

# 25th Annual Joseph R. Royce Research Conference

Department of Psychology  
University of Alberta

March 18, 2011

Keynote Address by

Paul W. Frankland, Canada Research Chair in Cognitive  
Neurobiology, Hospital for Sick Children Research  
Institute

Invited Presentations by

Jeff Schimel, University of Alberta

and

Chris Westbury, University of Alberta

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## Program in Brief

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8:30 Coffee

### 8:45-9:45 Session 1 (BioSci P226)

*Moderator: C. Shaoul*

8:45 Exploring math abilities in children with autism spectrum disorder (ASD)  
*C. Piatt, J. Volden, & J. Bisanz (University of Alberta)*

9:00 Learning from diversity: Lessons in mathematical equivalence from around the globe and within the classroom  
*R. Watchorn, J. Avis, & J. Bisanz (University of Alberta)*

9:15 Neural correlates of response inhibition in preschool children: An erp study  
*S. Lebeuf, M. Khoei, K. West, D. San Martin-Feeney, C. Mah, & S. Wiebe (University of Alberta)*

9:30 Who sleeps best? Trajectories and covariates of change in sleep quantity and quality across four years of university  
*N. Galambos, D. I. Vargas Lascano (University of Alberta), A. Howard (University of North Carolina at Chapel Hill), & J. Maggs (Pensylvania State University)*

9:45 Coffee

### 10:00-10:20 Invited Presentation (BioSci P226)

The facilitating and inhibiting effects of death thoughts on reading comprehension  
*Jeff Schimmel*

### 10:20-11:20 Session 2 (BioSci P226)

*Moderator: C. Lam*

10:20 The temporal relationship between referential gestures and speech in monolingual and bilingual speakers  
*M. Graziano, E. Nicoladis, & P. Marentette (University of Alberta)*

10:35 Value drives items down two memory lanes: Reward separately enhances implicit and explicit memory  
*C. R. Madan, E. Fujiwara, & J. B. Caplan (University of Alberta)*

10:50 Pigeons (*Columba livia*) encode wall length and angle amplitude in an open field geometry task  
*D. Lubyk & M. Spetch (University of Alberta)*

11:05 Modules, maps, and the robots that shun them: A behaviour-based model of navigation  
*B. Dupuis & M. R. W. Dawson (University of Alberta)*

### 11:30-1:00 Lunch and Posters (BioSci Lobby)

**1:00-1:20 Invited Presentation (BioSci P226)**

Idiom literality judgments in younger and older adults: Testing the inhibition deficit hypothesis  
*Chris Westbury*

**1:20-2:05 Session 3 (BioSci P226)**

*Moderator: J. Chen*

1:20 Autobiographical memory under siege: Investigating the organization and distribution of autobiographical memory in older Bosnians  
*C. Svob & N. R. Brown (University of Alberta)*

1:35 Availability of constituents' conceptual representations during the processing of opaque and transparent compound words  
*K. A. Marchak, C. L. Gagné, & T. L. Spalding (University of Alberta)*

1:50 Info Lit v. 2.0: Providing psychology students with foundations for academic searching, reading, and writing  
*L. K. McCoy, A. L. Schwanke, & C. K. Varnhagen (University of Alberta)*

2:05 Coffee

**2:20-3:20 Session 4 (BioSci P226)**

*Moderator: M. Yeung*

2:20 Therapeutic hypothermia influences cell genesis and survival in the rat hippocampus following global ischemia  
*G. Silasi & F. Colbourne (University of Alberta)*

2:35 Thrombin and iron, components of intracerebral hemorrhage, cause striatal neurons to atrophy  
*J. Caliperumal & F. Colbourne (University of Alberta)*

2:50 The ladies look left: Investigating lateralized behaviour in convict cichlids in a social environment  
*M. K. Moscicki, A. R. Reddon, & P. L. Hurd (University of Alberta)*

3:05 Octave generalization in humans: Designing a task for comparative study with animals  
*M. Hoesechele (University of Alberta), R. G. Weisman (Queen's University), & C. B. Sturdy (University of Alberta)*

**3:30 Keynote Address (BSM 1-49)**

The network organization of recent and remote memory  
*Paul W. Frankland (Hospital for Sick Children Research Institute)*

**Conference Organizing Committee**

Peter Dixon (Chair)  
Clayton Dickson  
Sandra Wiebe  
Jiawen Chen  
Michelle Yeung  
Kerrie Johnston

The Royce Conference thanks the Faculty of Arts, the Faculty of Science, and the Office of the Vice President, Research for their generous support.

