CSBBCS/SCSCCC

Annual Meeting

2012

Queen's University

Kingston, Ontario

June 7-9, 2012

CSBBCS
SCSCCC

Message from the Organizers

Welcome to Kingston and Queen's University! We are delighted to host the 27th Annual Meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science and are looking forward to welcoming you on campus on June 7.

CSBBCS 2012 Conference Credits

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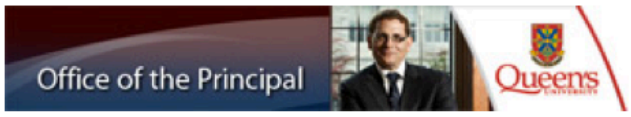

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General Information

Paper Sessions

All talks (paper sessions, symposia, and the Hebb Talk) will be held in the **Bioscience Complex (Earl Hall)** rooms BioSci 1101, BioSci 1102, BioSci 1103, **Humphrey Hall** room H102, and **Dupuis Hall** rooms 215, 217. Computers with PowerPoint installed will be available in each room. Please bring your slides on a USB stick and arrive at least 15 minutes prior to the start of your session to ensure that all presentations can be uploaded to our computers.

Poster Sessions

Poster sessions will be held in the **Bioscience Complex Atrium**. Boards (6 feet x 6 feet) will be numbered – pins will be provided. Please put your poster up BEFORE the scheduled start time of your Poster Session.

Coffee

Coffee will be served in the Bioscience Complex Atrium (see the program for times). Free with registration.

Breakfast

A continental breakfast will be provided Friday and Saturday morning. Free with registration.

Banquet

The banquet will be held on Friday night, June 8 at 7:00 PM in Ban Righ Hall (see maps at the back of the Program). You must have registered and purchased banquet tickets in advance using the online registration service (CSBBCS.org) to attend the banquet. The banquet is NOT free with registration and tickets will not be available on site.

Internet Access

Registrants will receive a user ID and password to access the Queen's University wireless network.

Parking

Parking for visitors is available in the underground Parking Garage (corner of University Avenue and Stuart Street), the Queen's Centre underground Parking Garage (entrance off Division Street), as well as pay and display parking areas (see map at the back). We recommend leaving vehicles at your hotels and walk to campus: it will save you money for parking fees and allow you to see and enjoy Kingston and its beautiful, historic downtown neighborhoods.

CSBBCS Executive Members (2011-2012)

President: Valerie Thompson, University of Saskatchewan
Past-President: Peter Dixon, University of Alberta
President-Elect: Steve Lupker, University of Western Ontario
Secretary-Treasurer: Peter Graf, University of British Columbia
Member-at-Large: Debbie Kelly, University of Saskatchewan (2009 - 2012)
Member-at-Large: Randy Jamieson, University of Manitoba (2011-2014)

Future BBCS Conference Dates

CSBBCS 2013 will be hosted at the University of Calgary, June 7-9, 2013
Organizer: Glen Bodner
CSBBCS 2014 will be hosted at Ryerson University, June 12-14, 2014
Organizer: Ben Dyson
CSBBCS 2015 will be hosted at Carleton University, dates to be determined
Organizer: Guy Lacroix

Society Awards for 2012

Donald O. Hebb Distinguished Contribution Award

Dr. Sara Shettleworth

For making significant contributions to the study of brain, behavior, and cognitive science

For students today, it may be hard to imagine that there ever was a time when evolution and ecology were studiously ignored by researchers in learning and cognition—a time when the work of ethologists and animal behaviourists also proceeded independently of most of psychology. If times have changed, and if considerations of evolution and cognition are now inextricably intertwined, it is largely because of the tireless efforts of Dr. Sara Shettleworth, the 2012 recipient of the Donald O. Hebb Award. She has made it her life's work to "capture a vision of an approach to the evolution of mind in which it is natural, indeed necessary, to integrate the answers to questions traditionally asked in psychology laboratories with the answers to questions about ecology and evolution."

Dr. Sara Shettleworth completed her B.A. with High Honors at Swarthmore College in 1965. In 1966 she received her M.A. in Psychology from the University of Pennsylvania. She completed her PhD at the University of Toronto in 1970 and remained to become a Professor there both in Psychology and in Ecology and Evolutionary Biology. She is currently Professor Emerita of the University of Toronto. Funded by NSERC throughout her career, her research on learning and memory in a variety of species of birds and mammals has appeared in over 100 articles and book chapters. An early paper, Constraints on Learning (1972) became a Citation Classic. In it she set the stage for her analytical pursuit of adaptive, ecologically-relevant and evolutionarily-selected behaviors. Highlighting the ecological context of behavior was the underpinning for a paradigm shift in experimental animal psychology that was just beginning in the early 1970s. Her work, and the spirit of her work, has been foundational and inspirational for scientists interested in understanding animal (including human) behavior. In her own research, she linked field and laboratory methodologies in the study of diverse species against the backdrop of evolutionarily-relevant functional analysis. In the best

tradition of Donald Hebb, her approach is broadly interdisciplinary with relevance for multiple areas of separate study including, but not limited to, behavioural ecology, experimental psychology, behavioral neuroscience and animal behaviour.

Again reminiscent of Hebb, and his Organization of Behavior, she synthesized the field of animal cognition in a definitive and masterful scholarly work entitled "Cognition, Evolution and Behaviour" published in 1998 with a 2nd edition in 2010. This work has been described as "essential to anyone interested in the...mechanisms that guide animal thought" and a 'magisterial overview of comparative psychology'.

Her new textbook for undergraduates entitled "Fundamentals of Comparative Cognition" was published in 2012; it too has been described as a "tour de force" and "stunningly erudite". She has served as a Distinguished Scientist Lecturer for the American Psychological Association (1996) and is a member of the Society of Experimental Psychologists (2003), a Fellow of the Animal Behavior Society (2007) and a Fellow of the Royal Society of Canada (2008). She was recognized for her outstanding contributions 'to the study of cognitive processes in animals' by the Research and Master Lecturer Award of the Comparative Cognition Society (2008).

She has served on the editorial board of, or as consulting editor for, Learning and Motivation; The Journal of the Experimental Analysis of Behavior; Ethology and Learning and Behavior. She is currently on the editorial board of the Journal of Experimental Psychology: Animal Behavior Processes and the Journal of Comparative Psychology.

It is hard to overstate the impact of her visionary leadership for comparative and experimental psychology. Yet for the individuals who trained with Dr. Shettleworth, it is her generous and committed mentoring that they would highlight. Her commitment to students is readily evidenced in the dedication of her synthetic masterwork. She has facilitated the careers of many successful scientists including Jonathon Crystal (Indiana University), Karen Hollis (Mount Holyoke College), Brett Gibson (University of New Hampshire). Robert Hampton (Emory University), David Brodbeck (Algoma University), Catherine Plowright (University of Ottawa), Pamela Reid (ASPCA), Jennifer Sutton (Brescia University College) and others, each of whom have themselves made important contributions to the field.

In summary, Dr. Shettleworth has brought together multiple biological and psychological perspectives on the study of animal minds in her

own research program, and in her scholarly and visionary synthesis of comparative cognition. She has imparted her rigorous, yet passionate, approach to the science of behavior to the many students she has supervised, and in her writings, to the many students who will only come to know her on the printed page. The Hebb Award honors the extraordinary caliber of Dr. Shettleworth's contributions to the study of brain, behaviour and cognition.

CSBBCS Early Career Award

Dr. Frank Russo

For exceptional quality and importance of contributions of a new researcher in Canada.

Frank Russo is Associate Professor of Psychology at Ryerson University and Adjunct Scientist at the Toronto Rehabilitation Institute. After earning his Ph.D. from Queen's University at Kingston, Frank completed Post-Doctoral Fellowships in Music Cognition and Cognitive Hearing Science. He founded the SMART (Science of Music, Auditory Research and Technology) lab at Ryerson in 2006. Projects in the lab tend to be highly multidisciplinary, often incorporating behavioral, computational and electrophysiological methods. Recent projects have investigated sensorimotor interactions involved in vocal-emotional communication, multisensory integration in music, cognitively based music information retrieval, assistive/ rehabilitative technology, and the psychology of the urban soundscape.

Frank's lab has published its research in a broad spectrum of journals including Proceedings of the National Academy of Sciences, Psychological Science, Psychonomic Bulletin & Review, Cognition and Emotion, Journal of Experimental Psychology: Human Perception & Performance, and Music Perception. Frank is also committed to the dissemination and translation of research beyond journals via teaching, public speaking, and collaborations with artists, community-based groups, and industry. Successful translations of his research include a Canadian train-horn standard, a sensory substitution technology supporting perception of music by deaf individuals, and a series of exhibitions/concerts featuring music without sound.

Richard C. Tees Distinguished Leadership Award

Dr. Raymond Klein

For outstanding leadership to the CSBBCS community.

Ray Klein has been involved in CSBBCS since its earliest days; indeed, he is one of the co-founders, and served on the initial executive. Later, in the mid-90s, he served a three-year term as President. In addition, he has twice organized our annual conference in Halifax, considered by many to be among our most successful meetings. He has been a real presence at the conference each year, and was clearly deserving of his Hebb Award in 2009 for his ground-breaking attention research.

In addition, Ray has been a significant presence on the national stage. He has served on the NSERC committee, he has served continuously on the editorial board of the *Canadian Journal of Experimental Psychology* for 20 years, and he was the founding member and first Chair of the Canadian Psychological Association's Perception, Learning, and Cognition section (Section 27). In addition, he has represented Canada internationally on the Governing Board of the Psychonomic Society and as Associate Editor of the *Journal of Experimental Psychology: Human Perception and Performance*.

At Dalhousie, where he has spent his entire career, Ray has recently served with distinction as Chair of the Department of Psychology. Before that, he was for many years the Graduate Coordinator for the department. He has supervised numerous graduate students who have gone on to successful careers. Finally, there are his own contributions to our science. Ray's research has been very influential on a number of fronts, as indexed by his total citations being greater than 5000 and an *h* of 31. From his early work on visual dominance to his recent work on inhibition of return, he has been a leader in the field of attention.

Program-at-a-glance

Thursday, June 7, 2012

4:00 - 7:00	Registration	Humphrey Hall Atrium
5:00 - 7:00	Poster Session-1 [P-1]	Bioscience Complex Atrium

Friday, June 8, 2012

8:30 - 10:00	Paper Sessions #1-6	Bioscience Complex, Humphrey Hall, Dupuis Hall

- #1 Symposium-1 [S-1]: New test instruments to study singing: perception, production, and emotion (BioSci 1102)
- #2 Symposium-2 [S-2]: Computational understanding of cognition (BioSci 1101)
- #3 Talk Session-1 [T-1]: Perception I (BioSci 1103)
- #4 Talk Session-2 [T-2]: Attention I (Dupuis Hall 215)
- #5 Talk Session-3 [T-3]: Language & Reading I (Dupuis Hall 217)
- #6 Talk Session-4 [T-4]: Animal Behavior and Neuroscience (Humphrey Hall 102)

10:00 - 10:15 Break

10:15 - 11:45	Paper Sessions #7-12	Bioscience Complex, Humphrey Hall, Dupuis Hall

- #7 Symposium-3 [S-3]: The cognitive and neural basis of recollection memory (BioSci 1102)
- #8 Symposium-4 [S-4]: Mathematical cognition (BioSci 1103)
- #9: Symposium-5 [S-5]: Vision for perception and action, 20 years later: where are we now? (Humphrey Hall 102)
- #10 Talk Session-5 [T-5]: Memory I (BioSci 1101)
- #11 Talk Session-6 [T-6]: Attention II (Dupuis Hall 215)
- #12 Talk Session-7 [T-7]: Language & Reading II (Dupuis Hall 217)

11:45 - 1:45 Lunch Break

(Friday, June 8, 2012 continued)

1:45 - 3:15	D.O. Hebb Lecture	Bioscience Complex 1101
3:15 - 3:30	Break	
3:30 - 4:30	NSERC Session	Bioscience Complex 1101
4:30 - 6:00	Poster Session #2	Bioscience Complex Atrium
7:00 - 9:00	Banquet	Ban Righ Hall

Saturday, June 9, 2012

8:30 - 10:00	Paper Sessions #13-18	Bioscience Complex, Humphrey Hall, Dupuis Hall

#13 Symposium-6 [S-6]: Categorization: processes and representations (BioSci 1102)
#14 Symposium-7 [S-7]: Cognitive control and bilingualism (BioSci 1103)
#15 Symposium-8 [S-8]: Visual attention, salience and the brain (Humphrey Hall 102)
#16 Talk Session-8 [T-8]: Memory II (BioSci 1101)
#17 Talk Session-9 [T-9]: Cognitive Processes I (Dupuis Hall 215)
#18 Talk Session-10 [T-10]: Human & Cognitive Neuroscience (Dupuis Hall 217)

10:00 - 11:30	Poster Session #3	Bioscience Complex Atrium
11:30 - 1:00	Lunch	

1:00 - 2:30	Paper Session #19-24	Bioscience Complex, Humphrey Hall, Dupuis Hall

#19 Symposium-9 [S-9]: Learning, memory & plasticity: a systems level approach (Humphrey Hall 102)
#20 Symposium-10 [S-10]: Electrophysiology as an investigation tool of attention and working memory (BioSci 1102)
#21 Talk Session-1I [T-11]: Memory III (BioSci 1101)
#22 Talk Session-12 [T-12]: Perception II (BioSci 1103)
#23 Talk Session-13 [T-13]: Cognitive Processes II (Dupuis Hall 215)
#24 Talk Session-14 [T-14]: Reasoning and Mathematical Cognition (Dupuis Hall 217)

2:45 - 4:00	Awards Presentation and Business Meeting	Bioscience Complex 1101
4:00 - 4:15	Break	
4:15 - 5:30	President's Symposium [S-11]: The nature, causes, and effects of mind wandering	Bioscience Complex 1101

Poster Session-1 [P-1]
(June 7, 5-7 pm)

[P-1-1] Enhancement of ERPs indexing attention to gaze cues for faces expressing negative or ambiguous emotions

Amandine Lassalle, Roxane Jeanne Itier; University of Waterloo

During social interactions, we often orient our attention in the direction signalled by gaze. In two gaze cuing experiments, we investigated the ERP correlates of this spatial attention orienting to gaze direction and their modulation by the emotion of the face cue. We demonstrated for the first time that EDAN and ADAN ERP components indexing different attention processes were present in a gaze cuing experiment, and that ADAN was modulated by fear, anger and surprise emotions, suggesting that emotions with a negative or ambiguous valence increase spatial attention allocation to the gazed-at site.

[P-1-2] Emotional Modulation of Spatial Attention depends on Stimulus Sequence

Amandine Lassalle, Roxane Jeanne Itier; University of Waterloo

Numerous studies looked at the influence of emotion on spatial attention to gaze, but yielded mixed results. With these three experiments using a gaze cuing paradigm, we showed that an emotional modulation of attention to gaze occurred when the dynamic face cue averted its gaze before expressing an emotion but not when the emotion was expressed before the aversion of gaze or when gaze aversion and emotion expression were concurrent. Using an ecological face cue gazing to the side before reacting to the observed object thus seems to be essential to study the impact of emotion on spatial attention.

[P-1-3] Speed-accuracy Trade-offs in Inhibition of Return during Active Oculomotor Inhibition

Mahmoud M Hashish, Matthew D Hilchey, Jason Satel, Jason Ivanoff, Raymond M Klein; Dalhousie University, Saint Mary's University

Recent work has revealed that the inhibition of return (IOR) phenomenon can be expressed differentially depending on the extent to which the oculomotor system is active during a task, resulting in either a perceptual/attentional "flavour" or a motoric "flavour" of IOR. The purpose of this investigation was to repeat an experiment that found evidence of motoric IOR (Ivanoff & Klein, 2001) while ensuring that the eye movement system was actively inhibited, verified through the use of eye tracking equipment and software. We found that when we encouraged active inhibition of the oculomotor system, a perceptual/attentional flavour of IOR was obtained.

[P-1-4] The effects of TMS over PPC in a visual feature memory / saccade task

David Christopher Cappadocia, Khashayar Gharavi, Michael Vesia, Joost C. Dessing, Xiaogang Yan, John Douglas Crawford; York University, Sunnybrook Health Science Centre, University of Waterloo

Perception and action are often treated separately, but ultimately perception must be used to guide meaningful actions when object selection and visual memory are required. We investigated the role of parietal cortex areas known to be involved in saccade and reach planning (the middle intraparietal sulcus [mIPS] and the superior parietal-occipital complex

[SPOC]) with TMS in a delayed match-to-sample saccade task, based on single or multiple visual features. Preliminary results show an interaction between TMS site and the visual feature to be remembered in the saccade task.

[P-1-5] Tactile temporal processing of empty intervals presented across fingers

Tsuyoshi Kuroda, Simon Grondin; Université Leval

An experiment employing the method of constant stimuli was conducted to examine how space between tactile stimuli marking time affects the processing of duration. Participants compared two intervals presented successively. The first interval was delimited by two electrical pulses both delivered to the index finger, whereas the fingers to which two pulses were delivered were systematically varied in the second interval. Delivering two pulses to different fingers resulted in longer perceived duration than delivering them to the same finger, and the discrimination level was not affected by the location of the pulses marking the second interval.

[P-1-6] Bodies are special: Stimulus type and strategy affect sex differences in mental rotation accuracy

Constance T Heidt, Adina N Rudrick, Laurie Sykes Tottenham; University of Regina

Recent mental rotation (MR) studies have found a negated or reduced sex difference (male advantage) when using stimuli resembling the human body. Confounding differences between human body and traditional block stimuli were addressed in the present study by using novel body and control 'funny-body' stimuli that were identical in cues and complexity, in addition to blocks. Analyses revealed men's MR performance was more accurate overall. However, a reduced sex difference on body stimuli was found, with women's performance facilitated more than men's. These results suggest that bodies may have a special influence on spatial processing in women relative to men.

[P-1-7] Developmental course of attention orienting by gaze and its modulation by facial expressions

Karly Neath, Elizabeth S Nilsen, Katarzyna Gittsovich, Roxane J Itier; University of Waterloo

Processing of facial expressions has been shown to potentiate orienting of attention towards the direction signaled by gaze in adults, an important social cognitive function. However, little is known about how this skill develops. Dynamic emotional stimuli were presented to 222 participants (7- 25 years) to examine the developmental trajectory of the gaze orienting effect (GOE) and its modulations by facial expressions. The GOE was present from 7 years onward, decreased linearly until 12-13 years at which point adult levels were reached, and was increased for fearful and surprised faces across ages. Implications for clinical and typically-developing populations are discussed.

[P-1-8] The Perceptual Limitation Hypothesis in the Discrimination of Fear and Surprise

Emma C. Pote, Vanessa Goncalves, Joel Dickinson, Annie Roy-Charland, Melanie Perron; Laurentian University

While basic emotions tend to be accurately recognized, specific confusions between emotions are observed. Fear is most often confused with surprise. The perceptual limitation hypothesis suggests that this difficulty is a function of their visual similarities. However, fear is comprised of two

discrimination indices not seen in surprise: one in the eyebrow region and one in the mouth region. Eye movements were measured in a discrimination task before and after a practice task. Accuracy at pre-test was greater when the relevant index was in the mouth zone. Accuracy following practice showed no difference as a function of indices. After practice, time spent in the eyebrow zone increased regardless of the indices. Results suggest that practice prompts observers to attend to relevant indices in the eyebrow zone and improves discrimination accuracy.

[P-1-9] Measuring rat ultrasonic vocalizations during simultaneous cue preference and taste learning

Selma Hamdani, Sara Halpern, Norman M White; McGill University

We investigated the simultaneous learning of conditioned cue preference (CCP) and acquired reduction in consumption (ARC, aka "conditioned taste preference") produced by amphetamine (3 mg/Kg) and morphine (5 or 15mg/kg). Rats had access to a sweet solution in both CCP apparatus compartments but only one of the two compartments was paired with drug injections. Rats in the morphine and amphetamine groups showed a CCP for the drug-paired compartment but also consumed less of the equal solution (ARC) in that same compartment. Rat ultrasonic vocalizations were more closely correlated with the CCP than with the ARC, suggesting control by contextual cues.

[P-1-10] Do human hands capture attention?

Marcus Neil Morrisey, Mel D Rutherford; McMaster University

Human bodies trigger specialized processing within the visual cortex. An attentional bias to bodies also exists. A recent study described a cortical region selectively responsive to human hands. We examined whether this might result in an analogous attentional advantage to hands, and if so, if it would be distinguishable from the response to bodies generally. Employing a dot-probe task across 3 experiments, we found participants were faster to respond when a probe coincided with pictures of bodies, hands or feet but were no faster with other stimuli. We found no evidence of a difference in response to bodies and hands.

[P-1-11] Picture-Object Correspondence in Bumblebees? II. Bumblebees spontaneously transfer learning from flowers to pictures of flowers

Emma Thompson, Catherine Plowright; University of Ottawa

This study is part of a series on whether pictures used in research on "floral recognition by bees" are perceived as flowers by the bees and not only the experimenters. Groups of n=20 underwent training on artificial flowers placed at the ends of corridors in a radial arm maze; e.g. yellow rewarding (S+) vs. pink unrewarding (S-). Subsequent testing on unrewarding pictures of the flowers resulted in a significant preference for pictures of the S+: though our previous work showed that bees do not confuse flowers with their pictures, they nonetheless treat them as similar.

[P-1-12] Here's looking at you: Visuospatial biases can influence judgements of faces and art

Bianca Hatin, Laurie Sykes Tottenham; University of Regina

Prior research suggests that line bisection may measure not only pseudoneglect, but also emotion

processing and perhaps right hemisphere function in general (Drago et al., 2008). However, in this research ratings of emotional evocation from paintings were made using ascending line-based scales, possibly confounding ratings with line-bisection biases owing to pseudoneglect. The present study addressed this confound by using ascending and descending rating scales and also extended the research to include overtly emotional stimuli. Interactions between line bisection and scale type were observed on emotion ratings, suggesting line bisection is related to biases in visuospatial attention, but not emotion processing.

[P-1-13] Enduring Changes in Context Dependent Fear Extinction after Adolescent, not Adult, Social Instability Stress in Female Rats

Daniel L Mongillo, Cheryl M McCormick; Brock University

Adolescent (n=48) and adult (n=48) female Long Evans rats underwent 16 days of social instability stress (SS; daily 1h isolation and change of cage partners) or were non-stress controls. Rats were then tested on the strength of acquired contextual and cue fear conditioning, as well as extinction learning, beginning either the day after the stress procedure or 4 weeks later. SS in adolescence resulted in impaired context-dependent fear extinction compared to control rats. SS in adulthood had no effect on any measure of fear conditioning. The results support the hypothesis that adolescence is a time of heightened vulnerability to stressors.
The use of facial features in facial expression recognition

[P-1-14] Forget worrying and remember to smile: The link between anxiety, depression, and prospective memory

Sarah E. Schell, Valérie Sirois-Delisle, Chelsea da Estrela, Gillian M. Alcolado, Adam S. Radomsky, Carrie Cuttler; Concordia University

Previous findings on the links between anxiety, depression, and prospective memory (PM) are mixed. Many studies focused exclusively on objective measures of PM and failed to examine the unique contributions of depression and anxiety. The current study examined the relationships between anxiety, depression, and PM, using both objective and self-report measures. In addition to PM measures, participants completed the Depression Anxiety Stress Scale. Significant correlations were found with self-report, but not objective measures of PM. Depression and anxiety were found to uniquely predict problems with episodic PM while anxiety was found to uniquely predict problems with habitual and internally-cued PM.

[P-1-15] Effect of vantage point on change detection in road traffic scenes

Alexandra S. Mueller, Lana M. Trick; University of Western Ontario, University of Guelph

Using a change detection task, this study investigated the effects of driving experience, vantage point of the scene, object safety relevance, and object size on the ability to select information in road traffic scenes. No effect of experience was found and vantage point determined the salience of information. Observers prioritized small road users over passenger vehicles when viewing road traffic scenes from a driver's vantage point, but they detected large irrelevant information faster than small. This interaction was not found in the driving-unrelated vantage point condition. Findings are discussed as they relate to driving safety and attention.

[P-1-16] Personality and behavioral outcomes associated with risk-taking are accurately inferred from faces

Sandeep Mishra; University of Guelph

Growing evidence suggests that people are able to accurately infer personality traits and behavioral outcomes from facial photographs. However, little research has examined whether people are able to accurately infer personality traits or behavioral outcomes associated with risk-taking. In this study, we examined whether people were able to accurately infer personality traits associated with risk-taking from facial photographs. We further examined whether such first impressions were associated with relevant behavioral outcomes—specifically, future discounting and gambling and problem gambling tendencies. Results suggest that people are able to accurately infer personality traits and behavioral outcomes associated with risk-taking from faces.

[P-1-17] Similar Sensitivity to Morphological Complexity in Poor and Typical Readers

Regina Henry, Victor Kuperman, Elisabet Service; McMaster University

In this morphological reading-intervention study, teenage participants with reading disabilities and an age-matched group of typical readers made auditory and visual lexical decisions on morphologically complex stimuli. Response times showed a main effect of morphological type in both modalities for all readers (compounds < derivations< pseudocomplex words). Although poor readers had slower response times and were less accurate in both modalities, there was no interaction between group and morphological type. This suggests that overall speed and accuracy may improve with reading skill, but the relative difficulty of processing different morphological types is not affected even after specific morphological training.

[P-1-18] The preference for symmetry in flower-naïve and not-so-naïve bumblebees

Catherine Plowright, Jennifer Chew Leung, Sarah Evans, Charles Collin; University of Ottawa

Truly flower-naïve bumblebees, with no prior rewarded experience for visits on any visual patterns outside the colony, were tested for their choice of bilaterally symmetric over asymmetric patterns in a radial-arm maze. No preference for symmetry was found. Prior training with rewarded black and white disks did, however, lead to a significant preference for symmetry. The preference was not specific to symmetry along the vertical axis: a preference for horizontal symmetry was found as well. The results challenge the notion that a preference for bilateral symmetry is unlearned. The preference for symmetry was the product of non-differential conditioning.

[P-1-19] Scene identification is benefited by an integration of the first- and second-order statistics of scenes: A filter-rectify-filter approach to scene gist

Bruno Richard, John Brand, Aaron Johnson; Concordia University

Humans have the ability to perceive and subsequently categorize the general attributes of a scene under pre-attentive (gist) conditions. It is believed that extracting the gist of a scene relies on feature detectors in the early visual system, yet, which features may be more informative than others to correctly identify a scene remain unclear. Although texture (a second-order characteristic)

has been shown to be of importance in correctly categorizing scenes, we demonstrate that a combination of both the first- (e.g., luminance) and second-order (i.e., texture) characteristics of scenes can increase accuracy of categorization in our model in comparisons to humans.

[P-1-20] Does preschoolers' emergent arithmetic ability depend on their working memory capacity and emergent phonological skills?

Donna M Drohan-Jennings, Joanne Lee; Wilfrid Laurier University

Children's mathematical ability is critical for academic success; thus it is vital to have a complete understanding of the predictors of mathematical ability. This study examined the relationships among preschool-aged (3- and 4-years old) children's working memory, phonological awareness and their ability to solve verbal, nonverbal and combined (verbal and nonverbal) arithmetic problems. Central executive capacity predicted children's ability to solve nonverbal and combined sums and the visuospatial sketchpad predicted ability to solve nonverbal sums. The results of this study demonstrate that different aspects of working memory are important depending on the type of problem to be solved.

[P-1-21] Social Stress in Adolescence Decreases Social Interactions in Adulthood in Male Rats

Brittany Barnes, Matthew Green, Cheryl M McCormick; Brock University

Social interactions were investigated several weeks after rats underwent social instability stress (SS) during adolescence. SS rats paired with another SS rat had decreased social interaction than controls (CTL) paired with another CTL rat ($p=0.001$) and SS rats paired with a CTL rat ($p=0.003$). Latency to a novel object was longer in SS than CTL rats ($p=0.05$), but groups did not differ in time spent investigating the object. All preferred to be near a novel conspecific than an object, but groups did not differ in time near the conspecific. Thus, stress in adolescence may increase social anxiety.

[P-1-22] Short-range target-distractor competitive interactions revealed by lateralized event-related potentials

Sébrina Aubin, Pierre Jolicoeur; Université de Montréal

Previous work suggests shape similarity and physical distance between a target and a salient distractor individually modulate the amplitude of the N2pc, an event-related potential component reflecting mechanisms of visuospatial attention deployment. Here we show a smaller N2pc when a distractor is less similar to the target compared to a more similar distractor, although only when the distractor and target are in physical proximity. These results suggest that N2pc reflects focal attention to the target and that less focal attention is needed when a salient, proximal, distractor can be filtered out on the basis of salient shape features.

[P-1-23] Student evaluation of teaching (SET): Faculty beliefs, behaviors, and perceptions

Bob Uttl, Brittney J Stevens, Carmela A White; Mount Royal University

Student evaluation of teaching (SET) ratings are used to evaluate faculty’s teaching effectiveness for hiring, tenure, promotion, and merit decisions. We conducted a large scale survey to examine faculty’s SET-related beliefs, teaching behaviors, and perceptions. The results showed

that faculty believe SET ratings are influenced by many teaching effectiveness irrelevant factors (TEIFs) and engage in behaviors that increase SETs but not learning (e.g., select easier textbooks, allow resubmission of assignments without penalty). Moreover, faculty also report that criteria and standards are unknown or unclear to them and that evaluation of their teaching is neither comprehensive nor fair.

[P-1-24] Remember to relax: The relationship between stress and prospective memory

Chelsea da Estrela, Valérie Sirois-Delisle, Sarah E. Schell, Gillian M. Alcolado, Adam S. Radomsky, Carrie Cuttler; Concordia University

Numerous studies have explored the detrimental effects of stress on cognitive processes. However, little is known about the relationship between stress and prospective memory (PM). Therefore, the current study sought to examine this relationship. Undergraduate students were asked to complete several PM tasks as well as two questionnaires which assess the frequency individuals experience PM failures in everyday life. The stress subscale of the Depression Anxiety Stress Scale was used to measure stress. Results support the hypothesis that a positive relationship exists between stress and self-reported problems with PM, underlying the detrimental effects of stress on cognition.

[P-1-25] Post-Weaning Social Isolation Increases Exploratory Behaviour and Elevates Locomotor Activity In Response to Novelty, Stress, and Amphetamine Challenge

Josh Lister, Richard J Beninger, James N Reynolds; Queen's University

The combined effects of social isolation (SI) and subchronic MK-801 treatment on locomotor activity, exploratory behaviour, and memory have received little attention. Rats were isolated or group-housed from weaning and injected bi-daily with MK-801 or saline for 1 week following 5 weeks of isolation. SI animals showed elevated locomotor activity in response to novelty, stress, and amphetamine challenge, while concurrently exhibiting more exploratory behaviour (rearing and jumping). Though no systematic impairment in novel object recognition performance was seen between conditions, SI rats spent more time exploring objects in this paradigm. Abnormal behaviour following SI may be relevant to schizophrenia.

[P-1-26] Do students learn more from more highly rated professors?

Bob Uttl, Carmela A White; Mount Royal University

Student evaluation of teaching (SET) ratings are used to evaluate faculty's teaching effectiveness based on the widely held belief that students learn more from highly rated professors. The key evidence cited for this belief is Cohen's (1981) meta-analysis of multi-section studies investigating relationship between learning and SET ratings. Surprisingly, Cohen's meta-analysis lacks basic meta-analytic information (e.g., primary studies' effect sizes). We conducted a comprehensive meta-analysis of multisection studies published to date and found that (1) Cohen's findings are an artifact of poor meta-analytic methods and (2) students do not learn more from professors with higher SET ratings.

[P-1-27] Adding context to a surprise face: The surprising case of surprise

Miriam FF Benarroch, Mel D Rutherford, Corey Lipman

Facial adaptation effects have been extended to facial expressions. The percetion of an emotionally ambiguous face following adaptation to a negatively valenced emotional face leads to the perception of a happy expression while adaptation to a positively valenced emotional faces leads to the perception of a sad expression. Surprise facial expressions produce ambiguous aftereffects. In three experiments, we replicate the ambiguity seen in the after image of surprise, explore the possibility that surprise is ambiguous due to a lack of contextual valence information, and review the impact of an emotionally charged story on the perception of an emotionally ambiguous face.

[P-1-28] Does diminished confidence in prospective memory cause urges to check?

Valérie Sirois-Delisle, Sarah E. Schell, Chelsea da Estrela, Gillian M. Alcolado, Adam S. Radomsky, Carrie Cuttler; Concordia University

Individuals with checking compulsions have intrusive doubts that they failed to perform a task and subsequently feel compelled to check. Correlational evidence has demonstrated a link between checking and prospective memory. The present is the first experiment to examine whether diminished confidence in prospective memory causes increased urges to check. Participants were given false positive or false negative feedback about their performance on prospective memory tests. They completed additional tasks and rated their urges to check those tasks. Participants who received false negative feedback reported greater urges to check. Thus, diminished confidence in prospective memory may contribute to checking compulsions.

[P-1-29] Scene identification is benefited by an integration of the first- and second-order statistics of scenes: A filter-rectify-filter approach to scene gist

Bruno Richard, John Brand, Aaron Johnson; Concordia University

Humans have the ability to perceive and subsequently categorize the general attributes of a scene under pre-attentive (gist) conditions. It is believed that extracting the gist of a scene relies on feature detectors in the early visual system, yet, which features may be more informative than others to correctly identify a scene remain unclear. Although texture (a second-order characteristic) has been shown to be of importance in correctly categorizing scenes, we demonstrate that a combination of both the first- (e.g., luminance) and second-order (i.e., texture) characteristics of scenes can increase accuracy of categorization in our model in comparisons to humans.

[P-1-30] Adult brain as a reflection of experience and cortical constraints during adolescence

Farshad Nemati, Bryan Kolb; University of Lethbridge

In a series of experiments we have demonstrated that the neural organization of adult brain is in a meaningful relationship with the experience and developmental constraints imposed on brain during adolescence. Although, such organization is a net outcome of meta-plasticity of the brain, it can be predicted based on individual and/or combinatory effects of experiences during adolescence in interaction with age-area dependent maturational state of brain. Such re-evaluation of the adult brain based on developmental effect of experience on adolescent

brain has important implications for treatment and preventive plans in medical sciences.

[P-1-31] ERP evidence for a supramodal mechanism of exogenous spatial attention

Mazyar Fallah, Sarah M Jones, Heather Jordan; York University

We asked whether reflexive orienting of attention to bottom-up spatial cues was controlled by a supramodal system. We recorded event-related potentials while participants performed an orthogonal spatial cueing task using peripheral non-predictive auditory and visual cues and targets. All four combinations of cue-target modalities were randomly interleaved, to allow for direct comparison of cueing effects on the evoked potentials. We found a negative deflection (Nd) on fronto-central electrodes modulated by spatial cueing in all four cue-target combinations. These results support a supramodal control system for the reflexive orienting of spatial attention to targets appearing across visual and auditory modalities.

