored, resulting in inhibition that persists into the no cue phase, disrupting this processing fluency.

(# 34)

A behavioural test battery examining the sensitivity of anxiety tests in adult zebrafish following acute chlordiazepoxide exposure.. Erica Loh, *MacEwan Univeristy*, Melike Schalomon, *MacEwan University*, Trevor Hamilton, *MacEwan University* ■ Due to their practicality in laboratory settings and genetic homology to humans, zebrafish (Danio rerio) are gaining popularity as a research species in disciplines such as behavioural neuroscience and pharmacology. Since zebrafish are a rapidly growing model organism for testing and developing novel drugs it is essential that reliable and valid tests are used to assess behaviour. The purpose of the present study was to compare the sensitivity of several behavioural tests commonly used to measure anxiety in fish research: the novel tank dive test, the light/dark test, and the shoaling test. In order to compare sensitivity between behavioural tests zebrafish were administered varying concentrations of chlordiazepoxide. We hypothesized that chlordiazepoxide would have a

linear dose-dependent effect in fish, such that as dose increased, behaviours indicative of reduced anxiety would be observed. Furthermore, we predicted that the light/dark test and shoaling task would be more sensitive measures of anxiety in zebrafish in comparison to the novel tank dive task, following chlordiazepoxide administration. Our results suggested a linearly increasing dose-dependent effect of reduced anxiety in fish, following of chlordiazepoxide exposure. Furthermore, our findings indicated that the shoaling test was the most sensitive measure of anxiety following chlordiazepoxide exposure, followed by the novel tank dive test and light/dark test, respectively.

(# 35)

Recognition memory: Attentional orienting and selective attention effects on encoding. Lisa Lorentz, *McMaster University*, Mitchell Reid LaPointe, *McMaster University*, Tamara M. Rosner, *McMaster University*, Javier Ortiz, *Universidad de Granada*, Hanae Davis, *McMaster University*, Ellen MacLellan, *McMaster University*, Bruce Milliken, *McMaster University* ■ Research on the attentional boost effect has shown that a word stimulus is better remembered when simultaneously presented with a simple target stimulus to be detected at study, than when presented with a distractor stimulus that is ignored at study. Seemingly unrelated research has found that a target word presented with an incongruent distractor at study is remembered better than a target word presented with a congruent distractor at study. The present research examined whether these two effects share the same underlying cognitive mechanism. Our logic followed that of Mulligan et al. (2014), who examined similarities between the attentional boost and word frequency effects. Here, we compared memory performance for trials in which the mechanisms underlying both the attentional boost and congruency effects might be triggered simultaneously, with memory performance for trials in which only one of these mechanisms ought to have been triggered. We predicted that if these effects share the same underlying mechanism, then the congruency effect ought to interact with the attentional boost effect. Interestingly, we observed such an interaction in Experiment 1, in which participants counted "boost" targets, but not in Experiment 2, in which participants made manual detection responses to "boost" targets. The results point to two interesting paths for future research, one that focuses on optimal methods for measuring the attentional boost effect, and the other on how different methods for measuring that effect might interact with mechanisms that underlie the congruency effect.

(# 36)

The role of color in short-term memory maintenance. Talia Losier, *Université de Montréal*, Christine Lefebvre, *Université de Montréal*, Mattia Doro, *University of Padova*, Roberto Dell'Acqua, *University of Padova*, Pierre Jolicoeur, *Université de Montréal* ■ The physical characteristics of a stimulus have a significant impact on processing. Pomerleau and colleagues (2014) demonstrated that spatial attention is deployed faster for certain colors of equal luminance. They indeed found a differential latency of the lateralized event-related potential (ERP) component N2pc. We attempted to determine if maintenance of information in short-term memory is also affected by the color of a stimulus. In order to do this, we measured the lateralized ERP component SPCN. We used an attentional blink paradigm in which there is a difficulty in correctly reporting a second target (T2) when it is presented close in time to an earlier one (T1) in a rapid serial visual presentation stream (RSVP). Manipulating the lag between the targets allowed us to study a potential interaction between the color effect and the difficulty of the task. As did Pomerleau and colleague's (2014), we found a change in N2pc latency indicating a slower spatial deployment of attention for green versus blue. Difficulty did not seem to affect spatial deployment of attention no matter the color. There was also a significant increase in the SPCN amplitude for the color blue no matter the difficulty. This suggests that certain colors are easier to maintain in short-term memory. These results indicate that certain colors have an advantage at multiple points in processing. This study also helps better understand the impact of the stimuli characteristics chosen for an experiment, allowing us to make a wiser decision.

(# 37)

Pupil dilation as a measure of action prediction. Jeff Loucks, *University of Regina*, Denee Buchko, *University of Regina* ■ Previous research indicates that observers' attention to perceptual information in human action varies as a function of the relevance of this information to predicting action outcomes. Specifically, observers are more sensitive to increases in drop height in the context of dropping into a narrow container as compared to a wide container (as increasing drop height increases targeting error). The current experiment investigated whether observers' eye behaviour might provide additional support for this idea. Adult participants viewed videos of actors dropping objects into containers and discriminated changes in drop height while pupil diameter and eye movements were recorded. Actors dropped into narrow vs. wide

containers, and videos were also presented in upright vs. inverted orientations. Results confirmed the prediction that pupils would dilate as a function of the predictive relevance of drop height: pupil diameter was significantly larger when participants viewed increasing vs. decreasing drop heights, but only for the narrow container, and only in the upright condition. Behavioural and dwell time data also revealed effects of inversion: observers' were significantly less accurate at discriminating height changes in the inverted videos, and also dwelled significantly less on the head in this condition. Moreover, dwell time on the head was significantly negatively correlated with accuracy, but only in the inverted condition. This research is the first to show that pupils respond to the predictive relevance of perceptual information during action observation, and replicate previous findings of inversion for spatial trajectory information in action.

(# 38)

The mitigating effects of repeated memory reactivations on forgetting. Sydney MacLeod, *Trent University*, Michael Reynolds, *Trent University*, Hugo Lehmann, *Trent University* ■ Memory reactivation is a process whereby cueing or recalling a long-term memory makes it enter an active and labile state. Substantial evidence suggests that, during this state, the memory can be updated (e.g., adding information) and can become more vulnerable to disruption (e.g., brain insult). It is possible, however, that memory reactivation can also prevent memory decay. Hence, repeated memory reactivations could mitigate forgetting. We examined this possibility by having participants view a series of neutral images and then randomly assigned them to one of four reactivation groups: no cued-recall (control), distractor control (cued-recall of experimental procedures but not the images), indirect cued-recall (e.g., image categories), direct cued-recall (e.g., what images did you see?). The study also included three retention intervals: 1 hour, 8 days, and 28 days. Importantly, the participants received three reactivations equally spaced within their respective retention interval. At the end of the interval, all participants were given a free recall test in which they were asked to write down each image they remembered with as many details as possible. Preliminary analysis of the data revealed that both the direct- and indirect-cued groups remembered significantly more images and more details than participants in the control conditions, with the effect being most pronounced in the 28-day retention interval condition. These findings suggest that memory reactivation indeed makes memories more resistant to decay.

(# 39)

Questionnaire length and psychological reactance influence random responding. Zdravko Marjanovic, *Thompson Rivers University*, Jennifer MacDonald, *Thompson Rivers University*, Lisa Bajkov, *Thompson Rivers University*, Noor Shakir Shubear, *Thompson Rivers University*, Tsz Yin Fung, *Thompson Rivers University* ■ Research has shown that participants who randomly respond to questionnaire items cause errors in data, producing unwanted effects and leading researchers astray in terms of the conclusions they make. This study tested the hypothesis that questionnaire length and psychological reactance (i.e. rebelliousness) influence random responding. Studies indicate that long questionnaires hinder participants' motivation to answer items conscientiously due to boredom or fatigue. A participant may also psychologically react when they perceive a loss of autonomy or feel coerced to participate by questionnaire administrators. To test this, we administered a personality questionnaire to 156 undergraduate university students. Participants were randomly assigned to complete either a long or short questionnaire containing either a neutral or reactance priming task. Random responders (RR) were identified using the 5-item Conscientious Responders Scale (CRS), a validity scale, and the Inter-Item Standard Deviation (ISD), a statistical comparison of response consistency. Results showed that there was a significant main effect of questionnaire length such that participants who received the long questionnaire randomly responded more than those who received the short questionnaire. There was no main effect of psychological reactance or an interaction effect. The findings suggest that questionnaire length meaningfully influences random responding rates which can be easily detected using validity scales, such as the CRS or the ISD. Implications for researchers and practitioners are discussed.

(# 40)

Habituation of the pupillary dilation response to auditory stimuli: Toward indexing the orienting response. Alexandre Marois, *Université Laval*, Mark Parent, *Université Laval*, Johnathan Crépeau, *Université Laval*, Maxime Legendre, *Université Laval*, Francois Vachon, *Université Laval* ■ The rare occurrence of a sound deviating from the auditory background tends to trigger attentional orienting and a group of sympathetic physiological responses, such as an increase in cardiac and electrodermal activities, that can be used to index this orienting response (OR). The pupil dilation response (PDR), another sympathetic-associated response, can be triggered by deviant sounds (e.g., Steiner & Barry, 2011).

Yet, findings surrounding the PDR as an OR index are conflicting. To clarify such inconsistencies, the current study was tailor-designed to assess whether the PDR satisfies the specific criteria to be identified correctly as a proxy of the OR, namely a classic habituation pattern and a sensitivity to the size of the deviation. In the context of an irrelevant sound paradigm, the PDR 1) decrement to a repeated standard sound; 2) recovery to a deviant sound; and 3) dishabituation to the re-presentation of the standard were assessed for small and large auditory deviations. In large-deviation trials, the PDR showed evidence for habituation and recovery, but dishabituation failed to reach significance. With small deviations, no evidence of habituation, recovery to the deviant tone or dishabituation was found. Those results showed that variations of the PDR are rather consistent with the properties of the OR, supporting the proposition that pupillary response can be a valid index of the OR.

(# 41)

Is smartphone use associated with more inattentiveness in everyday life? Jeremy Marty-Dugas, *University of Waterloo*, Brandon C. W. Ralph, *University of Waterloo*, Daniel Smilek, *University of Waterloo* ■ In a sample of 160 participants, we explored how self-reported smartphone use relates to self-reported everyday inattention. To assess smartphone use, we developed two scales; one assessing general smartphone use (i.e. how frequently people send and receive texts, use social media, etc), and the other measuring absentminded use of the smartphone (i.e. by assessing how frequently participants use their phone longer than intended, or without a purpose in mind). In addition to these scales participants completed scales assessing everyday attention lapses (MAASLO), attention errors (ARCES), spontaneous mind wandering (MWS) and deliberate mind wandering (MWD). Preliminary analyses revealed a strong positive correlation between absentminded smartphone use and general smartphone use, suggesting that those who use the smartphone more often tend to also use it more absent-mindedly. In addition, we observed significant positive relations between each of the smartphone use scales and each of the four measures of inattention. However, a series of regression analyses revealed that when controlling for absentminded smartphone use, general smartphone use was shown to have no significant relation to any of the four measures of inattention. Meanwhile, absentminded smartphone use was positively related to each of the inattention measures. This suggests that only a particular type of smart phone use is related to everyday inattention, rather than smart phone use per se.

(# 42)

Response speed and performance in a computerized Water Level Test. Liza Mastikhina, *University of Calgary*, Daniel Voyer, *University of New Brunswick* ■ The present study validated a computerized Water Level Test (WLT) and used response time data to examine some of the factors underlying performance on this task. Participants were 93 women and 75 men who completed a computerized WLT, as well as the original paper version of that test as a measure of concurrent validity. Unlike the original paper version, the computerized version allows measurement of response time divided into start time and completion time, which were recorded along with the deviation angle accuracy measure. Convergent validity was further estimated using self-reported high school grades in math as well as scores on the Mental Rotations Test, Landscape Perception Test, and Childhood Activities Questionnaire. Divergent validity was estimated using self-reported high school grades in English. Results indicated a significant male advantage on WLT accuracy regardless of testing format. Men started to draw the line on the computerized WLT faster than women; however, they were significantly slower than women to complete their response. Consideration of strategy selection suggested that those who reported reliance on gravity, compared to other possible selections, showed slower drawing speed. Correlational analyses confirmed convergent and divergent validity as expected from the various measures. Results are interpreted in terms of task validity and the potential role of reaction time in interpreting WLT performance.

(# 43)

Old wine in a new bottle: Problem-size effect re-examined with multilevel modelling. Chun-yun Ma, *Carleton University*, Jo-Anne LeFevre, *Carleton University*, Andrea L. Howard, *Carleton University* ■ Data obtained from experiments on mental arithmetic often feature variability due to inter-individual differences such as overall speed and accuracy as well as intra-individual fluctuations such as problem-specific solution approaches. These data pose challenges to statistical approaches that have been widely used in the field of math cognition, including ANOVA and regression. In the current study, we explored the use of multi-level modeling in overcoming these challenges in analyzing the problem size effect, a dominant behavioural pattern in arithmetic problem solving. Using two archival datasets, we examined latency as a function of problem characteristics including problem size and tie status, intra-individual differences

such as strategy choices, and inter-individual differences such as fluency and experience. Multilevel modelling enabled us to link variations in behavioural data (e. g., latency) to specific intra- and inter-individual differences and provided opportunities for proposing more elaborate and useful models of mental arithmetic.

(# 44)

Response placement and auditory asymmetries in duration estimation. Corinna Dawn McFeaters, *University of New Brunswick*, Daniel Voyer, *University of New Brunswick* ■ The current study investigated the effect of response placement on perceptual asymmetries in the estimation of auditory time intervals ranging from 260 to 480 ms (in steps of 20 ms). One hundred fifty participants completed a temporal bisection task in which the words bower and dower spoken in a neutral tone were presented monaurally to the left or right ear. In Condition 1, short and long duration estimations were indicated by clicking on these response alternatives presented on the left and right, respectively. In Condition 2, placement of the response alternatives was reversed. An ear by condition interaction was observed, showing a significantly larger bisection point for the left ear in Condition 1, whereas the bisection point was significantly larger for the right ear in Condition 2. An ear by word by condition interaction was also present. Although stimuli generally demonstrated a larger bisection point for the left ear in Condition 1 and for the right in Condition 2, the effect of condition was not significant for the word bower presented to the left ear. Overall, results are reflective of a spatial effect of response placement, rather than a perceptual asymmetry, for the task of duration estimation.

(# 45)

Long-term marijuana use and spatial memory performance: Does dope affect dimensional recall? Adam James Bennett McLandress, *Nipissing University*, James R. Donovan, *Nipissing University*, Benjamin O'Hanlon, *Nipissing University*, Darren Wade Campbell, *Nipissing University*, Sandra Stewart, *Nipissing University*, Ralph Dell'Aquila, *North Bay Regional Health Centre* ■ Long-term marijuana use is hypothesized to impair spatial memory performance. Direct investigations of this hypothesis, however, are limited and inconsistent. One recent study reported no differences in navigational spatial memory performance between long-term marijuana users and non-users. We examined spatial memory performance between non-marijuana users and long-term marijuana users with a computer version of the Corsi block-tapping task. Methods. To date, we have recruited 18 (15 male) cannabis using and 25 (8 male) non-using young adults. Marijuana users reported using cannabis for a mean of 3.85 years (SD = 1.98) and a mean of 3.8 grams (SD = 4.84) consumed per week. The Corsi spatial memory task measured participants' ability to reproduce progressively longer spatial sequences of briefly illuminated squares. Spatial sequences began with 2 briefly illuminated squares on the set of 9 non-linearly positioned squares. Two repetitions of each sequence length were assessed, and two errors within a sequence length ended the task. Results. Among males, marijuana users (M = 5.87, SD = 0.69) did not differ in memory span from non-users (M = 5.63, SD = 0.64). Among females, the users (M = 6.17, SD = 0.76) scored trend-level higher than the non-users (M = 5.19, SD = 0.77). Neither duration nor intensity of marijuana use were correlated significantly with spatial memory performance. Discussion. Our pattern of findings is consistent with studies reporting no differences between long-term marijuana users and nonusers in spatial memory. Future studies should assess more varied spatial memory configurations for increased sensitivity.

(# 46)

Language and thinking styles. Srdan Medimorec, *University of Waterloo*, Gordon Pennycook, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ■ In his 1954 essay, Isaiah Berlin interpreted the ancient Greek saying, "The fox knows many things, but the hedgehog knows one big thing," as a metaphor for the dichotomy between two worldviews and thinking styles. More recently, this classification has been reaffirmed in the context of expert political judgement. In both cases, predictions were made that belonging to one of the categories (fox vs. hedgehog) should be reflected in one's language in specific ways. This notion is the subject of the current study. We use computational language analysis to compare language styles between writers and thinkers whom Berlin classified as foxes or hedgehogs in his original essay. Our sample includes 18 authors and approximately 13 million words. The results are consistent with the idea that certain language indices can be used to relatively accurately classify authors into one of the categories (fox or hedgehog). We discuss potential implications for future studies investigating the relation between language and thinking styles.