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## Session 1 (BioSci P226)

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### 8:45 **Exploring math abilities in children with autism spectrum disorder (ASD)**

*C. Piatt, J. Volden, & J. Bisanz (University of Alberta)*

Documenting children's knowledge, skills, and strategies in math provides insights not only into how children think mathematically, but also into the organization, coordination, and development of children's cognition more generally (Bisanz et al., 2005; Pressley & Hilden, 2006). Typically children generate and use a variety of strategies as they learn math concepts. The ability to generate multiple strategies allows children to discover new, more efficient strategies (Shrager & Siegler, 1998). Whether children with ASD show the same patterns of strategy discovery and use as they learn is unknown.

Performance, strategy use, and strategy generation were examined in six males and one female with high functioning autism, ages 6 to 13. Each child completed a variety of math tasks including multiple measures of counting, estimation, arithmetic, and problem solving. Three findings emerged. First, substantial variability in performance across tasks was observed within children. Second, like typical children, children with ASD generated and used multiple strategies when solving math problems. Third, children with ASD may not use strategies as adaptively as typical children. Siegler's (2005) model of typical learning will be used to guide a discussion of how children with ASD may learn math, and how they may learn more generally.

### 9:00 **Learning from diversity: Lessons in mathematical equivalence from around the globe and within the classroom**

*R. Watchorn, J. Avis, & J. Bisanz (University of Alberta)*

An important hurdle in the development of mathematical skill is mastering algebra, a gatekeeper to higher math. Understanding symbols such as the equal sign is essential for solving basic algebraic equations. The majority of American and Canadian children, however, interpret the equal sign as meaning, "put the total next" instead of expressing the equality between both sides of the equation. Performance on equivalence problems (e.g.,  $2 + 4 = 3 + \underline{\quad}$ ) reflects this misunderstanding. In Study 1, we found that Taiwanese children were far more likely than Canadian children to solve equivalence problems correctly, indicating that poor performance on these problems is not a universal pattern in mathematical learning. One hypothesis is that performance on equivalence problems is greatly facilitated by exposure to "non-canonical" arithmetic problems (e.g.,  $2 + 4 = 1 + 5$ ). In Study 2, we found each of four Taiwanese and none of the Canadian math texts included non-canonical arithmetic problems. In Study 3, Canadian students in Grades 1 and 2 who were exposed to non-canonical problems in five monthly instructional sessions outperformed their peers on equivalence problems. These results imply that exposure to non-canonical problems may be important for understanding the equal sign.

### 9:15 **Neural correlates of response inhibition in preschool children: An ERP study**

*S. Lebeuf, M. Khoei, K. West, D. San Martin-Feeney, C. Mah, & S. Wiebe (University of Alberta)*

Response inhibition, a component of executive function, is the ability to withhold a prepotent response. To investigate the development of response inhibition over the preschool years, we used Event-Related Potentials (ERPs) in conjunction with an age-appropriate Go/NoGo task. The task was manipulated to include two levels of difficulty to examine whether difficulty of discrimination modulated neural recruitment. Preliminary analyses included 31 3- to 6-year-old children.

We analyzed two ERP components associated with inhibition in adults, the N2 and P3, and compared grand average amplitudes across age groups (younger vs. older preschoolers), trial types (Go vs. NoGo), and conditions (easy vs. difficult). There were no trial-type differences across age groups for the N2 component, but P3 NoGo amplitude was enhanced relative to the Go condition for all ages. Furthermore, both N2 and P3 amplitudes increased for the more difficult condition relative to the easy condition in younger preschoolers.

This suggests that increasing the difficulty of stimulus discrimination increased the level of neural recruitment required in the early preschool years. Overall findings suggest that there are changes in the neural correlates of response inhibition over the preschool years.

**9:30 Who sleeps best? Trajectories and covariates of change in sleep quantity and quality across four years of university**

*N. Galambos, D. I. Vargas Lascano (University of Alberta), A. Howard (University of North Carolina at Chapel Hill), & J. Maggs (Pennsylvania State University)*

This study modeled trajectories of change in sleep quantity (duration) and quality (disturbances) and their covariations with living arrangements, stress, social support, and academic performance across four years of university in 186 Canadian students. On average, women slept longer as they moved through university while men slept less. Year-to-year, students reported sleeping fewer hours during times of higher stress and lower social support. Women reported sleeping longer hours while living with parents whereas men reported sleeping longer hours while living away. Students reported more sleep disturbances during times of higher stress and while living away from parents. Sleep quantity and quality were unrelated to academic performance. Possible mechanisms for the observed patterns and conditions for optimal student sleep are discussed.