[P-1-32] The effect of sensory, attentional, and working memory challenges on the driving performance of young novice drivers

Ece Subasi, Lana M. Trick; University of Guelph

Young novice drivers have a disproportionate number of collisions compared to drivers in other age groups. This could be because young novice drivers fail to compensate appropriately to changes in driving conditions. This study used a driving simulator and looked at how samples of young drivers responded to three types of driving challenges: sensory, attentional, and working memory/dual task challenges. Driving speed, collisions, hazard response time and steering performance were measured. Results indicated that young drivers did not change their driving substantially in the face of the varying types of challenges, and as a result, their driving performance suffered.

[P-1-33] Eye-Hand Coordination When Reaching Around An Obstacle

Timothy J Graham, J. J. Marotta; University of Manitoba

To interact with the environment, one requires coordination between the visual and motor systems. To investigate this coordination, an experiment was designed in which subjects reached to pick up a target object in the presence of an obstacle located either ipsilateral or contralateral to their reaching hand. Ipsilateral obstacles influenced reaches to a larger degree than did those contralateral, which differed minimally from obstacle-free reaches. Ipsilateral obstacles produced increased trajectory deviations and reduced velocity when compared to contralateral, and required earlier deployment of vision for accurate navigation. This suggests obstacles are encoded based on their functional relevance to behaviour.

[P-1-34] Role of striatal visual pathway in attention capture and inhibition of return

Takuro Ikeda, Masatoshi Yoshida, Tadashi Isa; Queen's University, National Institutes for Physiological Sciences, Aichi, Japan

Prior visual stimulus presentation induces immediate facilitation and subsequent inhibition of orienting response. The former facilitatory effect is termed attention capture and the latter inhibitory effect is termed inhibition of return (IOR). Previous studies revealed that superior colliculus (SC), a center of orienting

response, is important for IOR. However, it is still unclear which visual input is essential for IOR: striatal visual pathway or direct retino-tectal pathway. By using non-human primates with a unilateral lesion in primary visual cortex (V1), we found that attention capture and IOR are mediated by the different neural systems in the brain.

[P-1-35] Faster Fixation Durations On Emotional Words During Sentence Reading Are Moderated by Personality And Mood States

Naveed A. Sheikh, Kyle Lovseth, Debra A. Titone; McGill University

Processing for emotional words like 'revenge' and 'courage' is enhanced by top-down knowledge about short-term and long-term survival (e.g., avoiding violence and approaching mates, respectively). Using eye movement recordings for 36 native English speakers, we show that reading is faster for low frequency emotional compared to neutral words embedded within neutral sentences. However, interestingly, the direction of the effect is moderated by alexithymia, a personality trait that reflects difficulty processing emotion, and enhanced by increased negative state affect. Taken together, the results demonstrate that both enduring personality traits and transient mood states shape the top-down effects of emotion on cognition.

[P-1-36] The association of sensory integration during standing balance with measured mobility performance, self-reported activity level, and balance confidence in older adults

Lindsay Delima, Nandini Deshpande, Queen's University

We examined 23 healthy older adults' (10 females) performance on modified Clinical Test of Sensory Integration for Balance (mCTSIB) and modified timed-up-and-go test (mTUG), self-reported activity level (HAP), and balance confidence (ABC). Time to complete mTUG (r=0.80) and ABC scores (r=-0.76) were significantly correlated with average sway velocity during mCTSIB only in eyes closed+foam surface trials. Whereas, relatively lower but significant correlations were found between HAP scores and average sway velocity in firm surface mCTSIB conditions only (r-0.47 - -0.49). Performance on dynamic mobility task and balance confidence are highly correlated with standing balance, however, only in most difficult condition.

[P-1-37] Is Direct Gaze Detected Better than Averted Gaze in the Periphery?

Adam Palanica, University of Waterloo

Direct gaze has previously been shown to be detected better than averted gaze. We examine whether this effect is true in the periphery, across various horizontal eccentricities along the visual field. Direct- or averted gaze faces were individually flashed across the screen as participants fixated the centre of the screen and discriminated gaze direction using a two-button press. RTs were significantly faster for direct- than averted gaze faces from -6° to 6° visual angle. However, a control study using inverted faces showed similar results, suggesting that this effect may be due to low level visual features rather than gaze signals.

[P-1-38] A sine tone is perceived as longer when preceded by a noise but not when followed by a noise

Tsuyoshi Kuroda, Simon Grondin; Université Laval

A sine tone is perceived as longer when preceded by a more intense noise than when presented in isolation.

This is the time stretching illusion. The occurrence of this illusion is attributed to the difficulty to detect the sine tone's onset; the detection of the onset is inhibited by the preceding noise, and the onset is illusorily restored within the noise. Three experiments of the present study using the constant method revealed that inhibiting the detection of the sine tone's offset, i.e., placing a noise after a sine tone, does not substantially increase the sine tone's duration.

[P-1-39] Memory for Form and Colour: Response Methodology Matters

Lindsey Fraser; Carleton University

An object's form is typically recalled more accurately than its colour (e.g., Brown et al., 2007; Mitroi et al., 2008). However, Monkman (2010) showed that this Form Superiority Effect (FSE) disappears when the form/colour stimuli are equated for perceptual discriminability. The current experiment examined whether Monkman's (2010) novel response methodology was responsible for eliminating the FSE. Monkman's perceptually equated forms/colours were compared to the standard forms/colours using the same memory response paradigm. This yielded a FSE for the perceptually equated stimuli. It is concluded that response methodology can influence the presence/absence of the FSE.

[P-1-40]

[P-1-41] Investigating The Orthogonality of Configural, and Holistic Processing Mechanisms in Facial Recognition

E. A. Nelson, N. Watier, I. Boutet, C.A. Collin; University of Ottawa

Are configural and holistic face processing mechanisms distinct? To address this question, we compared within subject performance (N=20) across four face perception tasks: face inversion, part-whole, configural/featural difference detection, and composite face identification. Performance on part-whole and composite tasks was positively correlated, suggesting the tasks tap into the same holistic processing mechanism. Similarly, performance on the face inversion and configural/featural tasks correlates, suggesting a common configural processing mechanism. Our data are compatible with the existence of orthogonal configural and holistic processing mechanisms.

[P-1-42] Near-Hand Effects Are Independent Of Both Exogenous And Endogenous Attention

Robert Saul Williams Aidelbaum, Liana E. Brown; Trent University

People respond faster to visual targets presented near, rather than far from, their hand (near-hand effect).

Explanations have suggested that the hand may act as an exogenous cue, an endogenous cue, or that near-hand targets recruit multisensory resources independent of selective attention. Using an additive-factors approach, this study sought to test these explanations. Hand proximity to visual targets was varied while completing an exogenous or an endogenous cueing task. Near-hand effects were present but interacted with neither exogenous nor endogenous cueing effects. Evidently, near-hand effects reflect the recruitment of a resource other than selective attention, such as hand-centered visual-tactile neurons.

[P-1-43] Metaphor processing during first and second language reading

Marilena Côté-Lecaldare, Katja Haeuser, Naveed A. Sheikh, Kyle Lovseth, Debra Titone; McGill University

Metaphors have figurative interpretations that may be directly retrieved from memory or compositionally built depending on whether a particular metaphorical extension is lexicalized. In this way, metaphors are similar to idioms (Libben & Titone, 2008), although unlike idioms, metaphors tend to be semantically decomposable and literally implausible. Here, we investigate how English-French and French-English bilinguals read English predicative metaphors (The textbooks SNORED on the desk) while their eye movements were monitored. English-French bilinguals read metaphors quite rapidly, suggesting a heavy reliance on direct retrieval. French-English bilinguals read metaphors with more effort, suggesting a greater reliance on compositional analysis.

[P-1-44] Phonological Priming in Japanese-English Bilinguals: Evidence from Lexical Decision and ERP

Eriko Ando, Debra Jared, Yasushi Hino, Mariko Nakayama, Keisuke Ida; Western University, Waseda University, Japan

The current study examined whether a masked phonological priming effect would be observed for Japanese-English bilinguals when primes were logographic (Kanji) words (e.g., 害, /gai/, "harm") and targets were phonologically similar English words (e.g., guy). The results of Experiment 1 revealed that lexical decisions to English words were facilitated when they were preceded by phonologically related kanji primes compared to when they were preceded by unrelated primes, particularly for one-character Kanji primes. Experiment 2 was a replication with the additional collection of ERP data. The results suggest a shared phonological store for the two languages.

[P-1-45] Passenger and Cell Phone Conversations While Driving: The Attentional Requirements for Processing Degraded Speech

Patrick Bickerton; Carleton University

Previous research has failed consider the impact of processing degraded speech from cell phone conversations while driving. The driving task consisted of tracking an object on screen with a steering wheel and responding to visual probes that simulated events (e.g., red light) in the driving environment. Participants performed a concurrent sentence verification task where they made true/false responses to brief sentences presented in either clear or degraded audio quality. The results show that driving performance (i.e., tracking, response to visual probe) was worse in the degraded audio condition than in clear audio condition.

[P-1-46] Uncovering the neural mechanisms of inhibition of return using event-related potentials

Jason Satel, Matthew D. Hilchey, Raymond M. Klein; Dalhousie University

Previous EEG studies investigating inhibition of return (IOR) in a standard spatial cueing paradigm have robustly observed P1 amplitude reductions for to-be-ignored cued targets, a finding that suggests an attentional/perceptual effect of IOR. We have extended this research by examining target-elicited ERPs when cues are foveated (as opposed to ignored) and by evaluating the brain activation patterns against behavioral IOR effects when environmental and retinotopic reference frames are dissociated. The data suggest that P1 modulations are associated with behavioural IOR when eye movements are prohibited whereas later Nd modulations are more closely related to oculomotor IOR.

[P-1-47] The effect of cognitive priming on object-location memory

Héloïse Drouin, Patrick Davidson; University of Ottawa

Priming a holistic mindset may facilitate context-dependent cognitive processes. For example, in two previous studies, (Kühnen & Oyserman, 2002; Oyserman, Sorensen, Reber & Chen, 2009) young adults in a holistic (i.e., collectivistic) priming condition showed significantly better memory for the location of objects in an array than did those in an analytical (i.e., individualistic) priming condition. In our replication, 117 students (40 men) were assigned to either an analytical, holistic, or control condition. We found an unanticipated interaction between priming condition and gender: holistic priming enhanced men's, but not women's, performance.

[P-1-48] Neural substrates underlying selective attention in a Stroop task

Angela Tam, Angela C Luedke, Juan Fernandez-Ruiz, Angeles Garcia; Queen's University, Universidad Nacional Autónoma de México

The Stroop task has been used extensively as a measure for selective attention. Using functional magnetic resonance imaging (fMRI), we scanned 15 young adults while performing a block design color-word Stroop task, where conditions had varying levels of interference to induce different cognitive strategies. While the majority of the responses were correct across conditions, reaction times varied significantly, with the slowest times in the maximum interference condition. For this condition, fMRI indicated greater activation in the fusiform and middle temporal gyri, while the zero interference condition showed greater activation in the superior occipital gyrus, supramarginal gyrus, and inferior parietal lobule.

[P-1-49] Parkinson's Disease duration determines the effect of dopaminergic therapy on ventral striatum function

Alex A. MacDonald, Ken N. Seergobin, Ruzbeh Tamjeedi, Hooman Ganjavi, Oury Monchi, Penny A. MacDonald; McGill University, University of Toronto, University of Western Ontario, Université de Montréal

We tested the dopamine overdose hypothesis to explain worsening of some cognitive functions in early Parkinson's disease (PD) with dopamine replacement. Medication doses aimed at treating motor symptoms presumably overdose brain regions receiving dopamine from the relatively-spared ventral tegmental area (VTA). Consistent with this view,

in early PD patients, stimulus-reward learning, which has been shown previously to be mediated by VTA-supplied ventral striatum, was normal off medication but worsened with dopamine replacement. In late PD patients, in whom VTA degeneration is expected given disease progression, stimulus reward learning was impaired off medication and did not worsen with dopaminergic therapy.

[P-1-50] Differential effects of Parkinson's disease and dopamine replacement on memory encoding and retrieval

Alex A. MacDonald, Ken N. Seergobin, Ruzbeh Tamjeedi, Hooman Ganjavi, Oury Monchi, Penny A. MacDonald; McGill University, University of Toronto, University of Western Ontario, Université de Montréal

We investigated the effect of Parkinson's disease (PD) and dopamine replacement therapy on memory encoding and retrieval separately, contrasting performance on measures that emphasized encoding (e.g., learning over repeated stimulus presentations) with those that accentuated retrieval (e.g., recall after a delay) in PD patients relative to controls, both ON and OFF dopaminergic therapy. For PD patients, encoding was normal at baseline and impaired by dopamine supplementation whereas retrieval was impaired off dopaminergic medication and improved by dopamine repletion. This pattern of findings suggests that VTA-innervated brain regions are implicated in encoding, whereas the SN-supplied dorsal striatum participates in retrieval.

[P-1-51] Associations between Colour and Emotion as Measured by an Implicit Association Task

Marlena Pearson, Jeffrey Nicol; Nipissing University

The present study used the Implicit Association Task (IAT) to determine if certain colours are automatically associated with certain emotions. These associations were measured based on reaction time (RT) using a button press to congruent pairings (i.e., red and anger; blue and sadness) and incongruent pairings (i.e., red and sadness; blue and anger) of visually presented stimuli. As predicted, the IAT effect (i.e., average congruent RT subtracted from average incongruent RT) revealed that incongruent emotion-colour pairs produced significantly slower RTs than congruent emotion-colour pairs. Our findings demonstrate that perception of emotion automatically affects cognitive processing.

[P-1-52] Delay and instruction specificity effects on prospective memory

Carrie A. Leonard, Bob Uttl, Carmela A. White; Mount Royal University

Episodic prospective memory (ProM) brings back to consciousness previously made plans. We examined the influence of delay between ProM instructions and a ProM cue (IC Delay) and instruction specificity (told vs. not told when ProM cue will appear). In contrast to recent claims, our results show that ProM performance was worse in the long vs. short delay condition. Moreover, performance was better following the specific vs. general ProM instructions. Thus, nominally episodic ProM task can be converted to vigilance/monitoring by using inadequate IC Delay and/or informing participants when to expect the cue.

[P-1-53] Are the latest standardized memory tests suitable for measurement of memory?

Bob Uttl, Carmela A White, Carrie A Leonard; Mount Royal University

Standardized memory tests [e.g., Verbal Paired Associate (VPA) Test from Wechsler Memory Scale-III (WMS-III)] have been criticized for their inability to measure individual differences in memory due to severe ceiling effects (Uttl et al., 2002; Uttl, 2005). In response, WMS VPA test has been substantially revised and its length increased from 8 to 14 word pairs (Wechsler, 2009). We administered the test to a large sample of examinees and found that the revised test continues to suffer from severe ceiling effects that limit its usefulness for both research and clinical purposes.

[P-1-54] Delay decreases prospective memory task performance: A meta-analysis

Bob Uttl, Joanna McDouall, Carrie A Leonard; Mount Royal University

Episodic prospective memory (Pro) enables us to bring back to consciousness previously formed plans at the right time and place. In contrast, when there is no delay between a plan formation and the ongoing task, the plan remains in consciousness and we monitor for ProM cues. Surprisingly, a recent narrative review concluded that delay between ProM instructions and the ongoing task does not necessarily reduce ProM performance. Our meta-analysis examined 30 years of literature and found that the delay reduces ProM task performance, consistent with the theoretical distinction between episodic ProM and vigilance/monitoring.

[P-1-55] Prospective memory: To delay or not to delay?

Bob Uttl, Joanna McDouall, Carrie A Leonard; Mount Royal University

Episodic prospective memory (ProM) brings back to consciousness the previously formed plan in response to a ProM cue. Recently, it has been suggested that commonly used filler tasks between ProM instructions and ongoing tasks are not necessary and that ProM may even improve with delays. We examined the effect of a delay between ProM instructions and an ongoing task start (IO Delay) and a delay between the ongoing task start to the appearance of the first cue (OC Delay) on ProM task performance. Both 7 min long IO and 15 min long OC delays substantially reduced ProM task performance.

[P-1-56] Differences in electric brain activity for words and nonwords predict individual differences in reading ability

Shannon O'Malley, Frederic Gosselin, Martin Arguin, Nicolas Moffat, Joëlle Bourgeois, Christine Lefebvre, Derek Besner, Roberto Dell'acqua, Pierre Jolicoeur; Université de Montréal, University of Waterloo, University of Padova, Italy

The sustained posterior contralateral negativity (SPCN), an electrophysiological marker of storage in visual short-term memory (VSTM), was measured for words and nonwords in skilled and poor readers. A smaller SPCN was found for words than for nonwords regardless of reading skill. Interestingly, non-lateralized ERPs elicited by nonwords were more negative than those elicited by words at posterior electrodes between 350 to 500 ms for skilled readers; this difference was significantly reduced in poor readers. Results suggest that words are more easily maintained in VSTM than nonwords both both groups, although lexical access was still impaired in poor readers.

[P-1-57] Effects of similarity between lineup members on children's eyewitness identification accuracy

Natalie M. Therrien, Ryan J. Fitzgerald, Heather L. Price; University of Regina

When constructing lineups for eyewitnesses, investigators must decide how similar the foils (i.e., known innocents) should be in relation to the suspect. For adult witnesses, foils and the suspect should be similar enough to prevent the suspect from standing out, but not so similar that even a reliable witness would have difficulty identifying the culprit. However, the impact of suspect-foil similarity on children's identification accuracy is unclear. In the present research, children were administered lineups of varying suspect-foil similarity. Children were most accurate when presented with low-similarity lineups; however, the confidence-accuracy relation was stronger with high-similarity lineups.

[P-1-58] Hyper-RIF in Arithmetic?

Anna J. Maslany, Jamie I. D. Campbell; University of Saskatchewan

Campbell and Phenix (C&P, 2009) found that practicing a multiplication fact (3x4) produced retrieval-induced forgetting (RIF) of the corresponding addition fact (3+4). RIF was much larger, however, after a single practice trial than after 40. In a similar experiment, Campbell and Thompson (C&T, 2012) did not observe this hyper-RIF. Experiment 1 examined effects of amount of practice and composition of the stimulus sets, factors that differed between C&P and C&T. There was no evidence that addition RIF varied with the amount of multiplication practice (i.e., no hyper-RIF). Experiment 2 attempted to replicate C&P's original experiment, but again found no hyper-RIF.

[P-1-59] Irrelevant faces capture attention without awareness

Mamata Pandey, Chris Oriet, Jun-ichiro Kawahara; University of Regina, Chukyo University, Japan

The presence of irrelevant peripheral distractors impedes identification of a centrally-located target appearing later in an RSVP sequence. This suggests that distractors capture attention, reducing the capacity available for target processing. Here, we investigated the extent to which such distractors are processed. Observers identified a red letter embedded within an RSVP sequence of black letters, one of which was surrounded by lines arranged as a face. Despite completing several blocks of trials, few observers spontaneously reported seeing faces when cued. Although observers had strikingly little awareness of them, these faces nevertheless induced a lag-dependent deficit in target identification.

[P-1-60] Visual attention deployment to targets is impaired by the distance between a target and a salient distractor: Evidences from human electrophysiology

Isabelle Corriveau, Ulysse Fortier-Gauthier, Vincent Jetté Pomerleau, Pierre Jolicoeur; Université de Montréal

N2pc (ERP component) is used as an index for the deployment of visual spatial attention to a target presented in a visual hemifield. When the attention deployment is difficult, certain factors can modulate this component. Participants saw a visual display composed of a target, a salient distractor and irrelevant distractors. They had to report the orientation of the target. N2pc amplitude increased with an increase of distance between the target and the salient distractor as well as decreased when no irrelevant distractors were present in the display. The results of this study support the competitive interaction between targets and distractors.

[P-1-61] Examining the Role of Retrieval Processes on Set-Alternation Costs

Jady Wong, Jason Leboe-McGowan; University of Manitoba

The goal was to evaluate an explanation of set-alternation costs based on episodic memory principles. The assumption is that performance of any task is a consequence of memory retrieval processes that involve representations of specific prior experiences (Kolers, 1976; Leboe, Whittlesea, & Milliken, 2005; Neill & Mathis, 1998; Tenpenny, 1995; Whittlesea, 1997; Whittlesea & Jacoby, 1990). To test whether enhanced retrieval modulates set-alternation costs, we manipulated the overlap of information. The results suggest that overlap between events impacts the magnitude of set alternation costs.

[P-1-62] A Motor Isolation Effect: When Object Manipulability Modulates Recall Performance

Sébastien Lagacé, Frédéric Downing-Doucet, Katherine Guérard; Université de Moncton

Several studies suggest that the motor system is activated during retention. For instance, verbal language production architecture would be recruited during verbal retention (e.g., Acheson & MacDonald, 2009). The objective of the present study was to investigate the role of the motor system in object memory. In two experiments using a free recall task, we manipulated the manipulability of objects to retain in memory. Unmanipulable objects were better recalled than manipulable objects. Moreover, isolating the motor characteristics of the middle object in the list modulated recall performance. The results suggest that unmanipulable and manipulable objects recruit different processes during retention.

[P-1-63] Cautiousness is domain-specific and sensitive to time pressure

Pete Wegier, Julia Spaniol; Ryerson University

Currently, it is not well understood whether cautiousness is a domain-general or domain-specific trait, and how it is affected by situational constraints. In two experiments, undergraduate students completed two unrelated probabilistic binary choice tasks, perceptual colour-discrimination decisions and risky financial decisions, in both time-constrained and unconstrained conditions. Contrary to the prediction of a unitary-trait hypothesis, the experiments offered no clear support of cross-domain correlation on measures of cautiousness. The effects of time pressure on cautiousness were also different in the two domains. Overall, these findings suggest cautiousness may be domain-specific rather than domain-general, and that risk taking may be relatively immune to situational constraints.

[P-1-64] Seeing red: Color specific differences in attentional deployment

Vincent Jetté Pomerleau, Ulysse Fortier-Gauthier, Isabelle Corriveau, Pierre Jolicoeur; University of Montreal

Behavioral results show differences in response times to tasks involving equiluminant targets of different colors. We investigated how target color affected perceptual and attentional mechanisms through event-related potentials (ERP). Three ERP components were examined: a posterior contralateral positivity (Ppc); the N2pc, reflecting the deployment of visual spatial attention, and a temporal and contralateral positivity (Ptc). Conditions in which the target was red

or blue, as compared to green or yellow had an earlier N2pc. Different colors have different input in visual spatial attention. This suggests precaution when comparing ERP tasks in which target color is different, even with equiluminant colors.

[P-1-65] Colour Improves Speed of Processing but Not Perception in a Motion Illusion

Carolyn J Perry, Mazyar Fallah; York University

We used the motion illusion termed direction repulsion (the directions of two superimposed surfaces being perceived as repulsed away from each other) to test the effects of attending to colour on motion processing. Compared to when the two were the same colour, segmenting the surfaces by colour did not reduce the illusion, but instead reduced the time required to judge both motion directions. Thus, attending to (ventral stream) colour sped (dorsal stream) motion processing without affecting motion perception. We discuss at which stages of visual processing colour could be bound to motion, resulting in speeded processing.

[P-1-66] A Memory Specificity Account of the Picture Superiority Effect in Associative Recognition

Fahad Naveed Ahmad, William Edward Hockley; Wilfrid Laurier University

The present study investigated the semantic and distinctive processing accounts of the picture superiority effect (PSE) in associative recognition. Experiment 1 demonstrated that the PSE is eliminated by associative interference. Experiment 2 showed that familiarizing individual items prior to the study and test phases of associative recognition also eliminated the PSE. Finally, Experiment 3 showed that associations involving specific instantiations of subject nouns produced a recognition advantage over general instantiations, and this advantage was also eliminated by associative interference. A memory specificity account is proposed to explain the PSE and effects of interference in associative recognition.

[P-1-67] I'm Sexy and I Know It: Analyzing Sexually Themed Photos within Online Dating Profiles

Tyler James Faulds, Daniela Wong Gonzalez, Christine Castañeda; Mount Royal University

This study analyzed the sexual content of self-submitted photos of users within online dating websites and compared the severity and types of sexual content found across demographic groups. Profiles were selected from PlentyofFish.com, with samples drawn from three Canadian cities. Photos were rated on the percentage of skin showing on differing body parts, the nature of the posture, and the presence of specific sexual elements. A two way ANOVA was run between four demographic groups, and showed a significant main effect of gender, and an interaction between gender and sexual orientation. Age was negatively correlated with overall sexual theme.

[P-1-68] The effect of cue-size on global and local processing

Geoff W. Harrison, Jason Rajsic, Daryl E. Wilson; Queen's University

Previous research has shown that pre-cues affect the spatial extent of the attentional focus (Turatto et al., 2000). Our experiment employed stimuli consisting of five shapes (four diamonds and one X or +) arranged into global shapes (also X or +) to test whether small and large pre-cues differentially alter global and local processing. Our results replicated costs

in processing for local stimuli outside the boundaries of a small spatial pre-cue, and produced novel evidence for an increase in global processing on trials with large pre-cues. These findings suggest that pre-cues prime not only specific locations, but also spatial scales.

[P-1-69] Subitizing Latency—But Not Approximate Number System Acuity—Correlates With Arithmetic Fluency In Adults

Carla C. Sowinski; Carleton University

We examined relations among approximate number system (ANS) acuity, subitizing latency and measures of addition, subtraction and multiplication fluency in adults (N = 109). The ability to quickly and accurately name small quantities (subitizing speed) was associated with simple symbolic arithmetic performance. However, the ability to accurately compare large quantities (e.g., ANS acuity) was not significantly correlated with arithmetic performance; this finding is counter to recent findings by Lyons and Beilock (2011). Approximate and exact quantity processing in relation to math skill development will be discussed.

[P-1-70] Selective attention in the elderly: An fMRI study

A. Tam, A. Luedke, M. Ruthirakuhan, J. Fernandez-Ruiz, A. Garcia; Queen's University, Universidad Nacional Autónoma de México

Using event-related functional magnetic resonance imaging (fMRI), 9 older adults were scanned while performing a modified color-word Stroop task, which included three trial types: congruent, incongruent, and neutral. The mean reaction time for incongruent trials was significantly slower than other trial types. fMRI indicated greater activation in the frontal, lingual, angular, cingulate and precentral gyri, parietal lobule, and insula in incongruent compared to neutral. Contrasting incongruent and congruent, fMRI showed greater incongruent activation in the frontal, precentral and cingulate gyri, and precuneus. No differences were found between congruent and neutral, since neutral stimuli do not cause Stroop interference.

[P-1-71] Does the conceptual organization of self-representation bias social perceptions?

Nicole LeBarr, Judith M. Shedden; McMaster University

We examined self-representation from a cognitive perspective to understand how its conceptual organization exerts bias on social perceptions. We hypothesize that variance of semantic similarity across individuals in relation to oneself mediates differential representation of individuals in our cognitive networks. Self-similar individuals share more semantic overlap and should be represented closer to one’s self-representation (vice-versa for dissimilar individuals). This was examined using a semantic priming task, in which the face of a semantically self-similar (versus dissimilar) individual served as a better prime for one’s own face. This highlights the bias that the conceptual organization of self-representation has on social perception.

[P-1-72] Retaining timbre in auditory short-term memory

Sophie Nolden, Patrick Bermudez, Christine Lefebvre, Stephan Grimault, Pierre Jolicoeur; University of Montreal

Auditory short-term memory (ASTM) is the ability to retain acoustic information for a short period of time. Previous studies revealed an event-related potential (ERP) reflecting

retention of pitch, the Sustained Anterior Negativity (SAN). We aimed to show an equivalent ERP for timbre. Participants retained one, two, or three tones differing in timbre in ASTM. They compared these tones to another set of tones that was presented after a retention interval of two seconds. Cerebral activity was measured during retention using ERPs. Preliminary data revealed an ERP component sensitive to memory load, similar to that in experiments focusing on pitch.

[P-1-73] The Evolutionary Ancestry of Phenomenal Consciousness

Lukasz (Luke) Adam Kurowski; York University

What are the necessary and sufficient conditions for a biological being to possess phenomenal consciousness? One suggestion from an evolutionary perspective lies in what is known by biologists as a 'Central Pattern Generator' (CPG). On this view, the CPG that began in a ganglion of one of our ancestors due to a mistake in genetic programming lost its connection and instead of going to the muscle and back it kept cycling inside that ganglion. The lost CPG ended up forming an organ for phenomenal consciousness and a navigational tool that proved useful in searching for food.

[P-1-74] Putting Repetition Blindness in Context

John R Vokey, Scott W Allen, Jason M Tangen; University of Lethbridge, University of Queensland, Australia

Repetition deficits following rapid serial visual presentation (RSVP) of letters in words and words in sentences are often attributed to failures of perception (i.e., encoding and representation) of the RSVP experience. An alternative account suggests that these deficits reflect the normally occult weaknesses and biases of retrieval-time processes in the reconstructive processes of report. In a series of RSVP experiments in which the surrounding list context or the context of retrieval for a given trial (within partial and 2AFC report) were manipulated, the repetition deficits found with full report on other trials were eliminated or reversed, supporting the reconstructive account.

[P-1-75] Effect of Aging on Music-Evoked Autobiographical Memory

Meghan Collett, Janice Lee, Kevin Shabahang, Ashley Vanstone, Lola Cuddy; Queen's University

We examined the role of aging in the retrieval of music-evoked autobiographical memories (MEAMs), following Janata, Tomic, & Rakowski (2007). Younger (n = 21; 17-21 years) and older (n = 18; 66-79 years) adults listened to 32 30-s familiar instrumental excerpts and then provided MEAMs. Unlike previous results obtained without music, where episodic memories are found disrupted for older adults (Levine et al., 2002), the ratio of episodic details to total content of MEAMs was similar on average for younger (.69) and older (.64) adults. Results suggest a strong effect of music on effortless memory retrieval in an aging population.

[P-1-76] The observation of errors during surgical training

Gavin Buckingham, John Haverstock, Marie-Eve Lebel, Sayra Christancho, Ken Faber, Melvyn A Goodale; The University of Western Ontario

Watching the performance of others is an important part of surgical training; medical students will routinely watch expert surgeons to learn new procedures. However, recent work suggests that errors are crucial for observational learning. We examined

medical students' performance in a simple VR surgical training task after they watched either a novice individual or an expert surgeon perform the same surgical task. Surprisingly, individuals who watched the error-laden novice performance outperformed those who watched the error-free expert surgeon's performance. These findings suggest that observing errors may be crucial for the rapid learning of a wide variety of visuomotor skills.

[P-1-77] Emotion-specific modulation of early visual perception

Sabina Caliciuri, Steven Perrotta, Jeffrey Nicol; Nipissing University

Exposure to a fearful facial expression modulates subsequent visual perception. We examined the generality of this emotion effect by presenting disgust, fearful, and neutral expressions, either centrally or bilaterally, and measuring orientation sensitivity for briefly presented low and high spatial–frequency targets. Interactions between emotional expression and target spatial frequency and between the type and the location of the emotional expression indicate that the effect of emotion on perception is emotion-specific and as well that it depends on the location of retinal stimulation. The results suggest that effect of emotion on perception cannot be attributed to a general arousal effect.

[P-1-78] Math confusion or mass confusion? It depends on the situation

Cheryll Lynn Fitzpatrick; Memorial University

Math word problems can be quite challenging to students. In recent years, the math word problem literature has emphasized the importance of situation models (SM). SM's are a way of building a mental representation (using the text and previous knowledge) organized around five dimensions: protagonist, motivation, causation, spatial and temporal. Wording of math word problems were manipulated to reflect two of these dimensions – spatial and motivational. Results suggest small effects on both dimensions, but these effects vary according to age with motivational effects more evident with Grade 3 students and spatial effects more evident with Grade 5 students.

[P-1-79] Interdependence between the Processing of Identity and Expression in Static and Dynamic Faces

Brenda Marie Stoesz, Lorna S Jakobson, Sophia Quan; University of Manitoba

According to the structural reference hypothesis (Ganel & Goshen-Gottstein, 2004), there is a functional interdependence between identity and expression processing with familiar faces, such that identity judgments are affected by variations in expression and vice versa. We used a Garner interference paradigm to compare interference effects for static and dynamic faces. Replicating Ganel and Goshen-Gottstein (2004), we found significant, but asymmetrical, interference effects for both expression and identity judgments with static stimuli. We also showed that there was less interference for dynamic faces, highlighting the importance of using naturalistic displays. Several possible explanations for this effect are considered.

[P-1-80] Configural and Featural Processing of Faces Use the Same Spatial Frequencies: An Ideal Observer vs. Human Observer Analysis

Charles Alain Collin, Stéphane Rainville; University of Ottawa, VizirLabs, Canada

Research suggests that both featural and configural aspects of face discrimination are tuned to the same middle band of spatial frequencies (SFs). But is this due to the physical distribution of stimulus information across SFs or to differences in how humans process information? To resolve this, we compared an ideal observer's performance to human performance on a featural/configural discrimination task. Algorithm performance peaked at ≈5 cycles/face, whereas human efficiency peaked at ≈10 cycles/face, showing that stimulus information alone cannot account for middle SF advantage. Crucially, results were similar for featural and configural discriminations, indicating they rely on the same SFs.

[P-1-81] Eye can't help it: The irrevocable automaticity of social attention

Dana A Hayward, Jelena Ristic; McGill University

It is well known that gaze direction causes shifts of attention, but the nature of the implicated attentional mechanisms remains unclear. To investigate this outstanding issue, we pitted social attention against endogenous attention using a counterpredictive cuing task that was presented either alone or in conjunction with a working memory task. Replicating past data, participants concurrently oriented social and endogenous attention to two different areas of space. Importantly, endogenous attention was suppressed by the working memory task while social attention remained unaffected by this manipulation. These data suggest that social attention is strongly automatic and independent of endogenous attention.

[P-1-82] Aging and cognitive control: An electrophysiological and kinematic investigation of the roles of context updating and response reprogramming

Kevin Trewartha; Queen's University

We investigated the role of working memory (WM) updating in response production during a motor sequencing cognitive control task. Younger and older adults performed multi-finger key-press sequences including pre-potent pairs, and pairs that conflicted with the pre-potent response. WM updating was evidenced by the P3 ERP component. Aging was associated with lengthened time spent executing the conflicting key-presses. Both groups exhibited a P3 component that was larger for conflicting responses, but it was attenuated in the elderly. This P3 component was related to a shortening of movement execution and minimizing of reaction time, but only in the younger adults.

[P-1-83] Verifiability and action verb processing: An ERP investigation

Sean Thomas, Trevor Brothers, David Vares, Joel Dickinson; Laurentian University, John Hopkins Medicine institute

The semantic meaning of verifiable action verbs ('throw'), is encoded along with the action associated with it and is thought to result from associative learning. Mental action verbs ('perceive'), (verbs with no externally verifiable products) theoretically would be learned differently. Yet it has been found that people respond similarly when the verbs are embedded in a common instruction of a response time task and size discrimination task. The purpose of the current study was to investigate associative learning theory in relation to mental action verbs compared to verifiable action verbs. Significant behavioural differences and differences in ERP data were found.