(# 47)

The effect of text difficulty on intentional and unintentional mind-wandering. Caitlin Mills,

University of Notre Dame, Paul Seli, *Harvard University*, Noah David Forrin, *University of Waterloo*, Sidney D'Mello, *University of Notre Dame*, Daniel Smilek, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ■ One of the most theoretically important findings in the mind-wandering literature is that mind-wandering occurs more during easy, relative to difficult, tasks. Although numerous studies have observed this effect, Feng et al. (2013) recently suggested that it may depend on the particular task that participants complete. They found that a task-difficulty manipulation in the context of reading produced the opposite effect, with more mind-wandering in the difficult versus easy condition. While this finding presents a challenge for contemporary models of mind-wandering, it is not clear why it was obtained. In considering possible explanations, we reasoned that the difficult task employed by Feng et al. might have been exceptionally difficult, leading participants to intentionally disengage from the task. Thus, we hypothesized that the increase in mind-wandering observed by Feng et al. in the difficult condition might be specifically attributable to an increase in intentional mind-wandering. We explored this possibility by asking participants to read easy and difficult texts. We intermittently presented probes during reading, asking them to report whether any mind-wandering they experienced was engaged intentionally or unintentionally. Our experiment yielded three key findings: First, we replicated the results of Feng et al., observing more overall mind-wandering in the difficult than in the easy texts. Second, contrary to our hypothesis, we found more unintentional mind-wandering in the difficult compared to the easy texts, but no difference in intentional mind-wandering. Finally, both unintentional and intentional mind-wandering were negatively correlated with reading comprehension.

(# 48)

Handedness does not modulate embodied numerical cognition, except when it does: An investigation of cross-cultural and individual differences in finger-counting habits. Kyle Richard Morrissey, *Memorial University of Newfoundland*, Darcy Hallett, *Memorial University of Newfoundland*, Jingmei Kang, *Northeast Normal University, China* ■ Handedness does not modulate embodied numerical cognition, except when it does: An investigation of cross-cultural and individual differences in finger-counting habits This investigation examined individual differences in both finger counting and handedness and their relationship to numerical cognition. Morrissey, et al. (in press) observed reliable cross-national differences in a magnitude judgement task that corresponded to structural features of finger counting habits, as well as between Canadians who start counting on their right hand or their left hand. That investigation, however, was limited to right-handed individuals, and therefore results may have been an incidental function of participants habitually counting or not counting on the hand with which they are writing. The present study tested both Chinese and Canadian left-handed participants in order to rule out this explanation. Results indicate that left-handers had the same pattern of responding as right-handers, with the same differences between those who started counting on their right or left hand, implying that these differences are indeed related to the hand with which one starts counting. We also investigated whether these differences are related to SNARC-like laterality effects, similar to Fischer (2008). What we instead found were reliable SNARC-like effects for Canadian and Chinese right-handed participants, and no SNARC-like effects for either Canadian or Chinese left-handed participants. This individual difference of SNARC-like effects appears unrelated to finger counting direction, raising the possibility of multiple independent embodied numerical codes being used simultaneously, some of which may be culturally variable, while others may not.

(# 49)

The effects of probiotics and immune challenge on learning and memory in pubertal mice. Emma Murray, *University of Ottawa* ■ There is increasing evidence indicating a close communication between the gut microbiota with the CNS brain functions and behaviour, but research has yet to examine the impact on neurological programming during the critical developmental stage of puberty. Evidence suggests that exposure to immune challenges during pubertal development can have long-term effects on stress and anxiety responses later in life. It is speculated that increasing gut bacteria diversity via probiotic administration can have defensive properties against immune challenges on long-term effects on CNS functioning. Six week old CD1 mice were exposed to immune challenge and a probiotic formula throughout puberty to observe the effects of bacterial endotoxin lipopolysaccharide (LPS) and probiotic Lactobacillus reuteri on stress and anxiety responses in adulthood. At 10 weeks (onset of adulthood), animals were subject to the Morris Water Maze (MWM) to examine effects on learning and memory. While LPS and probiotic did not affect MWM performance, all groups required less time to reach the target platform on later training days. Mice exposed to probiotic displayed differences in LPS induced sickness differently according to sex. LPS-treated males that received probiotic treatment dis-

played less sickness behaviour 8 and 24 hours post-LPS compared to males that received control brot. Females who were exposed to the probiotic displayed more sickness behaviour 24 and 48 hours post-LPS compared to females who received control broth. Time spent in target quadrant versus non-target quadrants and distance travelled prior to platform, are currently being analyzed.

(# 50)

The role of object similarity in visuo-haptic object identification. Melanie Louise Nadeau, *Mount Allison University*, Geneviève Desmarais, *Mount Allison University* ■ Though object similarity drives both visual and haptic object identification, past studies have shown that it failed to influence the identification of incongruent visuo-haptic stimuli. To investigate whether this was the result of learning about objects bimodally, we asked participants to learn to recognize objects in a single modality, either visually or haptically. First, we presented participants with sequences of visual or haptic learning trials where they were presented with one object at a time, and visual or haptic test trials where they were presented with one object at a time and asked to identify it. Once performance was flawless, participants completed a bimodal experimental phase where they were presented simultaneously with two objects: one they could see and one they could grasp. Participants were asked to identify either the visually-presented object or the haptically-presented object. Crucially, on half of the trials the two objects were identical, while on the other half they were different. We confirmed that when participants first learn to recognize objects, similar objects are confused more often than distinct objects independently of modality. Interestingly, in the experimental phase we observed an interaction between object similarity and learning condition. For participants who learned to recognize objects visually, similar objects interfered more with identification than distinct objects while no effect of object similarity was observed for participants who learned to recognize objects haptically. Results are discussed in the context of overlapping representations and visual dominance.

(# 51)

The effect of musical expertise on emotional judgment of music. Éva Madelyne Nadon, *Université de Montréal*, Élise Cournoyer Lemaire, *Université de Montréal*, Justin Bouvier, *Université de Montréal*, Nathalie Gosselin, *Université de Montréal* ■ Despite the fact that musical preference vary among individuals, previous research has shown that certain aspects of musical emotions tend to be judged similarly. This consistency can be explained by the close relationship between musical parameters and the expression of certain musical emotions (e.g., music with a fast tempo is perceived as stimulating). However, some individual differences, such as the variability in musical expertise, and in the level of familiarity for music can influence the emotional judgment of music. The objective of this study is to explore whether musical expertise and familiarity with music can influence the emotional judgment of music, especially for relaxing and stimulating music. To this aim, musicians and non-musicians listened to two categories of instrumental musical excerpts selected from the classical repertoire: slow-tempo music composed in a major key (relaxing) and fast-tempo music composed in a major key (stimulating). For each musical stimulus, participants had to judge whether the music was (1) very pleasant or very unpleasant (valence) and (2) very relaxing or very stimulating (arousal) using visual analogue scales (VAS). Secondly, they had to evaluate the level of familiarity (very familiar vs. unfamiliar) for all musical excerpts also using VAS. The emotional judgments of musical excerpts, as well as familiarity evaluation, made by musicians and non-musicians were compared. Preliminary results indicated no significant group difference on the judgments of arousal and valence despite the fact that musicians were more familiar with musical excerpts with a slow tempo and major mode compared to non-musicians.

(# 52)

Stimulation over motor cortex during action observation impairs object and action memory. Katherine R. Naish, *McMaster University*, Sukhvinder S. Obhi, *McMaster University* ■ Activation of the motor system when an action is viewed ("motor resonance") may play a role in how we interpret and respond to viewed actions. But does the motor system play a role beyond these purported on-line functions? In a series of experiments, we have explored the role of motor resonance in memory for action components, by assessing the impact of interfering with motor resonance on subsequent recognition of actions. An initial study investigated whether motor interference during action-viewing affects recognition of the object involved in the action. Single-pulse transcranial magnetic stimulation (TMS) was used to briefly disrupt motor processing while participants viewed a hand typing on a mobile phone. Shortly after video presentation, the same or a different phone was presented, and participants judged whether the object was the same as that just seen. Our data showed that the ability to

recognise the phone was significantly impaired on trials where TMS was applied over M1, while stimulation over the vertex did not affect performance. In subsequent experiments, we have extended this paradigm to assess the effect of motor interference on effector recognition. Our findings suggest that motor cortex is involved in the offline recognition of both the objects and hands involved in actions, suggesting for the first time that motor representations of observed actions are retained beyond the action observation period. These representations might enable the delayed imitation of actions, thereby playing a role in observational learning.

(# 53)

Commonly used face recognition tasks do not measure the same construct: Evidence from four holistic/configural tasks and the Cambridge Face Memory Test.. Elizabeth Nelson, *University of Ottawa*, Isabelle Boutet, *University of Ottawa* , Charles A. Collin, *University of Ottawa* ■ Researchers have used a variety of tasks to examine holistic/configural processing in face recognition, with the implicit assumption that they are all measuring the same construct. However, there is a lack of consensus with respect to how recognition performance correlates across the most commonly-used tasks. Additionally, there is a lack of evidence demonstrating what each task is actually measuring: featural, configural, or holistic face processing, or some combination thereof. Our hypothesis is that the most commonly-used tasks measure different constructs, or different components of face processing. We conducted a correlational analysis of efficiency scores across the following tasks: the Complete Composite Effect Task, the Partial Composite Effect Task, the Configural/Featural Difference Detection Task, the Part Whole Effect Task, and the Cambridge Face Memory Test (CFMT). Results demonstrate that performance is most strongly correlated within each task, which suggests that the tasks are measuring unique constructs or components thereof. The Complete Composite Effect Task shows weak correlations with all face processing tasks. The CFMT is weakly correlated with all conditions of the Complete Composite Effect Task as well as the upright conditions of the other three tasks. Implications for the face recognition literature, specifically the use of tasks as measures of face processing will be discussed.

(# 54)

The relationship between strategy sophistication and accuracy in an oddball number line task. Katherine M. Newman, *Institute of Cognitive Science, Carleton University*, Chang Xu, *Carleton University*, Feng Gu, *Carleton University*, Jo-Anne LeFevre, *Carleton University* ■ We examined the relationship between self-reported strategy sophistication and accuracy on a number line task. Adult participants (N=136) completed 29 trials on an "oddball" number line that ran from 0 to 7000. Target integers were selected to cover the entire range. Upon completion of the task participants were asked to describe any strategies used. Participants' responses were coded according to the number of different line bisections reported: One Level strategists reported a single bisection (e.g. "used the midpoint" or "divided into thousands") while Multi Level strategists reported two or more bisections (e.g. "found the midpoint and divided into thousands"). Our analysis showed that the overall mean percentage of absolute error was significantly lower for participants who utilized multiple line bisection strategies. This finding was most significant for target integers on the upper half of the number line.

(# 55)

Implicit and explicit awareness of conflict during a base-rate task is moderated by strategy choice. Ian Newman, *University of Saskatchewan*, Simon J. Handley, *University of Macquarrie*, Valerie Anne Thompson, *University of Saskatchewan* ■ Reasoning often involves evaluating multiple pieces of information that may be inconsistent. Detection of this inconsistency has been claimed to be flawless and implicit, indicated by implicit measures of conflict detection, such as decreased confidence and increased response time. We tested this claim, using both implicit and explicit measures of awareness of evidence inconsistency in a base-rate task, where personality descriptions and base-rate ratios could suggest similar or opposite responses. Our explicit measures indicate that reasoners seem to be aware of the response conflict and self-identified response strategies map sensibly onto implicit measures of conflict detection: probability estimates, confidence measures, and response times. The degree of sensitivity to inconsistency was related to the strategy employed by reasoners to solve the problems. These data suggest that implicit measures of conflict detection are moderated by individual differences in strategy choice, and may be less diagnostic of conflict detection than previously thought.

(# 56)

The impact of simple responses vs. discrimination of motion on visual spatial working

memory. Chris Nicholson, *Carleton University*, Matthew Brown, *Carleton University*, Ramy Kirollos, *Carleton University*, Chris M. Herdman, *Carleton University* ■ The present research examined the ability to remember either the location or the identity of visual stimuli in the presence of directional (left/right) motion cues provided by a motion seat. In E1, memory for stimulus location, but not for stimulus identity, was significantly impaired when participants were required to make a left/right button press response to the motion cues. In E2, participants made a detection response instead of a discrimination response. Detection responses did not impair memory for stimulus location or stimulus identity. These findings suggest that the memory subsystem responsible for storing stimulus location information (e.g., visual spatial working memory) is affected by the processes required to discriminate motion direction (E1), but not by the processes required to detect motion (E2). In E3 a go/no-go task was used that forced participants to process the motion cues for directionality, but reduced the demands associated with the act of responding to the cues. The results of E3 are mixed. Possible explanations and future directions are discussed.

(# 57)

The output of statistical language learning: Assessing word segmentation using erps. Nicolette Breeze Noonan, *The University of Western Ontario* ■ Past research has reliably shown that listeners can segment words from a structured artificial language sequence using only the transitional probabilities of adjacent syllables within and between words. However, learning performance is typically tested via an explicit two-alternative forced-choice test, wherein participants are asked to discriminate previously-exposed words in the language from foils. Such tasks could underestimate performance, since statistical language learning is thought to proceed implicitly. We took an alternative approach in which we used event-related potentials (ERPs) to measure learning on-line during exposure to a structured artificial language. The only cues to word boundaries within the artificial language were the transitional probabilities of syllables within words. ERPs were recorded continuously during language exposure and at test. During the exposure phase, neural responses indicating word recognition increased as a function of exposure time, although this response varied across individuals. At test, we found a reliable negative-going component approximately 100ms post-word onset followed by a positive-going component at approximately 200ms, distributed across left temporal and frontocentral sites indicating greater familiarity for words versus foil words at test, which corroborated the behavioural results. These results confirm that participants can accurately segment words from an artificial language while also providing a novel and potentially more sensitive index of word segmentation.

(# 58)

Good distraction: situational predictors of successful multitasking while driving. Robert Joseph Nowosielski, *The University of Guelph* ■ Distracted driving (driving while performing a secondary task) is the cause of many collisions. Most research on distracted driving has focused on operating a cell-phone, but distracted driving can include driving while eating, conversing with passengers or listening to music or audiobooks. Although the research has focused on the deleterious effects of distraction, there may be situations where distraction improves driving performance. Fatigue and boredom are also associated with collision risk and it is possible that secondary tasks can help alleviate the effects of fatigue and boredom. In this study, licensed drivers were tested in a driving simulator (a car body surrounded by screens) that simulated simple or complex roads. Road complexity was manipulated by increasing traffic, scenery, and the number of curves in the drive. Participants either simply drove, or they drove while listening to an audiobook or having a hands-free cellular phone conversation. Driving performance was measured in terms of braking response time to hazards: the time required to brake in response to pedestrians or vehicles that suddenly emerged from the periphery into the path of the vehicle. Overall, braking times to hazards were higher on the complex drive than the simple one, though the effects of secondary tasks such as audiobooks were especially deleterious on the complex drive. In contrast, on the simple drive, driving while listening to an audiobook did not impair driving performance.

(# 59)

Does punching cause a rapid increase in testosterone? Nathan Alexander Olmstead, *Nipissing University*, Triana L. Ortiz, , Justin M. Carré, ■ Testosterone is a hormone which has been linked to aggression and competitive behaviour in human and animal studies. The current experiment examined the effects of competition and physical exercise on testosterone reactivity in young men. Seventy-two students from Nipissing University and Canadore College were recruited to participate in one of three experimental conditions: 1) punch a mechanical force plate in the context of a competition; 2) punch a mechanical force plate without competition; and 3) no punch

control. Preliminary results indicate that while participants in the non-competitive condition experienced a significant rapid increase in T concentrations from simply punching the force plate 4 consecutive times, those in the competitive condition did not. However, these participants also had higher levels of testosterone prior to punching the force plate. We speculate that higher baseline testosterone concentrations prior to punching the force plate may be attributed to anticipatory effects of competition, whereby the prospect of a competitive interaction caused a rise in testosterone prior to actually engaging in physical activity.