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**Invited Presentation (BioSci P226)**

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**10:00 The facilitating and inhibiting effects of death thoughts on reading comprehension**

*Jeff Schimmel (University of Alberta)*

Over the last few decades a large body of empirical work based on terror management theory (TMT; Greenberg, Solomon & Pyszczynski, 1986) has shown that brief reminders of personal mortality cause individuals to embrace people and ideas that support their cultural worldview (CWV) and disparage people and ideas that oppose it (see Burke, Martens & Faucher, 2010 for a review). Because mortality salience (MS) activates these defensive concerns, it follows that MS should also enhance (vs. inhibit) people's ability to read and comprehend information that supports (vs. opposes) their CWV. Three studies investigated this hypothesis. Study 1 showed that MS (vs. control) increased reading comprehension of a pro-evolution essay among participants with a pro-evolution worldview, but decreased reading comprehension among pro-creation participants. Study 2 replicated this effect among pro-evolution participants, but only when the source of the information in the essay was perceived as credible. Study 3 conceptually replicated the results of Study 1 using a pro-creation essay.

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## Session 2 (BioSci P226)

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### **10:20 The temporal relationship between referential gestures and speech in monolingual and bilingual speakers**

*M. Graziano, E. Nicoladis, & P. Marentette (University of Alberta)*

Speech is often accompanied by gestures. There is a general agreement on the semantic and the temporal coordination between speech and gesture, yet a close analysis of their temporal alignment is crucial for theorising about the relationship between the two modalities. This study aims at examining the temporal relationship between gestures and speech in monolingual and bilingual speakers. Specifically, we test whether the two language groups show differences in the temporal alignment and whether the distribution of the timing of gestures relative to words is normally distributed. The analyses draw on gestures produced during narratives by 10 English-French bilinguals, 10 English monolinguals and 7 French monolinguals. Results reveal that bilinguals and monolinguals show a similar temporal pattern between gestures and co-semantic speech. In both language groups, synchronous gestures are significantly more frequent than asynchronous ones; moreover, asynchronous gestures both preceded and followed the correlated speech, yet the preceding ones tend to occur more often. A qualitative analysis was also conducted, revealing that both following and preceding gestures may serve a rhetoric function. The findings are discussed in light of the theoretical debate about the nature and the locus of the connection between speech and gesture.

### **10:35 Value drives items down two memory lanes: Reward separately enhances implicit and explicit memory**

*C. R. Madan, E. Fujiwara, & J. B. Caplan (University of Alberta)*

It should be advantageous to remember high-value items better than low-value items, but very little research has tested this hypothesis. Our participants learned reward values for words in a value-training task. Critically, memory encoding of the words themselves was incidental; after training, we tested participants for their memory for the trained words, with an implicit (lexical decision) and an explicit (free recall) test, both unrewarded. Memory for high-value words was better than memory for low-value words on both tests. Implicit and explicit value-dependent memory enhancements were negatively correlated, suggesting the presence of at least two parallel mechanisms whereby value can enhance memory.

### **10:50 Pigeons (*Columba livia*) encode wall length and angle amplitude in an open field geometry task**

*D. Lubyk & M. Spetch (University of Alberta)*

Pigeons were trained to locate food in two geometrically equivalent corners of a parallelogram-shaped arena. Both the angular amplitude of the corners as well as the length of the walls alone were sufficient for successfully completing the task. Following training, birds were tested in three separate conditions that manipulated the geometric information available for navigation. During tests in both a rectangular-shaped arena that preserved the wall length information but not the angular amplitude, and a rhombus-shaped arena that did the opposite, pigeons were still able to locate their goal corners, indicating an ability to use both types of geometric information in isolation. However, on a conflict test in a mirror parallelogram-shaped arena, in which the correct angular location was paired with an incorrect wall length location, birds showed a preference to the correct angular location. This suggests that angles may be weighted more heavily than wall lengths in this type of navigation task, which differs slightly from findings in a similar task conducted with the domestic chick.

## 11:05 **Modules, maps, and the robots that shun them: A behaviour-based model of navigation**

*B. Dupuis & M. R. W. Dawson (University of Alberta)*

The ability to navigate around in the world is fundamental to nearly every mobile creature. The challenge with investigating the mechanisms behind this ability lies with the difficulty in understanding the agents of interest: a brain is in many respects too complex to completely explain. This difficulty can be mitigated somewhat through the use of models, constructed to follow known processes and tested against empirical data. Most current models of navigation and reorientation are exclusively representational and place great emphasis on abstract concepts such as cognitive modules, mental maps and choice rules. We propose an alternative model that focuses instead on the role of behaviour and the environment - with no 'representation' present beyond immediately available stimuli. We explore this model through a behaviour-based robot, capable of reproducing many signature reorientation results, and posit that this method of modeling can prove fruitful in further developing existing theories of behaviour.