[P-1-84] Literary Language, New Media Technology, and Eye Tracking

Christian Riegel, Katherine M Robinson, Jo-Anne LeFevre, Chris Herdman, Brendan Demyen, Adam Dube; University of Regina, Carleton University

Differences in recall and reading speed have been found when texts are on full computer screens or small cellphone sized screens and that texts rich in literary language are processed more deeply. We examined whether recall, reading speed, and eye movements change as a function of display type and/or text type. There were 3 conditions (computer monitor, iPad, or iTouch) and 3 texts (poetry, fiction, non-fiction). Participants read each of the texts while their eye movements were tracked using a Tobii eye tracker. Reading speed for each text was measured as was recall using a fill-in-the-blank task. Results involving reading speed, recall, and eye movements will be discussed as well as issues related to the use of the Tobii eye tracker and mobile device stand.

[P-1-85] Biological Motion Perception in Children Born Very Prematurely

Kathryn E. Williamson, Lorna S. Jakobson, Daniel R. Saunders, Niko F. Troje; University of Manitoba, Harvard University, Queen's University

Biological motion perception involves several distinct processes (Troje, 2008). Deficits in one of these (detection of structure-from-motion) have been documented in preterm children (Pavlova et al., 2008; Taylor, et al., 2009). Here, we show that 8-11 year old children born very prematurely (< 32 weeks gestation) are impaired, relative to full term controls, in the extraction of local motion cues ($p = .048$), structure-from-motion detection ($p = .064$), and action recognition ($p = .036$). In addition, unlike controls, they show no age-related improvement in style recognition ($p = .013$). These results could inform the development of screening, diagnostic, and intervention tools.

[P-1-86] Cognitive impairments outlast motor impairments in water maze tasks following abuse-like inhalation of toluene vapour

Jimmie Gmaz, Linda Yang, Aida Ahrari, Bruce E McKay; Wilfrid Laurier University

Inhalation of toluene vapour produces severe motor impairments making measurements of co-morbid cognitive impairments difficult. Interestingly, recent evidence suggests that acute toluene exposure induces relatively long-lasting changes in medial prefrontal cortex (mPFC) neurons in brain slices. We found, using water maze tasks and adult male rats, that following recovery from motor dysfunction induced by acute binge-like inhalation of toluene vapour rats displayed residual cognitive deficits in reversal learning, but not spatial recall, suggestive of mPFC dysfunction. A repetitive, circling, swimming behaviour, as well as indices of anxiolysis, also persisted in toluene-exposed rats, suggestive of enduring changes elsewhere in the brain.

[P-1-87] c-Fos expression in the mPOA and amygdala in response to sexual behaviour after adolescent social stress in male rats

Christine Luckhart, Matthew Green, Cheryl M McCormick; Brock University

As adults, rats that underwent social stress (SS) in adolescence had decreased copulatory efficiency and lower testosterone compared to control males. In the present study, Fos expression in response to sexual

behaviour was examined in the medial preoptic area (mPOA) and amygdala. There was greater FOS-immunoreactive cell counts in rats undergoing sex behaviour testing than those who were not. There was a trend for greater Fos expression in the mPOA in SS males compared to controls ($p=0.08$). Stress during adolescence can have lasting effects on male sexual behaviour, which may be related to alterations in the underlying neural circuitry.

[P-1-88] Biomechanics of head-bobbing in pigeons

Nikolaus F Troje, Kateland Bobyn, Andres M Kroker, Qingguo Li; Queen's University

Head-bobbing in pigeons and other birds is considered a strategy to stabilize the retinal image during the short periods when the head remains motionless. However, it might serve biomechanical functions, too. Specifically, it may allow storing negative work exerted when the leading foot first contacts the ground and transferring it into positive work required during push-off of the trailing foot. Based on the measurement of ground reaction forces and body kinematics in walking pigeons, we present a model that predicts the phase relations between head-bobbing and foot placement and explains head-bobbing as a means for energetically efficient walking.

[P-1-89] Visual Discrimination Memory in Rats Becomes More Resistant to Hippocampal Damage Following Excessive Overtraining

Jessica E Taylor, Morgan G Stykel, Alyssa Arthur, Hugo Lehmann; Trent University

Complete damage to the hippocampus in rats causes retrograde amnesia for a visual discrimination. Evidence suggests, however, that overtraining prevents the retrograde amnesic effects of hippocampal damage in other memory tasks. Thus, we examined whether moderate distributed overtraining (additional 5 trials a week for 10 weeks) or excessive overtraining (additional 10 trials every three days for 10 weeks) on a visual discrimination task would prevent the retrograde amnesic effects of hippocampal damage. The excessive, but not moderate, overtraining condition mitigated the extent of the retrograde amnesia, supporting the view that distributed reiterations make memories more resistant to hippocampal damage.

[P-1-90] Corticosterone, Spatial Learning, and Neurogenesis

Elham Satvat, Ali Gheidi, Sandeep Dhillon, Irina Odintsova, Jeiran Eskandari, Diano Marrone; Wilfrid Laurier University

Chronic stress or high level of corticosterone (CORT) are associated with suppressed neurogenesis as well as impaired spatial learning and memory. Here we show that water maze performance of rats chronically injected with CORT (40 mg/kg for 28 days) is similar to that of control rats following a wash-out period of only 8 days. One week later, following spatial exploration, the expression of zif268, an activity-dependent immediate early gene, is being investigated in these animals. Of particular interest is the number of new granule cells labeled with BrdU prior to chronic CORT treatment that co-express zif268.

Poster Session-2 [P-2]
(June 8, 4:30-6:00 pm)

[P-2-1] Loss of environmental complexity and perinatal exposure to delta-9-tetrahydrocannabinol (THC) alters extinction of morphine-induced place preference and reinstatement by a priming dose of THC

Gabrielle B. Willems, Paul E. Mallet; Wilfrid Laurier University

While perinatal THC exposure has been shown to exacerbate the rewarding qualities of opioids in adulthood, exposure to an enriched environment (EE) during adolescence is implicated in opioid desensitization in adulthood. Here, animals transferred from an enriched or standard environment (SE) to an isolated environment (IE) in adulthood experience increased morphine reward in a manner dependent on the degree of change. Animals moved from EE to IE established a more salient preference and took longer to extinguish morphine preference compared to animals previously housed in SE. Furthermore, a priming dose of THC reinstated morphine preference only in animals perinatally exposed to THC.

[P-2-2] Changes in the Distribution of Memory-Related Gene Expression over Time

Ali Gheidi, Irina V Odintsova, Elham Satvat, Diano F Marrone; Wilfrid Laurier University

To study the effects of spatial experience on neuronal activity, experimental rats explored a novel environment once daily and groups of animals were sacrificed five minutes after the 1st, 6th, 12th, 24th, and 36th day. Expression of Arc, a gene coupled to neuronal activity, was examined in the hippocampus and neocortex. Preliminary results suggest that although spatial experience induces robust Arc expression relative to control animals that remained in their home cage (n = 9), activation decreases over time throughout hippocampal and cortical regions. These results are inconsistent with the major hypotheses of systems consolidation.

[P-2-3] Behavioural and physiological effects of the novel psychostimulant 4-methylmethcathinone (mephedrone, 4-MMC)

Carolyn Elizabeth Leckie, Nicholas Vito Cozzi, Bruce E McKay, Paul E Mallet; Wilfrid Laurier University, UW-Madison School of Medicine and Public Health

The novel synthetic cathinone derivative 4-methylmethcathinione (mephedrone, 4-MMC) has rapidly grown in popularity among recreational drug users since emerging in 2007 (UK). Anecdotal reports and some case-studies reveal 4-MMC to have unique enactogenic and amphetamine-like properties. In Sprague-Dawley rats, exposure to 4-MMC (up to 27 mg/kg, IP) induced a robust, short-lived hypermotility and did not condition a place preference. Effects on behaviour (as symptoms of either 'serotonin syndrome' or stereotypy); working memory (Delayed-Match-To-Position (DMTP) task); anxiety (Elevated Plus Maze, Emergence Task and Social Interaction); and visual attention (5-Choice Serial Reaction Time task, 5-CSRTT) from acute and chronic exposure were assessed.

[P-2-4] Emotional effect on memory for incidentally encoded information

Dana Greenbaum, Lixia Yang; Ryerson University

Literature suggests an emotional enhancement effect in memory for intentionally encoded information, with

a shift towards positive and away from negative information in older adults. This study examines whether the same effect also applies to memory for incidentally encoded emotional information. Ninety-seven participants completed an emotional Stroop task where they responded to the ink color of emotional words. A subsequent free recall of words used in the task replicated the well-reported emotional enhancement effect, with a better recall for emotional relative to neutral words and a better recall for high-arousing than for low-arousing words, in both young and older adults.

[P-2-5] The effect of predictability on spatial memory

Katherine Guérard, Jean Saint-Aubin, Marie-Claude Guérette; Université de Moncton

Several factors are known to influence the short term retention of spatially distributed information. In the present study, we investigated the effect of predictability on spatial memory. Participants were required to recall series of spatial locations in the same order they had been presented. In half of the trials, an arrow appeared in each location to indicate the location of the next item to be presented. The results showed that when the locations to remember are predictable, spatial memory is improved.

[P-2-6] To Read or Not to Read a Food Label: A real-world decision making task

Jessie Gardiner, Josée Turcotte, Bruce Oddson; Laurentian University

Even with recent gains in food-label usability, the effectiveness of a label is limited by whether it is used (read) consistently. Are consumers taking the time to read the ingredient lists, even when ingredient information is critical? Attempting to replicate real-world label-reading behaviours, a computerized task was developed in which 64 undergraduate students were asked to look for target ingredients in 30 food products. In each of the 15 randomized presentations, students could respond with or without reading the ingredient lists. Target accuracy never reached 100%, therefore trends in memory, reading behavior and decision making will be discussed.

[P-2-7] Word Frequency Effects and The Mixed List Paradox

Scott Goldstein; Laurentian University

Two experiments were conducted to explore the Item Order Hypothesis, the availability of cognitive resources at encoding, as the explanation for The Mixed List Paradox in serial-recall, which shows a loss of frequency advantage within mixed-lists. Word frequency effects were examined in serial-recognition and serial-recall for word-lists comprised of high-frequency words, low-frequency words, and mixed-lists incorporating both word-types. Experiment One of serial-recognition produced paradoxically differing results from previous research in non-serial-recognition tasks, highlighting this as an important understudied area. Experiment Two supports the Item Order Hypothesis by creating a paradigm that combines serial-recall and serial-recognition tasks to maintain encoding constant.

[P-2-8] Visuo-Spatial Information Processing and Storage in Working Memory

Jolie Bell, RhiAnne Brown, Matthew Brown, Sarah Cebulski, Chris M. Herdman; Carleton University

Two experiments delineated the processing and storage sub-systems of the visuo-spatial sketchpad. Trials consisted of a memory load task separated by an intervening memory

task. The load/intervening tasks were either the same (processing/processing, storage/storage) or different (processing/storage, storage/processing). If these sub-systems are separate, there should be more interference on "same" trials than on "different" trials. In E1, same trials produced more interference than different trials for processing loads, but not for storage loads. By increasing the number of items in the intervening storage task in E2, same trials produced more interference than different trials for both processing and storage loads.

[P-2-9] Recollection training in stroke survivors

Vess Stamenova, Janine M. Jennings, Lisa A.S Walker, Andra M. Smith, Patrick S.R Davidson; University of Ottawa

Many stroke survivors experience memory difficulties, making it crucial to develop effective memory rehabilitation techniques. Jennings and Jacoby's (2003) repetition-lag training has improved memory in older adults and Alzheimer's patients. Our goal was to investigate it in stroke. Ten (9 stroke, one tumor resection) patients were trained (3 times per week for 2 weeks) and administered the California Verbal Learning Test (CVLT-II) before and after training. Although most participants improved somewhat on the training task, they did not improve significantly on the transfer test. More intense or more targeted training (tailored to initial deficits) may be more effective.

[P-2-10] Categorical and Subcategorical Representations in Short-Term Memory Recall

Grant McGee, Jordan Richard Schoenherr, Robert Thomson, Guy Lacroix, Lisa Boucher; Carleton University, Carnegie Melon University

The category-order effect is observed when stimuli from a small, homogeneous category are presented before a large, heterogeneous category. In a series of experiments, we used latent-semantic analysis and frequency corpora to generate lists of items from the same category (e.g., bird, hawk) and compared recall performance when they either preceded or followed number digits (e.g., 1, 2) or number words (e.g., one, two). Our findings support a category-order effect. Nevertheless, they also demonstrate that orthographic properties and word frequency influence the effect. It is not simply a result of category size and homogeneity.

[P-2-11] Effects of Tryptophan Depletion and Nicotine Treatment on Mood and Emotive Facial Processing in Depression Vulnerable Individuals: An Event-related Potential Study

Dhrasti Shah, Andrea Thompson, Natalia Jaworska, Derek Fisher, Vadim Ilivitsky, Verner Knott; University of Ottawa

The effects of reduced mood on emotive facial processing and the modulating effects of nicotine were assessed by event-related potentials (ERP). In two test sessions participants were administered either mood depletion (MD) or placebo (PD) battery and nicotine or placebo patch. ERPs were acquired from 18 participants with a family history of depression during a facial expression recognition task. Nicotine prevented the attenuated P100 response to joyful expression induced by MD. Nicotine increased the P100 response to sad expression, relative to joyful, induced by MD. Nicotine adjustments to the MD induced neuronal effects seem to indicate that facial processing deficits

may be modulated by nicotinic cholinergic mechanisms.

[P-2-12] The role of vergence and proprioception in the Taylor illusion

Irene Sperandio, S Kalderali, P Chouinard, J Frey, MA Goodale; University of Western Ontario

In darkness, the apparent size of an afterimage induced by a light on an observer's hand will change as the position of the hand changes. This is known as the Taylor illusion. What drives this phenomenon? To answer this question, an observer's hand was moved either actively or passively after an afterimage was generated. Vergence was also manipulated. Although changes in vergence had strong effects on apparent size, proprioceptive feedback from the arm also played a role. The absence of a difference between active and passive conditions suggests that efference copy is not a major contributing factor to the illusion.

[P-2-13] The haptic perceptual upright

Michael Barnett-Cowan, Jody C Culham, Jacqueline C Snow; Western University

The orientation in which objects are most easily visibly recognized - the perceptual upright (PU) - is influenced by visual and body orientation relative to gravity. Whether gravity affects haptic object recognition is unknown. Blindfolded observers in different postures indicated whether the symbol 'p' presented in various orientations was the letter 'p' or 'd' following active touch. The average of 'p-to-d' and 'd-to-p' transitions was taken as the haptic PU. Overall the haptic PU is equally influenced by body orientation and gravity with a constant leftward bias. Similar visual PU results suggest a common representation of upright accessible to visual and somatosensory systems.

[P-2-14] Impact of visual search training on the efficiency of saccadic deployment

Woo Sik Yoon, Jason Rajsic, Daryl E Wilson; Queen's University

The purpose of this study was to examine the extent to which visual search (VS) performance improves with training, and whether changes in eye movement patterns accompany these improvements. Participants' attentional abilities were assessed with two VS tasks with different stimuli, and a useful field of view task. Participants were trained online for 6 days on only one VS type. Our data showed that after training, VS performance and attentional breadth increased. Saccadic efficiency improved as well, both in the trained and untrained visual search tasks. These results highlight the contribution of saccadic efficiency and attentional breadth to VS performance.

[P-2-15] Robotic Stroke Assessment of Postural Perturbation Feedback Responses

Teige C Bourke, Angela M Coderre, Sean P Dukelow, Kathleen E Norman, Stephen H Scott; Queen's University, University of Calgary

A robotic postural perturbation task was used to assess how the use of sensory feedback to guide motor action is impaired post-stroke. Subacute stroke subjects (n=25) and healthy controls (n=74) were required to maintain their hand at a central target while receiving a mechanical load to the elbow or shoulder at a random time. Stroke subjects were individually identified as having longer durations of deceleration away from the target (56%) and larger endpoint errors (40%) as compared to 95% of

controls. This task provides objective and quantitative assessment of the use of sensory feedback for motor control post-stroke.

[P-2-16] Saturation of auditory short-term memory (ASTM) capacity characterized by the formation of a plateau in brain activity: An ERP study

Kristelle Alunni, Synthia Guimond, Christine Lefebvre, Pierre Jolicoeur; University of Montreal, CERNEC, BRAMs, McGill University

Span is the maximum number of information maintained during a short period of time in short-term memory (STM). Vogel & Machizawa (2004) showed that cerebral activity increase when the number of visual information to maintain increase. When span exceed, this activity form a plateau. Guimond, et al. (2011) discovered an auditory component that also increases with number of tones to maintain. In the current study we demonstrated the formation of plateau when capacity was saturated. The results showed a significant increase of brain activation between 2 and 4 tones and a plateau for the load 4, 6 and 8.

[P-2-17] Inter-hemispheric communication in musicians and non-musicians

Rebecca Woelfle, Jessica A. Grahn; University of Western Ontario

Musical training may affect the size of the corpus callosum, potentially modifying speed of inter-hemispheric communication. This study tested interhemispheric transfer time (ITT) in musicians and non-musicians using both auditory and visual stimuli. We calculated ITT using the Crossed-Uncrossed Difference (CUD) measure: RTs to stimuli presented ipsilaterally were subtracted from those presented contralaterally to the responding hand. We predicted shorter CUDs for musicians than non-musicians, but no difference in CUDs between modalities. Results showed no significant differences in CUDs between musicians and non-musicians. Musicians showed a trend toward shorter auditory than visual CUDs, suggesting sensory-specific changes in ITT.

[P-2-18]

[P-2-19] Hall versus wall doorway collisions: Why aren't they right?

Bianca Hatin, Laurie Sykes Tottenham, Chris Oriet; University of Regina

When walking through a doorway, research has demonstrated predominately rightward collisions, although a recent study found consistent leftward collisions. We tested whether this discrepancy resulted from differences across the testing environments (hall/wall; environmental cues) and whether it was influenced by direction of attention (up/down/straight ahead). Significant leftward biases were observed for the hall doorway; no bias

was observed for the wall doorway. Environmental cues, but not direction of attention, strongly modulated hall performance only. However, neither factor explains why different studies yield different directional collision biases.

[P-2-20] The Effects of Instructions, Word Frequency and Word Type on Reading Aloud: FMRI and RT Evidence for a Cascaded Dual-Stream Model of Basic Reading Processes

Layla Gould, Jacqueline Cummine, Crystal Zhou, Stan Hrybouski, Zohaib Siddiqi, Brea Chouinard, Ron Borowsky; University of Saskatchewan, University of Alberta

We examined Word Type (regular vs. exception words) and Word Frequency (log10HAL WF) under two task Instruction conditions (name all, vs. name words only). Overall reliance on the ventral-lexical stream was increased during the name words condition as evidenced by BOLD activation and the WF effect on response time, with regular words showing the greatest effects of task instruction. The pattern of joint effects on response time among Word Type, WF and Instructions also supports the notion of cascaded, not parallel, processing. Together, the behavioural and neuroanatomical findings can be best accommodated by a dual-stream cascaded model of reading.

[P-2-21] The dynamics of configural processing disruption: a combined ERP and eye-tracking study

Dan Nemrodov, Frank Preston, Roxane Itier; University of Wateloo

Certain changes in the standard face configuration trigger an increase in amplitude of the face-sensitive N170 component. This study investigates the role of eyes in modulating the N170 within the context of upright intact and scrambled faces and facial features. The stimuli were presented in a fixation contingent manner. The results show that i) the increase in N170 amplitude is dependent on the presence of a facial feature at the fixation point, ii) isolated mouth is as effective as eyes in triggering this increase and iii) this increase is proportional to the amount of disruption of the standard face configuration.

[P-2-22] Understanding a target voice in the presence of competing talkers: Do listeners benefit from the continued presence of a particular target or masker voice?

Fabienne Samson, Ingrid S Johnsrude; Queen's University

When a target voice is held constant in complex auditory scenes, it is not masked as effectively by competing speech signals. Here, we examine whether listeners benefit from the consistent presence of a particular voice only when it is the target, or whether they also benefit when it is a masker. Listeners benefited from the continued presence of a masker voice in conditions with a single interfering talker, but not when there were two masking talkers. Targets may be more difficult to understand when more than one masking signal is present, or the two maskers may not be perceptually segregated by the listener.

[P-2-23] Who is to Blame When We Forget

Michelle Crease, University of British Columbia

People tend to give different interpretations for retrospective memory (RetM) and prospective memory (ProM) failures. To understand this tendency, we required students to read vignettes of ProM and RetM failures differing in importance

(high versus low) and sociality (asocial versus social), and they rated each vignette on 14 different 6-point scales. Results showed differences in subjects' tendency to attribute RetM and ProM failures to personality factors, but these differences depended on the social nature of the memory failure. Results also showed the expected effects due to the task importance manipulation.

[P-2-24] Estimating Witness Susceptibility to False Positive Identifications in Culprit-Absent Lineups

Mario J Baldassari; University of Victoria

Witnesses sometimes mistakenly identify innocent suspects in lineups from which the real culprit is absent, and those errors can have tragic consequences. Can we estimate in advance a witness's susceptibility to making false identifications in culprit-absent lineups? In Experiments 1A and 1B, we found that response criterion on a standard test of old/new recognition (of faces or words) significantly predicted the likelihood of false lineup identifications. Experiments 2 and 3 tested the predictive utility of a two-alternative forced choice facial recognition test that included trick items in which neither face had been studied earlier. Two weak predictive relationships were observed.

[P-2-25] Context Valence Influences Prospective Memory

Martin Yu, Brian Tsui, Peter Graf; University of British Columbia

Is prospective memory tasks performance affected by the valence of the context in which neutral cues are presented? To answer this question, we required students to respond to neutral picture cues which were displayed in different contexts, with contexts created by means of picture series that were positive (e.g., a cuddly kitten), negative (e.g., a broken arm) or neutral (e.g., a plate of apples). The findings indicate higher prospective task performance with cues displayed in valenced contexts than in a neutral context.

[P-2-26] Music-Dependent Memory

Paul Armstrong, Katharine Applegath, Jessica Grahn; University of Western Ontario

Mood and arousal are key components of music-dependent memory (MDM), whereby music can serve as a memory retrieval cue. Participants self-selected music highest and lowest in mood and arousal, then learned and performed a recognition task on face-name pairs while listening to silence or music varying in mood, arousal, or genre. Self-selection added a control in replicating our previous findings: in the low arousal-negative mood condition, changing the song within the same genre impaired memory performance relative to keeping the same song or changing the song and genre. Generally, performance is best when context at learning and test are similar.

[P-2-27] Temporal Auditory Contextual Cueing

Lori A. Doan, Jason P. Leboe-McGowan; University of Manitoba

We investigated the effects of non-spatial context on auditory perception. Participants identified a numerical target embedded in a sequence of alphabetic letter distractors. In the first 96 trials, each sequence contained invariant information up to the target digit. The invariant information was distractor identity and the duration of the gaps between the distractors. The last 32 trials did not contain invariant

information. Participants responded slower to the target digit embedded in the sequence in the last 32 trials. This suggests a temporal auditory contextual cueing effect analogous to the visual contextual cueing effect reported by Olson and Chun (2001).

[P-2-28] The effect of singing versus speaking on acquisition of a novel language

Henrietta Lempert, Assunta Ferrante, Emily Moorhouse, Natalie Kwok; University of Toronto

Does singing facilitate acquisition of a novel language? Participants repeat spoken or sung exemplars of a 14-word language which has two versions, suffix (hifto wadim vabie) and prefix (ohift wadim ievab). Three study test-trials are followed by post-training generalization to new words and an unexpected test of word recall. Currently available results (n =30) indicate superior ($p < .01$) recall in the singing condition (Ms, 5.33 vs. 2.75), consistent with an additive model of word-form learning. Results to date for rule generalization are not significant, but the sample is incomplete.

[P-2-29] Resting-State Activity Predicts Performance in a Verbal Recall Task

Rocío Adriana López Zunini, Shanna Kousaie, Christine Sheppard, Jean-Philippe Thivierge, Vanessa Taler; University of Ottawa

In the brain, resting-state activity refers to non-random patterns of oscillations that are not directly related to a task. We monitored resting-state activity using electroencephalography (EEG) prior to verbal recall task where 14 participants identified novel and repeated words presented one at a time on a screen. We computed power across frequency bands using a fast Fourier Transform. Results showed a positive correlation between alpha-band resting-state activity and performance accuracy. Our results suggest that electrode sites predictive of task performance may be involved in cognitive processes necessary for successful task performance such as attention, word recognition and response inhibition.

[P-2-30] Mini-Mental Status Scores Associated with Spatial Pattern Completion but not Spatial Pattern Separation Performance in Healthy Older Adults

Meera Paleja, Julia Spaniol; Ryerson University

Older adults (OAs) often report memory difficulties. Memory formation requires the ability to both separate similar events (pattern separation) and retrieve information even when given partial or degraded cues (pattern completion). OAs and younger adults (YAs) completed a pattern separation and pattern completion navigational task. OAs were divided into two groups, based on a median split of the Mini-Mental State Examination (MMSE). Low-performing OAs, but not high-performing OAs, performed worse than YAs on spatial pattern completion. All groups performed identically on pattern separation, suggesting pattern completion, but not pattern separation, may be associated with general cognitive status in healthy OAs.

[P-2-31] The use of facial features in facial expression recognition

Karly Neath, Roxane J Itier; University of Waterloo

Specific facial features such as the eyes are important for discriminating emotional expressions, but it is unknown whether fixation to these "diagnostic" features improves recognition accuracy for a given

emotion. Eye-tracking was used to ensure fixation to 8 facial locations during the presentation of masked happy, fearful, surprised, disgusted and neutral expressions for 17, 50, 100, and 150ms. At all times accuracy was greatest for happiness and lowest for fear. However, performance did not improve when participants fixated on the diagnostic features. Rather, results suggest that performance depends on the integration of features, varying across emotions and presentation times.

[P-2-32] Active Vision: The Influence of Target Function on Visual Search Strategies

Richelle Leigh Witherspoon; Queen's University

To facilitate both visual and physical interactions with our environment, we must take advantage of relationships such as those between an object's function and its typical scene location. In this study, participants studied either the function of 18 invented objects or just their features before searching for them. Compared to 18 novel objects, searches were more efficient when participants knew the object function across a number of eye movement measures. Based on these results, we suggest that the nature of our physical interactions with an object positively influence search strategies and optimizes the use of scene context.

[P-2-33] Preference for Building Colours

Diane Elizabeth Humphrey, Tara Dupuis; King's University College/University of Western Ontario

In a preliminary study architects/designers and non-architects (seven in each group) rated four styles of buildings shown in photographs in ten colours in randomized sequences in a power-point display. It was hypothesized that emotional associations would be similar to those found previously, and would not differ between groups, while style and colour preferences would differ between architects/designers and others. It was found that aesthetic ratings differed between the groups with architects preferring brighter colour buildings and non-architects preferring darker colour buildings, but no differences were found in preferences for styles. Some previously universal colour-emotion associations were found for both groups.

[P-2-34] Getting a Clearer Picture: Do Higher Refresh Rates Improve Pursuit Tracking Performance?

James Howell, Matthew Brown, Chris Herdman, Murray Gamble, Jon Wade; Carleton University

Subjective reports from simulation specialists and gamers indicate that 120 Hz hold-type displays produce less motion blur than 60 Hz displays. This does not coincide with the view that a 60 Hz refresh rate exceeds the frequency detection capability of the visual system. The purpose of this study was to objectively assess how refresh rate impacts visual attention. Participants tracked a target on an LCD monitor at 30, 60, and 120 Hz. Tracking performance was found to improve with higher refresh rates.

[P-2-35] Why We Rotate When Identifying Rotated Objects

Timothy L. Dunn, Evan F. Risko; Arizona State University

Individuals often physically rotate in the context of identifying rotated objects (e.g., a paragraph). An intuitive explanation of this behavior is that it returns the individual objects

(e.g., words) to an upright orientation in order to facilitate identification. We provide a strong test of this idea and find only partial support for it. Physical rotation in the context of identifying rotated words is about more than returning the individual words to an upright orientation. Discussion focuses on the implications of this result in the context of notions of cognitive offloading and embodied and embedded cognition.

[P-2-36] The occurrence of the filled duration illusion: A comparison of Japanese and Canadian listeners

Emi Hasuo, Yoshitaka Nakajima, Simon Grondin, Erika Tomimatsu, Kazuo Ueda; Université Laval, Kyushu University, Japan

The occurrence of the filled duration illusion (FDI) was examined with Japanese (students in acoustics) and Canadian listeners (not students in acoustics). The FDI is a phenomenon in which the interval between two very brief sounds (an empty interval) is perceived to be shorter than the interval between the onset and the offset of a continuous sound (a filled interval) of the same physical duration. Using the method of adjustment, we found that the FDI does not take place for most Japanese listeners, and that it was more likely to take place for Canadian listeners.

[P-2-37] Modifying driver following behaviour with a real-time headway evaluation system

Robert Ramkhalawansingh, Lana Trick, Blair Nonnecke; University of Guelph

Tailgating is a major road safety concern that emerges because drivers tend to misperceive their following distance (headway). Drivers seldom receive enough feedback to correct this error, leaving them vulnerable to rear-end collisions. The present investigation sought to implement a Headway Evaluation System: an in-vehicle display designed to provide motorists with real-time and aggregate headway feedback. Compared to drivers selecting their own headway or attempting to maintain a two second headway, drivers using the headway evaluation system maintained longer headways that were conducive to collision avoidance. This system may have benefit as a training device for newly licensed drivers.

[P-2-38] Colour Saturation Discrimination: How Many Colours Can We Perceive?

Natasha Pestonji; University of British Columbia

How good are we at discriminating between displays that differ in colour saturation, and is the relationship between discrimination performance and saturation value the same for all colours? We required students to discriminate between pairs of virtual grid patterns displayed in red, blue and green. Results on a same-different judgment task revealed the same pattern of speed and task accuracy across colours, with poor performance on paired displays with only a small saturation difference but excellent performance when paired displays differed by larger increments of saturation scale points.

[P-2-39] The Role of Working Memory and the Language Effect for the Bilingual-Chinese in Complex Mental Multiplication

Chang Xu, Ineke Imbo, Chris M. Herdman, Jo-Anne LeFevre; Carleton University, Universiteit Gent, Belgium

The purpose of the present study was to examine whether the role of working memory in complex multiplication for the Chinese differs when responding in first and second

language. Participants solved multiplication problems (13 x 6) in two languages under working memory loads. The results showed that participants were faster and more accurate when responding in Chinese than in English. Furthermore, they were more likely to rely on phonological working memory for horizontally presented problems, and visual working memory for vertically presented problems. The results will be discussed in relation to current models of numerical representations and working memory.

[P-2-40] Implicit Learning of Artistic Style: Turning People Into Pigeons

Shelley Gross, John R. Vokey; University of Lethbridge

Watanabe et al. (1995) successfully trained pigeons to discriminate Picasso paintings from those by Monet, even though the paintings varied so considerably that there wasn't any single characteristic that allowed inclusion into a single category. In concordance with the categorization concept of family resemblance, the skill was even generalizable to never-before-seen Monet and Picasso paintings. Current research demonstrates that humans can perform the same task using images that have been partially reconstructed with a weighted, linear combination of their derived eigenvectors when presented with the distractor task of remembering certain images paired with city names.

[P-2-41] Timing Minutes: Production of 1-5 Minute Intervals

Janel Fergusson, Peter Graf; University of British Columbia

Every day we complete a number of tasks that require us to accurately estimate the passage of time. Previous research has indicated that there are significant differences in the perception of 2 minutes as compared to longer intervals such as 4 and 6 minutes. The present study was designed to learn more about where these differences emerge. Subjects produced multiple intervals between 1 and 5 minutes while engaged in an attention-demanding secondary task. Accuracy, in terms of the percentage subjects under- or overestimate by, was compared across intervals, as well as the results of a number of cognitive measures.

[P-2-42] The Influence of Tonality on Rhythmic Perception

Anita Paas, Jessica Adrienne Grahn; University of Western Ontario

In music, it is unclear whether pitch structure (tonality) and rhythmic structure are processed independently, as previous research is inconsistent. Here we tested discrimination of rhythm or pitch changes in pairs of melodies to investigate if rhythm changes were more accurately detected in melodies with tonal versus atonal pitch structure, and if pitch changes were more accurately detected in melodies with regular versus irregular rhythmic structure. The results support independent processing of tonality and rhythm: detection of rhythm changes was similar for tonal and atonal melodies, and detection of pitch changes was similar for melodies with regular and irregular rhythms.

[P-2-43] Information represented in Human Auditory Cortex differs during Perception, Short-Term Memory and Imagery

Annika Carola Linke, Rhodri Cusack; Western University

Real-world sounds vary in a plethora of different ways and it is unclear which features are encoded in auditory

cortex. Electrophysiological evidence of rapid plasticity in non-human auditory cortex suggests that the information represented varies depending on task demands. However, limitations in methods for neural measurement have made it difficult to study auditory feature information coding in the human brain. We used functional magnetic resonance imaging (fMRI) and multivariate pattern analysis (MVPA), to show how the acoustic and semantic information represented in human auditory regions varies during perception and two cognitive tasks (short-term memory and imagery).

[P-2-44] Sampling inner speech using text messaging

Bob Uttl, Alain Morin, Tyler J Faulds, Theresa Hall, Justine M Wilson; Mount Royal University

Frequency, content, and functions of inner speech have been studied using questionnaires and other self-reports. However, this methodology relies heavily on people's ability to recollect what they talk to themselves about. We investigated naturally occurring inner speech by text-messaging participants with eight prompts per day for one week at randomly selected times. The prompts asked participants to report what they were talking to themselves about and what activities they were engaged in at the time of receiving the prompt. Our findings reveal similarities and differences in inner speech frequency and content obtained from self-reports vs. more immediate text prompts.

[P-2-45] Eye Movement Differences between Retrieval and Procedures in Simple Subtraction

Evan T Curtis, Corrie Bouskill, Jo-Anne LeFevre; Carleton University

Participants (N = 30) solved subtraction problems while their eye movements were recorded. Participants solved small problems (e.g., 6 - 3) faster and more accurately than large problems (e.g., 17 - 5). Participants also made more fixations and recorded longer gaze duration on large problems than on small problems. On small problems participants looked most often at the center of the screen, consistent with previous research examining eye movements during multiplication. However, on large problems participants looked most often at the operands. The difference in fixation patterns is argued to reflect the use of procedural strategies rather than fact retrieval.

[P-2-46] Natural Mood Interactions with Affective Priming

Miriam FF Benarroch, Judith M. Shedden; McMaster University

Many studies have found an influence of mood on a variety of cognitive tasks (for a review see Wyer, Clore, & Isbell, 1999). In these paradigms, mood is often induced prior to experimentation. Natural mood variation has received little attention although it is known from mood induction studies that changes in mood influence performance on a variety of tasks. We tested the influence of natural mood variation on a variety of cognitive tasks as well as natural mood interactions with affective priming in order to better understand natural mood variation as it relates to cognitive performance.

[P-2-47] Clear experimental evidence of higher-order retrospective revaluation in humans

Chrissy M Chubala, Randall K Jamieson; University of Manitoba

People reassess their knowledge about the predictive validity of cues in light of new information about competing

cues—a phenomenon called retrospective revaluation. Whereas theorists have been eager to reformulate their models to accommodate the result, empiricists have warned that retrospective revaluation is notoriously difficult to elicit in the lab. We present data from experiments with humans documenting clear and reliable retrospective revaluation at the first, second, and third orders of learning. Our data rule out several popular accounts of associative learning, including accounts that have been retooled to handle retrospective revaluation.