(# 60)

Effects of dopamine inhibition in the ovbnst on sucrose intake in rats. Mary C. Olmstead, *Queen's University*, Ariana Alexandra Nowickyj, *Queen's University*, Amanda C. Maracle, *Queen's University* ■ Compulsive intake, a primary feature of addiction, develops in animals following excessive intake of sucrose or cocaine. This bingeing behaviour is accompanied by alternations in dopamine (DA) responsivity in the oval bed nucleus of the stria terminalis (ovBNST). This suggests that sucrose bingeing alters DA function in the ovBNST, which, in turn, leads to compulsive responding. We tested this hypothesis by infusing a selective DA antagonist (SCH23390) into the ovBNST of male Long-Evans rats during the first 4 and last 8 days of a 28-day sucrose consumption phase. Rats given intermittent access to sucrose (12 hr per day) developed bingeing behaviour, defined as excessive intake in the first hour of access, within 4-5 days. In line with previous findings, a control group given 24 hr access to sucrose consumed the same amount of sucrose per day as the intermittent access group, with no bingeing. The effect of DA antagonism on sucrose intake was inconsistent, due to the fact that the majority of animals exhibited signs of illness during the experiment. These included behavioural symptoms, such as decreased grooming and reduced mobility, as well as physiological indicators of infection. Post-mortem pathology reports were consistent with bacterial meningitis and systemic infection. We hypothesize that excessive sucrose intake produced adverse physiological effects, leading to compromised immune responses.

(# 61)

Gender-specific differences in autism spectrum cognitive profiles: WIS vs. Raven. Alexia Ostrolenk, *McGill University*, Armando Bertone, *McGill Unviversity* ■ A male-to-female ratio of about 4.3:1 has been consistently reported in autism spectrum disorders (ASD). There is also evidence of differences in cognitive profiles of males and females with autism, showing gender-specific strengths and weaknesses on different subtests. Cognitive abilities are typically measured with Wechsler intelligence scales (WIS). However, the reliability of these assessments in autism is questioned, notably because some subtests require good language production and comprehension skills, often impaired in autism. Raven's Progressive Matrices (RPM), a measure of fluid intelligence, do not require language skills and may therefore be a more veridical measure of cognitive abilities in autism. In this study, we compared the cognitive profiles of autistic males and females across a large age range using both WIS and RPM measures in order to find out whether gender-related cognitive differences are contingent on the type of assessment tool used. The WIS and RPM scores of 37 females and 37 males with autism (aged 7-50) were matched on chronological age. Results were compared to male and female control groups. Preliminary results show gender-specific differences for both overall IQ scores and cognitive profiles that are dependent on the type of assessment tool used (WIS vs. RPM). We will conduct additional analyses assessing how age (i.e., children and adults) and symptom severity affects these profile differences. These have consequences in clinical practice since the type of assessment tool used results in different estimation of cognitive ability across gender in autism.

(# 62)

Checking in to avoid checking out: Using quizzing to sustain attention in lectures. Amy A. Pachai, *McMaster University*, Michelle Ogrodnik, *McMaster University*, Joseph A. Kim, *McMaster University* ■ The mind naturally wanders, with attention shifting away from the primary learning task (Smallwood & Schooler, 2006). However, left unchecked, mind wandering in the classroom can lead to poor academic performance. The use of interpolated quizzing (quizzing students at unexpected intervals) has been shown to reduce mind wandering throughout an online lecture (Szpunar, Khan, & Schacter, 2013). The current study aimed to extend the use of quizzing to reduce mind wandering in live lectures-the primary mode of knowledge transmission in higher education. Across an academic term, students used self-reported probes to indicate the prevalence of mind wandering for three different conditions: interpolated quizzing, quizzing at the end of lecture, or no quizzing. Quizzing at the end of lecture reduced overall reports of mind wandering compared to the interpolated or no

quizzing conditions. Interestingly, when mind wandering was divided into intentional or unintentional, interpolated quizzing actually increased reports of intentional mind wandering beyond the levels reported in the other two conditions, but resulted in comparable unintentional reports to quizzing at the end. In other words, quizzing, regardless of placement within a lecture, reduced unintentional mind wandering, but interpolated quizzing resulted in more intentional mind wandering. We further assessed how intentional and unintentional mind wandering reports correlated with short- and long-term academic outcomes in the course. Further research into the underlying mechanisms behind mind wandering is necessary to help determine how course design can optimize students' attention.

(# 63)

Spontaneous production rates are consistent across tasks varying in motor complexity. Rebecca Scheurich, *McGill University*, Anna Zamm, *McGill University*, Curtis Bogetti, *McGill University*, Caroline Palmer, *McGill University* ■ The rates at which individuals spontaneously produce rhythmic movement sequences, known as spontaneous production rates, may reflect a natural frequency at which energy expenditure is minimized; previous research shows the consistency of these rates within individuals in tasks such as walking and music performance (Murray, Drought, & Kory, 1964; Zamm, Pfordresher, & Palmer, 2015). The consistency of these rates across tasks that vary in motor complexity is unknown. The current study examined spontaneous production rates across two tasks that varied in motor complexity: music performance and finger tapping. Pianists performed familiar melodies on the piano (right hand, multiple fingers) and tapped the rhythms of these melodies (right hand, one finger) at a comfortable rate. Results showed that spontaneous production rates were consistent both across melodies and across music performance and tapping tasks. Results also showed that wrist width correlated with tapping rate (but not with music performance rate): the larger the wrist width, the slower the tapping rate. Further analyses investigating the contributions of wrist width and music performance rates to tapping rates revealed significant contributions of both factors to tapping rates, with a stronger contribution from music performance rates. Thus, spontaneous production rates demonstrated both task-general rate mechanisms as well as task-specific biomechanical influences.

(# 64)

Is inhibition involved in the processing of opaque compound words? A study of individual differences. Juana Park, *University of Alberta*, Faria Sana, *University of Alberta*, Christina L. Gagné, *University of Alberta*, Thomas L. Spalding, *University of Alberta* ■ Compound words (e.g., blueberry) vary in semantic transparency. They are classified as fully transparent if the meaning of the word can be extracted directly from the meaning of its morphemes (e.g., snowball), or as fully opaque if the meaning of the word is completely unrelated to the meaning of its morphemes (e.g., hogwash). Previous studies that used lexical decision and typing tasks have shown that these two types of compounds are processed differently. We hypothesize that this difference is due to the fact that, contrary to transparent compounds, opaque compounds need to recruit inhibitory processes to supress the irrelevant meanings of their constituents. If this is the case, participants who perform better on a task that requires the suppression of irrelevant stimuli should also process opaque compound words more easily. In this study, we examine whether the performance on the Eriksen flanker task predict the responses to the opaque compounds on a lexical decision task. The results suggest that performance on the incongruent trials of the Eriksen flanker task (which require the highest amount of inhibition) predicts the processing times of opaque, but not transparent, compounds. That is, participants who take longer to respond to incongruent trials are also slower when processing opaque compounds, but not when processing transparent compounds. This suggests that the recruitment of executive functions is a distinctive feature of opaque compound words.

(# 65)

Understanding motion extrapolation in older adults. Marlena Pearson, *Ryerson University*, Maureen J. Reed, *Ryerson University*, Tina Azarbad, *Ryerson University* ■ Age-related losses in vision and attention may impact older adults' ability to extrapolate motion from dynamic environments. Younger (ages 18-31) and older (ages 65-84) adults viewed film clips of a car travelling towards them from the view of a pedestrian at the curb. During each trial, the film was blanked and the participant estimated the point at which the car would have crossed the observers path (Time to Collision, TTC), the speed of the approaching vehicle, and the vehicle's distance from the observer when the film was blanked. The vehicle's distance at blanking (22, 44, 66, 88, 132 meters) and the car's speed (40 vs. 80 km/hr) varied randomly across trials. Participants tended to overestimate TTC (take more time to cross) and made

more accurate TTC responses at lower speeds. However, for the higher speed, younger adults showed improved TTC accuracy for shorter blanking distances (e.g., 22, 44 meters), while older adults showed inconsistent patterns of improvement (the shortest distances were not the most accurate estimates). Also, young adults underestimated car distances while older adults generally overestimated distances. Finally, both older and younger adults accurately estimated speed at 40 km/hr, but speed was underestimated at 80 km/hr. Older and younger adults show some difficulties in motion extrapolation, yet, older adult's inconsistent TTC estimates, underestimates of car speeds, and overestimates of observed vehicle distance may negatively impact older adult mobility.

(# 66)

The judgment of enjoyment and masking smiles with self-report measures of rating on scales from happiness to negative emotions. Annalie Marie Pelot, *Laurentian University*, Jessica Dénommée, *Laurentian University*, Karine Turcotte, *Laurentian University*, Mélanie Perron, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ Previous studies explored individual's judgment of masking smiles using dichotomous or categorical measures of rating which force individuals to categorize the masking smile into one discrete category. The current study further examined individuals' ability to distinguish between enjoyment and masking smiles (smiles containing trace of negative emotion) with positive-negative dimensional rating scales. Thirty-two undergraduate students participated in the smile judgment study, which consisted of an Enjoyment smile and six masking smiles: a smile with a trace of fear, of disgust, of anger in the brow, anger in the mouth, sadness in the brow and sadness in the mouth. Participants had to evaluate each smile with four different scales, which contained a positive and negative dimension (Happiness and either Fear, Sadness, Anger, and Disgust). Results indicated that participants could distinguish between the masking smiles and enjoyment smiles as they rated the enjoyment smiles more positively than the masking smiles. Participants were most sensitive to masking smiles containing traces of fear as they rated this expression more negatively compared to the other masking smiles. Other than the expression of anger (in the brow), masking smiles were rated more negatively overall than the genuine enjoyment smiles. Finally, response rates were quicker for enjoyment smiles than the masking smiles. Using dimensional measures of rating in the smile judgment task did not change individuals' judgment of the masking smiles but may change the way the smiles are processed.

(# 67)

Do protective effects of testing depend on misinformation format? Rosemary S. Pereverseff, *University of Calgary*, Glen E. Bodner, *University of Calgary* ■ Exposure to misinformation after initial retrieval has been shown to produce varied effects in suggestibility. When misinformation is presented through narratives after initial testing, suggestibility has been shown to increase, called retrieval-enhanced suggestibility, or RES. The opposite is true when misinformation is presented through questions, and a protective effect of test, or PET, pattern emerges. The present study explored whether this would also hold true for items presented in photos. After studying six household scenes (e.g., desk), some participants were given an initial free recall test. After a 48-hour delay, participants were exposed to suggested items not shown in the scenes (e.g., paper, pen) either through a narrative or a set of cued-recall questions. No protective effect of testing emerged on a final recall test. However, a protective effect of testing was obtained on a final source-monitoring test. Specifically, initial testing made participants less likely to attribute suggested items to the scenes. Thus, protective effects generalize beyond the social contagion paradigm, and presenting misinformation in a narrative format does not always yield retrieval-enhanced suggestibility.

(# 68)

The impact of instructions and response options in the judgment of masking smiles. Mélanie Perron, *Laurentian University*, Christian LaForge, *Laurentian University*, Anabel Therrien, *Laurentian University*, Lindsey Legate, *Laurentian University*, Gabrielle Colangelo, *Laurentian University*, Annie Roy-Charland, *Laurentian University* ■ Smiling may be a powerful strategy to conceal the expression of negative emotions. When concealing negative emotions, the individual has to activate muscles associated with the smile and inhibit muscles activation associated to negative emotion simultaneously. Studies have shown that adults do not always succeed in inhibiting negative emotions leading to micro-expressions. Research has also reported that adult perform close to chance level when asked to differentiate between enjoyment and masking smiles. The current study examined the impact of instructions and response options on the judgment of enjoyment and masking smiles containing traces of anger, sadness, disgust and fear. Participants were asked to judge the authenticity and happiness levels on a 7-point Likert scale from not happy/authentic at all, to totally authentic/happy. Their eye-movements were also

recorded during the judgment task. Results revealed that participants judged smiles as marginally happier than authentic. However, when using a Likert scale, differences between types of smiles remain the same as when using dichotomous options. More precisely, participants judged the enjoyment smiles as the happiest and fear smiles as the least happy. Smiles with angry brows were judged as happier than all other masking smiles but less happy than the enjoyment smiles. In sum, results support the importance of instructions to participants in the judgment enjoyment and masking smiles, more so than response options.

(# 69)

Familiarity breeds contempt: Does the mere exposure effect hold with negative stimuli? Natasha Pestonji, *University of British Columbia*, Raafay Rishi, *University of British Columbia*, Peter Graf, *University of British Columbia* ■ The mere exposure effect is the finding that people prefer familiar stimuli to novel stimuli. Zajonc (1968) famously demonstrated that simply exposing subjects to a stimulus (e.g. a line drawing/ideograph) is sufficient for them to prefer it. Such findings support "two-factor theory," which posits that previous exposure increases the fluency (ease or speed) with which a stimulus can be processed. This increased processing fluency results in more positive affect ratings. To test this theory, the present study examined whether even negative stimuli would be rated more positively after multiple exposures. We also examined whether the effect would occur if participants were asked to rate stimuli along a negative (repulsiveness) scale. For the study, participants rated attractiveness/repulsiveness of positive, neutral and negative pictures displayed once, three times, or six times. The results highlight the limits of the mere exposure effect, and provide preliminary support for other theoretical accounts of the relationship between familiarity and affective evaluation.

(# 70)

Our participants get "high on meaning"! Subjective meaningfulness effects in classification and lexical decision tasks. David Michael Sidhu, *University of Calgary*, Glen E. Bodner, *University of Calgary*, Penny Marion Pexman, *University of Calgary* ■ Semantic richness is a multidimensional construct that quantifies the amount of information associated with a given concept. Several dimensions for capturing this construct have been proposed, including subjective measures (e.g., imageability ratings) and objective measures based on word usage (e.g., measures of semantic diversity). The validity of these dimensions has in part been demonstrated by their ability to predict response times and accuracy in word recognition tasks. We took a different approach to capturing semantic richness, by simply asking participants to categorize a set of 402 items as high or low in meaning. Words that were longer, more frequent, and later acquired were more likely to be classified as high in meaning. We then explored whether participants were sensitive to this dimension. To this end, we presented high and low meaning words from the norming study. Participants were able to classify words as high vs. low in meaning, and lexical decisions in a subsequent block of trials were faster for words that were high vs. low in meaning. These preliminary results may point towards a novel aspect of semantic richness.

Poster session 3

(# 1)

Uh, um... The distinctive usage of filled pauses in psychopathic young offenders' speech. Brent Jeffrey Pitchford, *Carleton University* ■ Hancock, Woodworth, and Porter (2013) found that speech produced by psychopathic offenders contained more words related to basic needs and less related to social needs, as well as more disfluencies (e.g., uh, I). I used Wmatrix software (Rayson, 2003, 2008) to analyze transcripts of Psychopathy Checklist- Revised Youth Version (PCL: YV) interviews from a sample of young offenders. The young offenders were divided into two groups based on their PCL: YV total scores: Higher Psychopathic (HP; N = 13, M = 24.79, SD = 3.16) and Lower Psychopathic (LP; N = 14, M = 10.79, SD = 5.65). HP participants had fewer total disfluencies and filled pauses (i.e., uh, um) in their speech than LP participants. However, the usage of discourse markers (i.e., I mean, you know, like) was similar for HP and LP participants. Filled pauses (i.e.,uh, um) in speech have been linked to people's familiarity with the topic, the concreteness of the topic as well as people's anxiety levels during their social interactions (Christenfeld & Creager, 1996; Lalljee & Cook, 1973; Schachter, Christenfeld, Ravina, & Bilous, 1991). In an analysis of language use over the course of the interviews, I found that HP youths had fewer filled pauses during the second half which is consistent with the view that HP individuals have an attenuated ability to self-monitor

their speech over extended interpersonal interactions compared to LP individuals.

(# 2)

Common central mechanism of the attentional boost and desirable difficulty effects. Melissa Jeanine Ptok, *McMaster University*, Lindsay Lees, *McMaster University*, Karin R. Humphreys, , Scott Watter, *McMaster University* ■ The attentional boost effect (ABE) is generally described as an increase in attention to one task (often target trials in go/no-go monitoring) producing a memory benefit for stimuli presented simultaneously in a second task, contra typical dual task interference effects. The ABE has typically been interpreted as enhanced perceptual processing; recently a more central locus has been suggested. A separate recent literature has shown enhanced later memory for stimuli under incongruent versus congruent priming conditions, suggesting a general influence of increased selective attention and cognitive control to modulate incidental encoding in long term memory. Participants performed a typical ABE task with blocks of word or picture stimuli, with a subsequent memory test using only words (picture names). A substantial ABE was equivalent and independent of study modality, suggesting the ABE enhances a more abstract representation of the original stimuli. Adding a semantic classification task to stimuli eliminates the ABE, and reverses an original picture memory benefit. Reduced memory for pictures when relevant semantic features are more accessible (versus words) represents a cognitive control effect on incidental encoding. Interaction of ABE and control demands suggest a common central locus.

(# 3)

Race-biases in automatic imitation during motor preparation. Amentha Rajagobal, *McMaster University*, Katherine R. Naish, *McMaster University*, Sukhvinder S. Obhi, *McMaster University* ■ This research investigated automatic imitation of own-race and other-race members via the automatic imitation task. Participants performed an index or middle finger lift in response to a coloured cue, while observing a task-irrelevant hand making either the same or alternate finger movement. The presented hands were own-race or other-race, and appeared either 0ms, 100ms, or 200ms after the cue. When the cue and hand were presented simultaneously, responses to the cue were faster when the on-screen hand made the same movement, and slower when it made a different movement. These effects of movement observation on movement execution were similar regardless of whether the observed hand was the same or different race as the participant. Interestingly, when presented 100ms after the symbolic cue, observation of the hand produced no interference effect. At 200ms however, action observation was modulated by race, with greater interference for in-group hands than out-group hands. These results suggest that racial biases can influence motor processing only when motor preparation is already underway (i.e., 200ms from a cue).

