37th Banff Annual Seminar In Cognitive Science

Organized by Chris Striemer & Kyle Mathewson

Friday May 4

5:00 pm Welcome and opening remarks

Please register with Peter Dixon if you have not already done so ($85 for faculty, $40 for students and postdoctoral fellows).

5:15 pm **Signe Bray** (University of Calgary), *Reinforcement Learning in Autism Spectrum Disorder*

Autism spectrum disorder (ASD) is a complex and heterogeneous neurodevelopmental disorder diagnosed in early childhood. Children with ASD show challenges in social communication, repetitive motor behaviors and restricted, idiosyncratic interests. One approach to mitigating these challenges is through behavioral interventions that use repeated practice with reinforcement. However, several recent lines of evidence suggest that the neurocircuitry supporting the brain's ability to learn new associations may function atypically in ASD. A better understanding of how the learning brain is different in children with ASD could help to refine and improve early therapies. We have therefore undertaken a series of studies examining how youth with ASD respond to rewards and learn from feedback, and asked whether there are differences in the structure of brain regions important for learning. We find that there are subtle structural alterations in the thalamus and striatum, regions that are critical for associative learning. However, under certain conditions, namely when reinforcers are tailored to an individual's interests, behavioral and neural response to rewards is largely typical. I will discuss our findings in the context of social motivation theories of ASD, inter- and intra-individual variability and implications for therapeutic interventions.

6:30 pm Dinner break

8:00 pm Poster session (with cash bar)

9:30 pm Reception (with cash bar)

Saturday May 5

8:30 am Coffee, tea, juice, pastries

9:00 am **Jonathan Cant** (University of Toronto Scarborough), *Making a Scene: How Visual Features Contribute to Scene Representation*

It has previously been demonstrated that the scene-sensitive parahippocampal place area (PPA) is more active for judgments of the surface texture and material properties of single isolated objects, compared to judgments of object shape. On the surface, this appears inconsistent with the view that PPA is specialized for processing scenes, since the single objects were not presented in the context of a scene. However, surface texture (and the material-properties signaled by texture) is important in scene processing as it can be used to aid in image segmentation, can contribute to the recognition of scene identity, and can provide affordance-related cues relevant for navigation. Thus, the finding that attending to object texture and material activates PPA may be better interpreted

as evidence that PPA utilizes multiple visual features, in addition to its well-known role in processing global spatial features such as structural geometry, when representing scenes. Building on this observation, in this talk I will present the results of several studies examining the contribution of different visual features to scene representation in human occipito-temporal cortex. Specifically, I will present results investigating: 1) whether scene-selective cortex is more sensitive to processing scene, compared with object, texture; 2) whether the processing of different scene features (i.e., scene geometry/layout and scene texture/material) is mediated by shared or distinct neuronal mechanisms in scene-selective cortex; 3) whether the importance of scene layout and scene texture varies according the type of scene category being perceived (i.e., open vs. closed scenes, and natural vs. manufactured scenes); 4) how task context influences the representation of scenes in occipito-temporal cortex; and 5) the relation between object-ensemble perception and texture perception in scene processing. Finally, given that we do not typically perceive scenes devoid of objects (and in turn, we do not perceive objects outside of the context of a scene), I will present some recent results investigating interactions between scene and object perception (i.e., does global/scene perception interfere with local/object perception, or vice versa?). Taken together, these results will demonstrate that multiple visual features are represented in human scene-selective cortex, and that this representation is flexible, as the importance of different scene features varies according to perceived scene category and the goals of the observer. Moreover, the finding that object-scene interactions are influenced by both global and local image features may explain how one is able to perceive both the “entire forest” and the “individual trees” from a visual scene.

10:15 am Coffee, tea, juice

10:30 am **Giuseppe Iaria** (University of Calgary), *Human Variability in Spatial Orientation and Navigation*

The ability to orient in spatial surroundings is a fundamental cognitive process for daily-life functioning. This important behaviour allows individuals to reach any given location from anywhere within the environment. Theoretically. Individuals, in fact, vary widely in their ability to become familiar with the surrounding and find their way around, with some individuals getting lost even in very familiar environments. In this lecture, I will provide evidence of some behavioural and neurological mechanisms that may explain part of the human variability in spatial orientation skills. In addition, I will present data collected in a clinical population that may be insightful for investigating the genetic factors underlying topographical orientation and navigation in humans.