[P-2-48] Working memory, age, and experience influences on simulated critical incidents for general aviation pilots

Kathleen Van Benthem, Rani Tolton, Chris M. Herdman, Anne Barr; Carleton University, University of Otago, New Zealand

Crash rates in general aviation continue to exceed those of other aviation categories. Working memory, age, and experience have been related to general aviation performance. The critical incident rates of 101 pilots, aged 19 to 81 years, were obtained during flights in a Cessna 172 simulator. Cognitive test scores, hypothesized to measure the central executive and episodic buffer of working memory, were examined in relation to simulated critical incidents. Linear regression revealed that working memory scores accounted for the greatest amount of variance in critical incident rates, followed by age, and then pilot rating.

[P-2-49] The relationship between direct retrieval and mental and calculator-based computation in arithmetic: Implications for the Testing Effect

Aryn Pyke, Gary Bourque, Jo-Anne LeFevre; Carnegie Mellon University, Carleton University

The testing effect suggests that attempting to directly retrieve answers during learning improves subsequent recall. The current study further explores whether or not direct retrieval processes tend to proceed in series or in parallel with computation processes in simple arithmetic. If in parallel (race model), might 'testing effect' benefits accrue even when answers are computed, either mentally or with a calculator? We also explored whether retrieval attempts might (or might not) be obligatory but instead determined by factors like the degree to which the computation process is inconvenient (e.g., calculator with scrambled keys). Results and implications are discussed.

[P-2-50] Customized arithmetic training its use in a neuroimaging experiment

Christian Battista, Daniel Ansari, J Bruce Morton; University of Western Ontario

Brain activation during an arithmetic task depends on the particular strategy used to solve the problem (Grabner et al, 2009). Given this, during any study of mental arithmetic, it is critical to be aware of the strategies used to solve the problems presented. To this end we developed a system using problem sets that are tuned to each participant's knowledge base, such that strategy use is balanced across participants. We will review the development of the customized arithmetic training (CAT) program as well as results obtained from an fMRI experiment in which CAT was used.

[P-2-51] Predicting the Development of Children's Math Performance

Alex M Moore, Mark H Ashcraft; University of Nevada Las Vegas

We tested children in Grades 1 through 5 on a battery of math tasks, including number comparison, subitizing, addition (Grades 1 – 3) and subtraction (Grades 4 & 5). We also tested their abilities in number line estimation (0-100 & 0-1000). The data presented highlights the utility of investigating the inter-relations of these abilities. In particular, children who showed non-linear trends of estimates within number line estimation were markedly slower and more error prone on the rest of the battery, and also showed lower achievement test scores longitudinally. We focus on these and other inter-related abilities found in our data.

[P-2-52] Counting Ability in Preschool Children

Kristina Dunbar; Carleton University

Does playing numerical board games enhance preschool children's numeracy skills? Fifty children (M = 45 months) played either a linear game, a row game where numbers were grouped by decade, or a colour game. Compared to the colour game, children in the number game conditions showed improved rote counting and number recognition. The row game was most beneficial. Children who could already count past 12 did not show improvements. These findings suggest that the game context must engage children beyond their existing counting ability, and that a game focusing on decade organization can further develop numeracy skills.

[P-2-53] Homophone Spelling and Aging

Alain Carlson, Dana Murphy, Jeffrey Nicol, Mark Wachowiak; Nipissing University

This study compared the effects of biasing visual and auditory information on homophone spelling in younger and older adults. For each trial, participants wrote the first or second auditory word. This word was indicated by a number next to the visual word presented before the auditory words. In some cases, this word was a homophone preceded by a visual or auditory word designed to bias its spelling. Older adults were expected to demonstrate a larger biasing effect. However, the homophone spelling of both younger and older adults was similarly affected in both biasing conditions. Theoretical implications will be discussed.

[P-2-54] Women's sexual responses to reproductively relevant sexual stimuli across the menstrual cycle

Kelly Dawn Suschinsky, Jennifer A. Bossio, Meredith L. Chivers; Queen's University

We investigated whether women's sexual responses vary with the reproductive relevance of activities depicted and fertility status. Twenty-four women watched films varying by couple and activity type while their genital and subjective arousal were measured at two points in the menstrual cycle. Preliminary results are consistent with previous research indicating that sexual activity cues (relative to gender cues) may be a more important factor in women's genital arousal, that fertility status at first exposure to sexual stimuli has a significant effect on subsequent processing of sexual stimuli, and that this effect may differ between objective and subjective measures of arousal.

[P-2-55] Sexuality Schemas: The Role of Context and World Knowledge

Julie Shilhan, Joel Dickinson; Concordia University, Laurentian University

Readers have been shown to slowdown when information is incongruent with gender and role schemas. Two competing models attempt to account for the influence of context on the processing of schema incongruent information: the lexical re-interpretation model and the two-stage model. The current study evaluates the relevancy of these two models to the processing of information incongruent with dominant sexuality schemas (i.e. homosexual) by utilizing eye-movement methodology. Results showed a slowdown for male homosexual content that could not be mediated by context. As a result, an alternate model is proposed to account for our findings: the schematic dominance model.

[P-2-56] Middle sentences read easily: Self-paced reading and eye-tracking evidence

Juliana Meyohas, Roberto G. de Almeida; Concordia University

We investigated whether middle constructions (e.g., 'This book sells well') are more complex to process than their transitive counterparts (e.g., 'This store sells well') as found in other studies (Di Sciullo, de Almeida, Manouilidou, & Dwivedi, 2007; Maia, Oliveira, & dos Santos, 2010). Employing self-paced reading (N=110) and eye-tracking (N=114) techniques, we found that when middles are preceded by a structurally similar construction ('This novel is unpopular, but this book sells steadily') processing complexity is alleviated. Our findings suggest that context can influence parsing default strategies, and that verb subcategorization information is available during real time processing.

[P-2-57] The Perception of Vocal Affect in Isolated Words by Individuals Varying in Subclinical Psychopathy

Angel Mackenzie, John Logan, Ana Monterroza; Carleton University

Psychopaths identify prosodic information corresponding to fear less accurately than nonspsychopaths. The goal of the present experiment was to determine if this pattern of results would be replicated in a subclinical sample that varied in psychopathic characteristics. Listeners categorized spoken words designed to convey happiness, sadness, anger, fear, and disgust. Results indicated that although both groups of listeners could correctly identify the emotion category associated with the word's prosody, listeners with more psychopathic characteristics were less accurate. Contrary to previous work, however, identification of stimuli conveying fear and disgust was reduced compared to stimuli conveying the other emotions.

[P-2-58] Exploring the Cognitive Chronometric Architecture of Basic Reading Processes

Layla Gould, Jacqueline Cummine, Ron Borowsky; University of Saskatchewan, University of Alberta

We examined response time (RT) in a word naming task by using an additive factors method, and response duration (RD) by voice-recording and spectrogram analysis. The RT joint effects among Instructions (INST: name all, name words), Word Frequency (WF: log10HAL), and Word Type (WT: regular, exception) supports a cognitive chronometric architecture of at least two cascaded stages. The RD effects show that the more lexically a word is read, the shorter the RD, despite the opposite effect on RT. These joint effects on RT, and the dissociation of effects between

RT and RD, provide new challenges to models of reading.

[P-2-59] Semantic effects in concrete versus abstract word recognition across two tasks

Ashley Danguecan, Lori Buchanan; University of Windsor

There is little information on how semantic neighbourhood density (SND; Buchanan, Westbury, & Burgess, 2001) interacts with other semantic properties to influence word recognition. This study compared SND effects in letter detection and lexical decision for concrete versus abstract words. SND effects varied as a function of both concreteness and task: a greater SND effect for concrete over abstract words in letter detection and a greater SND effect for abstract over concrete words for lexical decision. The methodological implications of these results will be discussed as well how they might contribute to a comprehensive theory of semantic processing.

[P-2-60] Social inferences in Metaphor Use

Andrea Elizabeth Bowes, Albert Norman Katz; Western University

Happe (1993) argues that understanding metaphor requires an analysis of the speaker's intentions. The study presented here shows metaphor is related to social inferences. Participants read short scenarios between two friends where one friend ended the exchange with either a metaphorical or literal statement. We find use of metaphor suggests the interlocutors are better friends (closer) and that the interlocutor using metaphor is conveying stronger feelings in his or her statements. Participants in this study also completed the 'Reading the Mind in the Eyes Task' (Baron-Cohen et al., 2001) where they identified the correct emotions for 36 pairs of eyes. We find correct scores on this task correlate uniquely and positively with ratings of perceived closeness in contexts where the interlocutor uses a metaphor. The applications of these findings to non-literal language use and special populations are discussed.

[P-2-61] Do skilled readers prefer phonological syllable or BOSS structure in reading English words? Evidence from ERP

Daniel Trinh, Debra Jared; The University of Western Ontario

The current study investigated the role of syllables in reading English words. Event-related potentials (ERP) were measured while participants performed a lexical decision task. A congruency paradigm was used in which disyllable words were presented in two colours that either corresponded to, or was one letter away from, the phonological syllable structure, or the Basic Orthographic Syllable Structure (BOSS). Both behavioural and ERP results found stronger evidence for the use of phonological syllable structure than BOSS structure when reading multisyllabic words.

[P-2-62] Evidence against critical period constraints on second language grammars

Henrietta Lempert, Inga Moller, Ju Hee Lim; University of Toronto

Does erroneous BE agreement after plural subjects (The boys is sick) in first-language Chinese (CL1) reflect maturational constraints on functional categories or deficient processing of inflections? Sixty-nine CL1 undergraduates at three AoA levels completed plural (P) subject preambles: 1) The books on the shelf .....old (PS(ingular)); Most books on the shelf...old (Double-marked = D-

MPS); The books on the shelves...old (PP-control). Errors were more common in late arrivals than earlier arrivals. PS elicited more errors (166) than D-MPS (95) or control (85). The error decrement for D-MPS, even in late arrivals, argues against a maturational account.

[P-2-63] Saccadic eye movements in young adults performing a letter naming speed task and reading

Noor Al Dahhan, Donald C. Brien, John R. Kirby, Doug P. Munoz; Queen's University

Naming speed (NS) tasks, measuring how quickly and accurately participants can name stimuli (e.g. letters), are commonly used to test reading ability. However, the precise role of NS in reading is poorly understood. To better understand this role, we used three novel NS tasks that were either phonologically and/or visually confusing while eye movements were recorded in adults (Compton, 2003). We examined how these four tasks influenced NS performance and eye movements. It was found that these NS manipulations were associated with specific patterns of behavior and saccadic performance, reflecting differential contributions of NS to reading.

[P-2-64] The importance of everyday situations for abstract concepts

Lisa King, Ken McRae; University of Western Ontario

Research on abstract concepts has long emphasized that people understand them based on verbal knowledge regarding their associations with other words. However, word association alone seems insufficient for capturing the rich knowledge associated with abstract concepts. We demonstrate that real world situational knowledge plays an important role: abstract concepts are primed by situation descriptions that do not contain word associates, but either imply a character's emotional state, or capture the essence of an abstract concept as a whole. We then investigated these relationships between abstract concepts and situations more specifically. We conclude that situations are central for abstract concepts.

[P-2-65] Simulating the N400 and decision latency effects in semantic tasks using an attractor network

Milena Rabovsky, Ken McRae; Humboldt University, Germany, University of Western Ontario

We simulated lexical tasks using an attractor network that maps from word form to meaning (semantic features). Like N400 amplitudes, error was smaller for words that are high frequency, contain few features, or are semantically related to primes. Repetition-induced error decrease was stronger for low frequency words, and for words with many features. Also like N400 amplitudes, total network semantic activation was larger for words with many features. However, activation increased with frequency, repetition, and semantic priming which is opposite to N400 effects, but consistent with decision latencies. These results suggest an interesting relation between N400 amplitudes and network error.

[P-2-66] ERP evidence for automatic processing and integration of language specific suprasegmental cues

Sarah Cebulski, Kathy Van Benthem, Matthew Darling, Masako Hirotani; Carleton University

This ERP study investigated neurological activity associated with suprasegmental cues (intensity, pitch) to determine how they are processed

differently from segments (“ba”, “ga”) by Canadian English speakers. Although all cues were detected equally well as evidenced by a series of behavioural tests, a left-hemispheric negativity was earliest (180 ms post-stimulus) for intensity cues, indicating fastest discrimination of English relevant suprasegmental cues. Additionally, a P300 was observed for intensity cues compared with others cues including pitch. This study provides clear evidence that language relevant suprasegmental cues are processed faster than segmental cues and are better integrated than less relevant suprasegmental cues.

[P-2-67] Pragmatic inferences enrich indeterminate sentences: Evidence from false memories

Levi Riven, Roberto G. de Almeida; Concordia University

We investigated whether a biasing discourse context induced false recognition for foil sentences, in order to understand how indeterminate expressions such as (A) "Lisa began the book" come to be understood as something like (B) "Lisa began reading the book." Participants drew systematic inferences from the context, incorrectly recognizing sentences such as (B) even though they were only exposed to indeterminate sentences such as (A) in the discourse. Inferences diverged from the interpretations that participants reached when sentences such as (A) were presented in isolation, suggesting that pragmatically-driven comprehension of indeterminate sentences forms a distinct pathway to indeterminate sentence comprehension.

[P-2-68] Alzheimer's patients comprehend unfamiliar metaphors when they are apt

Carlos Roncero, Roberto G. de Almeida; Concordia University

Previous studies have suggested patients with probable Alzheimer’s Disease (AD) show good comprehension of metaphors rated high in familiarity (Amanzio et al., 2006). We examined AD patients’ interpretations of familiar metaphors (e.g., 'Lawyers are sharks') as well as metaphors rated high in aptness, but not familiarity (e.g., 'Families are fortresses'). We found that AD patients could successfully interpret familiar metaphors, but also the less well known but apt metaphors. Furthermore, their interpretations for these metaphors were comparable to that of a control group. We suggest that even for less familiar metaphors interpretation appears possible when the conveyed relationship is apt.

[P-2-69] Losing Time and Place: Some Dependent Measures Conceal Time-Place Learning

Matthew L Ingram, Scott H Deibel, Christine J Fontaine, Andrew B Lehr, Christina M Thorpe; Memorial University

Rats readily learn daily Time-Place learning tasks using free-operant (e.g., lever pressing), but not discrete trial (e.g., t-maze), versions of a task. Differences in response cost may explain this finding, however, the dependent measure used may also be accountable. Rats were trained on a lever-pressing task where different amounts of food were given at different locations depending on time of day. Latency to leave the start arm and first lever press suggested that the rats learned the spatiotemporal contingency, and first arm choice did not. Therefore, reliance on some dependent measures may obscure Time-Place learning effects.

[P-2-70] Rats use spatial, but not time of day information, as a discriminative stimulus

Christina Thorpe, Matthew L Ingram, Scott H Deibel, Christine J Fontaine, Darlene M Skinner, Gerard M Martin; Memorial University

Rats were trained that in one of two daily sessions (morning and afternoon) lever presses were reinforced on an FI-5s schedule and during the other session on an FI-30s schedule. In the first and third phase, time of day was the only available discriminative stimulus (SD). In the second phase, both time of day and spatial location could be used as an SD. Only in Phase 2 was there a significant difference in rate of responding on the first trial between sessions, indicating that rats used spatial location, but not time of day, as an SD.

[P-2-71] Acute Toluene Exposure Elicits Age-Dependent Motor Impairments

Susan Rachelle Samuel-Herter, Shelby Slaght, Bruce McKay; Wilfrid Laurier University

Volatile substance (toluene) abuse is a growing problem for adolescents, perhaps reflecting an age-dependent vulnerability to the cognitive and motoric effects of toluene. We found that toluene-exposed juvenile male rats (1 month) had more severe impairments in a neurological assessment, in an open field task analyzing several motor functions, in a hang task measuring muscle strength, in a balance beam task examining vestibulocochlear functioning and in a gait analysis task assessing striding behaviour, than did adolescent rats (2 months), who were themselves less impaired than adult rats (12 months). Thus 'product availability' may be insufficient to explain youth toluene abuse.

[P-2-72] Kinematic models for eye-head coordination during head free gaze shifts

Mehdi Daemi, John Douglas Crawford; York University

The purpose of this study is to consider different possible algorithms for transformation of visual signals into three-dimensional gaze shifts of the eyes and head. We will present three kinematically correct models: one that transforms topographic eye-centered visual inputs and converts them into a combination of 2-D eye centered gaze commands and 3-D body-centered head displacements, and two that transform eye-centered visual inputs directly into separate but coordinated 3-D eye and head commands. These algorithms will ultimately be used to train neural network models and for comparison with neural data collected in our lab.

[P-2-73] Social instability stress in adolescence has long-term effects on hippocampal-dependent learning and memory

Matthew R Green; Brock University

Adult male rats were assessed on hippocampal-dependent and medial prefrontal cortex-dependent tests after undergoing social instability stress (SS) in adolescence. In the Morris water maze, SS rats' performance decreased from the last trial each day to the first trial on subsequent days, whereas the control (CTL) rats did not ($p=0.007$). In a spatial object location test, for the 4h inter-trial-interval, SS rats had poorer memory than CTL rats ($p=0.07$). There were no group differences on the delayed alternation task. Thus, the hippocampus may be more vulnerable than the medial prefrontal cortex to chronic stress in adolescence.

[P-2-74] Insight into human navigation in urban environments from Mongolian gerbils (Meriones unguiculatus)

Kevin R. Barton, Colin Ellard; University of Waterloo

Previous research in architecture has shown a profound influence of the configuration urban spaces on aggregate human movement rates within those spaces. The strength of this relationship has caused some authors to conclude that navigation through urban spaces is driven by an understanding of design principles imposed by architects and planners. To test the sufficiency of this claim, exploration behavior of Mongolian gerbils was compared to exploration behaviour of humans in an identical environment constructed in virtual reality. Results indicate a similar pattern of exploration, directly challenging the proposal that these characteristic patterns of movement are driven by high-level cognition.

[P-2-75] Exposure to stress in mid-adolescence increases anxiety-like behaviour in adulthood: Indications of risk-taking behavior

Meaghan M Wilkin; Queen's University

Our previous research demonstrates that exposure to intermittent physical stress (IPS) during early vs. mid-adolescence differentially alters rats' anxiety-like behaviour in adulthood. Here, we exposed rats to IPS during mid-adolescence (PD35-46) and tested them in adulthood (~PD72) using the elevated plus maze. As in our previous work, we observed marked increases in open-arm exploration in the stress rats relative to controls. This reaffirms our earlier suggestion that stress during mid-adolescence increases risk-taking behaviour in adulthood. Brains were harvested and processed using the Golgi-Cox method. The impact of mid-adolescent stress on dendritic morphology/synaptic spine density in adulthood will be discussed.

[P-2-76] Binge inhalation of toluene vapour reorganizes functional brain circuits in the rat: a complex network analysis

Kristina E Perit, Bruce E McKay; Wilfrid Laurier University

Binge inhalation of the abused solvent toluene causes robust changes in activity in numerous brain structures, which we have shown through a rigorous whole brain mapping of toluene-induced c-Fos immunoreactivity. Here we have applied complex network analyses to this data set to understand the reorganization of functional brain circuits during abuse-like toluene inhalation. Toluene results in a striking increase in the number of weak functional network connections, while most strong functional network connections are lost. Reorganized networks are less clustered, with substantial changes in the structure of network modules; resulting networks are, however, still significantly more organized than random networks.

[P-2-77] Inactivation, but not permanent lesions, of the hippocampus has dissociable effects in impairing context and spatial memory in the rat

Gavin Scott; Trent University

Temporary inactivations and permanent lesions of the hippocampus (HPC) occasionally lead to discrepant amnesic effects. Here, we directly compared and contrasted the retrograde amnesic effects of partial HPC lesions, complete HPC lesions, and tetrodotoxin inactivation of the HPC on contextual fear conditioning and spatial memory. Complete HPC damage impaired memory in both

tasks, whereas partial lesions did not cause amnesia. Interestingly, inactivations only caused amnesia on the spatial memory test. The findings suggest a possible dissociation between context and spatial memory when the HPC is temporarily inactivated versus permanently damaged.

[P-2-78] Ventral-Lexical and Dorsal-Sublexical Streams in Reading as a Function of Part of Speech: Evidence from FMRI Activation and Reaction Time

Layla Gould, Carrie Esopenko, Jacqueline Cummine, Naila Kuhlmann, Gordon Sarty, Ron Borowsky; University of Saskatchewan, University of Toronto, University of Alberta

Identical, homonymous, separately-cued nouns (the bat) and verbs (to bat) were named, and a word-associate generated to ensure that participants treated the target as the appropriate part-of-speech (POS). Experiment 1 (fMRI) - Most activation was shared by both nouns and verbs, across both the ventral and dorsal streams. Experiment 2 (RT) – An overadditive interaction on naming RT between POS and bigram frequency provided evidence that the shared dorsal activation for nouns and verbs involves grapheme-phoneme-correspondences, whereas an overadditive interaction between POS and word frequency provided evidence that the shared ventral activation for nouns and verbs involves orthographic lexical access.

[P-2-79] Individual differences in mental rotational ability, brain electrophysiology, and task performance are correlated in males during spatial working memory

Gregory J Christie, Deborah M Saucier; Simon Fraser University, University of Ontario Institute of Technology

We investigated sex and individual differences in mental rotational ability as participants completed a task of either spatial or verbal working memory (WM). Males were significantly faster during spatial WM both relative to females and relative to their own performance during verbal WM. Scalp-recorded ERPs revealed a P300 in both tasks as participants encoded information into WM, and the amplitude of the P300, RT, and mental rotational ability were inter-correlated in males but not in females. The results thus demonstrate in males a direct relationship between innate mental rotational ability, task performance, and brain electrical activity during spatial encoding.

[P-2-80] Point of gaze modulates the N170 component inversion effect: a combined ERP eye-tracking study

Dan Nemrodov, Thomas Anderson, Frank Preston, Roxane J. Itier; University of Waterloo

The amplitude increase of the N170 face-sensitive ERP component in response to intact inverted faces compared to upright faces, known as the N170 Face Inversion Effect (FIE), is attenuated or completely abolished for eyeless faces. This study examines the role of the gaze fixation location on modulating the FIE for intact and eyeless faces. The fixation was presented at the left/right eyes, nasion, forehead, nose and mouth locations. The results show that fixation location modulates the FIE to eyeless, but not to intact faces, with the effect increasing as a function of the distance from the blank eye area. These findings provide novel evidence for the role of eyes in face processing and suggest the need to control for gaze-related effects in studies employing facial stimuli.

[P-2-81] Examining memory for beat based rhythms

Taylor Parrott, Jessica A Grahn; University of Western Ontario

Research suggests that the ability to perceive regularity (the beat) in rhythm varies widely. We tested participants with high and low beat perception ability on a series of rhythm and timing tests. Results will determine if participants with low beat perception ability truly show a deficit in the perception of the beat, or whether the deficit is in memory and internal generation of the beat to form an accurate mental representation of the rhythm. Our findings provide insight into the stage of beat processing that is altered in those with low beat perception ability.

[P-2-82] Minimizing the Effects of False Feedback in Mulitline Slot Machine Games: An Eyetracking Study

Jackey Lee, Candice Jensen, Michelle Jarick, Mike Dixon; University of Waterloo, University of British Columbia

Although slot machines use counters to enable players to track wins and losses, they also use reinforcing sights/sounds to disguise the losses players incur. Research suggests that novices are susceptible to this false feedback. We investigated whether an educational video would make participants more attentive to counters containing true information. We monitored 16 participants' eye-fixations while playing an actual slot machine. Following the educational video, participants fixated significantly more often on "true" information counters which enabled them to correctly detect false feedback. Thus, education can immunize novice players against false feedback, and possibly lessen the risk of later gambling problems.

[P-2-83] Object-based vs. space-based attention in the modulation of conscious perception

Fabiano Botta, Sarah Jeannin, Juan Lupiáñez, Paolo Bartolomeo, Ana Chica; University of Granada, Spain

Recent studies (Chica et al., 2011) have highlighted that while exogenous attention has a strong impact on conscious perception (CP), endogenous attention only produces weak modulations on conscious reports. However, the cognitive mechanisms underlying this dissociation remain unknown. We studied whether these effects of exogenous attention on CP can be better explained in terms of space-based or object based attention (see Egly, Driver and Rafal, 1994). Results suggest that while space-based attention gives rise to a modulation of CP both in terms of perceptual sensitivity and response decision, object-based attention is only associated to changes in response criterion.

[P-2-84] Long-term cognitive consequences of concussion: Electrophysiological Evidence

Lana J Ozen, Myra A Fernandes, Roxane Itier; University of Waterloo

Persistent complaints of lingering cognitive deficits are common following a concussion, though the brain basis of these is unknown. Studies have shown P300 amplitude decreases on an oddball detection task in this group, suggesting reduced available attentional resources for stimulus classification. In our study we showed that concussion participants had significant decreases in P300 amplitude compared to controls that was independent of attentional load on a visual n-back task. Notably, during high load conditions, P300 amplitude

decreased as reaction time increased in concussion participants. Results suggest a remote concussion reduces available attentional resources, and when heavily taxed, slows response times.

[P-2-85] ERP analyses of the discrimination of intra- vs. inter-modal time intervals

Emilie Gontier, Emi Hasuo, Simon Grondin; Université Laval

This study aimed to determine the cognitive and neural mechanisms underlying the discrimination of empty intervals bounded by brief auditory (A) or visual (V) signals (Intramodal: AA or VV; Intermodal: VA or VA). The results indicate that performance is higher when two auditory signals delimit the intervals and is lower in inter- than in intra-modal conditions. ERPs indicate that the quality of temporal discriminations depend on the efficiency of an accumulation processes supported by the frontal structures. The ERP analyses also suggest that inter-modal timing induced an attentional shift which reduces cognitive resources available for processing time.

[P-2-86] Misestimates of hand position contribute to gaze-dependent errors in memory-guided reaching

Joost C. Dessing, Patrick A. Byrne, Armin Abadeh, J. Douglas Crawford; York University

When people reach toward remembered visual targets, viewed peripherally in the dark, they typically overshoot the distance between gaze and target location. While all previous studies of this phenomenon assumed that the errors reflect misestimates of target position, they could equally well stem from misestimates of final hand position. In our experiment the so-called gaze-dependent reach errors were entirely suppressed when subjects received visual feedback of the finger during the reach. This novel finding is most parsimoniously explained by gaze-dependent reach errors without visual feedback stem from misestimates of hand position.

[P-2-87] Narrative apprehension and reconstruction: an fMRI Study of episodic memory

Christopher L. Friesen, Richard Bruce Bolster, Patricia Gervais, Uta N. Sboto-Frankenstein; University of Winnipeg, National Research Council of Canada-Winnipeg

Encoding and retrieval of inferred narrative context was investigated using fMRI. Subjects viewed slide shows of actors completing daily activities in chronological and randomized order. Subjects were subsequently shown two slides from the encoding phase and asked which came first. Narrative encoding found to be uniquely associated with activation in the left frontal cortex and parahippocampus, as well the right temporal pole. By contrast activation related to narrative memory was found in right hippocampus and bilateral fusiform gyrus. The effect of narrative context on the relationship between frontal and temporal lobe activity was further explored using dynamic causal modeling (DCM).

[P-2-88] Modulation of Inhibition of Return by Target Duration and Intervening Events ("Cue-Back")

Elisa Martín-Arévalo, Ana Chica, Juan Lupiáñez; University of Granada, Spain

Inhibition of Return consists on slower reaction times to stimuli appearing at locations where attention was captured previously. The exact mechanisms underlying the effect have not been determined yet. In the present work, we manipulated two variables, which

modulated the IOR effect as a function of task: Target duration and Intervening events (between cue and target). In the detection task IOR was only modulated by target duration, whereas only the intervening event modulated IOR in the discrimination task; in a Go-No Go task the two variables modulated IOR. Possible mechanisms for these modulations (detection cost and cue-target integration) are discussed.

[P-2-89] The effects of single-task practice on backwards response compatibility in a manual-manual dual-task paradigm

Maria Giammarco, Sandra Thomson, Scott Watter; McMaster University

Serial response selection in dual-task processing, as a result of structural constraints, is assumed to be robust. However, both backwards response compatibility and reduction in dual-task costs with practice suggest some degree of parallel response selection. The current study seeks to examine whether practice with Task1 or Task2 alone modulates the magnitude of backwards response compatibility in manual-manual dual-task processing. Results indicate dual-task costs are smallest with practice in both tasks, yet compatibility effects are apparent regardless of practice, pointing towards the rapid automaticity of compatibility effects. The potential role for individual differences in task performance is discussed.

[P-2-90] Keeping the Rhythm: Exploring Attention Lapses and Behavioural Stability

Paul Seli, Tanya R. Jonker, Grayden J. F. Solman, James Allan Cheyne, Daniel Smilek; University of Waterloo

Sustained attention failures appear to be an inherent feature of human cognitive functioning, yet little is known about the mechanisms underlying these failures. Here we propose that a central executive resource is necessary to control and stabilize behavioural variability, enabling consistent task performance. When attention lapses, these resources are disengaged, attenuating the constraints that would otherwise dampen behavioural variability. We obtain support for this hypothesis by showing positive correlations between behavioural variability on a rhythmic response task (Metronome Response Task) and attention-lapse frequency as indexed by a GO-NOGO task, and conclude that behavioural variability is a marker of attentional disengagement.

Poster Session-3 [P-3]
(June 9, 10:00-11:30 am)

[P-3-1] Covert attention, pre-saccadic facilitation and saccade planning can be dissociated in posterior parietal cortex (PPC) damaged patients

Aarlenne Khan; Queen's University

Covert spatial attention and saccade planning have generally been considered to be part of the same brain mechanism. We asked whether these mechanisms were dissociable and to this aim, we compared the performance of two patients with lesions in the right PPC in two tasks, 1) discrimination with saccades (pre-saccadic attention) and 2) discrimination during fixation (covert attention). Within the left hemifield, one patient was impaired in covert attention but showed pre-saccadic facilitation while the other showed preserved covert attention but no pre-saccadic facilitation despite normal saccades. This indicates that covert attention, pre-saccadic facilitation and saccades can be dissociated.

[P-3-2] Exploring attentional strategies during facial emotion recognition

Victoria Kling, Dawn Chan, Elina Birmingham; Simon Fraser University

Eye tracking research has revealed mixed findings regarding which facial features are attended to during facial emotion recognition (FER). We used the Moving Window Technique (MWT) to examine top-down attentional strategies employed during FER. In the MWT, the observer explores a face using a mouse-controlled window. In separate blocks, observers viewed either open-mouth or closed-mouth emotionally expressive faces. We hypothesized that observers would adapt their exploration strategy according to the degree to which mouths provided important expression information. The data are novel with respect to the top-down strategies that observers employ during FER.

[P-3-3] Effects of Exposure to Emotionally Charged Visual Information on Attention

Danielle I. M. Labossière; University of Manitoba

Exposure to emotionally charged visual stimuli has been associated with a range of immediate effects on attention. The consequences that previous exposure to such stimuli have for the performance of a target localization task during a visual event were investigated. During an initial visual event, participants were exposed to such stimuli either in the role of a target, a distractor, or as a lone item. These exposures often resulted in an impairment to performance on a subsequent localization task. The results suggest that exposure to the critical stimuli produces a global disruption to attention which extends beyond its immediate presentation.

[P-3-4] Probing the locus of visual adaptation effects by alternating stimulus chromaticity or ocularity

Susan Elizabeth Boehnke, Roy Reintjes, Brian J. White, John Van Opstal, Doug P. Munoz; Queen's University, Radboud Universiteit Nijmegen, Netherlands

When stimuli are repeatedly flashed into the receptive field of visual neurons in the superior colliculus (SC) or visual cortex, the neural response to subsequent stimuli is reduced in magnitude and delayed in onset, i.e. adaptation. This can delay reaction time observed after stimulus repetition, as in "Inhibition of Return". We examined the level of processing at which repetition effects occur by recording from neurons in the SC while we alternated stimuli between different retinogeniculate channels (parvo, magno, koniocellular via stimulus chromaticity) or different eyes. Results indicate different parts of the repetition effect occur in peripheral and central channels.

[P-3-5] Attentional Bias and the Pictorial Sexual Stroop Paradigm

Julie Shilhan, Aaron Johnson, Jim Pfaus; Concordia University

We examined attentional biases for sexually explicit images using a novel pictorial Stroop paradigm. Participants were instructed to indicate the colour of a tinted image (by pressing the appropriate key on a colour-coded response box) that corresponded to one of four image categories: sexually neutral, naked males, naked females and naked heterosexual couples. We found that response latencies were longer for naked couples than neutral pictures. This processing interference is reflective of a difficulty in inhibiting the task-irrelevant dimension (i.e. sexual content).

[P-3-6] The Value of Natural vs. Urban Environments on Attention Restoration

Tricia Lawrie, Andrea Scerbe, Katherine Arbuthnott; University of Regina

Berto (2005) showed that participants who viewed photos of nature performed better on directed attention tasks than participants who viewed photos of urban environments. This result supported Attention Restoration Theory (ART; Kaplan, 1995). The present study examined ART using more ecologically valid stimuli. The nature video consisted of a lake with trees and the urban video consisted of bicycle traffic on a city street. Directed attention was depleted and measured using The Sustained Attention to Response Task (SART). Numerically, the nature-video group performed better than the urban-video group. Brief contact with nature may improve attentional vigilance.

[P-3-7] The Compound word effect in associative recognition

Fahad Naveed Ahmad; Wilfrid Laurier University

Participants studied compound and non-compound word pairs in an associative recognition task. Experiment 1 showed hits and false alarm rates were significantly higher for compound word pairs. Experiment 2 found accuracy was significantly greater for compound word pairs in a two-alternative forced-choice test. In Experiment 3 a modified Remember/Know response procedure also showed a recognition advantage for compound word pairs, and indicated that unitization leads to increased use of familiarity for recognition of compound compared to non-compound word pairs. The current study demonstrates a novel paradigm to examine the conjunction memory effect and the role of familiarity in associative recognition.

[P-3-8] Interaction between effects of modality and of expectancy in time interval production

Andrée-Anne Ouellet, Charles Viau-Quesnel, Rémi Gaudreault, Paule Ellefsen-Gauthier, Claudette Fortin; Université Laval

Producing a target duration when a visual stimulus is presented is longer than reproducing an auditory duration, presumably because auditory stimuli capture attention more easily. Another effect is that expecting a break in timing would induce attention sharing, disrupting timing. Prebreak duration was varied in 2.5-second productions with auditory and visual stimuli. Modality and expectancy interacted: productions were longer when the break occurred later, but more so in the visual modality. The modality effect was also stronger when modality varied between trials (Exp. 1) than between sessions (Exp. 2). These results support attentional interpretations of the modality and expectancy effects.