(# 4)

Examining the relation between mind wandering and grit. Brandon C. W. Ralph, *University of Waterloo* ■ We examined the relation between mind wandering and the personality trait of grit in everyday life (Study 1), in the laboratory (Study 2), and in an undergraduate classroom across an entire semester (Study 3). Our hypothesis was that moment-to-moment lapses of attention (mind wandering), which disrupt successful completion of short-term goals, might be related to peoples' tendencies to successfully complete long-term goals (measured as grittiness). Both in everyday life (Study 1) and in the classroom (Study 3) we found that the propensity to mind wander was significantly and negatively correlated with self-reported grit. Interestingly, the correlation between grit and mind wandering was strongest for unintentional mind wandering, as opposed to intentional mind wandering. Grit was also found to be strongly and negatively correlated with self-reports of general absent-mindedness in everyday situations and the ability to controllably switch attention between tasks. Taken together, our findings suggest that the propensity to experience brief lapses of attention may manifest in long-term goal completion, and that the personality trait of grit may have roots in fundamental differences in attentional control.

(# 5)

Inhibitions of return: Two orienting biases. Ralph S. Redden, *Dalhousie University*, Raymond M. Klein, *Dalhousie University* ■ Inhibition of return is usually viewed as an inhibitory aftermath of visual orienting typically seen in the form of slower responses to targets presented in a previously attended location or object (Posner & Cohen, 1984; Posner et al., 1985). Using the diagnostic patterns obtained when peripheral onset or central arrow targets are used, we have seen that there are two forms of inhibitory aftereffect: one caused by a peripheral stimulus whereby the effect is to decrease the efficiency of subsequent visual processing in the proximity of this stimulus (input effect); the second caused by oculomotor activation whereby the effect is a motor bias (output effect).

These are distinguished clearly by whether the effect can only be measured by peripheral targets (input form when the reflexive oculomotor system is suppressed) or by whether there are roughly equivalent delays in response between central or peripheral targets (output form when the reflexive oculomotor system is not suppressed). When performance is represented in speed-accuracy space the input form is manifest as a shift from one speed-accuracy tradeoff function to a less efficient one representing degraded or delayed processing of cued targets while the output form entails no shift in the function, but instead a movement along it (a response bias). Both forms bias orienting and hence can perform the novelty seeking function attributed to the inhibitions in the seminal papers: the input form does so by biasing perception, whereas the output form does so by biasing action.

(# 6)

Pecking accuracy in pigeons is controlled during stop phases. THOMAS REID, *Queen's University*, LESLIE THEUNISSEN, *Queen's University*, NIKOLAUS TROJE, *Queen's University* ■ Pecking at seeds requires accurate spatial coordination of the head. Pigeons have a specific sequence of head movements while pecking, which consists of two stop phases and two thrust phases. Although it has been known for a long time that pigeons stop their head during pecking (Goodale, 1983), the function of the stop phases remained unsolved. Here, we hypothesised that the stop phases are used for motor planning and expected that they are the longer the smaller the target stimulus is. Pigeons (Columba livia) were observed using high-speed motion capture (Qualisys, Oqus) while they pecked at white circles with diameters between 5 and 32 mm to receive a food reward. Our results show that the duration of both stop phases significantly increased as stimulus size decreased. We also found significant positive correlations between stimulus size and the distances of the beaks to the stimulus. Furthermore, head orientation was pre-adjusted to the target position after the first stop phase and finalized after the second. Therefore, we conclude that the first stop phase is not only used to decide upon a broad area to peck at, as suggested earlier, but also contributes to preparation and fine motor planning of the final approach to the target. Goodale, M. A. (1983). Visually guided pecking in the pigeon (Columba livia). Brain, Behavior and Evolution 22, 22-41. This work was funded by an NSERC Discovery Grant to NFT

(# 7)

Assessing the automaticity of semantic access for numerals and words using the PRP paradigm. MICHAEL REYNOLDS, *Trent University*, NATALIE FORD, *Trent University* ■ Three experiments examine whether numerals and words activate their semantic representations automatically using the Psychological Refractory Period (PRP) paradigm. Task 1 was always a colour discrimination task (is the box red or blue?) and Task 2 was a magnitude comparison task with Arabic numerals (e.g., 4) in Experiment 1 and number words (e.g., four) in Experiment 2 (which number is numerically larger?), and a size comparison task with animal words (e.g., rat) in Experiment 3 (which word denotes the larger animal?) Three levels of stimulus onset asynchrony (SOA) were used (50, 150, and 2000 ms). The distance effect was used to index the activation of semantic information. Critically, the distance effect decreased in size with decreasing SOA for numerals and number words, but not for animal words. This finding indicates that numerals and number words, but not non-number words, activate their semantic representations in the absence of central attention, which is consistent with numbers, but not words, activating semantics automatically.

(# 8)

Rhythmic auditory stimulation: The influence of music-induced enjoyment on gait parameters. BRITTANY S. ROBERTS, *Western University, Brian and Mind Institute* ■ Rhythmic Auditory Stimulation (RAS) involves synchronizing footsteps to an external cue, such as a metronome or a musical stimulus, and has been used in physical rehabilitation to support gait. The influence RAS has on patients with Parkinson's Disease (PD), a movement disorder related to an internal timing deficit, has been extensively researched over the past forty years. It has been found that music that is rated high in groove (the desire to move) facilitates longer, faster and less variable strides when played at a faster tempo than preferred walking pace. However, studies using RAS have not examined whether subjective musical preference may increase the improvements among individuals. Therefore, the current study investigated changes in gait parameters in result of enjoyment using unfamiliar music excerpts rated high in groove. Additionally, the instructional cue given differed between subjects in order to observe instruction-based differences on gait. Sixty healthy undergraduate students provided ratings on familiarity, enjoyment, groove, and beat salience for 35 songs (each played 15% faster than baseline walking pace). Based on these ratings, the participants walked to 8 highly enjoyed songs; 8 unenjoyed songs; and 2 metronome clips. The Beat Alignment Test (BAT) was completed which indicated beat perception ability as well as synchronization ability. Analysis showed an insignificant

difference between high enjoyment and low enjoyment on gait parameters, contrary to our prediction.

(# 9)

Roadside advertisements: effects of valence and arousal on driver performance. Heather Elizabeth Kaitlin Rodd, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Billboards are designed to attract attention, and one way they do this is by presenting images that evoke emotional reactions. To find out if driving performance was impaired by the emotional content of billboards, drivers were tested in driving simulator (a complete car body surrounded by 300 degrees of viewing screens that immersed the driver in a wrap-around virtual environment). Participants drove down a simulated straight highway where customized billboards appeared at regular intervals on the right side of the road. The billboard images were chosen from the International Affective Picture System (IAPS). Participants saw four types of images: positive high arousal (e.g. sky diving), positive low arousal (e.g. chocolate cake), negative high arousal (e.g. a snake about to strike), and negative low arousal (e.g. a cemetery). Data were collected on average speeds and steering performance (standard deviation of lateral position). After the drives were complete, recall and recognition for the various types of images was also assessed. The billboards had no effect on driving speed, and recall and recognition for the four types of image was comparable. However, steering performance was significantly better when the drivers were passing signs with positive images. This result supports the hypothesis that positive emotions broaden attention (broaden-and-build-hypothesis), thus improving steering control due to increased ambient attention. Current and future results of this research may have implications for both theoretical and applied research on attention, emotions, and driving.

(# 10)

An analysis of the structure of the French Canadian version of the WISC-IV. Annie Roy-Charland, *Laurentian University*, Kristine Elizabeth Saft, *Laurentian University*, Adele Lafrance, *Laurentian University* ■ The concept of intelligence has fascinated researchers and theorists for centuries. In this vein, intellectual testing has been considered a significant tool in determining an individual's cognitive functionality and potential for achievement in educational institutions. One of the most popular tools for assessment of children's intelligence is the Wechsler Intelligence Scale for Children (WISC). The English version of the WISC-IV is composed of four primary factors: Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. Confirmatory factor analyses support this structure as well as the sub-tests that load on each of the factors. The French Canadian version proposes the same structure as the English version. However, the analyses provided in the manual show structural discrepancies with some sub-tests loading equally on two factors or some loading on a factor other than their proposed one. The current study used confirmatory factor analyses to propose the most stable structure for the French version of the WISC-IV as well as a structure that would be comparable to an English version of the tools. The series of analyses suggest that the most stable structure includes two factors, Verbal Comprehension and Perceptual Reasoning, composed of two sub-tests each, which is similar to the composition of the WASI. These results are of most importance, both theoretically and practically, as this simple structure of WASI is stable in both English and French and also less time consuming for administration. The implications are important in accurate diagnoses, and treatment thereafter.

(# 11)

Psychological mechanism underlying aggression in young women. Erika L. Ruddick, *Nipissing University*, Taylor-Rae Coté, *Nipissing University*, Triana L. Ortiz, *Nipissing University*, Justin M. Carré, *Nipissing University* ■ The current experiment examined psychological mechanisms through which interacting with a "sexy-dressed" same sex confederate influences intra-sexual aggression. Specifically, we examined whether interacting with a "sexy-dressed" female confederate (vs. "conservatively-dressed" female confederate) would influence intra-sexual aggression, and whether the psychological process of dehumanization would mediate this effect. We also examined whether individual differences in trait intrasexual competitiveness would influence the degree to which interacting with a "sexy-dressed" female promotes intra-sexual aggression. One hundred and thirteen female Nipissing University students were randomly assigned to one of two experimental conditions; 1) interact with a "sexy-dressed" female; or 2) interact with a "conservatively-dressed" female. Results indicated that women assigned to the "sexy-dressed" female condition dehumanized the female confederate to a larger extent than those assigned to the "conservatively-dressed" condition. Also, the degree to which women dehumanized their interaction partner was positively correlated with intra-sexual aggression. Furthermore, the psychological process of dehumanization mediated the effect of interacting with a "sexy-dressed" female on subsequent aggressiveness. Finally,

this mediation effect was only significant among women scoring relatively high on trait intra-sexual competitiveness (i.e., moderated mediation). These results reveal a novel psychological mechanism through which interacting with potential same-sex rival influences aggressive behaviour toward that rival.

(# 12)

Gambling and implicit memory associations: Results of a pilot study. Gillian Russell, *University of Lethbridge*, Robert J. Williams, *University of Lethbridge* ■ Measures that assess implicit cognitions are thought to assess processes unavailable to conscious introspection and be less sensitive to self-justification and social desirability than traditional explicit assessments. A large body of knowledge concerning the implicit cognitive mechanisms underlying alcohol- and substance-related addictions has been produced, however, there is very little known about the implicit mechanisms related to problem gambling. This pilot study evaluates two indirect measures of gambling, namely word and behaviour associates, which tap into implicit memory associations. Word association tests use ambiguous cue words that include: situations associated with a behaviour; outcomes of a behaviour; and, associated paraphernalia. While behavioural associates operate on the principle that mere presentation of a written outcome can lead individuals to think about a specific behaviour if the behaviour is sufficiently associated with that outcome in memory. Because, these methods do not require special equipment they may be more easily integrated into clinical practice and population research than other, more commonly used tests of memory association (i.e. the Implicit Association Test).

(# 13)

Prevalence effects in motorcycle conspicuity. Bertrand Sager, *Simon Fraser University*, Kreykenbohm Elisabeth, *Simon Fraser University*, Brie Wish, *Simon Fraser University*, Thomas M. Spalek, *Simon Fraser University* ■ Motorcyclists are often involved in collisions where the driver of a car "looked but failed to see" the motorcycle before turning left across its path. Much work focuses on sensory factors (size, lighting, and colour) that contribute to conspicuity, and suggests countermeasures to increase motorcycle visibility (e.g. fluorescent jackets). However, despite efforts to increase conspicuity, "failure-to-see" collisions are increasing, and the assumption that motorcycles are difficult to see in traffic remains largely unchallenged. Previously, we employed change-blindness paradigms to examine whether motorcycles were less visible than cars in a traffic environment. Surprisingly, we found higher sensitivity to motorcycles than to cars, without conspicuity-enhancing treatments applied to the motorcycles. This high sensitivity to motorcycles was present only in traffic contexts and cannot be explained by sensory conspicuity. In the present work, we explored the role of expectation and manipulated the prevalence of motorcycles and cars in the display, as well as how frequently motorcycles and cars were the target. Change-blindness flicker-paradigms were again employed, revealing that while in-display prevalence had no effect on target sensitivity, target probability which was learned across-trials did have an effect, but only for cars. That is, while motorcycle sensitivity was the same regardless of which vehicle-type was the likely target, sensitivity was lower for cars when they were the more likely target. Therefore, consistent with our previous work, motorcycles do not seem to suffer from a lack of conspicuity, even when studied in prevalence situations closer to the everyday driving context.

(# 14)

Role of conventionality in metaphor comprehension. Faria Sana, *University of Alberta*, Juana Park, *University of Alberta*, Christina L. Gagné, *University of Alberta*, Thomas L. Spalding, *University of Alberta* ■ One of the prevailing questions in current metaphor research has been whether and to what extent conventionality of a metaphor influences its comprehension. Metaphors rated on several measures, including conventionality (Exp1) were presented in a sensical/nonsensical task (Exp2). Responses were faster to more conventional than to novel metaphors, suggesting that high conventionality facilitates metaphor comprehension. The career-of-metaphor theory attributes this difference in response latencies to differences in cognitive processing. Whereas processing conventional metaphors entails retrieving the appropriate figurative meanings directly from long-term memory, processing novel metaphors evokes competition between literal and figurative meanings that must be resolved. To test these claims, participants completed a secondary numbers task while responding to the sensical/nonsensical task (Exp3). If comprehension is automatic for conventional metaphors and effortful for novel metaphors, taxing cognitive resources during metaphor processing should only affect response latencies for latter, but not for the former. Responses were slower to all metaphors, regardless of conventionality, suggesting that while conventional metaphors are processed faster than novel metaphors, both are likely to recruit similar cognitive processes. These results call into question one of the

dominant theoretical accounts of metaphor comprehension.

(# 15)

Processing of lexical tones by non-tone-learning infants: Acoustical perception versus phonetic perception. Elsa Santos, *Université du Québec à Montréal*, Rushen Shi, *Université du Québec à Montréal* ■ Previous research on consonants/vowels showed that infants are born with acute ability to discriminate native and non-native contrasts, and this ability declines for non-native contrasts some time before one year of age. Little is known about lexical tones. We tested French-learning 11-months-olds' perception of lexical tones in Mandarin. Stimuli were two tonal contrasts, one similar (rise versus low), another more distinct (high versus fall). Infants were randomly assigned to the two contrast groups. Within each contrast, one sub-group of infants was habituated to tokens of one tone (e.g., rise), and the other group to the other tone (e.g., low). Both sub-groups were tested with new tokens of the habituated tone (Same) versus the contrasting tone (Different). Results show that the rise-low group did not discriminate the Same and Different test trials. Interestingly, looking times increased significantly (and equally) for both types of test trials relative to the last habituation trial; i.e., instead of perceiving the tonal change, infants perceived the token change from habituation to test trials regardless of the status of tones. For the high-fall contrast, looking times increased significantly for the Different relative to Same and last habituation trials, and the latter two showed no discrimination despite token changes, suggesting that this contrast was discriminated in a phonetic fashion. Taken together, at 11 months non-tone-learning infants can perceive distinct lexical tones in a phonetic way; however, less distinct tones are only perceived acoustically, but not phonetically.

(# 16)

The use of visual information in the recognition of spontaneous facial expressions of emotions. Camille Saumure Regimbald, *Université du Québec en Outaouais*, Marie-Pier Plouffe-Demers, *Université du Québec en Outaouais*, Daniel Fiset, *Université du Québec en Outaouais*, Caroline Blais, *Université du Québec en Outaouais* ■ Most studies verifying the visual strategies underlying facial expressions recognition have used posed expressions, although evidence suggest that their appearance differ from spontaneous expressions. This study therefore compared the visual strategies used to recognize both kinds of expressions. Exp. 1 aimed at selecting spontaneous expressions (drawn from the Multimedia Understanding Group) well recognized by naive participants (N=31;19women). On each trial (720 in total), a face expressing one of the six basic emotions (anger, disgust, fear, sad, happy or surprise) or neutrality was displayed, along with six 7-points scales (i.e. one for each emotion). The participant's task was to indicate, on the six scales, the perceived intensity of each emotion in the face. Agreement on the perceived emotion across judges was measured by calculating entropy for each stimulus. The 21 identities with the highest average entropy across four spontaneous expressions (joy, disgust, fear and sadness) were selected, as well as their posed version. In Exp.2 (N=16;3men), these stimuli were used with the Bubbles method to reveal what facial regions, in which spatial frequency band, are used to recognize an expression. The results indicate a better performance and a higher systematicity in the visual information utilization with posed expressions. This suggests that the recognition of spontaneous expressions relies on visual strategies slightly different from those used with posed ones, and that they should be included in future researches in order to achieve a more complete portrait of the visual mechanisms underlying facial expression recognition.