11:45 pm Lunch break

1:15 pm Poster session

2:45 pm **Jason Barton** (University of British Columbia), *Object Recognition in Prosopagnosia*

Prosopagnosia is the impaired ability to recognize faces. It is considered a selective visual agnosia, yet there has been controversy for many decades about whether the recognition of non-face objects is truly spared by this condition. This is related to the debate about whether the human perceptual system has a modular organization, with cortical processes dedicated to highly specific visual processes. Several criticisms have been directed at the literature, such as

inadequate sample sizes, inadequate sampling of object types, testing stages of perception that don't match the prosopagnosic deficit, and failures to consider the effect of prior expertise and interest. We assessed a sample of twelve subjects with acquired prosopagnosia and 14 with developmental prosopagnosia. We applied two experiments. The first was a test of short-term familiarity for several object types. The second examined car expertise effects through a two-part process. In the first, expertise was indexed by verbal semantic knowledge about cars. In the second, subjects performed a test of visual car recognition. In controls, the visual score is highly correlated with the verbal score. We found that both acquired and developmental prosopagnosic subjects were impaired on non-face object recognition. Both groups recognized fewer cars than predicted from their verbal score, and increases in expertise generated only half the normal gain in visual recognition scores. Nevertheless, an item-concordance analysis continued to show expertise effects in prosopagnosic groups. We conclude that a more detailed analysis of object recognition in prosopagnosia can reveal expertise-adjusted deficits in visual performance, though expertise continues to exert an effect on their object recognition. This argues against the modular hypothesis of cortical perceptual organization, and supports an overlap of neural resources devoted to different perceptual tasks.

4:00 pm Coffee, tea, juice, cake

4:15 PM **Jacqueline Snow** (University of Nevada), *Beyond Images: An Emerging Paradigm Shift in the Study of Human Behaviour and Brain Function*

Ultimately, we aim to generalize and translate scientific knowledge to the real world, yet current knowledge of the human brain and cognition is based almost exclusively on studies of impoverished visual stimuli that have no relevance for real-world behaviour. In this talk I will present research from my lab, including evidence from behavioural, neuropsychological, fMRI, and EEG studies in humans, showing that real-world solid objects elicit differences in cognition and neural coding compared to 2-D and 3-D image displays. Throughout the talk I will describe a range of innovative techniques and apparatus we use for 'bringing the real world into cognitive neuroscience.'

5:30 pm Closing remarks

6:00 pm Adjourn

Friday Posters

1 Danielle Olafson, Ford Burles, Guiseppe Iaria, Kyle Mathewson, Claire Scavuzzo (University of Alberta), *Affect of acute exercise on spatial navigation*

2 Famira Racy, Alain Morin, Christina Duhnych (Adler University), *Preliminary validation of the general inner speech questionnaire*

3 Brian Duffels, Paul D. Siakaluk, R. Luke Harris (University of Northern British Columbia), *Neurological correlates of body-object interactions in semantic categorization*

4 Lin Wang, Weimin Mou (University of Alberta), *Effects of familiarity and room size on the interaction between geometry and feature during reorientation*

5 Erin Maxwell, Glen E. Bodner (University of Calgary), *How do eye movements affect the qualitative aspects of a memory?*

6 Paul Siakaluk, Annie Bourque, Kiran Ghag, Brian Duffels, Heath Matheson, Penny Pexman (University of Calgary), *Emotionality effects in semantic categorization*

7 Devon J. Chazan, Gabrielle Pelletier, Lauren D. Goegan, Lia M. Daniels (University of Alberta), *Teachers' confidence in the classroom related to perceived evidence strength in professional development programs*

8 Abdel Tayem, Jonathan W. P. Kuziek, Eden Redman, Jeff Murray, Jenna Reinen, Aldis Sipolins, Kyle E. Mathewson (University of Alberta), *Predicting colour memory behaviour based on evoked neural and oscillatory activity*

9 Bronte Diduck, Yvonne Wong (Concordia University), *Effects of sex and sport participation on mental rotation and mental imagery ability*