[P-3-9] Selection of eyes in the dot probe paradigm: evidence for left visual field specificity

Elina Birmingham, Coralie Riendeau, Jelena Ristic; Simon Fraser University, McGill University

Processing of faces depends on dedicated brain systems in the human right hemisphere. We investigated whether spontaneous selection of faces and eyes depends on these brain areas. Participants viewed pairs of images (face, house) and detected a target occurring in the upper or lower part of each image. Comparing Response Times (RTs) for targets occurring at the location of the Eyes or Mouth relative to the location of the

House revealed that Eyes were automatically selected, but only when faces were shown in the left visual field. This supports the notion that right-hemisphere processing supports selection of eyes.

[P-3-10] Executive control of attentional orienting in individuals with migraine

Marla J S Mickleborough, University of British Columbia

This study examines the neurocognitive processes underlying the executive control of attentional orienting in individuals with migraine. We used a spatial orienting task with cues presented centrally predicting targets appearing in left or right visual fields to migraineurs (n=32) and non-migraine controls (n=32). We looked at event-related potentials (ERP) components dissociating the interpretation of the attention-directing cue and the act of actually orienting attention itself to the cued location. Our results reveal that the executive control signals – which are the necessary precursors to the attention-related changes in visual cortical sensory response – are intact in migraineurs.

[P-3-11] Predictive arrows produce superadditive effects in focal attention

Mathieu Landry, Jelena Ristic, McGill University

Recent studies indicate that attentional effects elicited by spatially predictive arrows reflect a combination of exogenous and endogenous orienting rather than endogenous orienting in isolation. We investigated whether this result held when task difficulty is manipulated (easy vs. hard target discrimination). The results from both task difficulty conditions replicated past data. That is, attentional effects produced by predictive arrows were always larger relative to exogenous effects in isolation, endogenous effects in isolation as well as their additive sum. Thus, interactions between attentional systems also emerge when focal attention is engaged by a difficult task.

[P-3-12] Feature-search mode or singleton-detection mode: Which is the default?

Hayley E P Lagroix, Matthew R Yanko, Thomas M Spalek; Simon Fraser University

When searching for a uniquely-coloured target in a RSVP stream of homogeneously-coloured distractors, observers can use one of two search modes: singleton-detection or feature-search. Using an attentional capture paradigm, we varied the number of possible target colours from 1 to 4, in Experiments 1-4 respectively. Contrary to the common belief that singleton-detection is the default mode (Bacon & Egeth, 1994), we show that observers shift gradually from feature-search to singleton-detection mode as the number of target colours increases to four. This shift may be related to the capacity of visual working memory, estimated at four items (Luck & Vogel, 1997).

[P-3-13] No salience-driven attention capture by a multiple-colour distractor in the additional-singleton paradigm

Ali Jannati, John J. McDonald; Simon Fraser University

The presence of a salient distractor in a display interferes with searching for a less-salient target. According to the salience-driven selection hypothesis, attention is initially deployed to the location of the salient distractor before it can be deployed to the location of the target. To test this hypothesis, we measured event-related potentials (ERPs) in a variant of the additional-

singleton paradigm with a shape-singleton target and a salient colour-singleton distractor that could have one of five different colours. Contrary to predictions from salience-driven selection hypothesis, the N2pc, an ERP index of attentional selection, was not elicited by the salient distractor.

[P-3-14] Mind-wandering impairs driving performance

Matt Ryan Yanko, Thomas Miroslav Spalek; Simon Fraser University

In the present work we examined how mind-wandering influences driving performance. In a series of experiments using a high-fidelity driving simulator, participants followed a car along an otherwise unoccupied highway. At random times during the drive, the lead vehicle abruptly applied the brakes, requiring a braking response from the participants. In addition, an auditory tone was presented at random intervals, requiring participants to indicate if their mind was on-task, or wandering. We found that drivers increased separation from a lead vehicle when mind-wandering and, with following distance held constant, drivers showed slower RTs to a lead vehicle breaking.

[P-3-15] Modelling Decision-Making in Prisoner's Dilemma

Sarah Cebulski, Elizabeth Christie, Deirdre Kelly, Matthew Alexander Kelly, Sebastien Plante; Carleton University

Human decision-making is a challenge to explain even in the simple game of iterated prisoner's dilemma, in which players repeatedly choose between cooperation and defection. In a game theoretic analysis, the rational choice is "always defect". However, people tend to exhibit "defection regret" and cooperate frequently. We explore five explanations of this behaviour that appeal to (1) limitations of human decision-making, (2) affect, (3) reasoning about other minds, (4) empathy, and (5) social norms. Existent computational models appeal to (1) and (2), but we argue they are insufficient. We hypothesize that all five are necessary to explain players' decisions.

[P-3-16] The Impact of Explanatory Schemata on Performance in a Syllogistic Reasoning Task

Georgina Faddoul, Lisa Marie Boucher, Jordan Richard Schoenherr, Robert Thomson, Guy Lacroix; Carleton University, Carnegie Melon University

In a reasoning task, participants evaluated valid and invalid syllogisms that described natural phenomena. The syllogisms communicated facts about fictitious living beings that varied in the extent to which they were human-like (e.g., molecules, snakes, human groups). The conclusions of the syllogisms either provided mechanistic explanations (e.g., “forces”, “cause-and-effect”) or intentional statements (e.g., “liking”, “wanting”) about the living beings. The results from analyses of accuracy and subjective confidence ratings suggest intuitive explanatory schemata: participants believed that intentional explanations were applicable to all human-like beings, yet mechanistic explanations were applicable to all beings with the exception of humans.

[P-3-17] Expert Explanations: Information Source Bias in Human Reasoning

Lisa Marie Boucher, Helena Sillanpaa, Georgina Faddoul, Jordan Richard Schoenherr, Guy Lacroix; Carleton University

In two experiments, we examined how source credibility affects people’s logical reasoning abilities. In

Experiment 1, participants were presented with descriptions and explanations about natural phenomena provided by either Scientists or People. Experiment 2 varied the types of scientists (e.g., neuroscientists, biologists) and the phenomena examined (e.g., mammals, bacteria). The results indicated that source credibility biased accuracy and subjective confidence. Participants believed that Scientists were considered credible with regard to their own domains of knowledge as well as "neighbouring epistemic domains". Moreover, People and Scientists were believed to have mutually exclusive domains of competence.

[P-3-18] Trunk and step characteristics during normal and narrow-based walking under manipulated vision and lower limb somatosensory inputs: effects of aging

Fang Zhang, Nandini Deshpande; Queen's University

Objective(s): The purpose of this study was to investigate the impact of age and sensory manipulations on walking stability. Methods: Thirteen young and thirteen older adults walked under normal condition and on a narrow base, with and without vision and lower limb somatosensory (walking surface) manipulations. Results: Gait velocity was significantly higher in normal walking vs narrow-based walking condition. Walking condition and surface, vision and aging all had a significant impact on average trunk toll. The step width had higher variation in blurred vision vs normal vision. Conclusion: Both aging and sensory manipulations had an impact on walking stability.

[P-3-19] Motor learning influences error perception in music: Evidence from event-related potentials

Brian Mathias, Caroline Palmer, Fabien Perrin, Barbara Tillmann; McGill University

We investigated influences of auditory and motor learning of musical sequences on musicians' brain responses to perceived pitch errors. Skilled pianists performed (and perceived) or simply perceived novel melodies, and were then presented via headphones with note-perfect and error-containing versions of the melodies. Altered pitches in performed and perceived melodies elicited early negative and late positive event-related potential components, which were not elicited by error-free melodies. The negativity was larger for pitch changes in previously performed, compared to only perceived, melodies. These findings suggest that auditory-motor associations formed during performance generate stronger memory-based expectancies than those derived from auditory encoding alone.

[P-3-20] A reaching task reveals the rapid extraction of probability information from arbitrary colour cues

Wood, D.K., Milne, J.L., Chapman, C.S., Gallivan, J.P., Culham, J.C., and Goodale, M.A; University of Western Ontario

Subjects quickly (< 325 ms) initiated reaches toward two potential targets, a green and a red circle. Subjects had to adjust their in-flight trajectories and hit the final target, which was cued only after the reach had been initiated. One of the target colours was 3 times as likely to become the final target. Initial trajectories were biased toward the high-probability target, regardless of final target location. These results indicate that the motor system can rapidly extract probability information from arbitrary colour cues and incorporate that information into the planning of reaches.

[P-3-21] Assessment of hemispherical asymmetries of the uncinate fasciculus using diffusion tensor parameters

Sunny Thind, Uta N. Sboto-Frankenstein, Patricia Gervai, R. Bruce Bolster; *National Research Council of Canada- Winnipeg, University of Winnipeg*

Within the diffusion tensor imaging community, there is little consensus on the existence or extent of hemispherical asymmetry of the uncinate fasciculus (UF) on the basis of fractional anisotropy (FA). In the current study, we present FA intensity-coded tracts and expand the discussion to include other diffusion parameters. Although we do not observe FA differences between hemispheres, marginally higher right UF λ3, apparent diffusion coefficient, axial and mean diffusivity values suggest hemispherical asymmetries of the UF are present.

[P-3-22] Frontal Lobe Single-channel EEG Activity Recorded During the Performance of Saccadic Eye Movement Tasks

Kasey Sarah Hemington, James N Reynolds; Queen's University

Electroencephalogram (EEG) recording devices with a single dry-sensor channel are sensitive to changes in psychological state that occur during tasks that measure cognitive load, similar to multi-channel EEG devices. We hypothesized that differences in frontal lobe EEG occur during performance of saccadic eye movement tasks designed to probe executive functions like attention and inhibition. Healthy young adults performed eye movement tasks while wearing the single sensor device. Changes in EEG were found to reflect differences in task type and complexity. An easy-to-use, portable EEG capability will greatly facilitate the study of frontal lobe dysfunction in children with neurodevelopmental disorders.

[P-3-23] Entrainment of Premotor Cortex Activity by Ambiguity in Musical Metre

Daniel Cameron, Job Lindsen, Marcus Pearce, Geraint Wiggins, Keith Potter, Joydeep Bhattacharya; University of Western Ontario, University of London, UK

Humans tend to synchronize movements with the metric beat of auditory rhythms. We investigate the amplitude and inter-trial phase coherence (ITC) of EEG in subjects listening to a piece of rhythmic music containing metrically ambiguous and unambiguous rhythms. During ambiguous rhythms, amplitude and ITC are greater in the Delta band and at the frequencies specific to the metric beat of rhythms. These differences in EEG appear to originate in left ventral premotor area and right inferior frontal gyrus. Differences in amplitude and ITC of EEG may reflect metre processing in motor areas, at frequencies with which listeners synchronize movements.

[P-3-24] Encoding Target Location and Orientation in a Reaching Task

Brandie Michelle Stewart, John Randall Flanagan, Jason Gallivan, Aarlenne Zein Khan, Lee Baugh; Queen's University, University of South Dakota

We examined action planning using a task in which participants reached towards multiple targets (bars presented on a screen) of varying location and orientation, one of which was cued after reach onset. Participants held a bar that they had to align to the cued target. We found that the initial direction of reaches (planned prior to target cuing) not only matched

the distribution of target locations independent of their orientations, but that the initial wrist orientations matched the distribution of target orientations independent of their locations. These results indicate that target location and orientation are independently processed during reach planning.

[P-3-25] Direct and Indirect Routes to Action: Converging Evidence from a Priming Paradigm

Kevin Allain LeBlanc, Genevieve Desmarais, Eric Richards; Mount Allison University

Though semantic information can impact action production, actions can be generated based on the visual properties of objects alone. We asked participant to learn novel object/action/label associations, and to practice these associations over five days. We tested naming and action production using a priming paradigm where an ignored prime (a word or an object) corresponded to the same or to a different triad than a target word or object that participants either named or gestured to. Semantic information was shown to influence action production on the first day of training only, and under certain prime and target conditions.

[P-3-26] Is the left occipital face area part of a word processing network?

Alexandra Mihaela Coros, Lars Strother, Tutis Vilis; Western University

Visual cortical neurons are sensitive to stimulus position and category. We used fMRI to assess the relationship between position sensitivity and word processing. Using words presented at different locations we found that face-selective lateral occipital cortex (OFA) showed maximal fMRI responses to centrally presented words. The OFA also showed stronger fMRI adaptation to words than the putative visual word form area (VWFA), but like the VWFA, the OFA appeared to be tuned to whole words. Our findings suggest that the left OFA is part of a word processing network that includes the VWFA.

[P-3-27] Consistency of the Numerical SNARC Effect

Laura C Gibson, Daphne Maurer; McMaster University

Individuals perceive numbers on a left-to-right number line, as evidenced by the SNARC effect. However, recent evidence that manifestation and direction of SNARC is dependent on context suggests SNARC is a fleeting mental construct with high variability across time and situations. Based on findings of strong, consistent effects at the group level for specific contexts, we hypothesized SNARC would be relatively consistent within individuals. We tested 56 adults twice on a SNARC paradigm and correlated performance between visits. Analysis revealed a moderate correlation in direction of SNARC across time ($r=.378$), suggesting individuals' SNARC within a specific context is relatively consistent.

[P-3-28] Grasping with a Twist: fMRI Decoding of Object Orientation and Intended Hand Actions

Teresa D. McAdam, D. Adam McLean, Jason P. Gallivan, Jody C. Culham; Western University

We used functional magnetic resonance imaging (fMRI) to determine which human brain areas code the initial orientation of a dial or the planned action upon it. Participants were presented with a rotatable dial in one of two oblique orientations. After a 6-s preview, auditory instructions cued the subject to plan to either turn the dial to the opposite orientation, or to simply grasp the dial. During the

movement planning phase, visual cortex could decode the orientation of the dial while parietal areas implicated in reaching and grasping could decode turning vs. grasping (and sometimes the direction of the turn).

[P-3-29] The Effect of Aging on Audio-Visual Temporal Order Judgments and Visual Gap Detection

Emilie C Harvey, Patrick J Bennett, Allison B Sekuler; McMaster University York University

Auditory gap detection deteriorates with age, but less is known about the effects of aging on visual gap detection. We therefore measured performance in a visual gap detection task and an audio-visual temporal order judgment (TOJ) task in younger (19-33) and older (70+) adults. Sensitivity (d') in the gap detection task and threshold in the TOJ task were both lower in older adults. Furthermore, performance measures in the two tasks were correlated significantly. Our findings indicate that aging diminishes sensitivity to visual stimuli presented close together in time, and that this age difference may constrain cross-modal integration in some circumstances.

[P-3-30] Multisensory integration of visual and vestibular cues in a motion simulator: An analysis of the P3 event-related potential component

John G. Grundy, Martin v. Mohrenschildt, Judith M Shedden; McMaster University

The P3 is a positive-going event-related potential component that is often thought to reflect higher-order cognitive processing for the detection of novel events. This component has been examined in multiple sensory modalities, and is believed to be a reliable index for the integrity of these systems in clinical populations. Recently, a robust P3 component was found in response to novel vestibular stimulation as well. Here, we examined the integration of both visual and vestibular cues and its impact on the P3 component. We show an integrative P3 component distinct from both the visual and the vestibular P3. Multisensory integration and practical implications are discussed.

[P-3-31] Comparing ICA and traditional EEG analyses

Lucy M McGarry, Jaime A Pineda, Matt D Schalles, Frank A Russo; Ryerson University, University of California, San Diego

Traditional EEG research involves calculating average power across a given frequency and time range for electrodes of interest, and comparing these across conditions. In the current study we compared traditional EEG analyses to independent components analysis (ICA). Initial filtering and deletion of artifactual components was identical for each analysis. For channel and component analyses we examined event-related spectral perturbations (ERSPs) in order to examine data with greater time/frequency precision. Results were similar when examined in electrode space or component space, and were more robust in component space. These findings support ICA as a valid EEG analysis procedure.

[P-3-32] Individual differences in limb-specificity of gaze-dependent errors in memory-guided reaching

Masahiro Kokubu, Joost C. Dessing, J. Douglas Crawford; York University, Osaka University of Health and Sport Sciences, Japan

Reaching movements in the dark overshoot remembered visual targets relative to gaze. So far, this effect has only been studied for right-handed reaches. Here, we directly compared

the errors in left- and right-handed reaches in 10 right-handed subjects. Subjects alternately reached to memorized visually peripheral targets with their left and right index finger for different gaze directions. Similar gaze-dependent overshoots were observed for both hands, even though some subjects showed differences between the hands in the left or right visual field. This is consistent with the possibility that gaze-dependent reach errors arise from limb-specific misestimates of hand position.

[P-3-33] Why do Fingers Count? Examining the Relation between Finger Gnosis and Mathematical Ability

Marcie Penner-Wilger; Franklin & Marshall College, United States

There is a relation between children's ability to distinguish, without visual feedback, which fingers have been touched (i.e., finger gnosis) and their math ability. I present research that pinpoints the relation more specifically to the representation of number. I then propose an account of why finger and number representations are related, which centers on neural reuse. Finally, I present evidence from cross-domain modeling that supports the view that the relation between finger gnosis and math ability is the result of redeployment of a neural substrate that supports both finger gnosis and the representation of number, along with other diverse uses.

[P-3-34] Feature Finder: A powerful Matlab tool to processing physiological signals

Frank A Russo, Alex James Andrews, Nespoli Gabriel; Ryerson University

FeatureFinder is a freely available Matlab tool that lets you organize, filter, and analyze physiological signals (e.g., EMG, HR, GSR) in a manner that is more extensible than commercially available software. Once a profile has been setup, the user can instantly preview effects of different processing strategies. Features can also be extracted into a text file for subsequent statistical analyses. Processing can be executed via a graphical-user-interface or through scripts that allow the development of novel filters, features, and pipelines. This talk is intended to showcase FeatureFinder's functionality and to expand its growing community of users.

[P-3-35] Role of the early visual cortex in transsaccadic integration in humans

Pankhuri Malik, Benjamin Dunkley, Joost C Dessing, John Douglas Crawford; York University

Transsaccadic integration is the process by which visual stability is maintained across saccades through spatial updating of visual scenes. We investigated the role of early visual cortex (EVC) in this process using TMS. Participants were required to discriminate orientation changes in the stimulus during fixation and across saccades. In addition to the no TMS baseline, stimulation of retinotopically-defined visual quadrants was delivered in the interstimulus intervals. Behavioural results show no difference in performance between fixation and saccade conditions. This veridical spatial updating of low-level visual features implicates the role of EVC in transsaccadic integration. TMS results will be further discussed.

[P-3-36] Oral contraceptives moderate relationship between sex hormones and emotion recognition across the menstrual cycle

Holly M McCrindle, Laurie Sykes Tottenham, Jessica M Yelland, Bianca Hatin; University of Regina

Research suggests sex hormones influence emotional abilities. We investigated the relationships between emotion recognition and estradiol and progesterone in women taking oral contraceptives and in naturally cycling women. Facial and prosodic emotion recognition was tested at three points across the menstrual cycle, when influences of estradiol and progesterone are dissociable. Phase-related differences were observed in facial, but not auditory, emotion recognition ability. Hormone levels were correlated with facial recognition during different phases of the cycle, in naturally cycling women only. Results suggest sex hormones influence emotion recognition changes across the menstrual cycle, and oral contraceptives moderate this influence.

[P-3-37] Intuitive robotic bimanual tasks for neurological assessment

Carl PT Jackson, Sean P Dukelow, Stephen H Scott; Queen's University, University of Calgary

Many daily activities require us to coordinate our hands together. We are interested in using robotic technology to quantify bimanual coordination ability in healthy participants and participants following stroke. Participants performed two bimanual tasks in a virtual environment: goal-directed reaching while balancing a ball on a bar, and hitting objects into a goal with a paddle. Behavioural data generated metrics quantifying task-level performance, basic motor control and bimanual coordination, and allowed us to distinguish controls from stroke patients. These data will provide guidelines to assess normal, healthy performance in bimanual control, and probe coordination deficits in patients with neurological damage.

[P-3-38] Synergistic effects of positive and negative motivation on perception and cognition

Frank Hu, Srikanth Padmala, Luiz Pessoa; University of Maryland

It is well known that reward facilitates perceptual processing, while negative affective stimuli interfere with performance. Yet, the investigation of both of them is largely independent of each other. How appetitive and aversive processes simultaneously contribute to behavioral performance? In the present fMRI study, participants performed a simple visual discrimination task that followed separate positive and negative motivations acquisition sessions. Behaviorally, we observed an enhanced speed-up effect, instead of a motivational opponency effect during reward/CS+ condition. Brain imaging results indicated that both amygdale and nucleus accumbens are sensitive to positive and negative dimension, and closely interact with one another.

[P-3-39] Systematic Spatial Foraging Patterns in Hummingbird Rufous Hummingbirds (Selasphorus rufus)

Christine Elizabeth Bond Mishra, Ida Elizabeth Bailey, Sue Healy, T. Andrew Hurly; University of Lethbridge, University of St. Andrews, UK

We examined systematic spatial foraging patterns of wild Rufous hummingbirds visiting experimental flowers. All birds demonstrated preference for outer flowers on the experimental array, and most preferred particular areas of the array. Some birds exhibited patterns in their movement across the board – moving in a particular direction, or visiting near-by flowers next. Birds with strong spatial preferences revisited emptied flowers less often, suggesting a function for systematic foraging patterns. Such abilities may interfere

with experimental attempts to assess simple preferences in choice tests.

[P-3-40] Mu Opioid Signalling Increases Impulsive Action on a Fixed Delay Response Inhibition Task

Megan Mahoney, Mason Silveira, Mary C Olmstead; Queen's University

Impulsive action, the inability to withhold a response, is decreased by mu opioid receptor (MOR) deletion(1) and increased by MOR agonists(2). Surprisingly, morphine has no effect on impulsive action in a response inhibition (RI) task(3). We tested whether these differences relate to the ability to predict the period subjects must inhibit a response. Rats were trained to withhold responding for either 4 or 60 s. Morphine increased impulsive action in both conditions; naloxone blocked the effect. In contrast, morphine had no effect when the premature phase was variable(3).Therefore, MOR activation increases impulsive action *only* when subjects can time the inhibition interval. [1. Olmstead et al. 2009, PLoS One, 4, e4410; 2. Pattij et al. 2009, Psychopharm, 205, 489–502; 3. Befort et al. 2011, Psychopharm, 205, 489-502]

[P-3-41] The role of neuropeptide Y Y1 and Y2 receptors in the lateral septal regulation of anxiety in three animal models

Natalie Leigh Trent, Janet Lee Menard; Queen's University

Neuropeptide Y (NPY) is an abundant peptide in mammalian brain with binding sites highly expressed in the lateral septum (LS). We characterized the contribution of NPY receptor subtypes in the LS to the regulation of anxiety in animal models. In our first study, pre-treatment infusions of a Y1 antagonist into the LS blocked NPY-induced anxiolysis in the novelty-induced suppression of feeding test. In a subsequent study, NPY_{13-36}-induced anxiolysis in the elevated plus-maze test was blocked by pre-treatment infusions of a Y2 antagonist in the LS. Thus, distinct lateral septal NPY receptors contribute to NPY-mediated anxiolysis in a test specific manner.

[P-3-42] Activation of Object Representations by Brief Exposure to Associated Contexts

Emily Cole, Donato Ercolani-Arts, Dave G. Mumby; Concordia University

Individuals often perform better on recognition tests if learning and testing occur in the same context rather than different contexts. This facilitation is thought to occur because exposure to the familiar context on the test activates the individual representations of stimuli that were previously encountered in that context, thus making it easier to perceive the familiarity of those stimuli. We tested this hypothesis by familiarizing rats to an object in a particular context, and then briefly re-exposing them to that context (with no objects present) prior to a test. The findings indicate that exposure to a context can activate representations of individual objects that were experienced in that context.

[P-3-43] Comparing subthalamic nucleus and substantia nigra pars reticulata electrical stimulation

Jay Jantz, Masayuki Watanabe, Douglas Munoz; Queen's University

In the basal ganglia (BG), 'indirect' and 'hyperdirect' inhibitory pathways converge in the subthalamic nucleus (STN). The STN is a target for Parkinson's treatment, and activates the substantia nigra pars reticulata (SNr), which inhibits the thalamus and the superior colliculus (a critical region for saccade control). However, it is unclear how individual BG nuclei

interconnect to modulate voluntary movement. To determine a mechanism of BG-mediated saccadic control, we investigated whether the STN is involved in saccade initiation, and if so, what BG pathway is involved. We found the STN modulates saccade initiation, through multiple pathways depending on stimulus conditions.

[P-3-44] Reference frames for visual and movement responses in the Frontal Eye Fields during head-unrestrained gaze shifts

Amirsaman Sajad, Xiaogang Yan, Gerald P Keith, Hongying Wang, J. Douglas Crawford; York University

Frontal Eye Field (FEF) neurons show both visual and saccade-related responses. However, cortical neurons (FEF or otherwise) have not been explored during head-unrestrained behavior. We recorded from FEF neurons in head-unrestrained monkeys during visually-guided delayed-saccade task. To date, analysis of 35 neurons revealed that the FEF response-fields are best represented in an eye-centered frame. Further it is shown that visual activity of FEF neurons codes for visual target location, whereas the movement activity codes for the actual gaze. These results suggest that the FEF participates in the transformation of visual signals into eye + head gaze commands in eye-centered coordinates.

[P-3-45] Electrophysiological Properties of Dystrophin-Deficient Purkinje Neurons in the Mouse Cerebellum

Wanda M. Snow, Judy E. Anderson, Mark Fry; University of Manitoba

Duchenne Muscular Dystrophy (DMD) arises from a lack of dystrophin, typically present in muscle and brain, including cerebellar Purkinje neurons. To elucidate the neurophysiological effects of dystrophin deficiency, we examined intrinsic electrophysiological properties of Purkinje neurons from both vermal (implicated in motor function) and lateral (involved in cognition) cerebellar regions in the murine mdx model of DMD and wild-type mice. Preliminary analyses reveal regional differences in action potential amplitude, duration, and maximum slope in the absence of genotypic differences. This research will help elucidate the degree of neuronal dysregulation in DMD and has implications for understanding the cerebellum's role in cognition.

[P-3-46] The histaminergic system of the lateral septum is involved in regulating rats' defensive behaviors

San-San Chee; Queen's University

Past research has implicated the histaminergic system of the lateral septum (LS) in anxiety. Here, we report that bilateral infusions of histamine (0.5μg/side) into the LS reduce anxiety-related behaviours in the elevated plus maze (EPM) and novelty-induced suppression of feeding paradigm (NISF). Moreover, pre-treatment with either pyrilamine (10μg/side), a H_1 receptor antagonist, or ranitidine (10μg/side), a H_2 receptor antagonist, blocks the anxiolytic effects of intra-LS histamine in the NISF but not in the EPM. Altogether, our results suggest that intra-LS infusions of histamine are anxiolytic, and this anxiolytic effect is mediated at both the H_1 and H_2 receptors.

[P-3-47] Cortical zinc application restores developmentally-dependent declines in plasticity of the rat primary auditory cortex

Laura G Rosen, Hans C Dringenberg; Queen's University

The glutamatergic N-methyl-D-aspartate (NMDA) receptor is essential for cortical long-term potentiation (LTP). Age-related structural changes to NMDA subunits are likely responsible for declines in plasticity with maturation. We recently demonstrated that intracortical application of an NMDA NR2A subunit antagonist (zinc) in the primary auditory cortex elicits levels of LTP after theta-burst stimulation of the thalamus normally seen in much younger animals. To determine whether this LTP enhancement is developmentally-dependent, intracortical zinc was applied in juvenile, adult and aged rats. Results indicate that zinc enhances LTP in the juvenile and aged brain, suggesting that zinc enhances plasticity over a wide range of ages.

[P-3-48] NR2B-subunit changes in V1 layer II/III neurons following visual discrimination training of adult rats

Peter Gagolewicz, Eric Dumont, Hans Dringenberg; Queen's University

NMDA receptors (NMDARs) are key molecular devices for controlling synaptic plasticity and memory function. We examined effects of visual training on NMDAR conductance in the mature, rodent primary visual cortex by training rats in a modified Morris Water Maze containing a Y-maze insert. Following successful task acquisition, brain slice electrophysiology was used to identify training-induced alterations to neurons in layers II/III of the primary visual cortex. Whole-cell patch clamp recordings from trained rats treated with NR2B antagonist Ro 25-6981 (1 uM; applied to slice bath) revealed significantly reduced (30 %) EPSCs. This suggests behavioural (visual) training can alter NMDAR conductance.

[P-3-49] Control errors during the hold phase of head-bobbing in pigeons

Andres M Kroker, Kate Bobyn, Qingguo Li, Nikolaus F Troje; Queen's University

Head bobbing in pigeons is characterized by alternating a hold phase during which the head remains almost motionless and a thrust phase during which it is moved into the next position. What sensory information is used to control head position during the hold phase? Here, we use high-speed optical motion capture to characterize the control errors. Results indicate that control occurs on two entirely different time scales. A very small constant velocity of the head is indicative for accurate feed-forward control, while superimposed oscillatory movements of the head are interpreted to represent close to real-time feedback control.

[P-3-50] Comparison of Synaptic Plasticity in the Monocular and Binocular Segments of the Rat Primary Visual Cortex

Min-Ching Kuo, Hans C Dringenberg; Queen's University

Recent evidence suggests that the mature primary visual cortex (V1) of rodents expresses surprisingly high levels of plasticity such as long-term potentiation (LTP) or depression (LTD). Here, we show that NMDA-receptor-dependent LTP is readily induced by thalamic theta-burst stimulation (TBS) in the lateral (binocular) V1 (l-V1), but not the medial (monocular) V1 (m-V1) of anesthetized rats. Further, both V1 segments express LTD, but only LTD in m-V1 requires NMDA receptor activity. Finally, thalamic TBS induced LTP in both ipsi- and contralateral V1, with greater, non-NMDA receptor-dependent LTP in the contralateral fiber system.

[P-3-51] The effect of fear and disgust on time perception

Noémie de la Sablonnière, Vincent Laflamme, Simon Grondin; Université Laval

The aim of the present study was to measure the effect of emotions on time perception. More specifically, three types of emotional stimuli were presented to participants during a temporal bisection task: pictures of faces expressing disgust, pictures of faces expressing fear and pictures of disgusting food. The results of the experiment show that participants were significantly more likely to overestimate time when pictures of faces expressing fear were presented than when pictures of disgusting food were. The participant's sensitivity to time as measured by their Weber ratio was unaffected by these stimuli.

[P-3-52] The Rapid Peripheral Motion Contrast Threshold (RPMCT) Test: Preliminary Validation of A 2 Minute Screening Test for Older Driver Competency

Heather Woods-Fry, Steven Henderson, Sylvain Gagnon, Charles A. Collin; University of Ottawa

Older drivers have an increased rate of automobile crashes, likely due in part to motion perception deficits. To assess these deficits, we developed the Peripheral Motion Contrast Threshold (PMCT) test and, more recently, the RapidPMCT, a 2 minute version intended as a screening tool. Here, we compared the tests to determine if they yield similar results. 30 undergraduate students performed both tasks. A strong positive correlation between PMCT and RapidPMCT validated the use of the quicker test. Ultimately, we believe the RapidPMCT can serve as part of a screening battery for distinguishing safe drivers from unsafe ones.

[P-3-53] Tracking Eye Movements while Recognizing Faces: A Spatial Frequency Study

Chantal Lynne Lemieux, Elizabeth Anne Nelson, Charles Alain Collin; University of Ottawa

Previous work shows that the most informative spatial frequency (SF) ranges vary depending on facial feature. We examined subjects' eye movements during the encoding and retrieval of filtered faces. Stimuli were 16 faces filtered to preserve 11 SF bands across the spectrum, plus an unfiltered condition. Seven areas of interest (AOIs) were defined for each face, and fixation times were analyzed across AOI and SF. Low SFs elicited more fixations on medial AOIs (nose, forehead, chin), which may indicate a tendency towards holistic processing. In contrast, high SFs elicited more fixations on inner features (eyes, mouth), suggesting greater featural processing.

[P-3-54] Effects of Spatial- and Task-Attention Switches on Auditory Perceptual Organization

Julia J Huyck, Graham K Raynor, Miriam A Heavenrich, Ingrid S Johnsrude; Queen's University

Attention is often required for a mixture of sounds to be perceptually segregated. Here we examined how switches in attention between tasks and/or ears cause a segregated percept to "re-set" to an integrated one. During each 12s trial, participants were cued to detect targets either in a two-tone auditory sequence for which segregation builds up over time, or in an unrelated distractor task in the opposite ear. Switching task OR ear between trials caused segregated percepts to "re-set"; segregation occurred subsequently within 10s. If both task and ear switched, the

resetting effect was greater, with segregation not occurring again within 12s.

[P-3-55] Loneliness and Attachment Anxiety Affect the Viewing-From-Above Bias While Viewing Stick-Figure Walkers

Adam Heenan, Erica J. Refling, Tara K. MacDonald, Nikolaus F. Troje; Queen's University

We examined the viewing-from-above (VFA) bias when viewing stick-figure walkers in a sample of undergraduate students. Stimuli were orthographically projected and contained no information about their orientation in depth, thus making them perceptually ambiguous. Previously in our lab, we found that greater anxiety correlates with greater VFA biases. Here, we measured attachment anxiety, and we induced loneliness in half the participants. Greater anxiety was correlated with greater VFA biases for both men in the control condition and women in the induced loneliness condition. We found the inverse relationship for men in the loneliness condition and women in the control condition.

[P-3-56] Visual persistence of contour integration

Lars Strother, Alexandra Mihaela Coros, Tutis Vilis; Western University

Contour integration is fundamental to object perception. Most models of contour integration predict the detectability or salience of a contour as a function of relative distance and orientation between successive discrete visual elements. Under conditions of camouflage, an object may not be detectable in the absence of additional cues (e.g. motion, color). We introduce a method of measuring the strength of contour integration as a function of its perceptual disintegration under conditions of camouflage. Our results show that the parameters of standard contour integration models also predict the perceptual integrity of contours that require additional cues for initial image segmentation.

[P-3-57] Choosing a manual action produces visual prior-entry

Adam Kendal, Guillaume T. Vallet, David I. Shore; McMaster University, Laval University

We conducted three experiments to investigate the impact of choosing a specific manual action on audiovisual perception. Observers completed a modified audiovisual temporal order judgment (TOJ) task in which they initiated a trial with a key press using the left or right index finger. In each trial they were presented with an auditory and visual stimulus separated by a short interval. Observers reported which stimulus was presented first. Our results demonstrate that immediately following the key press, visual processing occurred more rapidly than auditory processing. These results suggest that choosing a specific manual action produces a visual prior-entry.

[P-3-58] The transsaccadic integration of visual motion

Benjamin Thomas Dunkley, Joost C Dessing, J Douglas Crawford; York University

Spatiotemporal continuity of visual motion occurs despite frequent saccades, meaning motion signals are temporally integrated across eye movements to form a coherent percept of a moving object. Termed transsaccadic integration, this suggests some motion-sensitive neurons have spatiotopically defined receptive fields. We investigated transsaccadic motion perception using

TMS. Participants performed a coherent motion discrimination task across saccades. Results revealed no significant difference in motion sensitivity across eye movements compared to baseline. This suggests the visual system integrates the motion signals across eye movements required for veridical perception. Results regarding the role of MT+ in transsacadic perception will be discussed.