(# 17)

Taking off the training wheels: Measuring brain activity during outdoor cycling using an active wet EEG system. Joanna Scanlon, *University of Alberta*, Jonathan Wiliam Perry Kuziek, *University of Alberta*, Danielle Cormier, *University of Alberta*, Kimberly Townsend, *University of Alberta*, Kyle E. Mathewson, *University of Alberta* ■ Mobile EEG allows the investigation of brain activity in increasingly complex environments. In this study, EEG equipment was adapted for use and transportation in a backpack while cycling. Participants performed an auditory oddball task while cycling outside and sitting in an isolated chamber inside the lab. Cycling diminished alpha amplitude and increased EEG noise. Significantly decreased P2 amplitude was observed when evoked by both standards and targets during cycling outside. This may be due to attentional processes filtering the overlapping sounds between the tones used and similar environmental frequencies. This study established methods for mobile recording of ERP signals. Future directions include investigating P2 filtering inside the laboratory.

(# 18)

The role of auditory feedback in regulating fundamental frequency during ongoing vocaliza-

tions. Nichole E. Scheerer, *Wilfrid Laurier University*, Jeffery A. Jones, *Wilfrid Laurier University* ■ Auditory feedback (AF) plays an important role in monitoring and correcting for errors during speech production. Previous research suggests that at vocalization onset, AF is compared to a sensory prediction generated by the motor system to ensure the desired fundamental frequency (F0) is produced. After vocalization onset, AF is compared to the most recently perceived F0 in order to stabilize the vocalization. This study aimed to further investigate whether after vocalization onset, AF is used strictly to stabilize speakers' F0. In this event-related potential (ERP) study, participants produced vocalizations while the F0 of their AF was perturbed by half a semitone. For half of the vocalizations, at vocalization onset, participants' F0 was also raised by half a semitone. Thus, half of the perturbations occurred while participants heard their unaltered AF, while the other half were induced while AF was already in an altered state. If after vocalization onset AF is used strictly to stabilize speakers' F0, then similarly sized vocal and ERP responses would be expected across all trials, regardless of whether the perturbation occurred while listening to altered or unaltered AF. Preliminary results indicate that perturbations to participants' unaltered AF resulted in larger ERP, but not vocal, responses than those to their altered AF. Thus, while vocal responses suggest that after vocalization onset AF is primarily used to stabilize the vocalization, ERP responses suggest that speakers are more sensitive to perturbations to their unaltered AF, but are unable to rapidly utilize this information to alter their vocal behaviour.

(# 19)

Comparisons of the sensitivity of yes-no and forced-choice associative recognition. Garrett Schliewinsky, *Wilfrid Laurier University*, William E. Hockley, *Wilfrid Laurier University* ■ Ahmad and Hockley (2014) compared associative recognition for pairs of words that form compound words (e.g., candle wax) with random pairings of these words. They found that, for young adults, there was no difference in overall discrimination in tests of yes-no recognition, but a discrimination advantage for compound word pairs emerged on a 2-alternative forced-choice test. Ahmad, Fernandes, and Hockley (2015) replicated this pattern of results and went on to demonstrate that older adults showed a discrimination advantage for compound word pairs on both types of associative recognition tests. In the present study, we examined the effects of the familiarity of random word pairs on associative recognition performance in a three-phase design. In phase one, word pairs were presented twice on a familiarization list. In phase two, participants studied familiarized and non-familiarized word pairs for an unspecified memory test. In phase three, half the participants were given a yes-no associative recognition test and half were given a forced-choice test. The discrimination advantage for familiarized pairs was greater on the forced-choice test than on the yes-no test whereas there was no difference in discrimination between the recognition tests for unfamiliarised pairs. The finding of a difference in sensitivity between yes-no and forced-choice recognition poses a challenge for Signal Detection Theory as the same assumptions are used to describe performance on both types of tests. Differences in yes-no and forced-choice recognition may arise because of different contributions of familiarity and recollection on each type of test.

(# 20)

Investigation of facial affect processing following cognitive behaviour therapy for patients with schizophrenia: An event-related potential (ERP) study. Dhrasti Shah, *University of Ottawa*, Ashley Beaudion, *University of Ottawa Institute of Mental Health Research*, Nicola Wright, *The Royal Mental Health Center, Ottawa, Ontario*, Verner J. Knott, *University of Ottawa Institute of Mental Health Research*, Charles A. Collin, *University of Ottawa* ■ Objectives: Schizophrenia is associated with poor social functioning, including difficulties interpreting emotions and intentions of others. Group CBT may also be a promising approach for improving information processing difficulties and by so doing, facilitating cognition and daily functioning. The aim of the study was to assess the effects of group CBT on electrophysiological measures of facial expression processing in schizophrenia patients. Methods: The current study used event-related potentials (ERPs) to examine facial expression processing deficits in schizophrenia patients (n=9) compared with nine healthy controls (HC) in an emotive identification task. Patients' symptoms and neural processing during the emotive identification task were assessed at baseline and end of group CBT treatment. Results: Results showed attenuated N170 amplitude and slower N170 latencies in response to fearful facial expressions in schizophrenia patients, compared with HCs. N170 latencies were also slower in the patient group, versus HC group, to sad and joy facial expressions. Following treatment, schizophrenia patients showed faster N170 in response to fearful facial expressions. Furthermore, following treatment, patients' symptoms score, measured by the PSYRATs, for loudness and amount of negative content of auditory hallucinations decreased. Conclusions: This study provides

evidence that schizophrenia patients have deficits in structural encoding of fearful facial expressions. Additionally, this study provides evidence that CBT decreases encoding time to faces with fearful expression, suggesting that CBT may mediate improved social cognition by increasing information processing speed to threatening expressions.

(# 21)

The way it makes me feel: The influence of emotional music on autobiographical memory retrieval. Signy Sheldon, *McGill University*, Julia Donahue, *McGill University* ■ A prominent finding is that music is able to evoke powerful emotions that trigger the recollection of past personal experiences, or autobiographical memories. While it is widely accepted that emotions impact autobiographical memory, few studies investigating music-evoked autobiographical memories (MEAMs) have directly examined the impact of musical emotions. The current study compared the characteristics of autobiographical memory retrieval to music cues that differed in terms of emotional valence (positivity vs. negativity) and arousal (intensity). Participants (N=24) recalled autobiographical memories while listening to happy, sad, scary and peaceful clips (Veilliard et al., 2008). Our main finding was that participants recalled more social, energetic, and vivid memories while listening to positive music, and that they recalled these memories faster than when they listened to negative music. This suggests that different musical emotions can influence both the accessibility and content of memory recall.

(# 22)

Does the presence of the conscientious responders scale in psychological questionnaires affect the outcome of testing? NO! Noor Shakir Shubear, *Thompson Rivers university*, Zdravko Marjanovic, *Thompson Rivers University* ■ Random responding (RR) is a form of data distortion in which respondents endorse items of a questionnaire without regard for their semantic content or meaning. Recently, Marjanovic developed two tools to identify random responders in questionnaires: the Conscientious Responders Scale (CRS), a 5-item validity scale, instructs participants to answer its items in a specific way (i.e. "Please choose option one"), and the Inter-Item Standard Deviation (ISD), a statistical approach, quantifies the amount of inter-item response consistency that responders produce across the items of a measure. While ISD does not alter the look and the content of a questionnaire, CRS does. This study examined the effect of the presence of these unusual items (CR) on the rate of RR and the outcome of the test in general.109 undergraduate students, randomly assigned into two groups, were asked to complete the NEO-FFI questionnaires that either incorporated the CRS items (CEQ) or did not (NEQ). Data were analyzed by calculating the ISD scores for all of the measures in the CEQ and NEQ questionnaires. With one exception, results showed that CEQ produced equivalent rates of RR as the NEQ. Additionally, the presence of the CRS had no effect on the descriptive statistics in the CEQ (e.g., means, SDs, alphas) vs. the NEQ. This means that adding the CRS to a battery of psychological measures does not meaningfully affect their psychometric characteristics. Implications for applied psychologists and basic researchers are discussed.

(# 23)

Is un stylo sharper than une épée? Associations netween grammatical gender and shape.. David Michael Sidhu, *University of Calgary*, Penny Marion Pexman, *University of Calgary*, Jean Saint-Aubin, *Université de Moncton* ■ Contrary to arbitrariness, studies have demonstrated that "round" nonwords like maluma are associated with round shapes, while "sharp" nonwords like takete are associated with sharp shapes (i.e., the Maluma/Takete effect; KÃ¶hler, 1929). In addition, studies have shown that English and French female (or male) first names tend to be associated with round (or sharp) shapes (Sidhu, Pexman & Saint-Aubin, submitted). Here we investigated whether the association between gender and shape would extend to grammatical gender, and its interaction with the Maluma/Takete effect. French-speaking participants were visually presented with round or sharp nonwords that had endings typical of either masculine (e.g., -age) or feminine nouns (e.g., -arde), to pair with either a round or a sharp shape (Experiment 1). In addition to demonstrating the Maluma/Takete effect, these participants were more likely to pair feminine (or masculine) nonwords with round (or sharp) shapes. To confirm this was due to the gender of the nonwords, and to rule out effects of spelling/orthography, we gave French- and English-speaking participants the same task auditorily (Experiment 2). French-speakers demonstrated a Maluma/Takete effect, and an effect of grammatical gender. However, English-speaking participants only showed a Maluma/Takete effect, and no effect of grammatical gender. These results demonstrate that speakers of a language with grammatical gender will make associations between those gender categories and shape. Thus, while grammatical gender is assumed to be arbitrarily related to meaning, our results may provide new evidence for non-arbitrariness.

(# 24)

An analysis of the impact of perceptual fluency manipulations on response times for gender role and sexuality schemas. Paige Smith, *Laurentian University*, Breeanna Streich, *Laurentian University*, Justin A. Chamberland, *Laurentian University*, Emalie Hendel, *Laurentian University*, Joël Dickinson, *Laurentian University* ■ Research has shown that schema congruent information is responded to more quickly than schema incongruent information. Studies have also found that perceptually fluent information is responded to more quickly and rated more positively than perceptually disfluent information. The purpose of the current study was to combine research on schema violations and perceptual fluency to determine the impact of perceptual fluency manipulations on ratings of relatedness for gender role and sexuality schemas through the use of an Implicit Association Test (IAT). The goal of this study was to gain a better understanding of the cognitive impact of processing manipulations. It was hypothesized that congruent blocks would have faster response times than incongruent blocks in the IAT. It was also hypothesized that perceptual fluency could be strategically manipulated to eliminate the slowdown effect associated with schema-incongruent information. The results showed a main effect of congruency on response times and ratings of relatedness for both gender role and sexuality schemas. It was also found that the slowdown effect could successfully be eliminated through the use of perceptual fluency manipulations. Future studies should utilize other methods to manipulate perceptual fluency, as well as investigate how changes in response times can influence different types of attribute ratings.

(# 25)

Personality characteristics can predict silent disfluencies in spoken language.. Mikhail Sokolov, *Carleton University, Institute of Cognitive Science*, John Logan, *Carleton University* ■ Psychopaths have long been described as having a particular "gift of glib" that gives them a superficial charm, and allows them to successfully manipulate others. Previous studies focusing on language perception showed marked differences between those high in psychopathic characteristics (HP) and those low in psychopathic characteristics (LP). However, far fewer studies have been conducted on speech production, leaving a knowledge gap. The present study asked 36 participants (22=female) to vocalize a series of recollections plus improvised, fictional stories. A total of 504 minutes of audio was analyzed for silent speech disfluencies. The total duration of disfluencies was longer in stories produced by HP individuals (M=47.4, SD= 5.1) compared to LP individuals (M=37.3, SD=2.98); t(12)= 4.48, p= 0.0008. Furthermore, a longer average duration of each speech disfluency was found in the HP (M=0.68, SD=0.09) compared to LP (M=0.51, SD= 0.024); t(12)= 4.89, p= 0.0004. In addition, a moderate correlation was found between the Behavioural Inhibition Scale and the total number of speech disfluencies produced (r=-0.37, p¡ 0.05) and the total duration of disfluencies (r=-.36, p¡ 0.05). The results are consistent with the hypothesis that HP individuals differ in their use of language compared to LP individuals, and suggest that significant cognitive load is associated with extemporaneously generating a spoken fictional story.

(# 26)

The effects of near-miss outcomes on urge to continue gambling. Madison Stange, *University of Waterloo*, Candice Graydon, *Uniiversity of Waterloo*, Mike J. Dixon, *University of Waterloo* ■ Near-misses are gambling outcomes that appears to come close to a win, but result in a monetary loss. Despite this, near-misses in s lot machines have been shown to increase physiological arousal and prolong gambling. Our research aims to understand if similar effects are found with scratch cards, an accessible and seemingly innocuous gambling form that contains near-misses. Undergraduate participants (n = 58) played two scratch cards and experienced six outcomes. On card 1, participants experienced two losses and a small win ($5.00). On card 2, half of the sample experienced three losses (n= 29) while the other half experienced two losses and a near-miss (n = 29). Ratings of urge were collected after each outcome. Following play, participants were given the option of purchasing more cards with their winnings. Those whose last game was a near-miss showed higher urge ratings than those whose last game was a loss. The frequency of purchasing did not differ between near-miss and loss groups. However, there was an interaction between group and purchasing behavior. For those whose last game was a loss, no differences in urge occurred between purchasers and non-purchasers. For those whose last game was a near-miss, urge was significantly higher among purchasers than non-purchasers. These results indicate that near-miss outcomes may be partially responsible for prolonged scratch card gambling due to the urge to gamble that they generate. This work has implications for problem gambling, decision making, and motivation research.

(# 27)

Exploring the consequences of distractor devaluation on advertising stimuli. Biljana Stevanovski, *University of New Brunswick*, Jenna Tyler, *University of New Brunswick* ■ Distractor devaluation refers to the observation that participants rate previously ignored distractors more negatively (e.g., less cheery) than previously attended targets. The present experiment investigated distractor devaluation in a go/no-go task that used images depicting humans or non-humans (e.g., trees). Participants completed a "go/no-go" game in which they responded (i.e., go) to targets (e.g., humans) and avoided making responses (i.e., no-go) to non-targets (e.g., non-humans). It was expected that non-target items would be less "liked" as compared to target items. On each trial, distractor ads were presented to the left and the right of the display, which mimicked advertising used for online games. The critical test was: would these task-irrelevant ads be influenced by whether they were presented alongside target (go) items versus non-target (no-go) items? Previously viewed distractor ads and novel ads were rated (i.e., whether they were liked, familiar). The results are discussed in terms of their implication as to how advertisements are evaluated when they are presented during online games.

(# 28)

Bilingual experience and executive control over the adult lifespan: Evidence from the Wisconsin Card Sort Task. Sivaniya Subramaniapillai, *McGill University*, Maria Natasha Rajah, *McGill University*, Stamatoula Pasvanis, *Douglas Institute*, Debra Titone, *McGill University* ■ A topic of recent controversy is whether bilingual language experience in older adults buffers normal age-related declines in executive function (reviewed in Baum & Titone, 2014). Some studies show reduced age-related decline using behavioural measures (e.g., Gold et al, 2013; Kavé et al., 2008, Bialystok et al., 2004), some show altered neural recruitment using brain measures (e.g., Luk et al., 2011, Grady et al., 2010; Park et al., 2010; Bak et al., 2014), and some fail to show an impact of bilingual language experience on executive control using either behavioral or neural measures (e.g., Kousaie & Phillips, 2012; Kousaie et al., 2014; Zahodne et al., 2014). Here, we investigate this issue using the Wisconsin Card Sort Task (WCST; Grant & Berg, 1948) in an adult lifespan sample (n = 152) ranging from 19 to 76 years of age. Interestingly, women showed the greatest age-related cognitive decline across WCST measures, and were more likely than men to show improved performance (e.g., fewer perseverative errors) with increased bilingual experience (i.e., number of languages known, percentage non-L1 usage). We consider implications of this finding for questions regarding the relationship between bilingualism and cognition, and the effects of biological sex on cognitive aging.