10 Gabrielle N. Pelletier, Priya Nath, Martin Mrazik (University of Alberta), *A holistic approach to recovery: An outpatient program for mild traumatic brain injury*

11 Jinous Mirzaagha (University of Lethbridge), *Why we SMARC: An investigation with musicians and non musicians through tones lacking the fundamental frequency*

12 Selina Wang, Valerie A Thompson (University of Saskatchewan), *Understanding the basis of feelings of rightness in reasoning*

13 Daniel Robles, Kyle Mathewson (University of Alberta), *Feedback error-related negativity as a control signal for the attention system*

14 Ana Sharma, Peter Dixon (University of Alberta), *Narrative temporal order judgements and distraction*

15 ShuaiNan Fang, Cathy Agyemang, Lane Liddle, Peter Dixon (University of Alberta), *How does feedback affect mind wandering during the n-back task?*

17 Angela Cullum, Cassidy Fleming, Jacqueline Cummine (University of Alberta), *An investigation of the relationship between reading and speech production in children and adolescents*

18 Kulpreet Cheema, Jacqueline Cummine (University of Alberta), *Relationship between white matter and reading acquisition, refinement and maintenance*

19 Christina Duhnych, Famira Racy, Alain Morin, James Patton, Julia Hagerty, David Gomez (Mount Royal University), *Correlations between inner speech, mind wandering, mindfulness, self-regulation, self-reflection, self-rumination, self-concept clarity, and situational self-awareness*

20 Haotong Wang, Jennifer L. Briere (University of Saskatchewan), *Socializing through the web: Does it improve wellbeing?*

21 Kaley Dallaire, Derek Phung, Cindy Santos-Ticas, Cass Foursha-Stevenson (Mount Royal University), *Syntactic awareness and language knowledge*

22 Alysha Rajaram, G. D. Splinter, J. W. P Kuziek, K. E. Mathewson (University of Alberta), *The road to mobile and affordable EEG experimentation*

23 Kevin B. McKillop, John R. Vokey (University of Lethbridge), *Response to wrist applied haptic stimuli*

24 Ryan Clancy (Mount Royal University), *Music and narration in virtual reality: Effects on anxiety and presence*

25 Daniel G. Geary, V. A. Thompson (University of Saskatchewan), *Metacognitve assessments in conditional reasoning*

26 Emiko Muraki, Alison Heard, Penny Pexman (University of Calgary), *The challenge of abstract meaning: Semantic processing of abstract verbs*

27 Jean-François Nankoo, Omar Medina, Tyler Makepeace (MacEwan University) Christopher Madan (University of Nottingham), Christopher Striemer (MacEwan University), *Cerebellar tDCS alters motion perception*

28 Brittany Angus-Cook, Brandon Craig, Nadia Botha, Christopher Striemer (MacEwan University), *Cerebellar tDCS alters the onset of inhibition of return*

Saturday Posters

29 Lauren H. Vomberg, Bryn Hughes (University of Lethbridge), *Backbeat placement affects tempo judgment*

30 Devon Currie, Glen E. Bodner (University of Calgary), *When the going gets tough, does the revelation effect get going?*

31 Jesse Ponath, Valerie Thompson (University of Saskatchewan), *The influence of pictures on feeling of rightness*

32 Yu Du, Weimin Mou, Xuehui Lei, (University of Alberta), *UP is up and north is north: Humans' 3D heading representation*

33 Alesha Reed, Jacqueline Cummine, Carol Boliek (University of Alberta), *Chest wall intermuscular coherence across the lifespan*

34 Raphaëlle Robidoux (University of Ottawa), Alexandre Lafrenière, Olivier Girard-Joyal, Eva Nadon, Sandra Lafortune (Université de Montréal), *The new ethics of cognition: A critical reflection*

35 Gagan Kailey, Cass Foursha-Stevenson (Mount Royal University), *Practical executive function advantages as a function of video game play*

36 Alison Heard, Andrea Protzner, Penny Pexman (University of Calgary), *First you see it, now you don't: Investigating the effect of task demands on semantic processing*