[P-3-59] Grasping the Ebbinghaus Illusion: Perception and action dissociate but overt attention does not

Robert Leslie Whitwell, Irene Sperandio, Mehul Garach, Melvyn Alan Goodale; University of Western Ontario

Does a task mismatch in attention explain why pictorial size-contrast illusions dissociate perception and action? To test this, we asked participants to select one of the two inner discs in the Ebbinghaus illusion based on the apparent sizes of the discs. On different trials, participants used their thumb and forefinger to pick up the selected disc or provide a perceptual estimate of its size. Surprisingly, the participants' fixations did not differ across the tasks. Nevertheless, their grasps resisted the illusion while their manual estimates did not, suggesting that differences in overt attention cannot explain the perception and action dissociation.

[P-3-60] Body inversion and biological motion inversion: What is the relation?

Yaroslav Konar, Nikolaus F. Troje; Queen's University

Inversion effects have been described for biological motion point-light displays but also for static depictions of a person's body. Which role does the movement in the biological motion display really play? If it only provides the articulation of the body in the absence of explicitly drawn connections, then inversion effects for point-light displays should be about as strong as for static stick figures. We measured perceptual inversion effects of dynamic and static stick-figures and point-light displays and found that they are most pronounced with dynamic point-light stimuli. Results are critically discussed with respect to theories about configural processing.

[P-3-61] Ups and downs in the relation between complexity and aesthetics: A historical perspective

Séamas Weech, Nikolaus F Troje; Queen's University

The inverted-U function between complexity and attractiveness has proven perhaps the most appealing theory of aesthetics through history, yet many questions surround the idea. Why has research in aesthetics equivocally supported this function? What are the true dimensions that interact to effect the two slopes of the function? Here, we outline a combination of issues producing conflicting results, namely the use of limited stimulus subsets; poor quantification of 'complexity'; and an under-emphasis on entropy—which represents the downward slope of the function. We present an overview and relate the history of the function to recent saliency and stochastic modeling approaches.

[P-3-62] Enhancing Cross-Language Comprehension: Facilitating Perception of Non-Native Speech Categories

Cassandra Larose, Jordan Richard Schoenherr, John Logan; Carleton University

Phoneme representations in long-term memory allow people to classify signals along acoustic continua. Phonemic category boundaries also bias the classification of speech sounds

from non-native languages, reducing the ability to detect acoustic differences. If the same acoustic information can be partitioned into any number of phonemic categories, then effective training procedures could facilitate the perception of non-native speech sounds. Using a phoneme identification task, participants were sensitized to differences along a voice-onset time (/b-p/) continuum enabling the identification of a non-native phoneme (/ph/). Finally, participant confidence reports suggested that they were generally unaware of their capacity to accomplish the task.

[P-3-63] Time to wave goodbye to phase scrambling: a set of objects with warped versions created with a diffeomorphic transform and evaluated for recognition

Bobby Stojanoski, Rhodri Cusack; Western University

Perception of real-world objects requires rapid integration of simple and complex features; a task the brain performs efficiently. We present a new warping method that preserves the spatial frequency distribution and perceptual grouping of an object. We evaluate how the distortion affects object perception across categories. Using Amazon's Mechanical Turk, we acquired perceptual ratings of stimuli that varied along a continuum from structure-less to fully intact objects from 13 categories. We found that varying the amount of visual distortion differentially influenced perceptual ratings across categories. In addition, we show that participant viewing conditions cannot explain the category specific perceptual differences.

[P-3-64] Understanding the Benefit of Facial Gestural Information for Degraded Speech

Rachel V Wayne, Ingrid S. Johnsrude; Queen's University

Perceptual learning of spectrally degraded speech is most efficient when the degraded acoustic utterance is accompanied by the corresponding facial gestures. However, it is unclear whether gains in learning conferred by visual accompaniments to degraded speech are specific to the facial gestural mode of presentation or are attributable to other factors such as effort or attention. In this experiment, we test whether the advantage for synchronous presentation of facial gestural information with degraded speech remains after controlling for level of effort required to recover the message content. Results and implications will be presented.

[P-3-65] Long-term retention after Perceptual Learning of Noise-Vocoded Speech

Julia Jones Huyck, Ingrid S Johnsrude; Queen's University

People are able to improve their understanding of degraded speech with only a few minutes of exposure. Here we were interested in whether retention of this learning differs depending on the amount of practice received after ceiling levels of performance are reached. To investigate this question, a subset of participants from a previous training study were re-tested 8 to 13 months later. In that study, one group completed 15 training trials after reaching ceiling levels of performance and three groups reached ceiling only during the last 5 trials. All groups performed similarly during re-testing, indicating no differences in long-term retention.

[P-3-66] Masquerading as the background: A look at how figure-ground segmentation leads to camouflage in visual search

Brandon Christopher William Ralph, Paul Seli, Vivian Cheng, Grayden Solman, Dan Smilek; University of Waterloo, Wilfred Laurier University

We explored visual camouflage by having participants search for a target figure-ground image among other figure-ground images. Each image contained two regions: one region depicting a meaningful object, and the other a meaningless background. Target-distractor congruency was manipulated: the meaningful region of the target and distractors had the same colours on congruent trials but opposite colours on incongruent trials. Also, some participants were familiarized with the images before search while others were not. We found that incongruent targets were camouflaged because their meaningful regions were sometimes incorrectly parsed as background. Prior familiarity with search items had no influence on performance.

[P-3-67] Examining the Influence of Retrieval-Cue Specificity on Retrieval-Induced Forgetting

Andrea Scerbe, Tom Phenix; University of Regina

Retrieval-Induced Forgetting (RIF) occurs when retrieved memories cause the suppression of related memories that were not retrieved. These suppressed memories are consequently more difficult to access when compared to a baseline (Anderson, Bjork & Bjork, 1994). Previously, some researchers (e.g., Perfect et al. 2004) have argued that the occurrence of RIF is dependent upon a consistent context between the retrieval practice and test environments. This study examines this assertion by manipulating consistent and inconsistent retrieval-practice/test environments. The implications of our findings will be discussed.

[P-3-68] The effect of body posture on the crossed-hands deficit

Michelle L Cadieux; McMaster University

Placing the hands in a crossed posture impairs tactile temporal order judgments. An interaction between internal and external reference frames is believed to be the main contributor. In order to investigate the contribution of gravity, we examined the effects of body position–upright vs. supine. The supine body position produced superior performance with a crossed hands posture. We believe the influence of gravity degraded the external reference frame, giving a greater weighting to the internal. This reduced the conflict, which resulted in a reduction of the crossed-hands deficit.

[P-3-69] Prime time for the Shams Illusion: solid results with split tones

Ben Bauer, Colleen Elizabeth Shaw, Erik Timothy Tremblay; Trent University-Oshawa

Shams et al. (2000,2001,2002) characterized a powerful auditory-visual (AV) interaction. A brief, discontinuous, fixed-frequency tone (e.g., 7ms on, 57ms off, 7ms on) paired with a single flash of light induces the illusion of two flashes. Using a similar split tone and a continuous-tone control, we investigated the impact of these accessory tones (Nickerson, 1973) on two classic experimental procedures thought to tap representations of briefly presented visual items. In the Sperling (1960) partial report procedure with tone/array SOA=0 and an identity lexical priming procedure with tone-prime SOA=0, we find boundary conditions on the impact of the Shams two flash illusion.

[P-3-70] Bypassing the bottleneck: response information computed in parallel persists to influence overt Task 2 performance

Sandra Jean Thomson, Cassie J Cetlin, Scott Watter; McMaster University

The assumption of strictly serial response selection in dual-task performance has been challenged by demonstrations of Task2-to-Task1 response priming. However, this priming does not actually violate the response selection bottleneck theory if the Task2 response information computed in parallel with Task1 response selection does not contribute to actual Task 2 performance. The present study examines response compatibility effects from unattended Task2 response information on overt Task2 responses. We provide the first evidence that Task2 response information generated in parallel with Task1 bypasses the bottleneck to directly influence Task2 performance, challenging the idea of a strict informational bottleneck.

[P-3-71] Training effects in the psychological refractory period paradigm

Lila Kathryn Danis, Sandra J Thomson, Scott Watter; McMaster University

The strict response selection bottleneck theory of dual-task processing has been challenged by studies demonstrating backward response compatibility. Response information for Task 2 has been shown to influence Task 1 performance, indicating response selection overlap of two tasks. This study examined training effects on dual-task performance and backward compatibility. Results show dual-task costs and compatibility effects decreasing with practice. However, when the Task1 stimulus set increased, both dual-task costs and compatibility effects returned to magnitudes statistically identical to those observed in the first session. The implications of these findings provide information on mechanisms contributing to the backward compatibility effect.

[P-3-72] Beat perception in 3D: A comparative analysis between sight, sound, and touch

Heather Khey Beldman, Jessica A Grahn; Western University

Beat perception (BP) is the uniquely human capacity to sense the regularity in rhythm. We wanted to examine whether BP could be induced in the auditory, visual, and tactile modalities by assessing behavioural responses to modality-specific stimuli. For each modality, 36 participants performed a rhythm discrimination task that required them to correctly distinguish between rhythms. We found that BP was induced in the tactile and auditory modalities, but not in the visual modality. In addition, results suggest that musical experience was positively related to performance in discriminating between rhythms.

[P-3-73] Why Can't We Kick the Seau and Break the Glace? An Eye Movement Study of Idiom Code-Switching

Lianne Morier, Kyle Lovseth, Debra Titone; McGill University

There is considerable debate over whether idiomatic expressions are processed via direct retrieval, compositional analysis, or some combination of both (e.g., Libben & Titone, 2008). It is also unclear how different bilingual populations process idioms. In this study, we investigated how English-French bilinguals process idiomatic expressions by using eye movement measures of reading during an idiom code-switching task. The

findings show that a French code-switch in English idioms is more disruptive for native English speakers than a corresponding code-switch in non-idiomatic sentences. Furthermore, increased idiom familiarity facilitates recovery from a code-switch, while increased idiom decomposability hinders recovery. These results suggest that direct retrieval of known idiomatic forms and meanings drives initial figurative comprehension, although compositional analyses of idiomatic strings subsequently occur. This pattern of data is most consistent with hybrid or multidetermined models of idiom processing (e.g., Titone & Connine, 1999; Libben & Titone, 2008), according to which direct retrieval and compositional processing both contribute to figurative comprehension in a time- and knowledge-dependent manner.

[P-3-74] Going through the Motions: Skill Differences in the Representation of Arithmetic Operations

Alan Zigler, Courtney Gregor, Marcie Penner-Wilger, David H. Landy; Franklin & Marshall College, United States, University of Richmond, United States

Hubbard et al. (2005) propose that adults represent addition as rightward movement along a mental number-line and subtraction as leftward movement. To test this proposal, participants solved single-digit arithmetic problems on a computer screen with rightward- or leftward-moving dots. We hypothesized that for addition, rightward motion would facilitate problem solution (as it is congruent with the mental representation of movement along a mental number-line) and that leftward movement would interfere with problem solution (as it is incongruent). For subtraction, the expectations were reversed. We found that only students with lower levels of mathematical skill showed the hypothesized operational momentum effect.

[P-3-75] Symbolic and non-symbolic representations of number: All mixed up?

Courtney Gregor, Jessica House, Alan Zigler, Marcie Penner-Wilger; Franklin & Marshall College, United States

College students performed a number comparison task across three presentation formats (symbolic, non-symbolic, and mixed format). We examined the ratio effect, the finding that as the ratio between two numbers increases the time to discriminate which number is larger decreases. We found that the ratio effect was greater for non-symbolic (i.e., squares) and mixed format trials than for symbolic trials (i.e., digits). There was a strong relation between the ratio effect for non-symbolic and mixed format trials, but not symbolic trials. Calculation fluency and finger gnosis scores were not related to the ratio effect for any of the presentation formats.

[P-3-76] The Impact of Restricted Field of View on Memory for Object Identity and Location

Derek Pasma, Chris Herdman, Andrew Staples, Matthew Brown; Carleton University

Research on restricting Field of View (FoV) has examined performance metrics that rely on perception (e.g., distance judgments), but not on memory. This study assessed the impact of FoV on memory for objects in a virtual environment. Participants studied the identity and location of objects in two FoV conditions (40°/120°) and then attempted to replace the objects in their correct locations. There were more identification and placement errors in the 40° condition than in the 120° condition. This is consistent with the

finding that FoV restrictions impair perception-based judgments, but also indicates that FoV restrictions interfere with visual memory.

[P-3-77] Attitudes and behaviour in real-world environments: The relative contributions of the physical properties of space, presence of others and previous experience

Vedran Dzebic, Justin S. Perdue, Colin G. Ellard; University of Waterloo, Stantec Architecture Ltd.

Spatial cognition research employing virtual-reality, suggests that isovist analysis, a description of the visible space from a particular observation point, encapsulates behaviours and attitudes towards environments. The current study examined the nature of this relationship within two real-world student centres at the University of Toronto: Scarborough and University of Waterloo. Isovist measures were generated and correlated with questionnaires and semantic differential task data collected within both buildings. Results suggest that isovist properties alone cannot capture experience of space; other factors such as the presence of other individuals and previous experience within the environment may also shape behaviour and attitudes.

[P-3-78] Detecting successful psychopathy? Cheating, psychopathic personality traits, and the face ratio

Shawn Geniole; Brock University

We investigated relationships between psychopathic personality traits (PPT), cheating, and facial width-to-height ratio in university students (n=128). The PPT factor of fearless dominance (FD) predicted cheating in men (r2=.36), not women, and was correlated with men's face ratio (r2=.09). Observers' (n=24) ratings of FD and of aggression from photographs of men's faces in Study 1 predicted actual FD scores (r2=.21) and the face ratio was associated with men's ratings of aggression (r2=.24). Our results indicate that specific PPT traits predict cheating in men, and that humans are sensitive to these traits.

[P-3-79] Towards an understanding of nonconscious decision processes in consumers

Kirk Stokes, Antonia Mantonakis, Daniel Bernstein; Brock University, Kwantlen Polytech University

To avoid violating the Canadian Criminal Code, which prohibits pure-chance gaming, marketers add skill-testing questions to contest ballots. We have previously found that, compared with intact items, items presented in distorted or otherwise obscured ways are more often judged as familiar or preferable. Using real-world contest ballots, we examine this phenomenon in the context of wine consumption. Results indicate that solving anagrams increases the amount of a wine consumed and that, for some consumers, this consumption may be related to enhanced valuations of the wine. Implications for marketers and non-conscious decision processes are discussed.

[P-3-80] Eye images increase cooperation, but not for long

Adam Sparks; University of Guelph

Social scientists from a variety of fields use experimental economic games to study cooperative decision making. Outcomes of economic games can be influenced by the formal parameters of the game; participants make more cooperative decisions when games are structured to provide them information about the reputation of other players. Decisions can also be influenced by contextual cues; some studies have shown elevated levels of cooperation

by people exposed to images of eyes or faces, though others have failed to replicate this effect. An effort to reconcile the body of findings about the "eyes effect" can usefully inform theoretical debates about the evolution of cooperation and practical efforts to maintain cooperation in real world systems. I report the results of an experiment in which participants showed the effect after a brief exposure to eyes, but not after a longer exposure. Habituation to uninformative cues may account for some of the discrepancies in eyes effect findings.

[P-3-81] Trust and Social Categorization: Whom can we trust?

Elena Canadas, Rosa Rodriguez-Bailon, Juan Lupianez; University of Granada, Spain

This study investigates whether participants use categorical or individual knowledge to predict others' reciprocation in a "Trust Game". Specifically, participants chose whether to cooperate or not with black and white partners, who then reciprocated or not. Reciprocity rates were manipulated by creating consistent-members associated with high(low) reciprocity, shared with most members of their race group, and inconsistent-members associated with the reciprocity of the opposite race group. Looking at the pattern of cooperation with consistent and inconsistent members, a measure of categorization-individuation could be created. Results show opposite performance's patterns for white and black partners.

[P-3-82] Generosity as a Costly Signal: Female Act- and Context-Specific Preferences

Sara Kafashan; University of Guelph

Females should prefer qualities that maximize direct fitness benefits in a long-term mating context (e.g., resources, abilities, and cooperative intent), and indirect fitness benefits in a short-term mating context (e.g., abilities). Individuals can use generosity to signal underlying qualities, such as resources, and/or abilities, in addition to one's cooperative intent. We investigated female short-term and long-term mate preferences for acts that indicated abilities via generosity (Study 1), and resources via generosity (Study 2). Participants saw vignettes of individuals engaging in acts that varied in the level of generosity and abilities, and generosity and resources. Participants rated the attractiveness of individuals as short-term and long-term mates. We found evidence that generosity increased individuals' attractiveness in a short-term and long-term mating context. However, preferences for resources and abilities were similar across mating context.

[P-3-83] Alcohol use, drug use and related harms in university students: importance of age of first intoxication with alcohol

Mary Beth F Dunn, Bruce McKay; Wilfrid Laurier University

This study focused on relationships between age of first intoxication with alcohol, and past-year and lifetime use of alcohol and other drugs, in a large (n ~1400) sample of university students. Students first intoxicated with alcohol before age 15 currently drink alcohol and smoke marijuana far more often, have substantially higher likelihood of lifetime experience with psychostimulants, hallucinogens, and Ecstasy/MDMA, experience more legal problems and abuse/dependency symptoms, and have poorer academic achievement in university, than students first intoxicated at 18+ years old. Frequent and harmful alcohol/drug

use in university is thus a characteristic primarily of those with early alcohol use.

[P-3-84] Similarities and Differences in Psychology Honours Programs Across Canada

Jane A Fix, Heather L French, Theresa E Hall, Allyson M Kozuska, Bob Uttl; Mount Royal University

Psychology honours degree programs are designed to increase students' knowledge within the specific area and to prepare them for graduate level study in their area of interest. Surprisingly, no prior research has examined similarities and differences among these programs in Canada. Accordingly, we examined admission requirements, admission processes, degree completion requirements, advice provided to students interested in pursuing honours degrees, and accessibility of honours relevant information on universities' websites. Our survey included all English speaking universities listed on the Association of Universities and Colleges of Canada. The results reveal similarities as well as substantial differences in psychology honours programs across Canada.

Symposium-1 [S-1]: New test instruments to study singing: Perception, Production, and Emotion

Organizer: A. Cohen

Overview: We present new test instruments under development that measure a variety of abilities and behaviours associated with music. Unlike experiments designed for single use and a replication, these instruments aim for reuse under standardized conditions. The accumulation of data from large numbers of individuals differing in age, gender, musical training, cultural background, and mental status provide the opportunity for modelling the developmental trajectory of music cognitive faculties. The particular tests to be presented, and data arising from them, focus on emotion in singing, vocal auditory motor development assessment (VAMDA), and the measurement of singing skills including improvisation (AIRS Test Battery).

[S-1-1] Database of emotional speech and song

Steven R Livingstone, Katlyn Peck, Frank A Russo; Ryerson University

This paper introduces a database of emotional speech and song. Our purpose in creating this database was to provide researchers with a high-quality, freely available set of audio-visual recordings of emotional speech and song in North American English. The battery consists of 12 highly trained actors, speaking and singing short statements with 9 different emotions, each with two emotional intensities. We report on psychometric evaluations, facial motion, and acoustic properties. The battery will allow researchers to assess the relative contributions of audio and visual channels, and to draw comparisons between responses to emotional speech and song.

[S-1-2] The vocal auditory motor development assessment (VAMDA): Measuring children’s perception and production of singing

Christine D. Tsang, Farah Iqbal, Alexandria Persaud, Rayna H Friendly, Nicole Folland, Simone Dalla Bella, Laurel J Trainor; Huron University College, McMaster University, University of Montpellier, France

It has been proposed that proficient singing in adults involves memory, motor skills, auditory perception and

feedback mechanisms. Singing proficiency is typically measured in terms of pitch accuracy, however much of the developmental literature has not focused specifically on pitch accuracy skills in children, making it difficult to compare across adult and child singing abilities. In this paper, we discuss a new child singing assessment (VAMDA) in which school-age children are tested on a set of matched auditory perception and vocal production tasks, as well as extra-music cognitive measures, to examine whether children's singing proficiency is related to basic auditory, motor and cognitive processes.

[S-1-3] The AIRS On-line Test Battery of Singing Skills

Bing-Yi Pan, Annabel Joan Cohen; University of Prince Edward Island

The new interactive AIRS (Advancing Interdisciplinary Research in Singing) Test Battery is accessible worldwide over the Internet. It delivers an audiovideo sequence of singing tasks (such as reproduction of music elements, creation of a melodic ending, and composing a melody, as well as several speech/language skills including articulation, intonation as in a tone language, and story generation). For each task the system records the participant's audiovideo response. These data are stored and indexed in a remote server for retrieval and sharing. The system will be demonstrated along with preliminary data reflecting lifespan and cultural influences on singing acquisition.

Symposium-2 [S-2]: Computational Understanding of Cognition

Organizer: D. Mewhort

Overview: The symposium presents five examples of current work designed to show how computational modelling solves long-standing problems, illuminates current disputes, and open new approaches to old issues. Topics include decision in forced-choice tasks, perceptual processes in vision, mechanisms of associative learning, search through semantic memory, and human game playing. The topics explore different computational representation and processing mechanisms. The focus across the wide range of topics is the representation of the problem and the optimum computational mechanisms needed to understand human behaviour. We hope to prompt discussion of the role of modelling in cognitive psychology and of how to bridge differences in modelling methods.

[S-2-1] A connectionist account of response selection and trial-by-trial adaptation

Blair C Armstrong, Kevin W Mickey, David C Plaut; Carnegie Mellon University, Standford University

Ratcliff, Van Zandt, and McKoon (1999, Psych. Review) claimed that connectionist models fail to capture important aspects of performance in two-alternative forced choice response tasks that are captured well by the diffusion model. We re-evaluate this claim with both computational and behavioural investigations involving a perceptual judgment task. The results identify several limitations with previous data that have been used as a "golden rule" for assessing model performance, and show that connectionist models not only perform well but also capture effects that are outside the scope of the diffusion model such as trial-by-trial adaptation.

[S-2-2] Modelling visual processing via emergence

David Pierre Leibovitz; Carleton University

A model of low level visual processing is outlined along with a demonstration of the numerous phenomena it unifies. Specifically - filling in, visual memory, image stability, color homogeneity, blind spot, temporal edge detection, eye blink - phenomena that would ordinarily be investigated under different sub fields and with disparate models. The model is based on the interaction between recurrence and eye motion. The model is built using the Emergic Network system, which is a new cognitive modeling system created for this project and others like it. Emergic Networks facilitate the exploration of how recurrent and distributed functions produce functional emergent effects. I will present an overview of the Emergic Network System and the simulation results for each phenomena it models.

[S-2-3] A memory-based explanation of higher order retrospective revaluation

Randall K. Jamieson, Chrissy M. Chubala; University of Manitoba

People revaluate their knowledge about the predictive validity of cues in light of new information about competing cues (e.g., De Houwer & Beckers, 2002, QJEP). The result, called retrospective revaluation, has forced a reconsideration of the mechanisms that underlie simple associative learning. In this talk we (a) present data that document higher order retrospective revaluation and (b) show that an exemplar-based model of learning and memory explains those data (Jamieson, Crump, & Hannah, 2012, L&B). According to the model, retrospective revaluation follows from a combination of discrepancy encoding and trace inversion at retrieval.

[S-2-4] Optimal Foraging in Semantic Memory

Michael N. Jones, Thomas H. Hills, Peter M. Todd; Indiana University, Google Research, University of Warwick

Animals often search for resources that occur in spatial patches, such as nuts beneath trees. Humans also search for cognitive resources that occur in memorial patches, such as names, solutions to problems, etc. In spatial environments, adaptive foraging involves optimal global transitions between locally exploited resource clusters: decisions that prevent animals from staying too long in over-exploited patches, and from giving up too early on rich patches. We present a comparison of computational models of memory search converging on the hypothesis that strategies for optimal spatial search (for food) may have been subsequently exapted to search for information resources in memory.

[S-2-5] A memory based model of human game playing: Understanding the relationship between game theory and cognition

West, R. L., Lebier, C., Stewart, T., Rutledge-Taylor, M.; Carleton University

Game theory has shown us that many real world situations can be understood as games. However, human game playing behaviour often deviates significantly from the optimal game theory solution. We present a cognitive model that explains a wide range of game playing data, including data that we gathered using a new paradigm specifically designed to test the model. The unique feature of this model is that it is not based on game theory concepts but is instead based on cognitive mechanisms related to human memory. The model has been

realized and tested as a neural network, an ACT-R model, and a holographic memory model. We discuss differences between these instantiations of the model and differences between our model and models based on game theory concepts. In particular, we argue that only the models based on our memory theory of game playing can account for the data that we have collected.

Discussants:

D. J. K. Mewhort, Matthew A. Kelly; Queen's University, Carleton University

Symposium-3 [S-3]: The cognitive and neural basis of recollection memory

Organizer: M. Fernandes

Overview: In memory, the ability to encode, store, and retrieve information requires numerous cognitive processes. Identifying those critical for successful memory performance has long been a goal of psychologists and neuroscientists. Remembering an event from our past often involves recreating contextual aspects that accompanied the initial encoding of information. In this symposium we will review evidence from cognitive studies, neuroimaging data, patient work, and animal paradigms that pinpoint critical processes, and brain regions, important for contextually-rich memories, or recollections, of the past. Results suggest a mechanism exists to disambiguate memories, which relies on reactivation of contextual cues from encoding, and the integrity of the hippocampus.

[S-3-1] Recollection as Social Glue

Patrick Davidson; University of Ottawa

What is recollection for? One of its crucial functions may be to help establish and maintain social-emotional connections. We asked memory-impaired patients what they could recollect about a "flashbulb memory" event. Such memories arguably help us build social connections by sharing our personalities and histories with other people. Memory-impaired patients were unable to do this, some even just a few days after the event. Recently, we examined interpersonal relationships in amnesic patients by administering a formal questionnaire to three patients (and family members) and controls. Social networks appeared to be winnowed down, although not obliterated, by amnesia.

[S-3-2] Future thinking without recollection in amnesia

R. Shayna Rosenbaum; York University

Amnesic people who are unable to recollect past experiences in episodic memory are also unable to imagine possible future experiences. However, recent work suggests that the temporal component is not the essential feature of the amnesic person's deficit in "mental time travel." We investigated the nature and limits of recollection with respect to future thinking by testing amnesic people who lack the ability to recollect past personal episodes. The results indicate that temporal thought and future-oriented decision-making can be preserved in the absence of the ability to recollect the past and imagine the future.

[S-3-3] Pattern Separation and the Dentate Gyrus

Diano F Marrone; Wilfrid Laurier University

Accurate memory retrieval depends on balancing the need to form many unambiguous representations of similar events (pattern separation)

against the ability for retrieval from altered or incomplete cues (pattern completion). The dentate gyrus (DG) is thought to mediate pattern separation by de-correlating incoming activity from entorhinal cortex. According to early anatomical and theoretical accounts, this may be done through the recruitment of unique cell populations in response to similar events. Using gene expression and tetrode recordings, recent data contradict this model, and suggest the need to revise the standard account for how pattern separation is implemented by the DG.

[S-3-4] On the Flexibility of Recollection in Forming New Associations: Evidence from the AB/AC Paradigm

Jason David Ozubko, Morris Moscovitch, Gordon Winocur; Rotman Research Institute/Baycrest Centre, University of Toronto, Trent University

Here we test the notion that despite the strength of recollective representations, the flexible nature of recollection better supports memory changes based on the elements of those representations, vs elements that are a part of familiar representations. In two experiments, subjects studied a list of AB word pairs. Subsequently, subjects studied AC word pairs. In both cases, we found that subjects are better able to learn and recall AC word pairs when the initial AB memory was recollective vs familiar. These results support the notion that memory representations based on recollections, rather than lead to interference with new learning, provide the necessary flexibility to promote it.

[S-3-5] How context at encoding can boost recollection during retrieval

Myra Annette Fernandes; University of Waterloo

We showed the quality of memory was influenced by whether target study words were encoded with more versus less accompanying visual contextual detail: recollection was enhanced, though gist-based familiarity memory was unaffected by encoding condition. Normal aging impaired this benefit, which could not be remedied by lengthening encoding time. From this, and recent neuroimaging studies, we propose a model in which recollection and familiarity for words can be dissociated in two ways: recruitment of additional brain regions in frontal, medial-temporal, and content-specific cortices during recollection, and variations in strength of brain networks activated during recollection versus familiarity-based memory responses.

Symposium-4 [S-4]: Mathematical Cognition

Organizers: Jo-Anne LeFevre and Katherine Robinson

Overview: In this symposium, the authors will address the question of how various aspects of spatial (that is, non-verbal) processes are involved in mathematical tasks. The question of how solvers use non-verbal representations in their solution is of interest both practically and theoretically. Researchers will explore questions involving fractions, place value, and conceptual knowledge, areas which are challenging for children and adults, and that invoke many interesting questions about representation and process in mathematical cognition.

[S-4-1] The varying relations between mathematical ability and working memory

Darcy Hallett, Sally Payne, Aishah Bakhtiar, Cheryll Fitzpatrick; Memorial University

Previous studies have found links between working memory and mathematical ability, but very little research has explicitly examined how these relations may differ across different aspects of working memory. The current study separated working memory into verbal, numerical, and spatial-figural working memory and also included a task on memory updating. Results indicate that Sentence Span and Memory Updating are more strongly related to math ability than other aspects of working memory. Furthermore, the different working memory tasks also had different pattern of relations with fraction ability compared to more general math ability.

[S-4-2] The Relation Between Math Anxiety and Numerical and Spatial Processing

Erin Anne Maloney, Evan F Risko, Stephanie Waechter, Daniel Ansari, Sian L Beilock, Jonathan A Fugelsang; University of Chicago, Arizona State University, University of Waterloo, University of Western Ontario

Math anxiety is a condition in which individuals experience negative affect when engaging in tasks that demand numerical and mathematical skills. Individuals high in math anxiety have been shown to perform worse than their non-math anxious peers on a wide range of numerical and mathematical tasks, ranging from simple tasks such as counting objects to more complex calculations. Recent work suggests that math anxiety is transmitted socially (Beilock, Ramirez, Gunderson, & Levine, 2011). Here we suggest that, in addition to the social factors that influence math anxiety, some individuals may also have a cognitive predisposition to develop math anxiety. Specifically, we demonstrate that high math anxious individuals have deficits in the basic building blocks of mathematics (e.g., enumeration, number comparison, and spatial processing) and we argue that these deficits may predispose one to become anxious about mathematics. We discuss this theory with respect to its implications for the design and implementation of remediation programs.

[S-4-3] The Effects of Lesson Sequencing on Preservice Teachers' Place Value Knowledge

Diana A Royea, Helena P Osana; Concordia University

The present study examined the effect of lesson sequencing on the mathematical content knowledge of undergraduates in a teacher education program. Twenty-nine (N = 29) participants were randomly assigned to three conditions: Concepts-First, Procedures-First, and Iterating Concepts-Procedures. Eight lessons were delivered online in a different sequence depending on condition. The participants' conceptual, procedural, and pedagogical knowledge of numeration, place-value, and multidigit arithmetic were assessed at six time points before, during, and after the instruction. While all participants showed learning gains over the course of instruction, the iterative condition was found to be most effective for the development of conceptual knowledge.

[S-4-4] The Temporal Dynamics of Fraction Representations: Components are Processed First

Thomas Faulkenberry; Texas A&M University

Using negative priming, Meert, Gregoire, & Noel (2010) predicted that representations of fraction magnitude are formed by first processing the components and then estimating their ratio. The present study uses mouse-

tracking to test this prediction. We analyzed the dynamics of participants' hand movements as they compared fractions to the fraction 1/2. We found that before settling to the correct answer, hand trajectories tended to deviate toward the answer that was consistent with component magnitude, not fraction magnitude. However, there was an overall numerical distance effect. This data supports the idea that in fraction comparison, components are processed before magnitude.

[S-4-5] When children can execute procedures but don't know the appropriate contexts in which to apply them: The Case of Fraction Arithmetic

Aryn A. Pyke, Robert S. Siegler; Carnegie Mellon University

Children learning fraction arithmetic often apply procedures appropriate for another arithmetic operation but inappropriate for the operation requested. An intervention was developed to support the encoding/selection of procedures in a manner that better connects them to the appropriate type of problem (addition/multiplication/division with equal/unequal denominators). Feedback varied by condition. Control children received correct answers. Intervention children received the solution and procedural rules. Also, some children categorized each problem's type before solving it. We expected categorization to facilitate recall of the appropriate procedure, and/or to facilitate forming strong associations between the problem type and procedure rules. Results and implications are discussed.

Symposium-5 [S-5]: Vision for perception and action, 20 years later: where are we now?

Organizer: D. Crawford

Overview: In 1992 Goodale and Milner published a highly influential theoretical paper on two cortical streams for vision: a ventral stream for perception and a dorsal stream for action. Here, GOODALE will describe how this theory developed, followed by three topical presentations informed by the theory. FLANAGAN will discuss the relation between the control of action when manipulating objects and the explicit perception of object weight. CULHAM will review her evidence for separate but interacting perceptual and motor cortical centres related to hand actions. CRAWFORD will provide evidence that dorsal and ventral streams interact to integrate visual features across gaze fixations.

[S-5-1] A brief history of the perception and action proposal

Melvyn Alan Goodale; Western University

In 1992, David Milner and I proposed a new account of the division of labour between the ventral and dorsal streams of visual pathways that arise from early visual areas and project to inferotemporal cortex and posterior parietal cortex respectively. According to our account, visual perception is mediated by the ventral stream whereas the visual control of action is mediated by the dorsal stream. In this talk, I will give a brief and personal account of how David and I were led to this proposal – and how our ideas have evolved over the last twenty years.

[S-5-2] Weight prediction in action and perception

R. Flanagan; Queen's University

The prediction of object weight is critical for skilled manipulation but also influences perceived weight. In this talk, I will argue that weight prediction used in action depends on two sources of information: long-term priors

relating material and size to weight, and sensorimotor memory obtained from previous lifts. In contrast, weight prediction used when judging weight depends only on long-term priors. The different processes underlying weight prediction in action and perception enable us to rapidly adapt our motor output for particular objects without adversely affecting our abilities to judge weights or act effectively on other, dissimilar objects.

[S-5-3] What has neuroimaging revealed about the two visual streams in the human brain?

Jody C Culham; Western University

In 1992, Goodale and Milner proposed that visual processing proceeds along two routes, a ventral "vision-for-perception" stream and a dorsal "vision for action" stream. That same year, the first papers describing functional magnetic resonance imaging (fMRI) appeared. I will review how fMRI has contributed to the two streams theory over the past 20 years, including cases such as grasping where clear dissociations between the streams have been observed and cases such as tool use where information must be shared across the two streams. While fMRI has provided considerable support for the two streams theory, it has also led to a richer characterization of human brain areas within the two streams and has begun to reveal the complexity of interactions within and between the streams.

[S-5-4] How do visual streams interact for perception and memory during saccades?