(# 29)

A new paradigm to test the mechanisms of contextual cueing effect: An eye movement study. Yabo Hui, *Tianjin Normal University*, Chen Song, *Tianjin Normal University*, Chao Wang, *McMaster University*, Guang Zhao, *Liaoning Normal University*, Xuejun Bai, *Tianjin Normal University*, Hong-Jin Sun, *McMaster University* ■ In a visual search task in which participants look for a target letter T among a number of distractor letter Ls, ifhalf of the scenes were repeated over blocks while the other half were novel,over time, lower reaction times (RTs) were found for repeated scenes than for novel scenes (contextual cueing effect, Chun and Jiang, 1998).It has been proposed that contextual cueing effect is generated from attentional guidancein the repeated scenes (the repeated contexts cue target location). In this study, we compared the contextual cueing effect generated from the traditional contextual cueing paradigm, in which, for a given repeated scene, target appeared in one fixed location, with our new multiple-target paradigm in which in a given trial, the target appeared in any one of multiple (2 or 4) possible locations. Contextual cueing effectswere found in allconditions, which suggest that attention guidance might not be entirely responsible for contextual cueing effect. Using eye movement recordings, we were able to divide the behavioral RT into three stages: initial latency, search phase and response phase (Zhao et al., 2012). We found that for all conditions, the benefit of RT in the repeated scene mostly appeared in the search phase indicating that participants spent less search time for repeated scenes. These results argue that a process or processes other than attentional guidance could play a significant role during contextual learning.

(# 30)

The role of distractor identity in contextual cueing effect. Lei Zheng, *Tianjin Normal University*, Yuwei Wang, *Tianjin Normal University*, Chao Wang, *McMaster University*, Laura Jin, *McMaster University*, Xuejun Bai, *Tianjin Normal University*, Hong-Jin Sun, *McMaster University* ■ In the classic contextual cueing paradigm, participants performed a visual search task in which they looked for a target letter T among a random layout of distractor letter Ls. Over time, smaller reaction times (RT) were found for repeated scenes than for novel scenes (Chun and Jiang, 1998). In this study we explored the possible learning

of distractor identity if that information is added to the conventional contextual cueing paradigm. In addition to target letter T and distractor letter Ls, we added a picture of a face (upright or inverted) adjacent to each letter in the display. Same face or a set of different faces (but in the same orientation) were used in all the scenes. Following 30 learning blocks, participants experienced 5 testing blocks in which the repeated scenes maintained the same spatial layouts as that during learning but the identity of the faces were randomly exchanged. The results demonstrated that comparable contextual cueing effect were found following learning regardless whether the distractor letter Ls was paired with same face or a set of different faces suggesting little RT benefit when repeated distractor identity information was also provided in addition to the repeated layout information. In the beginning of testing phase, however, the new set of face identity-location pairing for upright faces (but not for inverted faces) diminished contextual cueing effect, suggesting that information of the identity of the faces also contributed to the contextual cueing in the learning phase.

(# 31)

Location probability cueing: Localizing target on a touch screen. Shiyi Li, *Tianjin Normal University*, Ying Fang, *Tianjin Normal University*, Xuejun Bai, *Tianjin Normal University*, Hong-Jin Sun, *McMaster University* ■ In a visual search task, if target appears more frequently in one region of the scene, over time, participants will implicitly learn the target location probability. Previous research, using letter search task (and through keyboard response), has demonstrated that the attended locations are viewer-centered and are not updated with viewer movement (Jiang & Swallow, 2012). In this study, we reexamined the spatial frame of reference in this type of learning using computer-rendered illustrations of 3D scenes presented on a touch screen which allowed touch response. The scene consisted of a display of an array of chairs randomly positioned on the ground. Participants searched for and pointed at a target positioned on a chair. Participants learned the layout from two views 180 degrees apart and tested from a view 90 degrees different from the two learning views. During training, across multiple trials, the target was more often found in one, rich quadrant than in any one of the sparse quadrants. In the testing phase, the target was randomly placed appearing in each quadrant with the same probability. Results demonstrated probability cueing in the training phase indicated by decreased reaction time in the rich quadrant compared to the sparse quadrants. In the testing phase, unlike what Jiang and Swallow (2012) found, the group average did not show the preference for viewer centered representation. Analysis of the data from individual participants showed different participants tended to use different spatial frames of reference.

(# 32)

Contextual cueing effect following display rotation. Yuwei Wang, *Tianjin Normal University*, Lei Zheng, *Tianjin Normal University*, Shiyi Li, *Tianjin Normal University*, Chao Wang, *McMaster University*, Xuejun Bai, *Tianjin Normal University*, Hong-Jin Sun, *McMaster University* ■ In the classic contextual cueing paradigm, participants performed a visual search task in which they looked for a target letter T among a random array of distractor letter Ls. In a given block, scenes in half of the trials were repeated once over blocks while scenes in the other half were novel. Over time, smaller reaction times were found for repeated scenes than for novel scenes. In this study, we examined following learning whether contextual cueing effect remained after the display was rotated. Participants experienced 30 learning blocks in which the display monitor was rotated 22.5 degrees clockwise (or counter-clockwise) around the z-axis (in the frontal-parallel plane) from the normal landscape orientation. Participants then experienced 5 testing blocks in which the monitor was rotated 22.5 degrees counter-clockwise (or clockwise) from the normal landscape orientation, thus creating a 45-degree rotation from learning to testing phase. Significant contextual cueing was found in the training session, with faster RTs in the repeated condition than in the novel condition as participants learned the relationship between repeated layout and target location. The contextual cueing effect in the testing phase was comparable to that at the end of training phase after the display rotated 45 degrees. Our results suggest that when the scene contained a clear indication of the view change (from the physical rotation of the monitor), the spatial relation learned during training can be mentally transformed to a new view.

(# 33)

A new paradigm to test the mechanisms of contextual cueing effect: Multiple-target paradigm. Chen Song, *Tianjin Normal University*, Chao Wang, *McMaster University*, Yabo Hui, *Tianjin Normal University*, Guang Zhao, *Liaoning Normal University*, Xuejun Bai, *Tianjin Normal University*, Hong-Jin Sun, *McMaster University* ■ In the traditional contextual cueing paradigm, participants search for a target letter T among distractor letter Ls.

Over time, lower reaction times (RT) were found for the repeated scenes than for the novel scenes (Chun and Jiang, 1998). It was proposed that contextual cueing effect is generated from attentional guidance in the repeated scenes where the repeated contexts cue the unique target location for a given scene. One might make inference from the idea of attention guidance that, for a given scene, if the target could appear in one of multiple possible locations, there should be a RT cost before the context cues the correct target location. In this study, we compared the contextual cueing effect generated from the traditional contextual cueing paradigm, in which, for any given scene (among 12 repeated scenes in a block), target appeared in one location, with our new multiple-target paradigm in which, in a given trial, the target appeared in any one of multiple (2, 4, 12, or random) possible locations. Contextual cueing effects were found when the target could appear in one among 1, 2 or 4 possible locations but only minimal effect was found when the target could appear in one among 12 or more possible locations. Since the uncertainty of the target locations in the repeated scenes did not generate substantial RT cost, our results suggest that attention guidance might not be entirely responsible for contextual cueing effect.

(# 34)

Exploration method in a virtual environment and cognitive map accuracy. Jennifer E. Sutton, *Brescia University College and University of Western Ontario*, Meghan Vollebregt, *University of Western Ontario*, Bailey Grogan, *Brescia University College* ■ Individual differences in creating a cognitive map of a new environment are evident in both the real-world (Ishikawa & Montello, 2006) and virtual environments (VEs; e.g., Weisberg et al, 2014). Learning in these studies typically involves route integration, where participants first travel pre-determined routes, and then travel along two more routes that connect the initial routes. While this method equates participants' exposure to a large environment across participants, it also scaffolds the encoding process by "chunking" the environment into smaller segments. Alternatively, learning via free exploration is not limited to specific routes and requires subjects to manage and organize the incoming spatial information using a self-generated strategy. In the current study, participants (N=80) learned the locations of buildings in a VE, Silcton, either via route integration or free exploration. Afterwards, they created a map of Silcton and estimated directions between buildings. In addition, they completed the Spatial Orientation Test (SOT, Hegarty & Waller, 2004), a small-scale test of perspective taking, and a spatial n-back working memory assessment. Hierarchical regression models revealed that map accuracy was significantly predicted by learning method and score on the SOT, but not sex or n-back accuracy. In contrast, direction estimation accuracy was predicted by accuracy on the n-back task. These data suggest that both better perspective-taking ability and freely exploring an environment contribute to a more accurate mental map, and that map creation and direction estimation may depend on different underlying abilities.

(# 35)

Effects of semantic priming on lexical processing.. Alexander Taikh, *University of Western Ontario*, Stephen Lupker, *University of Western Ontario* ■ Responding to a target word is facilitated when it is preceded by a semantically related prime, a prime that has an associative relationship or shares features with the target, rather than by an unrelated prime. However, it is unclear whether this effect is due to semantic information automatically activating lexical structures of the target or to a strategic use of the prime-target relationship. Orthographic similarity between a masked prime and a target also affects word recognition. Specifically, orthographically similar word primes inhibit responding whereas orthographically similar nonword primes facilitate responding (e.g., Davis & Lupker, 2006). Both effects are presumed to arise at the lexical level and can be explained by most interactive activation and competition models (Davis, 2010; McClelland & Rumelhart, 1981). The present experiments were designed to examine potential interactions between these two priming relationships. Specifically, orthographically similar or dissimilar masked primes were preceded by visible primes that were either semantically related or unrelated to the target. If semantic priming arises automatically at the lexical level, the two factors should interact. In contrast, if semantic priming is due to strategic use of the prime-target relationship after lexical processing is complete, one would expect additive effects. In the crucial experiment, an interaction emerged. Only a semantic priming effect was observed (i.e., the orthographic inhibition effect disappeared). These results indicate that semantic priming does appear to have at least some portion of its impact at the lexical level.

(# 36)

A novel semantic battery for MCI and AD. Emma Roberts, *University of Ottawa*, Christine L.

Sheppard, *Bruyère Research Institute*, Laura Monetta, *Université Laval*, Vanessa Taler, *Bruyère Research Institute and University of Ottawa* ■ Objectives Semantic function often declines in people with mild cognitive impairment (MCI), and is one of the first areas to decline in those with Alzheimer's disease (AD). Current tests of semantic function are either very time consuming, or provide limited information. We aimed to develop a brief yet thorough semantic battery screening tool that differentiates between healthy older adults (OA) and MCI patients. Methods: Twenty OA and 8 MCI patients completed a neuropsychological battery assessing overall cognitive function, and the novel semantic battery, comprising 6 tasks assessing semantic function through the oral, written, and visual modalities. Participants' score on the battery was compared with scores on established tasks of semantic function, namely the Boston Naming Test (BNT) and Pyramids and Palm Trees (PPT). Results: The battery effectively differentiated between groups and was highly correlated with the BNT but not the PPT. Picture Naming, Generation and Multiple Choice Questions were the most discriminative tasks, with OA outperforming patients. OA did not differ in performance on biological and artifact items. Several tasks indicated poorer performance on biological items than artifacts in MCI. Discussion/Implications: The semantic battery successfully differentiated between groups and correlated with an established test of semantic function (BNT). Future research should explore current trends with larger samples. Results indicate that performance on biological and artifact items is valuable in distinguishing between OA and MCI, and that naming and shared feature style tasks are effective in differentiating between these groups.

(# 37)

Effects of format and problem structure on problem solving procedures in mental division. Shawn Tan, *Carleton University Institute of Cognitive Science*, Jo-Anne LeFevre, ■ The mediation hypothesis is the finding that shorter latencies are observed for division problems presented in multiplication formats (e.g., 9 × [ ] = 72) than in division formats (e.g., 72 ÷ 9 = [ ]). We examined support for the mediation hypothesis across three experiments (N = 32, 30, and 29). Participants performed division problems presented in division multiplication formats. We varied problem structure across experiments. We controlled the location of the dividend (e.g., 72 ÷ [ ] = 9; 72 ÷ 9 = [ ]; 72 = [ ] × 9; 72 = 9 × [ ]) in Experiment 1 versus the location of the operator in Experiment 2 (e.g.,72 ÷ [ ] = 9; 72 ÷ 9 = [ ]; 9 × [ ] = 72; 9 × [ ] =) and Experiment 3 (e.g., 72 = [ ] × 9; 72 = 9 × [ ]; [ ] = 72 ÷ 9; [ ] = 72 ÷ [ ]). We found support for the mediation hypothesis in Experiment 2, but not in Experiments 1 and 3. We also compared dwell times for problems with identical structures across experiments. We observed differences in dwell times between the dividend and divisor between Experiments 1 and 2 and the operator between Experiments 1 and 3, suggesting that problem solving procedures for mental division vary depending on the problem structures that were presented in each experiment.

(# 38)

The impact of early adolescent adversity on behavioural defense and serotonin transporter expression in adulthood. Cindy Tao, *Queen's University* ■ Stress causes changes to neurochemical systems and has a strong association with increased activation of the serotonin (5-HT) system. During adolescence, the brain undergoes vast and rapid changes and is thus vulnerable to disruption from stress. Previous work has shown a history of stress prior to weaning has long-lasting effects on 5-HT density and appears to be accompanied by changes in defensive behaviour. Female Long-Evans rats were stressed with intermittent physical stress (IPS; consisting of water immersion, elevated platform, and foot shock) over the early adolescent period (postnatal day 22-34). Upon reaching adulthood, the other group of rats in the stress and control conditions were tested in the elevated plus-maze and shock-probe burying tests to assess their defensive behaviours. A social interaction test assessed social behaviour between pairs of unfamiliar rats in matching conditions (i.e., stress-stress, control-control pairings). Brain tissue will be processed using immunohistochemical staining to identify the density and distribution of SERT in the brain and to make comparisons between stress and control animals. The goal of this research is to provide a better understanding of the impact of adolescent stress on defensive and social behaviours in females, along with its effects on the 5-HT system and SERT in the brain.

(# 39)

What the eyes tell us about how bilinguals encode real-world linguistic landscapes. Naomi Vingron, *McGill University*, Julia Hamill, *McGill University*, Jason W. Gullifer, *McGill University*, Jakob Leimgruber, *University of Freiburg*, Debra Titone, *McGill University* ■ In daily life, we encode visual input from a 'linguistic landscape' (LL) comprised of text and objects (signs, billboards, etc.; Gorter, 2013; Landry & Bourhis, 1997; Shohamy, 2006). In cities like Montréal, LLs incorporate multiple languages in a manner determined by law and

inhabitants' propensities. While much is known about LLs sociolinguistically, how people encode LLs is unknown. Do bilinguals fixate text that is most prominent, that is known the best, or objects that support textual interpretation? Building upon the bilingual reading (reviewed in Whitford, Pivneva, & Titone, 2015) and scene viewing literature (reviewed in Henderson & Ferreira, 2004), we monitored French-English bilinguals' eye movements as they viewed LL images from Montréal, and Canada generally. Participants viewed each image for 8 seconds, and subsequently made "informativeness" or "aesthetics" evaluative ratings (within-subject, counterbalanced). Preliminary results suggest that fixation proportions over time reflected both language background and rating type. When viewing L2 signs, bilinguals regressed more to L2 vs. L1 text. As well, when viewing mixed language signs, bilinguals fixated prominent text first (French), and increased fixations for English text at later viewing intervals. Interestingly, L1-French bilinguals looked at English text more than French text compared to L1-English bilinguals at later viewing intervals. Bilinguals also fixated text-related objects more during aesthetic vs. informativeness ratings. These pilot results are promising with respect to developing methods that use eye movements to address novel questions about how people visually encode real-world LLs.

(# 40)

Effects of bilingualism and mild cognitive impairment on verbal fluency performance. Jonathan Ngoc Tran, *Bruyère Research Institute and University of Ottawa*, Christine L. Sheppard, *Bruyère Research Institute*, Shanna Kousaie, *Montreal Neurological Institute*, Laura Monetta, *Laval University*, Vanessa Taler, *Bruyère Research Institute, University of Ottawa* ■ The study aims to assess verbal fluency performance in English and French monolingual and French-English bilingual healthy older adults and people with mild cognitive impairment (MCI). Participants were healthy older adults (English monolingual: n = 60; French monolingual: n = 30; bilingual: n = 59) and MCI patients (English monolingual: n = 27; French monolingual: n = 11; bilingual: n = 10). Participants completed four verbal fluency tasks requiring varying levels of executive control: (1) letter fluency, (F, A, S); (2) semantic fluency (animals); (3) switching letter fluency, where participants were required to switch between words beginning with A and words beginning with F; and (4) switching semantic fluency, where participants are required to switch between vegetables and musical instruments. The data indicate that healthy older adults outperform MCI participants across all fluency tasks. Previous literature on patterns of verbal fluency performance on semantic fluency relative to letter fluency in MCI patients is mixed. Our research supports the position that MCI patients perform worse on semantic fluency tasks relative to letter fluency tasks, which is similar to the pattern observed in Alzheimer's disease. The results did not support a bilingual disadvantage on language tasks, unlike previous literature. Furthermore, bilinguals did not show improved performance on tasks with higher executive demands, raising questions about the robustness and pervasiveness of the bilingual advantage in executive function.