37 Alain Morin, Christina Duhnych, Famira Racy, James Patton, Julia Hagerty, David Gomez (Mount Royal University), *"I talk to myself about, in order to, and when": Self-reported inner speech content and functions in a university sample*

38 Jonathan Kuziek, Kyle E. Mathewson (University of Alberta), *Pull the triggers!: Creating event-related potentials using video recordings*

39 Xiaohan Bao, Glen E. Bodner (University of Calgary), *The matrix reloaded: Measuring and manipulating the stability of aesthetic judgments*

40 Anne Walley, Lyndsay Pinder, Tristan Eckersley, Rodney Schmaltz, Trevor Hamilton (MacEwan University), *Zebrafish behaviour is not altered by low-frequency sound*

41 Chelsea Ekstrand, Josh Neudorf, Layla Gould, Marla Mickleborough, Ron Borowsky (University of Saskatchewan), *Unravelling words and space: The relationships of lexical and sublexical reading with voluntary and reflexive attention*

42 Jassleen Parmar, Evelyn Field, Anthony Chaston (Mount Royal University), *Aggression and perceptions of visible minorities in light-skinned females based on avatar skin colour in virtual reality*

43 Susan Heritage, Melike Schalomon (MacEwan University), *The effects of the H1 antagonist chlorpheniramine on anxiety in zebrafish*

44 Christopher Linden, Peter Dixon (University of Alberta), *Narratorial stance can influence the contradiction effect*

45 Craig St. Jean, Jacqueline Cummine, Bill Hodgetts, Miya Villarena, (University of Alberta), *The effects of transcranial direct current stimulation (tDCS) on word-reading performance in healthy and impaired adult readers*

46 Layla Gould, Justin Andrushko, Doug Renshaw, Ron Borowsky, Jonathan Farthing (University of Saskatchewan), *Test-retest reproducibility of functional MRI motor cortex activation in a hand grip contraction paradigm*

47 Robert L. Whitwell, James T. Enns (University of British Columbia), *Freely made touchpoints by patients with visual form agnosia and cortical blindness reveal shape sensitivity in the dorsal stream*

48 Stanislau Hrybouski, Melanie MacGillivray, Yushan Huang (University of Alberta), Christopher R. Madan (University of Nottingham), Rawle Carter, Peter Seres, Nikolai Malykhin (University of Alberta), *Involvement of hippocampal subfields and anteroposterior subregions in encoding and retrieval of item, spatial, and associative memories: Longitudinal versus transverse axis*

49 Graham McKenzie, Mitchell Harris, Fangfang Li (University of Lethbridge), *The effect of speaker sex on stop consonant production in English-speaking children and adolescents*

50 Taylor Blanchette, Glen E. Bodner (University of Calgary), *Have you seen this film detail before? Accuracy feedback boosts remembering*

51 Carly P. King, Nitasha R. Salim, James C. Mills, Valerie A. Thompson (University of Saskatchewan), *Judgments of solvability in unsolvable anagram problems*

52 Eden Redman, Jonathan W. P. Kuziek, Abdel R. Tayem, Jeff Murray, Jenna Reinen, Aldis Sipolins, Kyle E. Mathewson (University of Alberta), *Real brains in virtual environments: An investigation of attention in depth using a novel depth oddball task*

53 Xuehui Lei, Weimin Mou (University of Alberta), *Local and global sensorimotor interferences in perspective taking based on multiscale mental maps*

54 Josh Neudorf, Chelsea Ekstrand, Shaylyn Kress, Alexandra Neufeldt, Ron Borowsky (University of Saskatchewan), *Semantic priming of lexical decision by visual processing stream: Exploring semantic engagement through manipulation of foils*

55 Reyhaneh Bakhtiari, Michelle Ehmig, Stephen Langor, Joanna Scanlon, Aaron Granley, Anthony Singhal (University of Alberta), *Investigating driving performance of older adults with mild cognitive impairment*

56 Joanna Scanlon, Eden Redman, Jonathan Kuziek, Kyle Mathewson (University of Alberta), *A ride in the park: Cycling in different outdoor environments affects the auditory N1*

57 Ian Newman, Valerie Thompson (University of Saskatchewan), *Judgments of problem solvability during a water jug task*

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Notes