John Douglas Crawford; York University

The two stream hypothesis provides a useful heuristic for understanding the visual system, and leads to an important question: how do these streams interact? An excellent case study is trans-saccadic perceptual integration, which involves both 'dorsal stream' processes (saccades, visuospatial memory) and 'ventral stream' processes (feature and object perception). Here, I will summarize psychophysical, imaging, and TMS experiments designed to reveal a distributed network for trans-saccadic integration; including our published work on the role of frontal and parietal eye fields (Prime et al. J Neurosci 2008, Cereb Cortex 2010) and more recent work on visual cortex, MT+, and prefrontal cortex.

Symposium-6 [S-6]: Categorization: Processes and Representations

Organizers: J. R. Schoenherr and G. Lacroix

Overview: The proposed session, considers evidence for processes and representations involved in categorization. The session will begin with a critical examination of a single-process model of categorization, the Exemplar-Based Random Walk model of categorization. Following this dual-process accounts examining the role of metacognition are considered contrasting subjective measures of performance, the role of prior knowledge in phoneme categorical perception of native and non-native speech sounds as well as the role of executive function in children's' and adults' category learning for verbal and nonverbal systems. Finally, practical applications of categorization systems are examined in terms of artificial intelligence systems of threat identification.

[S-6-1] Explicit and Implicit Knowledge in Categorization

Jordan Richard Schoenherr, Guy Lacroix; Carleton University

In the present study, the development of explicit categorical knowledge was assessed using subjective probability judgments (i.e., confidence reports). Confidence reports were compared to categorization response accuracy in a categorization task with a performance asymptote. Our analyses revealed different levels of subjective awareness. In Experiment 1, when block feedback was provided, participants showed overconfidence indicating that they were unaware of the performance asymptote. In Experiment 2, the absence of block-feedback generated greater overconfidence in the information-integration condition suggesting that participants were unaware of the implicit representation guiding categorization performance. Taken together, our results support a dual-process account of categorization.

[S-6-2] Categorisation processes and representation: Evolution of representations

Denis Cousineau; Université d'Ottawa

The representation of categories is a much debated question. Some theories of categorization first start by postulating an internal representation, eluding the processes operating on them. A major divide regarding the representations is instantiated by the exemplarism and the prototypism frameworks. Here, we argue that exemplarism cannot account for learning and therefore, that it is a very dubious approach to categorization. The argument is based on an examination of the content of the exemplar memory in the General Context Model, and its response-time version, the Exemplar-Based Random-Walk Model.

[S-6-3] Subjective Awareness of Acoustic and Phonemic Representations during Speech Perception

Jordan Richard Schoenherr, John Logan; Carleton University

Acoustic properties of speech sounds are typically organized into phonemes in a listener's native language. Under certain conditions, however, acoustic representations can also be used to discriminate speech sounds. The present study examines the extent to which participants were aware of the phonemic and acoustic properties of stimuli during speech perception. Participants completed identification and AX discrimination tasks, provided confidence reports of their performance, and rated the typicality of stimuli in phonemic categories. Results demonstrated the dominance of explicit, phonemic representations during speech perception while also suggesting that participants are subjectively aware of the acoustic properties of the stimuli.

[S-6-4] To what extent does category learning rely on executive functions? Evidence from child development and concurrent tasks

Sarah J Miles, Rahel R Rabi, John Paul Minda; Western University

We explored the role of executive functions (i.e., cognitive abilities used to guide effortful behaviour) in category learning by studying the effect of concurrent tasks on categorization performance and the ability of children to learn categories. The extent to which a concurrent task used executive functions dictated its interference with rule-based category learning, suggesting an important role for executive functions. This role was explored further by investigating whether inhibitory control, a component of executive functions, was related to categorization ability. We found that children's cognitive control

predicted their ability to learn rule-based categories.

[S-6-5] Absolute Identification and Function Learning

Mark Andrew Brown, Ian Neath; Memorial University

Absolute identification (AI) experiments explore how people identify simple perceptual stimuli. Function learning (FL) explores how people learn continuous relationships between stimuli (S) and responses (R). The congruent S-R mapping typical of AI creates a positive linear function suggesting AI and FL may involve overlapping processes. Three experiments suggest a significant amount of overlap between the two tasks. Performance could mimic both classic AI and FL patterns simply by changing the dependent measure. Manipulating the instructions or the response labels had little effect on performance. Implications for AI and FL models will be discussed.

[S-6-6] Classifying Geospatial Intelligence Data Using an Integrated Cognitive-Neuroscience Architecture

Robert Thomson; Carnegie Mellon University

Analyzing and classifying geospatial intelligence data is a practical application of category-learning models in the cognitive sciences. We examine the use of the ACT-R cognitive architecture (Anderson & Lebiere, 1998) to simulate exemplar, prototype, and rule-application models in the context of selecting the most likely facility-type in the analysis of simulated geospatial intelligence data. The model predictions are then compared against a subset of human data. All of the exemplar, rule, and prototype models converge on similar results, which correspond well with human performance. Implications will be discussed.

Symposium-7 [S-7]: Cognitive Control and Bilingualism

Organizers: M. Hilchey, R. Klein

Overview: It is widely recognized that plasticity characterizes the mind and its organ, the brain. Building on this recognition, an exciting proposal asserts that the frequent requirement for young bilinguals to switch between simultaneously active and competing linguistic representations results in plastic changes in their executive control network. The purpose of this symposium is to evaluate the controversial claim that early-onset bilingualism confers domain-general, non-linguistic cognitive control advantages and to provide a forum for novel theoretical insights into and experimental explorations of this proposal.

[S-7-1] Bilingual cognitive control advantages: Methods, findings, and theory

Matthew D Hilchey, Raymond M Klein; Dalhousie University

Green (1998) proposed that a fundamental distinction between the bilingual and monolingual brains centered on the idea that bilingual brains relied heavily on domain-general reactive inhibitory control to select one among simultaneously competing semantic units during language production. Stemming from this proposal was the idea that, owing to frequent use, inhibitory control mechanisms might confer bilingual advantages on conflict resolution in non-linguistic interference tasks. A meta-analysis of the extant literature has reveals that the putative bilingual advantage is likely unrelated to inhibitory control and more general

than previously imagined. Methods, findings and theory will be discussed.

[S-7-2] Linking Individual Differences In Cognitive Control to Bilingual Language Comprehension And Production

Debra Titone; McGill University

The exciting hypothesis that bilingualism confers advantages in cognitive control is driven by studies that compare bilinguals and monolinguals, groups who may differ in other ways that also relate to cognitive control. Here, I highlight work from my laboratory that investigates this link WITHIN bilinguals across language domains that inherently differ in their draw upon cognitive control (reading, listening, language production; initial activation vs. suppression of language representations). This approach capitalizes on systematic variability found among bilinguals and their component language capacities. Thus, it has the potential to provide direct evidence for the underlying mechanisms of any potential bilingual advantages.

[S-7-3] No Coherent Evidence for a Bilingual Advantage in Executive Processing

Kenneth R. Paap, San Francisco State University

Purported bilingual advantages in cognitive control can be challenged in two fundamental ways. First, the advantages are not consistently observed and may be due to confounded demographic differences. This challenge is reinforced by three studies that compared bilinguals to monolinguals in 5 tasks and 19 indicators of executive processing. A second problem reconfirmed by the present findings is that indicators of a specific control function in one task do not correlate with those obtained with a related task. The complete absence of convergent validity undermines the interpretation that these are valid indicators of task-independent abilities associated with cognitive control.

[S-7-4] The bilingual advantage in cognitive control: behavioural and electrophysiological evidence

Shanna Kousaie, Natalie A. Phillips; Concordia University

Reports of an advantage for bilingual young and older adults relative to monolinguals on attention control tasks have received much interest in the literature. However, the bilingual "advantage" has not been consistently reported and has yet to be fully understood. We will present behavioural and event-related brain potential data from young and older adults showing differences in how monolinguals and bilinguals process conflict in attention control tasks; however, these differences differ across tasks and age groups. These data will be discussed with respect to methodological and participant differences between studies in an attempt to explain inconsistencies in the literature.

[S-7-5] Effect of L2 proficiency on modulating oculomotor control in adult bilinguals: Study with Hindi-English bilinguals

Niharika Singh, Ramesh Kumar Mishra; University of Allahabad, India

Current research suggests that bilingualism has strong modulatory effects on a range of cognitive control abilities, most notably tasks requiring attentional control or some form of inhibitory control. Bilinguals' performance on several non-linguistic interference task , using manual response, have indicated that bilinguals posses better executive

control as compared to monolinguals. However, it is still unknown if bilinguals advantage also extends to the other domains of human action. We wanted to see if similar bilingual advantage would result in an overall saccade response using an oculomotor non-linguistic Stroop task and how proficiency modulates such advantage. The high proficient bilinguals showed overall faster saccade latency on all the trial types than the low proficient bilinguals thus providing evidence for domain –general advantage extending to the oculomotor control in the bilinguals.

Symposium-8 [S-8]: Visual Attention, Salience and the Brain

Organizer: B. White

Overview: This symposium will explore some of the most recent primate neurophysiology, and sophisticated human neuroimaging related to the processes underlying visual attention, salience, and eye movements. The talks will contrast cortical and subcortical mechanisms of visual attention, and the neural representation of visual salience, through the use of single unit recording, local field potentials, and microstimulation in non-human primates, as well as functional magnetic resonance imaging of the human subcortical brain.

[S-8-1] The Representation of Visual Salience in the Superior Colliculus

Brian J White, Takuro Ikeda, David Berg, Laurent Itti, Douglas P Munoz; Queen's University, University of Southern California

The concept of a "salience map", the topographic representation of visual conspicuity across the retinal image, has been central to theories/models of visual attention. Given the growing popularity of this concept, it is crucial to understand where and how visual salience is represented in the brain. This talk will describe evidence of a robust representation of visual salience in the superior colliculus (SC), an evolutionarily ancient subcortical structure that has long been associated with the control of visual attention and eye movements. Because this observation was found in the superficial SC layers, it might arise from visual cortex, not parietal/frontal cortex, because the latter do not project to the superficial SC.

[S-8-2] Pupil dilation is evoked by visual salience and microstimulation of the superior colliculus

Chin-An Wang, Susan E Boehnke, Brian J White, Douglas P Munoz; Queen's University

A salient stimulus initiates a series of responses that include shifts of attention and gaze, and pupil dilation. Gaze and attention shifts are known to involve the superior colliculus (SC), and they are initiated by SC microstimulation. Here we demonstrate microstimulation of the SC also evokes transient pupil dilation. Moreover, pupil dilation is evoked by the appearance of salient visual stimuli. Together, these results suggest that the SC plays an important role in pupil dynamics, and pupil size may be an easily measured indicator of covert attention and visual salience.

[S-8-3] Traveling waves triggered by saccades in macaque visual cortex

Theodoros P. Zanos; McGill University

Propagating waves are frequently found in many brain regions, and they are thought to be involved in attention, memory, and motor control. We analyzed Local Field Potentials (LFPs) obtained from multielectrode arrays implanted into area V4 of the macaque monkey. During a visually-

guided saccade task, propagating waves were observed in the LFP beta band following saccades. These waves appeared only following saccadic movements towards the receptive fields, and they were accompanied by parallel changes in single-unit functional connectivity patterns. These waves moved retinotopically from the fovea to the periphery, implying a reallocation of visual processing resources after each saccade.

[S-8-4] Spatial and feature-based attention in the human thalamus and superior colliculus

Keith Schneider; York University

We used fMRI to measure the modulations by sustained spatial or feature-based attention in the human thalamus, including the lateral geniculate nucleus (LGN) and two pulvinar nuclei, and superior colliculus. Both forms of attention increased responses in the thalamic nuclei, with magnocellular portions of the LGN responding more strongly when the subjects attended to moving dots rather than static colored dots. The superior colliculus was strongly influenced by spatial but not feature-based attention. All of the nuclei exhibited increases responses immediately prior to the subject's switching their attention between two superimposed surfaces. We conclude that attention modulates the activity of neurons throughout the brain in accordance with each neuron's feature selectivity.

[S-8-5] Functional mapping of separable attentional control processes in primate fronto-cingulate cortex neurons

Thilo Womelsdorf; York University

Focusing attention on one object, location or memory critically depends on control mechanisms in the brain that successfully identifies relevant objects and prioritizes their processing. These attentional control processes are subserved by a network of brain areas that comprise the prefrontal cortex. In this talk I will outline how spiking activity and synchronization patterns of single neurons in three major anatomical subdivisions of the prefrontal cortex contribute specific attentional control information that relate to (i) predicting the relevance / expected value of objects, (ii) attentional rules needed to shift attention, and (iii) interference control that prevents distraction from irrelevant information.

Symposium-9 [S-9] Learning, Memory & Plasticity: A Systems Level Approach

Organizer: A. Hager

Overview: Seemingly simple acts of learning and memory that humans take for granted may have complex underlying processes. This symposium will present recent research exploring the link between processes of learning, memory and experience-dependent plasticity as well as the underlying mechanisms involved therein with the use of rats. Visual discrimination learning, context fear conditioning and the role of acute stress are all examined in their respective systems, i.e. the visual system, hippocampal-fear circuit and the CA1-subiculum pathway. Interesting similarities and differences in underlying plasticity mechanisms will be presented and open to discussion.

[S-9-1] The 'shocking' similarity of contextual fear conditioning episodes

Peter Finnie; McGill University

New memories may be built on past experience in a manner that could influence how they are encoded. Indeed, learning a task in one

environment has been observed to preclude the requirement for dorsal hippocampal (dHC) NMDA-receptors during acquisition of a similar task in a distinct environment. Based on our observation that only recent exposure to a similar training procedure can switch the mechanisms of subsequent learning, we conclude that dHC NMDARs are critical to learn new sequences of contextual events, but not necessarily new spatial contexts. These results may begin to reveal how the brain integrates related behavioral episodes.

[S-9-2] NR2B-subunit dependent plasticity enhancement in the trained hemisphere of adult rats following monocular visual discrimination learning

Audrey M Hager, Hans C Dringenberg; Queen's University

The rat visual system allows for relatively selective activation of one hemisphere under monocular viewing conditions. Rats underwent monocular visual discrimination training using a custom-designed harness and face-mask to associate visual cues with an escape platform in a water maze task. Monocular training resulted in weak inter-hemispheric transfer of information assessed with probe trials, indicative of a high degree of lateralization of learned information. Further, greater potentiation of the 'trained' hemisphere was dependent on NR2B receptors in V1 indicating that this plasticity enhancement is due to direct, sensory-related activation of V1, rather than general brain activation and related neuromodulatory systems.

[S-9-3] Acute stress, but not corticosterone injections, disrupts both short- and long- term forms of synaptic plasticity in the CA1-subiculum pathway in rat

Matthew James MacDougall, John George Howland; University of Saskatchewan

Exposure to acute stress dramatically alters synaptic plasticity within various regions of the hippocampal formation; however, little is known about the effects of acute stress on synaptic plasticity within the subiculum. Using in vivo electrophysiological recordings in anesthetized male Sprague-Dawley rats, we demonstrate that acute stress, but not corticosterone injections, disrupts paired- pulse facilitation, long-term potentiation, and a late-developing potentiation within the CA1-subiculum pathway. Moreover, the deleterious effects of acute stress were prevented by pretreatment with the selective glucocorticoid receptor antagonist RU38486. These experiments demonstrate that glucocorticoid receptor activation is necessary but not sufficient for the observed effects on subicular plasticity.

[S-9-4] Distributed reiteration supports the neural reorganization of long-term memory

Hugo Lehmann; Trent University

The claim that the hippocampus is important for recent and not remote memories is supported by temporally graded retrograde amnesia. The account of this phenomenon is that certain memories are initially dependent on the hippocampus until sufficiently consolidated in neocortical structures over a protracted period of time. Here I will present evidence demonstrating that 1) memories do not solely become independent of the hippocampus over time, 2) distributed reiteration of the learning episode is a determining factor in making memories resistant to hippocampal damage, and 3) other medial temporal lobe structures are involved in supporting these memories.

Symposium-10 [S-10]: Electrophysiology as an investigation tool of attention and working memory

Organizers: P. Jolicoeur, C. Lefebvre

Overview: Because of its fine temporal resolution, electrophysiology can provide good reflections of early and fast-occurring brain events. Event-related potentials (ERPs) are therefore a powerful tool to investigate mechanisms of attention and short-term memory. This symposium presents studies that focus on ERP components appearing at different points during the attentional pipeline, each representing a different but complimentary aspect of processing. Current issues involving feature-defined target detection (P2 component), focusing of attention on visual targets (N2pc), and working memory (P3 and SPCN components) will be discussed.

[S-10-1] Colour salience affects fundamental mechanisms of visual attention: Evidence from lateralized event-related potentials

Ulysse Fortier-Gauthier, Roberto Dell'Acqua, John J. McDonald, Pierre Jolicoeur; Université de Montréal, University of Padova, Italy, Simon Fraser University

Equiluminant green and red served as salient target or distractor colours; these roles changing between trials based on a cue. One stimulus was on the vertical midline while the other was in a lateral position in a circular array of non-salient grey distractors in a search task. An event-related lateralization (ERL), the N2pc, was found to be larger and earlier for red than green targets. An earlier positivity posterior and contralateral (Ppc) relative to lateral distractors was found for red stimuli; green distractors produced no ERLs. These results suggest strong modulations of fundamental attentional mechanisms on the basis of salience.

[S-10-2] The visual P2 is attenuated for attended objects near the hands

Greg Louis West; Université de Montréal

Vision is altered when people place their hands near the object they are observing. To investigate the neural processes underlying this effect, we measured electroencephalographic VEPs elicited by reversing checkerboards, while participants' hands either surrounded the visual display or rested at their sides. We found the P2 component was attenuated for hand-proximal stimuli, but only when participants attended to the location of the checkerboard. These results suggest that hand-proximal stimuli benefit from enhanced selective attention at later stages of perceptual processing.

[S-10-3] Basic mechanisms of visual spatial attention revealed by mental curve tracing and the dynamics of electrical brain activity

Christine Lefebvre, Catherine D Messier, Roberto Dell'Acqua, Pierre Jolicœur; Université de Montréal, Università di Padova, Italy

When covertly following a lateralized curve, subjects produce an event-related potential component, the SPCN, reflecting processing of the traced curve in working memory. SPCN onset varies as a function of the length of curve traced before this curve departs from the vertical midline, suggesting tracing is a serial process. Here we show that SPCN onset also varies as a function of the terminal position of a traced curve. These results suggest that curve

tracing may involve two phases, with an initial rapid scan computed over the whole curve followed by a slower covert displacement of attention.

[S-10-4] Measuring ERPs in an immersive virtual reality motion simulator: Tracking visual targets correlated with self-motion

Judith M Shedden, John G Grundy, Martin v Mohrenschildt; McMaster University

Virtual reality motion simulators are used to train operators of powerful tools such as airplanes and ground vehicles to provide a safe level of skill prior to operating the real machine. We are interested in what aspects of the learning experience are critical to effective transfer of skills, and under what conditions simulated motion is a critical factor. To start, it is important to understand behavioural and brain responses to motion cues and how motion perception is integrated with visual cues in the simulator. We use event-related potentials to examine brain correlates of the integration of vestibular and visual cues.

[S-10-5] ERP measures of working memory impairment in patients with mild cognitive impairment and Alzheimer's disease

Natalie A. Phillips, Erin K. Johns, Guido A. Powell; Concordia University, Lady Davis Institute for Medical Research

Patients with amnestic mild cognitive impairment (aMCI) may be in a preclinical stage of Alzheimer disease and working memory (WM) is known to be impaired in both groups. We recorded event-related brain potentials (ERP) in 16 Alzheimer disease (AD) patients, 21 MCI patients, and 27 age- and education-matched normal elderly controls (NECs), during a verbal *n*-back task. Accuracy on the 2-back load distinguished all three groups (NEC>MCI>AD) while P300 ERP amplitudes distinguished controls from patients (NEC>MCI=AD). The results indicate that changes in resource allocation, as measured by the P300, may be a sensitive indicator of WM impairment in pre-clinical AD.

Symposium-11 [S-11] CSBBCS Presidential Symposium: The nature, causes, and effects of mind wandering

Organizer: P. Dixon

Overview: Mind wandering can be characterized as attention to task-unrelated, internally generated thought. Although this ubiquitous phenomenon is critically related to performance in a wide range of settings, until recently it has received scant attention in the study of cognition. The speakers in the present symposium present a variety of new insights into mind wandering. These include a perspective on mind wandering as unconstrained mental processing (Smallwood), the relationship of mind wandering to working memory capacity (Kane), an embodied perspective on mind wandering (Smilek), mind wandering as one of several mental states in reading (Dixon), and a functional analysis of mind wandering (Schooler).

[S-11-1] Understanding unconstrained mental processes during waking thought: a cognitive neuroscience exploration of the wandering mind

Jonathan Smallwood; Max Planck Institute for Human Cognitive and Brain Sciences, Germany

Over the last several decades it has become apparent that a primary activity of the mind is the self-generation of mental processes that are only minimally constrained by external events. It will be shown that the production of such self-generated

unconstrained thought relies on cognitive processes that can also be deployed in an external task based setting. Second, in order to focus attention on internally generated thought, the mind must neglect the processing of external perceptual information, a process known as perceptual decoupling. In combination these two influences afford the mind-wandering that occupies almost half of our waking lives.

[S-11-2] Working Memory Capacity and The Costs of Mind Wandering

Michael J. Kane, Jennifer C. McVay; University of North Carolina at Greensboro

Individual differences in working memory capacity (WMC) predict complex cognitive capabilities (e.g., reading, reasoning) as well as performance in simple attention tasks. "Executive attention" theories of WMC argue that shared variance between WMC and higher-order cognition reflects primarily variation in attention control. This talk will explore the WMC-attention relation by focusing on goal-neglect and mind-wandering phenomena. Goal neglect refers to momentary failures to respond according to goals despite knowing and appreciating them. I'll argue from laboratory and daily-life research that goal neglect (and WMC variation therein) sometimes results from mind-wandering, or the subjective experience of off-task thought.

[S-11-3] Wandering minds, wandering bodies: The relation between mind wandering, inattention and fidgeting

Daniel Smilek, Jonathan S. A. Carriere, Paul Seli, James Allan Cheyne; University of Waterloo

We evaluated whether individual differences in 1) spontaneous mind-wandering and 2) attention lapses express themselves in individual differences in fidgeting (i.e., spontaneous extraneous movement). We developed self-report scales of fidgeting, spontaneous mind-wandering, and deliberate mind-wandering and included scales of attentional distractibility and attentional shifting. Regression analyses including all the foregoing variables revealed that fidgeting was uniquely predicted by spontaneous mind wandering only. Another analysis showed that self-reported fidgeting was also predicted by measures of inattention and attention-related errors, but not by memory-related errors. Thus, fidgeting may be the embodied component of attentional instability and fluctuating consciousness.

[S-11-4] Textual control of mental states in reading

Peter Dixon, Marisa Bortolussi; University of Alberta

Reading narrative is not a stable, uniform activity, but rather varies over time depending on the changing goals of the reader, the evolving nature of the text, and events in the environment. A well-established component of these varying states is mind wandering, in which readers attend to task-unrelated thoughts. More generally, though, readers may also differentially attend to the words of the text, the events of the story, and personal reactions or elaborations of those events. In the present research, we investigated how the interest value of the text modulates these moment-to-moment variations in mental state.

[S-11-5] The Costs and Benefits of Mind Wandering

Jonathan Schooler; University of California, Santa Barbara

Mind wandering is often costly with regard to performance on the task that one is being distracted from. At the same time it can offer significant distal benefits. This talk will review the costs (e.g. Impaired comprehension and working memory) and the benefits (e.g. Creative incubation, future planning) of mind wandering. Additional consideration will be given to possible strategies for minimizing the disruptions and maximizing the value of mind wandering.

Talk Session-1 [T-1]: Perception I

[T-1-1] Our slow sixth sense

Michael Barnett-Cowan; Western University

Multisensory stimuli originating from the same event can be perceived asynchronously due to differential physical and neural delays. While transduction of and physiological responses to vestibular stimulation are extremely fast, recent studies indicate that the perceived onset of vestibular stimulation is slow compared to the other senses (i.e., vestibular stimuli need to be presented prior to other stimuli for synchronous perception). I will argue that this likely reflects the fact that vestibular stimulation is associated with events following head movement, that the vestibular system rarely works alone, and that the brain prioritizes physiological response to vestibular stimulation over perceptual awareness.

[T-1-2] Scientific progress in psychology and neuroscience of perception: Computation, realization and reduction

Farshad Nemati; University of Lethbridge

Computational paradigm suggests a non-reductive relationship between psychological states and their physical realizers. However, I will argue that the structure of the theories determines the extent to which scientific progress can be made in relating the two in such non-reductive context. Examination of the theories of geometric-optical illusions demonstrates that such progress in the neuroscience of perception can be better achieved via (i) advancing psychological theories with significant unifying power, (ii) finding the neural realizers of the perceptual processes introduced in the theory. Multi-factorial models of geometric-optical illusions demonstrate significant potential for such progress based on computational approach.

[T-1-3] Perceived duration of emotional events in younger and older adults

Jeffrey Nicol, Kelly Clarke, Jessica Tanner; Nipissing University

A temporal bisection task was used to investigate age differences in the effect of emotion on perceived duration. When emotional (i.e., angry, happy, and sad) or neutral facial expressions were presented alone younger and older adults both perceived angry expressions longer, while only older adults also perceived happy and sad expressions longer, relative to neutral expressions. However, when neutral faces flanked the emotional or neutral target face, younger adults perceived happy and sad expressions longer, while older adults then perceived angry and sad expressions longer, relative to neutral expressions. The results are discussed with respect to the socioemotional selectivity theory of aging.

[T-1-4] Vibrotactile speaker discrimination among deaf individuals

Paolo Ammirante, Frank A. Russo, William F. Thompson, Deborah I. Fels;

Ryerson University, Macquarie University, Australia

Two experiments investigated deaf individuals' ability to distinguish speakers based on vibrotactile stimulation. Nineteen participants made same/different judgments on pairs of utterances presented to the lower back through voice coils embedded in a conforming chair. Discrimination of stimuli matched for F0, duration, and loudness was above chance for spoken sentences (Experiment 1) and vowel sounds (Experiment 2). Spectral measures of "different" stimulus pairs predicted their discriminability in both experiments. Beyond their application to assistive technology, these findings support the hypothesis that vibrotactile discrimination of spectral information involves cortical integration of filtered output from frequency-tuned skin receptors.

[T-1-5] The dynamics of LFPs in area MT during dysrhythmia perception

Navid Ghandehari Sadeghi, Erik Parker Cook; McGill University

We studied both adaptation and attention in the Middle Temporal area of visual cortex by using a repeating motion pulse stimulus while monkey subjects performed a dysrhythmia detection task. We found that for both adaptation and attention, local field potential (LFP) changes were similar and positively correlated with changes in spike rate in frequencies above 50 Hz, but differed in frequencies below 50 Hz. Therefore while higher frequency LFP power can be considered representative of spiking activity, our results suggest that lower frequency electrical activity in the brain may reflect factors such as neuromodulatory signals.

Talk Session-2 [T-2]: Attention I

[T-2-1] On the flavours of inhibition of return (IOR)

Raymond M. Klein, Matthew D. Hilchey, Jason Satel; Dalhousie University

In her 1997 dissertation, using variants of the model task pioneered by Posner, Tracy Taylor (Taylor & Klein, 2000) discovered 2 distinct "flavours" of IOR. When saccadic responses were precluded, the effect of IOR was confined to the input pathway (attentional/perceptual favour); yet, when saccadic responses were executed (either to the cue or target, or both) IOR was confined to the output pathway (decision/motor flavour). Recent work from our laboratory validates this important distinction, explores its implications, and identifies the motor flavour as the type of IOR that has been hypothesized to be a novelty seeking foraging facilitator.

[T-2-2] Introducing a Combined Attention Systems Test

Michael A. Lawrence, Brittony Osler, Megan J Fisher, Michelle Kerr, Stephanie Allen, Shannon Johnson; Dalhousie University

The Attention Network Test (ANT) and its variants (ANT-I, LANT, ANT-R, etc) have become popular research tools for simultaneous quantification of several phenomena of attention. However, non-optimal design of these tests limit their power and interpretability. This talk will present a new attention test, the Combined Attention Systems Test (CAST), that was designed to obviate the limitations of the its predecessors and extend measurement to further phenomena of attention.

[T-2-3] Attending in space and time: Is there just one beam?: Revisited, really

Yoko Ishigami, Raymond M. Klein; Dalhousie University

Sloppiness of attention in time and space has been studied separately. The purpose of the current study was to explore relationships between sloppiness in the temporal and spatial domains. The participants identified and localized targets (i.e., red among black items) in visual search and rapid serial visual presentation (RSVP). Consistent with the previous studies and our pilot study, sources of errors came predominantly from neighboring items of the targets. The correlation between measures of the sloppiness in space (visual search) and time (RSVP) were near zero, suggesting that different attentional "beams" bind features in space and time.

[T-2-4] Effect of L2 proficiency on modulating oculomotor control in adult bilinguals: Study with Hindi-English bilinguals

Niharika Singh, Ramesh Kumar Mishra; University of Allahabad, India

Current research suggests that bilingualism has strong modulatory effects on a range of cognitive control abilities, most notably tasks requiring attentional control or some form of inhibitory control. Bilinguals' performance on several non-linguistic interference task , using manual response, have indicated that bilinguals posses better executive control as compared to monolinguals. However, it is still unknown if bilinguals advantage also extends to the other domains of human action. We wanted to see if similar bilingual advantage would result in an overall saccade response using an oculomotor non-linguistic Stroop task and how proficiency modulates such advantage. The high proficient bilinguals showed overall faster saccade latency on all the trial types than the low proficient bilinguals thus providing evidence for domain –general advantage extending to the oculomotor control in the bilinguals.

Talk Session-3 [T-3]: Language & Reading I

[T-3-1] Trial History Modulates Joint Effects of Stimulus Quality, Frequency, and Priming in Lexical Decision

Michael E.J. Masson, Reihold Kliegl; University of Victoria, University of Potsdam, Germany

Additive and interactive effects of stimulus quality, word frequency, and semantic priming have been used to test theoretical claims about the cognitive architecture of word reading processes. We present linear mixed model analyses of a lexical decision experiment that challenge purported architectural implications of such effects. We demonstrate that apparent additive effects can be the product of aggregating over- and underadditive interaction effects that are modulated by characteristics of the previous trial's target. Even a simple practice effect consisting of improved response speed across trials was powerfully modulated by the nature of the previous target item.

[T-3-2] Individual Differences in Phonological Processing and Oculomotor Control Drive Reading Impairments in Schizophrenia

Veronica Whitford, Gillian A. O'Driscoll, Christopher C. Pack, Ridha Joober, Ashok Malla, Debra Titone; McGill University

Skilled reading requires intact language and oculomotor control. Dysfunction of both these processes is characteristic of schizophrenia. While reading is impaired in schizophrenia (e.g., Revheim et al., 2006), whether language or oculomotor dysfunction

drives these impairments is unknown. We tested 20 people with schizophrenia and 16 controls on a battery of language and oculomotor control tasks. Compared to controls, people with schizophrenia displayed robust oculomotor markers of reading difficulty, and impairments on language tasks crucial to skilled reading. Given that language and oculomotor dysfunction precede illness onset, reading may provide a sensitive window onto cognitive dysfunction in schizophrenia-vulnerability.

[T-3-3] Visual Word Identification: Lexical Processing versus Semantic Processing in the Context of the Task Set Paradigm

Shannon O'Malley, Derek Besner; Université de Montréal, University of Waterloo

Can subjects process a word before they know exactly what task they are supposed to perform? The standard answer is yes. However, as we have shown in various papers this conclusion is unwarranted; intention and context both play a role in lexical processing. Here we report an experiment in which subjects read a target word aloud or generated the antonym depending on a cue that appeared either well before the target or at the same time as the target. The results provide further support for the view that context is considerably more important than suggested by current theoretical accounts.

[T-3-4] What the eyes tell us about bilingual language production: increased inhibitory capacity and second language (L2) proficiency help bilinguals resolve within- and between-language competition

Irina Pivneva, Abigail Free, Debra Titone; McGill University

In an eye-movement study of bilingual speech production, we investigated whether inhibitory capacity and L2 ability relate to within- and cross-language lexical competition. Forty-eight bilinguals orally described picture arrays ("The hose and the stove are above the bridge") in L1-, L2-only, and L1-L2 mixed blocks. Pictures varied in the number of plausible within-language labels. Gaze-speech latencies were longer for L2 vs. L1 speech, and for pictures having multiple labels. These effects were modulated by both inhibitory capacity and L2 proficiency. Thus, there appears to be a close coupling between bilingual language production and inhibitory capacity among bilinguals.

[T-3-5] The effect of lexical stress on rapid object naming

Elisabet Service, Sainica Premananth; McMaster University

Since Denckla and Rudel (1974), studies have repeatedly found rapid naming (RAN) tasks to predict reading fluency. The present study is part of a project to find out what variables affect RAN speed in typical readers as a basis of understanding why RAN is slow in dyslexia. We tested naming of two- and three-syllable pictures and words with first, second or mixed stress in a naming grid. The atypical second-syllable stress slowed down picture and word naming for two-syllable words but only naming for three-syllable words. Mixed stress slowed down three- but not two-syllable words.

Talk Session-4 [T-4]: Animal Behavior & Neuroscience

[T-4-1] Friends and strangers: Observation learning in rats during foraging

Corrine Keshen, Sarah Buck, Mark Cole; Huron University College (UWO)

Observer rats observed expert demonstrator rats (cagemates or non-cagemates) forage for food on top of towers arranged in a circle. Six towers, randomly located, were striped and baited; six towers were white and sham baited. The observer rats foraged among the re-baited, and re-arranged, towers immediately after observing the demonstrator (Experiment 1) or after a delay of 24 hours (Experiment 2). In both experiments, observers found the baited towers significantly more often in their first six choices than the demonstrators had during their learning trials. In Experiment 1, observers performed better after watching an unfamiliar demonstrator than a familiar demonstrator.

[T-4-2] Modification of anxiety-like behaviors by nociceptin/orphanin FQ (N/OFQ) and time-dependent changes in N/OFQ-NOP gene expression in ethanol withdrawal

Harinder Aujla, Rosalia Cannarsa, Patrizia Romualdi, Roberto Ciccocioppo, Remi Martin-Fardon, Friedbert Weiss; University of Winnipeg, University of Bologna, Italy, University of Camerino, Italy, Scripps Research Institute, United States

Studies suggest a possible link between genetic polymorphisms of the NOP transcript and alcoholism. The neuropeptide nociceptin/orphanin FQ (N/OFQ) exerts anxiolytic-like and anti-stress actions. Thus, rats were exposed alcohol administration and, during withdrawal, gene expression products and effects of N/OFQ on anxiety-like behaviours were assessed. One week post-ethanol, N/OFQ dose-dependently attenuated elevated anxiety-like behavior in ethanol-dependent rats and produced anxiolytic-like effects in nondependent controls. However, three weeks post-ethanol, N/OFQ altered behavior consistent with anxiogenic-like actions in ethanol-dependent rats, but continued to exert anxiolytic-like actions in nondependent controls. Ethanol history-dependent changes of ppN/OFQ and NOP gene expression showed a distinctive time-course.