(# 41)

Predictors of mathematical performance in older adults. Lana Mae Trick, *University of Guelph*, Michael Wolter, *University of Guelph*, Elizabeth Ann Infante, *University of Guelph*, Ryan James Waring, *University of Guelph*, Carol Lau, *University of Guelph*, Robert Joseph Nowosielski, *University of Guelph*, Natasha Dienes, *University of Guelph*, Marcie Wilger-Penner, *Kings University College at Western University* ■ There is a range of negative outcomes for individuals with skill deficits in basic mathematics. Consequently, there has been a great deal of interest in identifying predictors of mathematical performance in children and young adults. For example, associations have been found between impaired mathematical performance and deficits in basic visual enumeration (subitizing and counting), measures of working memory, and specialized abilities such as finger gnosis, the ability to consider each finger as separate and individual. At this point, it is unclear whether these abilities are only the necessary pre-requisites for acquiring mathematical competence early in life or if the component abilities used in these tasks are actually required when thinking about/carrying out mathematical calculations. Senior adults pose an interesting test case for these theories. Interestingly, compared to young adults, many older adults have superior abilities at basic arithmetic, partly because they learned arithmetic without the aid of calculators, but at the same time there is age-related deterioration in motor/visual spatial skills among some older adults. Adults over the age of 65 participated in a study where performance was measured in arithmetic calculations (without calculators), subitizing and counting, and finger gnosis.

(# 42)

Predicting dual task interference while driving. Lana Mae Trick, *University of Guelph*,

Robert Joseph Nowosielski, *University of Guelph*, Heather Elizabeth Kaitlin Rodd, *University of Guelph*, Rylan James Waring, *University of Guelph*, Ryan Toxopeus, *University of Guelph*, Ata Khan, *Carleton University* ■ In many cases, carrying out two tasks at once causes interference between tasks, which is to say that performance on one or both tasks is slower and less accurate than it would be if the tasks were carried out in isolation. One place this can be clearly seen is when driving an automobile, where tasks such as cellular phone conversations or texting have been shown to interfere. It is possible that some people can manage to maintain their performance in the face of distraction better than others though. Measures of executive working memory are thought to predict how well an individual can coordinate multiple activities when it is necessary to switch attention between tasks. In this study we used a common measure of executive working memory, the Operation Span test (the OSPAN) to predict the amount of interference produced when drivers carry out a secondary task while driving. Drivers were tested in a high fidelity driving simulator. Participants either just "drove" or drove while carrying out secondary tasks and the amount of dual-task interference was measured. We also measured driver age, driving experience, and the reported frequency with which the drives carried out these secondary tasks while driving. Results will be discussed as it relates to the role of executive working memory in driving.

(# 43)

Building a Monte Carlo simulator to assess performance at estimating averages of time durations. Martin Harry Turpin, *University of Waterloo*, Michael David Klein, *University of Waterloo*, Jennifer Stolz, *University of Waterloo* ■ Many of the tasks that have been developed to measure time estimation assume that participants have the ability to accurately represent the average of a set of durations. This may be an accurate assumption given that people are able to accurately estimate averages of other quantities such as size and number. However, relatively little research has focused on our ability to estimate average durations. We had participants estimate either one out of a set of several overlapping durations, or the average of all of the durations in the set. Estimates of both average and individual durations became less accurate as the number of overlapping durations increased, with lower correlations between actual and estimated values as well as a greater degree of deviation between actual and estimated values. Based on participants' estimates of individual durations, we simulated their expected performance on the averaging task as though they were able to perfectly average together their representations of each duration. Results suggest that although participants are quite good at estimating average durations, some error is introduced during this process.

(# 44)

Crossing to the light: Crossmodal cue influences tactile TOJ performance. Kaian Unwalla, *McMaster University*, Anthony Battaglia, *McMaster University*, Michelle L. Cadieux, *McMaster University*, David I. Shore, *McMaster University* ■ We live in a multisensory world. Our senses interact to produce the world we perceive. An attentional cue in one modality influences perception in other modalities. A visual cue can influence our ability to judge the order of two successive vibrations. We were interested in whether this same attentional shift would occur when we adopt a crossed hands posture. Typically when making these tactile temporal order judgments, performance declines when the hands are crossed. This may be due to a greater influence of the external environment when the hands are crossed. We investigated this by providing an exogenous visual cue at one or both of the hands prior to making judgments about the temporal order of two successive vibrations, when the hands were crossed and uncrossed. We observed a prior entry effect in both postures that was larger with the hands crossed. Results are discussed in terms of the degree of influence of the external environment.

(# 45)

Intelligence, individual differences, and prospective memory. Bob Uttl, *Mount Royal University*, Laura Grant, *Mount Royal University*, Kelsey Cnudde, *Mount Royal University* ■ A number of previous studies reported correlations between measures of intelligence and prospective memory but other studies found no such relationships. To examine the relationship between measures of intelligence, individual differences, and prospective memory, we conducted two studies: a review of relationship between intelligence and prospective memory measures reported in previous studies and a large sample size study with over 1,100 undergraduate students investigating relationship between intelligence, processing resources, and episodic prospective memory. The review of previous studies revealed varied but generally positive correlations between intelligence and prospective memory. The large sample study with undergraduate students showed weak to moderate relationships between episodic prospective memory and measures of

both crystallized and fluid intelligence as well as other measures of individual differences in cognition.

(# 46)

Meta-analysis of multi-section studies: Student ability predicts student achievement better than Student Evaluation of Teaching (SET) ratings. Bob Uttl, *Mount Royal University*, Kelsey Cnudde, *Mount Royal University*, Laura Grant, *Mount Royal University* ■ Student Evaluation of Teaching (SET) ratings are used to evaluate faculty teaching effectiveness. In support of this practice, evaluation experts in higher education cite several meta-analyses of multi-section studies that report correlations between SET ratings and student learning/achievement measured, for example, by common exams or final grades. We have recently shown that the previous meta-analyses reporting correlations between SET ratings and student learning were fundamentally flawed and that SET ratings and student learning are unrelated. However, we also found that a number of multi-section studies reported correlations between students' prior ability/achievement (i.e., ability/achievement before they enrolled in the evaluated course) and student learning. Accordingly, we meta-analyzed the relationship between prior ability/achievement and student learning and found that that this relationship was moderately strong and stronger than the relationships between SET ratings and student learning. These results are consistent with general findings from cognitive science that cognitive ability predicts later cognitive achievement on a variety of cognitive tasks. Moreover, assuming that a measure with the strongest correlation with student learning is the best measure of faculty teaching effectiveness, the results suggest that colleges and universities should consider replacing SET ratings with measures of students' prior ability. This proposal may be no less absurd than to evaluate faculty's teaching effectiveness using a measure (SET) which does not correlate with learning at all.

(# 47)

Peripheral motion contrast threshold as a predictor of aviator performance. Kathleen Van Benthem, *Carleton University, Ottawa, CA*, Chris M. Herdman, *Carleton University* ■ Maintaining control of an aircraft during flight draws upon a broad scope of cognitive mechanisms. However, developing cognitive screening tools for the aviation community has proven to be a difficult endeavour. Current cognitive assessment for aviators includes measures of working memory, mental calculation, attention, dual-task performance, reasoning, and mental flexibility. Previous aviation research suggests that domain-specific, measures of cognition are more likely to predict pilot performance than domain-general measures. In contrast, a domain-general measure, the peripheral motion contrast threshold, has demonstrated predictive utility for driving performance, another highly complex cognitive task. This work reports on the usefulness of a peripheral motion contrast test (Gabor sine wave grating) in predicting pilot landing performance, a task associated with peripheral motion detection. Preliminary linear regression results with licensed pilots indicate that response time to detecting peripheral motion was more sensitive to performance landing an aircraft than threshold values (decibels). Furthermore, in support of the need for complex measures for screening, dual-task peripheral detection measures were more predictive of landing performance than either peripheral motion response times or threshold values.

(# 48)

Social working memory: Fact or fiction? Todd Vogel, *McGill University*, Jelena Ristic, *McGill University* ■ Recent studies suggest that working memory may be uniquely specialized for maintaining and manipulating social information, such as other people's traits and/or their mental states. We examined whether these effects were associated with the manipulation of social information specifically or relational information more generally. Extending past reports, in our task participants were asked to hold, manipulate, and judge the relationship between social (i.e., friends) and nonsocial (i.e., fruits) items in working memory. The data for both types of information indicated overall decreased performance with increases in load, but showed no differences in memory performance between social and nonsocial information. While overall this data pattern is indicative of a general working memory mechanism, analyses of individual differences in working memory capacity and social competence suggest that social information may be processed differently than nonsocial information.

(# 49)

Complexity and artificial grammar learning. John R. Vokey, *University of Lethbridge*, Randall K. Jamieson, *University of Manitoba*, Lauren H. Vomberg, *University of Lethbridge* ■ Discrimination of novel grammatical strings from nongrammatical strings is better following training with strings from simple artificial grammars than more complex artificial grammars. The result accords well with the common intuition that complex material should be more difficult to learn than less complex material, but that

intuition assumes that what is being learned in these tasks is, in fact, the generative grammar to which levels of complexity adhere. If, instead, what is acquired and transferred to the test task is, say, memory for instances of the training list of strings or fragments thereof, the source of the influence of the complexity of the generative grammar on the discrimination of some small sample of novel grammatical vs. nongrammatical test strings is problematic. The fact that grammar complexity does matter could be taken as evidence that, indeed, participants are learning directly about the properties of the grammar from their exposure to exemplar strings. We explore the possibility that it is an indirect artefact of the selection of training and test strings from the grammars differing in complexity, and not an intrinsic property of complex grammars per se. We conducted a series of simulations using a PCA autoassociative artificial network of published findings and variations in the degree of grammatical coverage of various sets of training strings. The results suggest that it is the degree of grammatical coverage and not the complexity of the grammar per se that is the source of the effect of complexity.

(# 50)

Intuitive confidence in a sports betting domain. Alexander Cameron Walker, *University of Waterloo*, Jonathan A. Fugelsang, *University of Waterloo*, Derek J. Koehler, *University of Waterloo* ■ Previous research has revealed that intuitive confidence (i.e., the degree of confidence one has in an initial intuitive choice) is an important predictor of how people resolve choice conflicts between intuitive and equally valid non-intuitive alternatives (Simmons & Nelson, 2006). Two studies were conducted to investigate the determinants of intuitive confidence. Across these studies, participants predicted the outcomes of several National Basketball Association games, both with and without reference to a point spread. Our results demonstrated that participants' response times when choosing the outright winner of a game predicted separate choices made against a point spread. Specifically, we found that the faster participants were to predict the winner of a game, the more likely they were to predict the favourite against the point spread, suggesting that intuitive confidence directly reflects the speed with which an initial response comes to mind.

(# 51)

Narrowing down the estimate: exploring the cognitive factors involved in estimation. Rylan James Waring, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Estimation skill plays an important role in many daily actions and tasks (e.g. catching a baseball or determining if something is too large to carry). The processes behind these estimations can be broken into two categories: 1) perceptual magnitude estimations, and 2) computational estimations. Perceptual magnitude estimation involves the estimation of magnitudes like number (how many), space (how big/small, how close/far), time (how long), and loudness (how loud). Computational estimation is a process that occurs when people must modify an action that they have learned to perform a certain way to account for task impeding variables (e.g. modifying exact arithmetic calculation procedures when time is a concern to provide a quick 'best estimate'). Regarding perceptual magnitude estimation, a current theory suggests that all perceptual magnitude estimation processes may relate to each other through a general 'magnitude estimation' system. It is unclear, however, how perceptual magnitude estimation abilities relate to computational estimation processes. Performance on perceptual magnitude estimation tasks (number, surface area, auditory duration, and loudness) along with performance on a mathematical computational estimation task were examined as part of a correlational study. This was done to 1) examine if various perceptual magnitude estimations are influenced by a common 'magnitude representation' system, and 2) explore the relation between perceptual magnitude estimations and computational estimations. Results to be discussed.

(# 52)

Angular and curvilinear shapes within threatening and non-threatening faces. Nicholas Watier, *Brandon University* ■ Our visual system initially breaks down a scene according to large-scale changes in contrast. These changes provide information about the overall shape of objects in the scene. When threatening faces are filtered to preserve only large-scale changes in contrast, angular and diagonal shapes emerge among the facial features, whereas curvilinear shapes emerge among the features of non-threatening faces. This could help to explain the prominence of angular facial features among Disney villains, jack-o'-lanterns, and demonic tribal masks: at early stages of processing, the visual information that is extracted from threatening faces emphasizes angularity. Various objective and computational attempts at quantifying angularity in threatening and non-threatening faces are presented.

(# 53)

The influence of working memory on the semantic Stroop effect. Darcy White, *University of Waterloo*, Evan F. Risko, *University of Waterloo*, Derek Besner, *University of Waterloo* ■ It is widely believed that semantic activation from print is automatic in the sense that it is not susceptible to interference from other processes. Proponents of this view consider Stroop effects (standard and semantic) to be strong evidence in favour of automaticity. The present investigation explores whether a visuo-spatial working memory load can eliminate or reduce the semantic Stroop effect, given the recent claim that such a load can eliminate a form of semantic priming in the context of the lexical decision task.

(# 54)

Hyperlexia in university students. Darcy White, *University of Waterloo*, Derek Besner, *University of Waterloo* ■ Hyperlexia refers to the developmental dissociation between the ability to correctly pronounce words that are exceptions to the typical spelling-sound correspondences (e.g., PINT versus HINT, MINT, and LINT) and poor comprehension of these same words. We report a preliminary study of this phenomenon in university level readers, and discuss the implications for current models of reading aloud.

(# 55)

Incidental moods, source likeability, argument strength, and persuasion: Evidence for affect repair-based elaboration in sad people. Kyle Wilson, *Laurentian University* ■ People in happy moods often fail to elaborate on persuasive arguments, while people in sad moods tend to scrutinize arguments in greater detail. According to some motivational accounts, happy people will elaborate a message if they believe it might maintain their positive mood. In the present study, people in induced happy or sad moods were exposed to a likeable or dislikeable argument source and were presented with strong or weak arguments advocating comprehensive final examinations for graduating university students. Attitudes toward comprehensive examinations were measured. There was a main effect for argument strength and a source likeability x argument strength interaction on attitudes toward comprehensive final examinations. These effects occurred in the context of a mood x source likeability x argument strength interaction. Contrary to previous research, people in happy moods elaborated arguments regardless of source likeability and were persuaded by strong but not weak arguments. For people in sad moods, there was a source likeability x argument strength interaction such that, people in sad moods elaborated arguments in the likeable source condition and were persuaded by strong but not weak arguments. However, people in sad moods failed to elaborate arguments in the dislikeable source condition and were equally persuaded by strong and weak arguments. Indices of cognitive elaboration mimicked this pattern of effects. The pattern for sad people is consistent with a motivation-based affect repair explanation of mood-related processing differences. Implications are discussed.

(# 56)

You are more seductive than you think: Videos of lecturers may capture attention and impair learning. Kristin E. Wilson, *University of Waterloo* ■ There is a growing body of research that suggests the utility of graphics and visual images on learning outcomes in online learning environments are varied and depend largely on the relevance of a visual image to the content being learned (e.g., Schnotz & Bannert, 2003; Sung & Mayer, 2012). Graphics that capture attention, but are not immediately relevant to the core concepts being taught, are referred to as 'seductive graphics'. Seductive graphics may engage students' attention, however a cost is incurred as a result of expending valuable attentional resources on content-irrelevant stimuli. These findings call into question the common practice of using videos displaying lecturers in online courses, as the visual of the lecturer him/herself is arguably irrelevant to the content being taught, and faces and movement capture attention in a manner that is difficult to control (Abrams & Christ, 2003; Langton, Law, Burton, & Schweinberger, 2008). In the present study we sought to address the question of whether a video with a visual of the lecturer relative to a still image with audio or a still image with audio and closed captioning differentially impacts students' ability to control their attention (self-reported mind wandering) and lecture comprehension. The results show a significant cost to comprehension in the visual of lecturer condition, relative to the other two still image conditions. There was no effect of lecture condition on mind wandering, which may reflect the role the visual of the lecturer plays in engaging attention, albeit to irrelevant visual content.

(# 57)

Evidence for cross-modal integration of emotional audio/visual stimuli. Michael Richard Woloszyn, *Thompson Rivers University*, Teagan Lee Lauriente, *Thompson Rivers University* ■ A

body of literature attests to the notion that cross-modal integration can increase memory for target stimuli (Logeswaran & Bahattacharya, 2009; Vines et al, 2011). The present study examined the effect of the emotional quality of background music on recall for happy and sad facial expressions, as well as the impact of happy and sad facial expressions on recall for the background music. Male and female undergraduates (N=87) viewed a series of line drawings depicting an androgynous child with either a happy or sad facial expression. Individual slides were accompanied by happy music, sad music, or no music. At test, participants were then shown the same images as seen during study, with both the music and facial expressions removed. Participants were instructed to recall either the type of music (happy, sad, none) or the facial expression (happy, sad) for each slide. Memory for the facial expression was influenced by the background music during study, in that incongruent face/music valence combinations were associated with significantly poorer recall than either congruent face/music valence combinations, or when no musical accompaniment occurred. Additionally, memory for the music playing during study showed a similar interaction, with congruent face/music valence trials being associated with significantly higher recall rates relative to either incongruent or silent trials. These results expand upon earlier work (Woloszyn & Ewert, 2012), indicating that memory for the emotional features of visual stimuli are influenced by the emotional quality of auditory stimuli, and vice-versa.

(# 58)

Female online dating preferences are influenced by looks, intelligence, income, and devotion level. Michael Richard Woloszyn, *Thompson Rivers University*, Kevin Clyde, *Thompson Rivers University* ■ Female Caucasian undergraduates (N=58) rated a series of 16 randomly-generated Caucasian male dating profiles for either short-term or long-term relationship interest. The profiles varied orthogonally along four binary dimensions (low/high): looks, income level, intelligence, and warmth/devotion level of the individual. Prior qualitative research revealed that, for short-term interest, females tended to rate physical attractiveness as most important, whereas for long-term interest, devotion levels were paramount (Goetz, 2013). Contrary to this, we found that, for short-term interest, all four factors significantly influenced ratings, although the physical attractiveness of the individual was associated with an effect size twice that of the other three. For long-term interest, all four factors again significantly affected ratings, however physical attractiveness and warmth/devotion level were equivalent in their effect size (double that of the other two factors). Additionally, looks interacted with income, such that if the individual in the profile was not physically attractive, income didn't impact on ratings, but if the individual was physically attractive, then there was a preference for high-income individuals relative to low. Similar interactions also appeared between looks and warmth, as well as looks and intelligence. We interpret these findings as evidence that, when selecting a potential long-term mate, females initially assess physical appearance, only focusing on the other factors if a minimum criterion level of physical attraction is first met, and downplaying or virtually ignoring the other factors if the physical attraction criterion is not met.

(# 59)

Assessing spatial working memory and multiple object tracking performance in seniors. Michael Wolter, *University of Guelph*, Elizabeth Ann Infante, *University of Guelph*, Rylan James Waring, *University of Guelph*, Robert Joseph Nowosielski, *University of Guelph*, Caroll Lau, *University of Guelph*, Natasha Dienes, *University of Guelph*, Lana Mae Trick, *University of Guelph* ■ Multiple object tracking (MOT) is a task that involves monitoring the positions of multiple items as the move amongst identical distractors. There is evidence to suggest that in young adults there is a relationship between MOT and measures of visuospatial working memory, and in particular the Corsi blocks task. This may mean that the two tasks share similar mechanisms but is unclear whether this relationship persists into old age. In standard tracking tasks, most young adults can track 4-5 items at once whereas older adults exhibit deficits, performing as if they were capable of tracking only 2-3 at once even though they have no difficulty reporting the locations of static objects. Several key brain regions are implicated in MOT, and they may be susceptible to age related decline, which may force the older adult to use a different strategy when tracking multiple objects at once. For example, imaging studies have revealed that the anterior cingulate, frontal eye fields, inferior precentral sulcus, anterior intrerparietal sulcus, posterior interparietal sulcus, transverse parietal lobule, superior parietal lobule, human motion area, lateral occipital cortex and cerebellum play a significant role in MOT tasks. In this study, we measured working memory as a predictor of MOT performance in healthy older adults. We evaluated adults 65 years or older using cognitive measures designed to assess MOT performance and visuospatial working memory. Results are interpreted in light of theories of cognitive aging as it affects attention and working memory.

(# 60)

Associative memory "deficit" in young adults: The importance of effective encoding strategies. Brenda Iok Wong, *Ryerson University*, Lixia Yang, *Ryerson University* ■ The purpose of this study was to examine the impact of using effective encoding strategies on associative memory performance in young adults. Forty participants were asked to study word pairs that were sequentially presented on the computer screen. After a 1 min filler task, they completed two recognition tests to assess their item and associative memory for the word pairs. Participants were then asked to report the encoding strategies they had been using during encoding, and to estimate the percentage of word pairs that they had used each strategy for. Our results indicate that participants often switched their use of encoding strategies during the study phase, thus did not rely on one type of strategy throughout the experiment. Moreover, participants who used high-level encoding strategies (e.g., sentence generation) more than 50% of the time during the experiment showed better recognition performance than those who used these strategies less. More interestingly, participants who used these strategies less showed an associative "deficit" (i.e., significantly poorer associative memory than item memory) that is commonly found among older adults (e.g., Naveh-Benjamin, 2000), whereas the same effect did not appear in participants who relied on high-level strategies. Our results highlight the role of encoding strategies in associative memory deficit, commonly observed in older adults.

(# 61)

Multiple object tracking capacity may impact older drivers' ability to drive safely. Heather Woods-Fry, *University of Ottawa*, Swanti Deut, *University of Ottawa*, Sylvain Gagnon, *University of Ottawa*, Jocelyn Faubert, *University of Montreal*, Charles A. Collin, ■ Multiple object tracking (MOT) is the ability to attend to the spatial location of multiple target items as they move among a group of featurally identical distractor items. On average, an older adults' tracking ability is lower than younger adults. Our research group has examined how performance on a 3D-MOT task is related to older adults' ability to drive safely. We tested the driving performance of a group of 15 older adults (65-87 years, mean=79) with a high fidelity driving simulator to gather several metrics on driving safety. These older drivers also completed a 3D MOT task where they were asked to follow 3 pre-defined target spheres as they moved among a group of 5 identical distractors. The speed of the spheres changed according to a staircase procedure until threshold performance was reached, which was defined as the average speed at which 3 spheres could be successfully tracked. Results demonstrated that older adults who had higher speed thresholds on the 3D-MOT were less likely to have crashed during a simulated highway drive (r= .53, p= .02). These preliminary findings suggest that multiple object tracking is an important component to the driving performance of older adults.

(# 62)

Learned use of delayed picture cues by bumblebees (Bombus impatiens) while foraging. Emma Thompson, *University of Ottawa*, Catherine Plowright, *University of Ottawa* ■ Picture-object correspondence provides an alternate method of investigating associative cue use in a delayed matching task by provisioning a cue (picture) which may be spontaneously perceived as related to but different from a corresponding object. Memory for, and corresponding choice of, an object corresponding to a picture cue could be facilitated by this method with potential for matching between novel combinations. Bumblebees have been found to both easily differentiate images from corresponding objects but also spontaneously perceive a similarity between the two. Herein, an approach was designed to test the possible use of picture cues to signal reward in a foraging task. Target choice preference corresponding to associative picture cues was tested among three bumblebee (Bombus impatiens) colonies using delayed photograph cues (presented prior to target stimuli) corresponding to one of four object target stimuli. Photograph cues provided the only predictor of corresponding target reward, presented in stable locations. Rewarded and unrewarded tests show a choice preference significantly higher than chance for targets matching the cue but not transfer to novel cue-target combinations. Results show that bumblebees can learn to use associative picture cues while foraging. Furthermore, experience, conditions of high reward inconsistency and location are discussed as possible contributing factors to this associative learning in a delayed associative cue task.

(# 63)

Ordinal-symbol integration skills: The bridge between mathematics and quantity-symbol integration. Chang Xu, *Carleton University*, Katherine M. Newman, *Carleton University*, Feng Gu, *Carleton University*, Jo-Anne LeFevre, *Carleton University* ■ We examined the relations among

mathematical, quantity, ordinal, and inhibitory control skills for adults. Participants (N = 130) completed tasks that were used to measure their knowledge of quantity-symbol integration (i.e., automatic activation of numerical magnitude from Arabic digits) and ordinal-symbol integration (i.e., judge whether three digits were ordered). They also completed an inhibitory control task (black-white Stroop) and measures of calculation fluency, number line, and mathematical problem solving. Path analysis showed that participants' inhibitory control skills predicted their quantity-symbol integration which predicted their ordinal-symbol integration. Ordinal-symbol integration mediated the relations between all three mathematical measures and quantity-symbol integration.

(# 64)

The effects of mathematics automaticity training on math anxiety. Nadine R. Yildiz, *Memorial University of Newfoundland*, Darcy Hallett, *Memorial University of Newfoundland*, Kyle Richard Morrissey, *Memorial University of Newfoundland*, Cheryll Lynn Fitzpatrick, *Memorial University of Newfoundland* ■ Math anxiety is characterized by feelings of discomfort and anxiety around mathematics that tends to hinder performance. It is known to be high among elementary school teachers, which could negatively affect students. The present study assessed the effectiveness of an online math training program in the reduction of math anxiety, increased math self-concept, and increased math ability in Elementary school teachers-in-training. A math-fact automaticity training group was exposed to 33 sessions of arithmetic questions while a literacy control group was exposed to 33 passages about math and responded to multiple choice questions about the passage. Results indicated that the Math Facts Training group had a higher reduction in Math Anxiety than the Math Literacy Control Group, although there was little change in math self-concept scores. Further analyses of the intervention program suggest that online training can improve math fact ability, and this may help to ameliorate math anxiety.

(# 65)

Theory of mind processing involves temporospatial differences in children with autism spectrum disorder. Veronica Yuk, *University of Toronto*, Evdokia Anagnostou, *Holland Bloorview Kids Rehabilitation Hospital*, Daphna Buchsbaum, *University of Toronto*, Margot J. Taylor, *University of Toronto*, Charline Urbain, *The Hospital for Sick Children* ■ Children with autism spectrum disorder (ASD) exhibit difficulties with social interaction, which may be due in part to their deficits in theory of mind (ToM), or the ability to recognize that others may have mental states, thoughts, and emotions distinct from one's own. Whether these differences in ToM processing are associated with aberrations in timing and location of brain activity has not yet been determined, however. This present study compared the temporal and spatial properties of brain regions active during a false-belief ToM task in children with and without ASD using magnetoencephalography (MEG), a neuroimaging technique which has precise temporal and spatial resolution on the order of milliseconds and millimetres. While the two groups of children performed similarly on the false-belief task, whole-brain analyses revealed that whereas typically-developing children more strongly activated a prominent ToM-related brain area, the left temporoparietal junction between 325-375ms and 425-475ms, children with ASD appeared to have a delayed recruitment of a contralateral region, the right temporoparietal junction between 475-600ms, along with areas typically associated with executive functions, such as the right and left inferior frontal gyrus from 325-400ms and 500-550ms, respectively, and the left superior temporal gyrus from 500-600ms. Our results suggest that children with ASD may rely on alternative cognitive functions to complete ToM tasks. Subsequent analyses will measure brain connectivity to explore how these brain areas are interconnected, and how the ToM and other executive function networks may be enmeshed differently in children with and without ASD.

(# 66)

Development of anticipatory nausea in female rats varies across the estrous cycle. Danna Leah Zevy, *Western Universtiy London*, Martin Kavaliers, *Western University London, Ontario*, Klaus-Peter Ossenkopp, *Western University London* ■ The relationship between the estrous cycle and the development of anticipatory nausea (AN) in female rats was examined. AN is a conditioned response acquired after multiple associations between nausea and a novel context. Rats demonstrate a learned gaping response (i.e. conditioned disgust) when re-exposed to a context previous paired with toxin (LiCl) induced nausea. Research has demonstrated that females exhibit significantly higher frequencies of conditioned gaping responses relative to males. It has been suggested that gonadal hormones may play a role in this sex difference. In order to investigate the effects of female sex hormones on the development of AN, the estrous cycles of 32 adult female Long-Evans rats were

tracked. Following establishment of the cycles, rats were injected intraperitoneally with LiCl (96 mg/kmg) or saline (NaCl; 0.9%) on either proestrus (high estrogen levels) or diestrus (low estrogen levels) and immediately placed into a novel context. This procedure was repeated over four conditioning days, spaced 96 hours apart. Ninety-six hours following the final conditioning day, rats were re-exposed to the context drug-free where gaping responses were recorded. Results showed that subjects in proestrus injected with LiCl displayed significantly higher frequencies of conditioned gaping responses, relative to subjects in diestrus injected with LiCl. These results suggest that estrogen contributes to the higher incidence of AN in females, which has major implications for the treatment of AN in the human patient population undergoing chemotherapy.

(# 67)

Examining the reliability of the visuotactile simultaneity judgment and temporal order judgment tasks. Yichu Zhou, *McMaster University*, Jae Byun, *McMaster University*, Kathy Zi Yue Jiang, *McMaster University*, David I. Shore, *McMaster University* ■ The simultaneity judgment (SJ) and temporal order judgment (TOJ) tasks are the two widely used methods for measuring the size of the window of simultaneity among various sensory modalities; however, recent evidence in the literature suggest that these two tasks may in fact measure distinct cognitive processes. We present data from the visuotactile pairing of modalities that support this claim, and more importantly, based on within-task correlations, our new finding that the two tasks are not equally reliable. In addition, we show that the point of subjective simultaneity (PSS) in TOJ is more greatly affected by uncertainty of stimulus location compared to SJ. Together, these results illustrate the importance of careful task selection in the examination of multisensory integration.

(# 68)

That's my spot! Examining the formation of spatial habits in a naturalistic environment. Mona J. H. Zhu, *University of Waterloo*, Evan F. Risko, *University of Waterloo* ■ Previous research suggests that individuals tend to form spatial habits when interacting with objects in the environment, such that individuals' decisions about where to place an object tend to match that object's previous placement (Zhu & Risko, 2016). However, it remains unclear how such spatial habits may have developed over time. One hypothesis suggests that a process of stabilization may underlie spatial habit formation such that an individual's spatial behaviour becomes progressively more fixed over time. To examine this hypothesis, we tracked students' seating behaviour in a classroom setting over the course of 12 weeks for 3 separate courses. Consistent with previous research (e.g., Zhu & Risko, 2016), individuals' seating behaviour were localized and constrained by previous seating choices. Importantly, although individuals' order of arrival also constrained people's seating behaviour (i.e., the later the time of arrival, the further away individuals tended to sit from where they sat in a previous class), we found a significant relation between seating choice and time such that seating choices near the beginning of the 12-week period were more varied than those near the end. Implications of this study for understanding spatial habit formation will be discussed.

(# 69)

Gist hold on a little longer: Statistical summary representations facilitate retention in visual-short term memory. Omorowa Eguakun, *University of Regina*, Chris Oriet, ■ Statistical summary representations (SSRs) are used by the visual system to group similar items into gist-based representations that summarize features of the set rather than encoding individual items. Research on visual short-term memory (VSTM) suggests that larger sets can be held, but for shorter durations. Here, we explore whether SSRs are subject to a similar capacity-duration trade-off. In Experiment 1, subjects judged whether two displays matched or not (direct comparison); in Experiment 2, they instead judged whether two displays had the same average size or not (averaging). Participants were shown a sample array of circles of varying size, followed at one of five interstimulus intervals (ISIs) by a test array of circles that was identical, different, or statistically similar (same sized circles arranged in a different pattern). Consistent with previous findings, increases in ISI and set size decreased the accuracy of direct comparison. However, these variables had no effect on the accuracy of averaging. This suggests that SSRs facilitate retention of larger quantities of information with little loss over time. However, overall accuracy was much higher for direct comparison than for averaging. This calls into question the prevailing consensus that representations of individual items within sets are not retained. We speculate that sets of items as a whole can indeed be represented in VSTM for longer durations, but only as sets: if a task requires individuating items, these holistic representations must be decomposed, impeding comparisons.

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LABORATOIRE INSPIRE LABORATORY

Integrated Neurocognitive & Social Psychophysiology Interdisciplinary Research Environment

About the INSPIRE Laboratory

The INSPIRE laboratory is a shared multidisciplinary research facility, designed to study the relationships between people's thoughts, behaviours, and physiological reactions.

Researchers can monitor and control multiple workstations, recording various psychophysiological data that can be synchronized with a large variety of individual or group experimental tasks. Participants' perceptions, opinions, thought processes and emotions can be assessed in response to various visual or auditory stimuli.

Come visit the lab!

Because of space constraints, only 10 places are available per visit, first come first serve.
Plan approximately 20-30 minutes for the tour.

Date	June 24th, 2016	June 25th, 2016	June 26th, 2016
Time	4:30 pm	11:00 am 3:00 pm	10:00 am 12:00 pm

Acquisition and Analysis Software

Data acquisition & extraction:
Mindware BioLab
Mindware Signal Analysis Applications
more details: http://www.mindwaretech.com/

Popular experiment programming:
E-Prime
Experiment Builder
Matlab
DirectRT

Available Measures:

- Electrocardiography
- Impedance cardiography
- Electromyography
- Electrodermal activity
- Heart rate
- Blood pressure
- Eye tracking
- Body temperature

CSBBCS 2017 Conference in Regina