[T-4-3] Visual and Motor Frames of Reference in Primates' Superior Colliculus during Head-Unrestrained Gaze Shifts

Morteza Sadeh, Hongying Wang, Gerald P Keith, J. Douglas Crawford; York University

Recent head-unrestrained recordings suggest that SC neurons primarily code target location in eye coordinates during saccades directly to visual targets (DeSouza et al. J.Neurosci.2011). In this experiment we asked if the Frames of Reference (FoR) are encoded in the same manner for Visual and Motor Activities. We collected 71 neurons from left and right SC of two Rhesus Monkeys. Using a statistical method reported previously (Keith et al. J. Neurosci. Meth. 2009), we found that in Visual and Visuo-Motor Neurons encode the Target in eye FoR whereas Motor neurons show more coherence in encoding Gaze location relative to the eye.

[T-4-4] Continuous updating of superior colliculus visuospatial memory responses during smooth pursuit eye movements

Suryadeep Dash, Xiaogang Yan, Hongying Wang, Douglas Crawford; York University

Various studies have demonstrated remapping of visual responses, in several brain structures, before and after the saccade. However, no study to date has shown neural mechanism of spatial updating across smooth pursuit (SP). We recorded colliculus

neurons from animals trained to spatially update the location of a saccade target across an intervening SP. Of the neurons analyzed, every neuron that showed a visual response, exhibited a clear and robust modulation in activity when the location of remembered target passed across the receptive field of the neuron during SP. This may reflect a general mechanism for continuous updating during slow self-motion.

Talk Session-5: Memory I

[T-5-1] Effects of Mood and Arousal in Pre-Selected and Self-Selected Music on Learning and Memory

Tram Nguyen, Jessica A Grahn; University of Western Ontario

We explored how musical mood and arousal affected memory. Participants learned face-name pairs during a study phase, then immediately determined whether the face-name pairing in the test phase matched the study phase. During the task, silence or music with different levels of mood (positive/negative) and arousal (high/low) was played. We also compared experimenter-selected and participant-selected music. Recall was better with high compared to low arousal positive music, regardless of music selection. For experimenter-selected music, there was no difference in recall between arousal levels for negative music. For participant-selected music, recall was better with high compared to low arousal negative music.

[T-5-2] The Costs and Benefits of Production in Recognition

Glen E. Bodner, Alexander Taikh, Jonathan M. Fawcett; University of Calgary, Dalhousie University

The production effect is a memory advantage for items studied aloud over items studied silently. It typically occurs within subjects but not between subjects. It has been attributed to enhanced encoding of aloud items (increased distinctiveness), rather than to impaired encoding of silent items (lazy reading). Comparing within- and between-subject groups, we report recognition data and a meta-analysis showing that a benefit for aloud items and a cost to silent items can both contribute to within-subject production effects. The utility of saying items aloud as a study strategy is therefore constrained, given that memory for non-produced items can be impaired.

[T-5-3] Cross Modal Inference in Distributional Models of Semantics

Brent Kievit-Kylar, Michael Jones; Indiana University, United States

A growing body of both behavioral and neuroimaging research demonstrates that when humans process words, they automatically activate sensorimotor information about the word's referent. Shortcomings of purely linguistic semantic models can be overcome by understanding information integration across multiple modalities. Using data from the NSF Semantic Pictionary Project (Kievit-Kylar & Jones, 2012), we present a computational model to integrate information from multiple sensory domains with linguistic experience. The model predicts cross-domain inferences between linguistic, visual, gustatory, and olfactory representations. Incomplete information about a concept can be inferred by the system with greater accuracy using partial information from multiple sensory modalities.

[T-5-4] Retrieval in recognition memory: An analysis of serial-position curves

D. J. K. Mewhort, Elizabeth E. Johns; Queen's University

We investigated short-term recognition using lures that were orthographic neighbours of studied items. Each lure was assigned the serial position of its neighbour. Serial-position curves for hits and correct rejections were parallel, with marked recency. The curves suggest that decision depended on recollecting the best-matching study item (recall-to-accept/reject). We tested this idea using lures that overlapped more than one study item. Contrary to the recall-check idea, performance reflected the nature as well as the amount of the overlap. We describe a single-process model that retrieves general and item-specific information over time; it captures the results problematic for two-process ideas.

Talk Session-6: Attention II

[T-6-1] Influences of context on object change detection and identification

Mitchell Reid Pond LaPointe, Juan Lupianez, Bruce Milliken; McMaster University, Universidad de Granada, Spain

In change detection tasks, researchers have shown that objects embedded in contextually incongruent scenes are easier to detect than objects embedded in contextually congruent scenes. This finding is curious given a contextually congruent scene contains a host of cues as to which types of objects should be encountered, as well as their probable location. We present a two-process model that may account for the incongruent pop-out effect. While a congruent context may aid in object identification, the violation of an incongruent object to a scene's gist may explain the faster detection rates for contextually incongruent objects.

[T-6-2] Maybe automaticity isn't so rigid after all: Context-specific implicit sequence learning

Maria C D'Angelo, Juan Lupiáñez, Luis Jiménez, Bruce Milliken; McMaster University, Universidad de Granada, Spain, Universidad de Santiago de Compostela, Spain

Attention is often dichotomized into controlled versus automatic processing, where controlled processing is slow, flexible, and intentional, and automatic processing is fast, inflexible, and unintentional. In contrast to this strict dichotomy, there is mounting evidence for a form of context-specific attentional control that is rapid yet also flexible. We extend this idea to the domain of implicit sequence learning by showing that participants can learn implicitly two complementary sequences that are associated with distinct contexts. These results challenge views in which automatic processes are rigid and point to the role of context-specific control in the acquisition of implicit sequence knowledge.

[T-6-3] Can Orienting Attention to an Intervening Event reveal a Non-Spatial IOR Effect?

Adam Spadaro, Bruce Milliken, Juan Lupiáñez; McMaster University, University of Granada, Spain

Recently, studies have shown that non-spatial orienting procedures can produce repetition cost effects similar to a spatial orienting effect known as inhibition of return (IOR). Spadaro, He, & Milliken (2012) found that introducing an intervening event in a non-spatial orienting procedure produced a repetition cost, but only when a response was made to an intervening event. When an intervening event was presented, but a response was withheld, the expected repetition benefit was measured instead. The experiments reported here will investigate how attending and responding to an intervening

event can produce a repetition cost that may be a non-spatial variant of IOR.

[T-6-4] Extracting the gist of natural scenes requires global attention

John Brand, Aaron Johnson; Concordia University

Humans can classify a scene's category within 200 ms, but attention's role is unknown. Here, observers conducted a scene categorization task, either concurrently, with a task that required global or focused attention, or while primed to local or global processing using a Navon task. Categorization accuracy was higher when observers completed a concurrent task that required focused rather than global attention – indicating a dual-task decrease in performance only occurs when both tasks are global. Further, categorization accuracy was higher when primed by a global Navon task, rather than a local task. These findings imply that scene categorization requires global attention.

[T-6-5] Picking a Flavor: Do Perceptual Processing Strategies Abolish Oculomotor IOR?

Gregory Hector MacLean, Matthew David Hilchey, Raymond M Klein; Dalhousie University

At task-irrelevant locations, cueing effects can be attenuated. Cue-generated inhibition of return (IOR) can be dichotomized into two "flavours"; one perceptual and the other motoric, depending on the activation state of the oculomotor system. In a dual-task study, usually peripheral targets requiring manual responses appeared on one axis, while occasionally eye movements commanded by central arrow targets were used to measure the effects of cues presented on and off that axis. It was found that participants invoked a perceptual flavour of processing, tonically inhibiting the oculomotor system while abolishing the typically observed saccade-measured cueing effects.

Talk Session-7: Language & Reading II

[T-7-1] Generating structure from experience: The role of memory in language

Brendan T. Johns, Michael N. Jones; Indiana University

Theories of language have generally assumed that abstraction of linguistic input is necessary to create higher-level representations of the workings of a language (i.e. a grammar). However, the importance of individual experiences with language has recently been emphasized by usage-based theories (Tomasello, 2003) and grounded theories (e.g. Zwaan & Madden, 2005). Based upon this, a formal exemplar model of language is proposed, which stores instances of sentences across a corpus, using advances from semantic memory models. This memory store is used to generate expectations about the linguistic structure, based upon the importance of prediction in language (Altmann & Mirkovic, 2009).

[T-7-2] Joint attention helps adult learners learn new words

Masako Hirotani, Koji Shimada, Shuntaro Okazaki, Hiroki C. Tanabe, Norihiro Sadato; Carleton University, Max Planch Institute for Human Cognitive and Brain Sciences, Germany, National Institute for Physiological Sciences, Japan, Graduate University for Advanced Studies, Japan, University of Fukui, Japan

This study investigated the extent to which a number of parameters (e.g., eye-gaze between learners and target objects) associated with joint attention help adults learn new words. It used a novel paradigm with live interactions between two learners which took place in four different contexts. An eye-tracker recorded learners' eye-gaze. Adult learners mastered new words most successfully when they shared both the direction and timing of their eye-gaze towards the target objects. In addition, word learning initiated by a leaner alone, without sharing eye-gaze with another, failed to match these results. Overall, joint attention maximizes adults' learning of new words.

[T-7-3] The impact of L2-activated phonological and orthographic codes when bilinguals read in L1: ERP Investigation

Olesya Zhuravleva, Steve J. Lupker; University of Western Ontario

The current research employed a masked priming paradigm to examine the activation of second language phonological and orthographic codes by bilinguals when reading in their native language. Participants made lexical decisions to Russian (L1) targets preceded by English (L2) primes while their ERP responses were recorded. There was a difference in the ERP pattern in the 150-250 ms time window in case of a mismatch in the orthography of primes' and targets' onsets (e.g. crave - КАБАН) compared to onset matched controls (e.g. kick - КАБАН). A mismatch in the phonology of primes' and targets' onsets (e.g. knock - КАБАН) produced a modulation in the ERP pattern in a later time window (250-350 ms). Thus, L2 phonology and orthography do influence L1 processing. Further, the time course of orthographic and phonological processing for bilinguals appears to be similar to what has been reported for monolinguals (Grainger, Kiyonaga, & Holcomb, 2006).

[T-7-4] The Temporal Dynamics of Semantic Ambiguity Resolution: Computational and Behavioral Investigations

Blair C Armstrong, David C Plaut; Carnegie Mellon University

Most words are semantically ambiguous in that their meaning depends on context (e.g., <river>/<money> BANK).We propose a theory of semantic ambiguity resolution in which the discrepant effects of ambiguity that have been observed across tasks are explained by the temporal settling dynamics in semantics, and how these dynamics interact with the semantic representations of ambiguous words.This account was instantiated using a distributed connectionist network that incorporated biologically-plausible processing constraints.The account is further supported by lexical decision studies in which processing time was altered using nonword and visual contrast manipulations to alter the observed ambiguity effects as predicted.

[T-7-5] Accessing ambiguous morphological roots in sentences: Evidence from eye movements

Roberto G. de Almeida, John Brand, Gary Libben, Gina Marandola; Concordia University, Brock University

An eye-tracking experiment investigated whether morphologically complex words with semantically ambiguous roots (e.g., [[bark]ing]) undergo automatic decomposition during word recognition. These complex words were embedded into carrier sentences containing word pairs representing a root-only association (e.g., barking-tree), a root and full-word association (e.g. barking-dog),

and controls (barking-fail, barking-night). Participants (N= 113) read sentences while wearing a head-mounted eye-tracker. Results support morphological decomposition: Words related to the roots of the morphologically complex words yielded statistically shorter looking times than unrelated controls. We discuss our findings in relation to previous research concerning lexical access and morphological decomposition.

Talk Session-8 [T-8]: Memory II

[T-8-1] Examining the Role of Face Familiarity in Context Effects on Face Memory

Shahnaz Koji, Myra A. Fernandes; University of Waterloo

During encoding participants saw faces, differing in level of familiarity, paired with photos of scenes depicting indoor or outdoor environmental contexts. At retrieval, old faces from study were presented with either the same, switched, or a new context. Experiment 1 showed that reinstating the encoding context enhanced memory relative to a switched or new context, but this effect was reduced for famous faces. Experiment 2 showed that a 1X pre-exposure to an unfamiliar face reduced the context reinstatement effect. Results suggest that once a face is familiar, the influence of context on memory is reduced.

[T-8-2] Memory, Metamemory and Value-Directed Remembering in Older Adults

Alan D. Castel; University of California, Los Angeles

Although memory typically declines in old age, older adults can remember certain types of information. We examined how value, or importance of remembering target information, can guide both metacognition and memory operations, and lead to the efficient use of memory. In a selectivity task, where to-be-learned information was paired with point values, older adults could selectively remember important information, and this emerged with task experience. The findings illustrate that the use of metacognition, evaluative processing and prior knowledge can help older adults focus on selectively remembering important information by optimizing the allocation of attention and memory resources.

[T-8-3] Now You're Just an Item that I Used to Know: Examining the Time Course of Forgetting for Recollectable and Familiar Memories

Jason David Ozubko, Paul Seli; Rotman Research Institute/Baycrest Centre, University of Waterloo

Using a "remember"/"know" with confidence recognition paradigm, we present two experiments on the nature of forgetting. Experiment 1 demonstrates that familiar traces initially exhibit high confidence, however, as forgetting occurs these items become distributed across lower levels of confidence. In contrast, recollective traces are always high confidence and never distribute across lower levels of confidence. Instead, as forgetting occurs, fewer "remember" responses are made in general. Experiment 2 shows that these initially "remembered" items actually become "known" over time, and the distribution of the confidence suggests that when items were recollectable, they were also highly familiar. These data provide new insights into the relation between recollection and familiarity.

[T-8-4] Forget about him already! Faces yield costs and benefits in directed forgetting

Ryan J. Fitzgerald, Chris Oriet, Heather L. Price; University of Regina

In the present research, we investigated the consequences of cueing some faces to be remembered and others to be forgotten. Compared to a condition in which forget-cued faces were omitted, recognition of remember-cued faces in the directed-forgetting condition was impaired. Compared to a condition in which all faces were cued to be remembered, recognition of remember-cued faces in the directed-forgetting condition was enhanced. Thus, although exposure to forget-cued faces negatively affected memory of remember-cued faces (cost), having the freedom to forget some faces was better than having to remember all the faces (benefit).

Talk Session-9 [T-9]: Cognitive Processes I

[T-9-1] Extending the analyses of the dimensionality of the Raven APM

Bruce Oddson; Laurentian University

The Raven APM is considered a relatively pure measure of fluid intelligence. It is tempting to use dimensional analysis of its items to get insight into the underlying distributions of ability and measurement error. However, a combination of dimensional analysis, fsQCA and modeling of the Vigneau and Bors (2005) dataset suggests that suggests that the question of "dimensionality" of IQ tests may not be as easy to interpret as might have been thought. At least some errors are associated with high overall scores, suggesting that perceptual approach and/or strategies may play a role.

[T-9-2] The Role of Binding Mismatches in Producing Interference in Visual Working Memory (VWM)

Christopher Mark Fiacconi, Bruce Milliken; McMaster University

The purportedly durable nature of representations in VWM is thought to protect such representations from masking, or subsequent interference from new perceptual input. We report here a novel demonstration of interference in VWM wherein memory for a location-identity binding is impaired when participants are exposed to a subsequent perceptual display that contained a location-identity binding mismatch (Fiacconi & Milliken, 2012). We found that mismatch-related interference effects occur only when participants must respond to subsequent binding mismatches, and that simply attending to such mismatches is insufficient to produce interference. Thus, VWM performance likely reflects the online coordination of past and present.

[T-9-3] Natural Behavior in the Identification of Rotated Objects: A Performance Benefit

Evan F Risko, Srdan Medimorec; Arizona State University

Individuals often physically rotate when trying to identify rotated objects. While this particular natural behavior is systematically related to the difficulty of identifying the rotated objects, it is unclear whether it has any appreciable influence on performance. In the present investigation we determine the extent to which physical rotation impacts performance in the identification of rotated paragraphs. Results demonstrate that this behavior does in fact facilitate identification. Implications of this result are discussed with respect to the concept of cognitive offloading.

[T-9-4] Scrutinizing the bivalency effect: Factors influencing a block-wise response slowing

John G. Grundy, Miriam F.F. Benarroch, Sandra Monteiro, Judith M Shedden; McMaster University

The bivalency effect is a block-wise response slowing observed during task-switching upon presentation of occasional stimuli that cue two of the tasks being performed (i.e. bivalent stimuli). This response slowing is observed on all subsequent trials, including trials that do not share any features with bivalent stimuli. While past studies have mainly focused on the underlying cognitive processes and robustness of this effect, little is known about the specific stimulus properties that trigger this change in response strategy. In a series of experiments, we will describe a number of these factors, including unexpectedness, task-cueing, and colour, as well as their relative contributions.

[T-9-5] PRP training effects in RT and backward compatibility reveal locus of performance improvements

Sandra Jean Thomson, Lila K Danis, Scott Watter; McMaster University

Dual-task interference observed in typical PRP paradigms has been shown to decrease with practice, and this reduction in interference has been attributed to increased task automatization, timesharing, or a shortening of the central bottleneck stage of processing in Task1. To explore these alternative explanations, we measured both backward response compatibility effects and dual task interference over repeated training sessions. Automatization and timesharing accounts predict that Task2-to-Task1 response compatibility effects remain constant or increase with practice; however, our results indicate that the backward compatibility effect decreased with practice. This is consistent with a central stage shortening account of PRP training effects.

Talk Session-10 [T-10]: Human & Cognitive Neuroscience

[T-10-1] Decoding the neural mechanisms of human tool use

Jason Gallivan, Adam McLean, Kenneth Valyear, and Jody Culham; Queen's University, Western University

Highly sophisticated tool use is one of the defining characteristics of the human species but how is tool use supported by the brain? Here we show, using functional MRI and pattern classification methods, that specific brain areas involved in hand actions come to incorporate a tool into their neural codes. In addition, we found that the coding in different areas remained linked to either the hand or tool alone. These findings suggest that the addition of tools to the human movement repertoire is based upon goal-related representations that are both shared with and distinct from those for the hand alone.

[T-10-2] The Lateral Occipital Area is Not Necessary for Haptic Shape Representation

Jacqueline C. Snow, Melvyn A. Goodale, Jody C. Culham; Western University

Previous behavioral and fMRI studies of object perception highlight the critical role of the lateral occipital complex (LOC) in visuo-haptic object representations. Here we used fMRI to examine object-selective neural responses in a patient (MC) with extensive bilateral lesions to visuo-temporal cortex, including LOC. Controls showed robust object-selective responses within a classic network of areas including the LOC, parietal and frontal cortices. MC showed a strikingly similar pattern of

object selectivity, despite her LOC lesions. Although LOC may be critical for visual recognition of objects, our data indicate that it is not a necessary substrate for object-selective representations via haptics.

[T-10-3] The relationship between singing accuracy and auditory feedback

Nichole E Scheerer, Jeffery A Jones; Wilfrid Laurier University

Auditory feedback plays a role in monitoring vocal output and determining when adjustments are necessary. In this study untrained singers participated in a frequency altered feedback (FAF) experiment where they matched a note in pitch and duration. This study examined if singing accuracy could predict the compensation to FAF. Results indicate that note matching accuracy did not correlate with compensation magnitude, however, a significant correlation was found between baseline variability and compensation magnitude. These results suggest that individuals with a more stable baseline fundamental frequency rely more on sensorimotor representations and rely less on auditory feedback for monitoring vocal output.

[T-10-4] Partial learning of object dynamics based on fingertip forces in the absence of kinematic errors

Jonathan S. Diamond, Frédéric Danion, J. Randall Flanagan; Queen's University, Aix-Marseille University, France

Many studies of motor learning have examined reaching movements performed while grasping an object with novel dynamics that generate unpredicted forces on the hand and perturb hand motion. It is generally believed that motion or kinematic errors drive learning of the object's dynamics. Here we examined the contribution of force errors to such learning that result from mismatches between predicted and actual forces applied by the object to the hand, independent of kinematic errors. We show that force errors can drive adaptation of anticipatory grip force adjustments used to stabilize the object in hand but do not facilitate trajectory adaptation.

[T-10-5] Visual-vestibular interaction for maintaining trunk stability while standing up from a sitting position – a pilot study

Grace (Kai Yan) Lui, Nandini Deshpande; Queen's University

Sensory information from the visual and vestibular systems are critical to provide information to the brain to maintain postural control. During the task of sit-to-stand (STS), we examined visual-vestibular interactions under conditions of sub-optimal or no visual input. Six healthy young participants were asked to stand up quickly from a seated position when visual and vestibular inputs were manipulated. As the sensory conditions became more challenging, the transition phase of STS became shorter; however, trunk stability was preserved. Thus, it is suggested that during the STS task, visual inputs may be more dominant, even when it is sub-optimal or absent.

Talk Session-11 [T-11]: Memory III

[T-11-1] The benefits and costs of the "big three" encoding techniques

Colin M MacLeod, Noah D Forrin; University of Waterloo

The "big three" encoding manipulations known to produce robust memory effects are imagery, levels of processing, and generation.

We systematically compared these manipulations, keeping conditions as similar as possible across experiments. Each manipulation was carried out in both a between-subjects and a within-subject design, and with both an immediate free recall test and a delayed recognition test. Comparing the designs permits evaluation of the benefit and cost of each technique. We will demonstrate how the imagery and levels of processing manipulations differ from the generation manipulation in their effects on memory and consider factors that might underlie benefits versus costs.

[T-11-2] Retrieval-induced forgetting or context-induced forgetting?

Tanya R Jonker, Paul Seli, Colin M MacLeod; University of Waterloo

Practicing retrieval aids later recall of practiced material but can impair recall of related material, a phenomenon called retrieval-induced forgetting (RIF). The received explanation is that related material is inhibited to facilitate retrieval of practiced material (Anderson, 2003). In a series of experiments, we demonstrate that RIF depends on manipulation of context, suggesting that RIF is the product of the use of context rather than of inhibitory mechanisms. On this basis, we propose a context-cuing account that predicts RIF only when two conditions are met: The context changes between study and practice, and the practice context is present at test.

[T-11-3] Effect of Encoding Strategies on Memory for Novel Actions

Sophie Kenny, Ian Neath, Aimée Surprenant; Memorial University

When action lists are presented, participants do better on memory tests if they act while learning than if they remain still (Engelkamp & Krumnacker, 1980). According to the multimodal memory model, this enactment effect originates at encoding, when motor information enriches the memory trace which leads to better performance at test (Engelkamp, 1998). In an extension of the model, the capacity of motor encoding to enhance memory for novel actions was assessed. A significant enactment effect was demonstrated in a recognition test, but not in recall. The pattern of results over all experiments is discussed in light of differential strategy uses.

[T-11-4]. A misleading feeling of happiness: Metamemory for emotional pictures

Kathleen L. Hourihan, Elliott Bursey; Memorial University

Positive emotional information is typically remembered better than neutral information. When predicting future memory performance via judgments of learning (JOLs), individuals are sensitive to intrinsic item qualities. The current study examined how the emotionality of pictures guides JOLs, recognition, and recognition confidence. Subjects studied a mixed list of positive and neutral pictures, and made immediate JOLs. Confidence judgments were made in an old/new recognition test that followed. As predicted, subjects gave higher JOLs for positive pictures than for neutral pictures, but recognition performance showed the opposite result: Neutral pictures were more discriminable than positive pictures.

Talk Session-12 [T-12]: Perception II

[T-12-1] Vocal Pitch-Shift Compensation and ERP Response Across the Adult Lifespan

Jon Behich, Hanjun Liu, Jeffery A Jones; Wilfrid Laurier University

Adult aging brings with it numerous physical transformations and challenges. Adults from 18 to 80 years old (N = 80), equally represented by sex, were examined through event-related potentials during a frequency altered feedback experiment. Participants' produced a steady vocal pitch and heard their voice electronically shifted downward to elicit a corrective vocal-motor response. Results indicate that decreasing N100 amplitudes, and increasing vocal compensation variability and magnitude do not gradually occur across adult aging, but instead occur suddenly late in adulthood. Sex-based differences were also demonstrated, indicating that males and females process vocal perturbations and produce subsequent vocal compensations differently.

[T-12-2] Octave equivalence in humans and songbirds (black-capped chickadees)

Ronald Weisman, Marisa Hoeschele, Christopher Sturdy; Queen's University, University of Alberta

We compared octave equivalence in humans and songbirds (black-capped chickadees) using operant discrimination and transfer. We rewarded responses to the middle note range but not to the lower or upper note ranges in Octave 4. Then we tested for transfer by either rewarding the same or the opposite pattern of responses in Octave 5. Humans showed positive transfer when the same pattern of ranges was rewarded in Octave 5. Songbirds showed positive transfer when the opposite pattern was rewarded in Octave 5. Humans organize note range patterns by octave whereas songbirds organize notes into alternating ranges without reference to octaves.

[T-12-3] Classification and Prediction of Musical Emotion Based on Physiological Responses of Listeners Using Neural Networks

Naresh N Vempala, Frank A Russo, Gillian M Sandstrom; Ryerson University, University of British Columbia

Previous studies have shown that physiological changes occur during music listening that correspond to felt emotion. However, the nature of the relationship remains somewhat unclear. Our goal was to better understand this relationship by predicting felt emotion on the basis of physiological responses. To do so, we developed two types of neural networks – an emotion classifier and a valence/arousal predictor. Input to both networks consisted of five different physiological measures that were drawn from 20 participants listening to 12 music excerpts. Our results suggest the existence of a nonlinear relationship between physiological changes and felt emotion.

[T-12-4] Differences in emotion processing are explained by differences in stimuli

Cindy Hamon-Hill, John Barresi; Dalhousie University

We tested for an effect of disrupted motor mimicry on processing static but not dynamic, and brief (250 ms) but not long (1000 ms) emotional facial displays. Participants were most accurate on dynamic displays of 1000 ms, $p = .005$. A response bias to judge the face as a mismatch was more apparent on static than dynamic faces, $p = .002$, especially during a manipulation intended to interfere with spontaneous facial mimicry, $p < .001$. Our results indicate differences in emotion processing that can be

explained by quality of stimuli and raise questions about reports of deficits in emotion processing of special populations.

[T-12-5] How does the voice pitch of a spokesperson in an advertisement influence consumer's intent to purchase?

Adam Spadaro, Cara Tigue, Paul Fraccaro, David Feinberg; McMaster University

A lot of information conveyed through our voice can be influencing our decision-making without our awareness. Voice pitch is one such prominent characteristic that has been demonstrated to be a strong indicator of a person's attractiveness, dominance, and trustworthiness. Most of the research on voice pitch has been in the context of mate-choice, but several current studies have examined the role of voice pitch in different contexts. The current study will examine the influence of voice pitch in advertising. Specifically, how manipulating voice pitch in a variety of commercial voice-overs can influence consumer decision-making.

Talk Session-13 [T-13]: Cognitive Processes II

[T-13-1] Sub-lexical, Lexical and Semantic Processing When Reading Aloud: The Role of Intention

Shannon O'Malley, Derek Besner; Université De Montréal, University of Waterloo

It is widely assumed that sub-lexical, lexical, and semantic processing of print are automatic in the sense that they occur without intention. Using the Task Set paradigm developed by Besner and Care (2003) we show that all of these processes are affected by intention.

[T-13-2] On discriminating people: Visual redundancy in categorization

Wen Wu, Jason M Tangen, John R Vokey, Michael S Humphreys; University of Queensland, Australia, University of Lethbridge

It's conceivable that the categorisation of natural images is based on linguistic differences. For example, if you were presented with photographs of a person, and asked to distinguish them from photos of an object, you might simply search for the "person" or "object" in each photo, and sort them according to these linguistic targets. Here, we describe circumstances in which people distinguish natural images on the basis of redundant stylistic information, regardless of whether the target is present or not. We conclude that image classification is not always based on linguistic differences, and may depend on less verbalisable "stylistic" information.

[T-13-3] Inter-trial priming effects in singleton search are subject to implicit control

Dave R Thomson, Michael D'Ascenzo, Bruce Milliken; McMaster University

When searching for a pop-out target amongst homogeneous distracters, it has been shown that performance is greatly affected by whether the current target is the same or different from the target on the previous trial. This effect has been termed priming of pop-out (PoP) and has been argued to reflect the influence of an obligatory memory mechanism that cannot be overcome (Maljkovic & Nakayama, 1994). Here, we present the results of two experiments that demonstrate that PoP effects can indeed be modulated by observers' implicit expectancies about whether an upcoming target is likely to match or mismatch that on the previous trial.

We argue that PoP effects are subject to some degree of implicit control.

[T-13-4] Keeping the beat: Temporal dynamics of beat-deafness

Caroline Palmer, Pascale Lidji, Isabelle Peretz; McGill University

We examined synchronization processes as people entrained to a temporally changing beat. A dynamical systems model was applied to predict the temporal performance of people who tapped with a changing auditory signal. Individuals' abilities to synchronize with phase and period perturbations were compared with those of beat-deaf individuals. The model indicated deficits in the beat-deaf individuals, compared with control subjects, in an intrinsic tapping frequency that changes in response to temporal perturbations. Additional differences among beat-deaf individuals were captured by the rate of temporal adaptation. These findings support temporal adaptation as an entrainment of internal neural oscillations with exogenous rhythms.

[T-13-5] Affective Consequences of Internal Inhibition

Anne E Ferrey, Mallory Harris, Katherine McArthur, Mark J Fenske; University of Guelph

Inhibition is thought to have negative affective consequences during attentional selection of external visual stimuli. Here we examine whether inhibition has similar consequences during tasks requiring internal attention (i.e., selection/modulation of internally-generated representations). We compared affective evaluations of visual patterns previously held in working memory as a function of whether a delayed-cue required the item to be ignored or responded to. We also assessed the affective impact of inhibition for longer-term memory representations of word pairs using a modified Think/No-Think paradigm. Results of both studies suggest that inhibition does indeed have negative affective consequences following attentional selection of internal representations.

Talk Session-14 [T-14]: Reasoning and Mathematical Cognition

[T-14-1] Metacognition, intuition, and analytic thinking on Wason's selection task

Valerie Anne Thompson, Jonathan St. B. T. Evans; University of Saskatchewan, University of Plymouth, UK

Participants (N = 104) gave a fast, intuitive answer, a feeling of rightness (FOR) judgment about that answer, and a final answer to Wason's selection task problems. Half cued a heuristic matching strategy and half did not. Relative to the matching problems, FORs for the non-matching problems were lower with more evidence of analytic thinking. FORs were higher and analytic thinking less evident for "yes" than "no" responses, but only for the matching cases (i.e., when "yes" was heuristically cued). The data support the hypothesis that analytic reasoning varies with the strength of a metacognitive experience associated with heuristic judgments.

[T-14-2] Age Effects on Confidence in Deductive Reasoning

Jamie A Prowse Turner, Valerie A Thompson; University of Saskatchewan

Young adults are confident in their reasoning, even when doing poorly (Prowse Turner & Thompson, 2009). We asked whether older adults are more realistic in this respect. Young and older adults completed two deductive reasoning tasks and

provided their confidence ratings on an item-by-item basis. Results revealed that confidence varied by task, that older adults tended to perform more poorly and were less confident in their abilities compared to young adults. However, this decline in confidence did not reflect a more realistic analysis of their ability; suggesting that both older and younger adults are unrealistic in their reasoning ability assessments.

[T-14-3] Children's understanding of multiple additive concepts

Katherine Macleod Robinson, Adam K Dubé, Jacqueline Harrison; University of Regina

Children's conceptual understanding of arithmetic concepts are critical for the development of complex mathematical skills. Most studies have examined children's understanding of only one or two arithmetic concepts at a time and therefore little is known about children's general understanding of arithmetic concepts. In this study, Grade 3, 4, and 5 students solved addition and/or subtraction problems that could be more easily solved in they applied their understanding of six arithmetic concepts (inversion, associativity, commutativity, negation, equivalence, and identity). The development of conceptual understanding of these arithmetic concepts and how the concepts develop together or separately will be discussed.

[T-14-4] Retrieval-Induced Forgetting of Arithmetic Facts Across Cultures

Jamie Campbell, Anna J Maslany; University of Saskatchewan

Retrieving a multiplication fact (3 x 4) can slow response time (RT) for the corresponding addition fact (3 + 4). To pursue this phenomenon, non-Asian Canadian students answering in English, Asian-Chinese answering in English, and Asian-Chinese answering in Chinese received four blocks of multiplication practice and then two blocks of the addition counterparts and control additions. Slowing of RT occurred only for small additions (sum ≤10) in the first block and did not differ across groups. These effects were related to self-reported use of direct memory retrieval, confirming that multiplication practice can induce temporary retrieval-induced forgetting of addition counterparts.

[T-14-5] Analytic Cognitive Style Predicts Religious Belief

Gordon Pennycook, James Allan Cheyne, Paul Seli, Derek Koehler, Jonathan Fugelsang; University of Waterloo

An analytic cognitive style denotes a propensity to set aside highly salient intuitions when engaging in problem solving. We assess the hypothesis that an analytic cognitive style is associated with a history of questioning, altering, and rejecting religious claims. In three studies, we examined associations of conventional religious beliefs (heaven, miracles, etc.) with performance measures of cognitive ability and analytic cognitive style. In all studies, analytic cognitive style negatively predicted religious beliefs when controlling for cognitive ability, religious engagement, sex, age, political ideology, and education. Participants more willing to engage in analytic reasoning were less likely to endorse religious beliefs.

INDEX OF AUTHORS

Restaurants (Downtown)

Name	Type	Location	Phone
Megalos	American	226 Princess St.	613-531-9788
Amadeus Café	Bavarian	170 Princess St.	613-546-7468
Phnom Penh	Cambodian & Thai	335 King St. E	613-545-2607
Cambodiana	Cambodian & Thai	161 Brock St.	613-531-0888
Windmills Café	Casual Fine Dining	184 Princess St.	613-544-3948
The Keg	Casual Fine Dining	300 King St. E	613-549-1333
Milestones	Casual Fine Dining	27 Princess St.	613-544-8338
Tango	Casual Fine Dining	331 King St. E	613-531-0800
Chez Piggy	Fine Dining	68 R Princess St.	613-549-7673
Aroma	Fine Dining	248 Ontario St.	613-541-0330
Chien Noir	French	69 Brock St.	613-549-5635
Harper's Burger Bar	Gourmet Burgers	93 Princess St.	613-507-3663
Woodenheads	Gourmet Pizza	192 Ontario St.	613-549-1812
Grizzly Grill	Grillhouse	395 Princess St.	613-544-7566
Curry Original	Indian	253 A Ontario St.	613-531-9376
Franki Pesto's	Italian	167 Ontario St.	613-542-1071
Casa Domenica	Italian	35 Brock St.	613-542-0870
Pasta Shelf	Italian	195 Ontario St.	613-766-8122
Olivea	Italian	39 Brock St.	613-547-54836
Pilot House	Pub	265 King St. E	613-542-0222
Iron Duke on Wellington	Pub	207 Wellington St.	613-542-4244
The Grad Club	Pub	163 Barrie St.	613-546-3427
Kingston Brewing Company	Pub + Microbrew	34 Clarence St.	613-542-4978
Aquaterra	Restaubistro	1 Johnson St.	613-549-6243
Sima Sushi	Sushi	66 Princess St.	613-542-8040