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### Posters (BioSci Lobby)

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## 1 **Longitudinal associations between parent involvement in school, child school engagement, and literacy during middle childhood**

*A. Chakawa & W. L. G. Hoglund (University of Alberta)*

Research indicates that parent involvement in school (e.g., communication with teachers, participation in school activities) contributes to changes in children's literacy skills over time (Dearing, Kreider, Simpkins & Weiss, 2006). However, the mechanism by which parent involvement relates to children's literacy is not well established. Parent involvement may promote children's emotional (e.g., feelings about school) and behavioural (e.g., participation in classroom activities) engagement in school (Hughes & Kwok, 2007). In turn, children's school engagement may contribute to gains in their literacy (Ladd & Dinella, 2009). We examine whether parent involvement in school contributes to changes in children's school engagement and literacy skills over six-months and whether school engagement mediates the association between parent involvement and children's literacy skills. Participants included 461 low-income, ethnically diverse children in grades K-3 classrooms in 10 high needs schools. Data were collected in January, March and June of 2010. Parent involvement was measured using parent-reports (CPPRG, 1999). School engagement was assessed from child-reports (Furrer & Skinner, 2003). Literacy skills were measured using standardized assessments (Kaufman & Kaufman, 2004). Findings from this research will contribute to understanding of the mechanisms by which parent involvement in school may relate to children's literacy skills over time.

## 2 **Allelic distributions of APOE, BDNF, and COMT: Toward neurogenetic analyses of healthy aging, mild cognitive impairment, and Alzheimer's disease**

*B. P. Whitehead, D. Vergote, G. P. McFall (University of Alberta), S. W. S. MacDonald (University of Victoria), R. Camicioli, K. Lechelt, J. Jhamandas, D. Westaway, & R. A. Dixon (University of Alberta)*

Introduction: Recent research has focused on finding genetic markers that distinguish among adults who are (a) cognitively normal to elite, (b) classified with mild cognitive impairment (MCI), or (c) clinically diagnosed with Alzheimer's disease (AD). Three genetic loci have been identified as promising biomarkers influencing clinical and cognitive status with aging: Apolipoprotein (APOE), Brain Derived Neurotrophic Factor (BDNF), and Catechol-O-Methyl Transferase (COMT).

Objectives: We collect biosamples from healthy aging, normal aging, and MCI participants (n = 700; ages 58-100) and early AD patients (n~100; ages 55-85). Future analyses will determine associations among individual genetic markers, genetic burden, neurocognitive performance, and clinical status.

Methods and Materials: Saliva samples are collected and a neurocognitive battery is administered by researchers in the Victoria Longitudinal Study (VLS; Edmonton and Victoria). Participants with AD are diagnosed by Glenrose Hospital collaborators. DNA extraction and genotyping occurs at the Alberta Centre for Prions and Protein Folding Diseases. Data compilation occurs at the VLS lab.

Results and Discussion: This interdisciplinary project will clarify the contributions and interactions among (a) both specific genetic loci and their interactions, and (b) healthy aging, normal aging, MCI, and AD.

Conclusion: Increasingly, researchers explore the impact of genetic and environmental factors that differentiate trajectories and transitions associated with aging and neurodegenerative disease.

### **3 The role of emotional distractions on simulated driving performance**

*M. Chan, N. V. Lubemsky, & A. B. Singhal (University of Alberta)*

Driver distraction is estimated to be one of the leading causes of motor accidents. To date, the majority of studies have examined driver distraction from cell phone conversations, secondary tasks, such as adjusting in-vehicle controls, and roadside advertisements. However, little is known about the role of emotional distractions on driving, despite evidence that attention is highly biased towards emotional stimuli. In the first experiment, a driving simulator was employed to measure real-time driving performance in the presence of neutral and emotional content on roadside billboards. Our results demonstrate that a) negative stimuli decreased driving performance and positive stimuli improved driving performance relative to baseline, b) response times to targets were faster during sessions with emotional stimuli compared to neutral, and c) more emotional stimuli were recalled compared to neutral. These results suggest that positive and negative emotions may differentially affect driving behaviour, perhaps via an arousal mechanism. In the second experiment, electroencephalography (EEG) was collected to determine whether emotion related brainwaves are affected by an increase in emotional load during driving. Preliminary data from this experiment will also be presented and discussed.

### **4 Who goes? Parental influence on Canadian youth participation in postsecondary education**

*J. Chen & L. Strohschein (University of Alberta)*

My study investigates the effect of parental influence on youth participation in postsecondary education in Canada. Literature shows that factors including parental expectations and involvement in education, parents' educational attainment, and socioeconomic status are associated with child's advancement into postsecondary education. My project expands on prior research by integrating a longitudinal perspective, using data collected at three time points (age 10-11, 14-15, and 18-19), to examine the long-term effect of parental influence on who goes to college/university. Parental influence is assessed as parents' academic beliefs and school involvement, quality of the parent-child relationship, parents' educational attainment, and parents' working status and income. I'm particularly interested in change and interaction among these influences over time, and their effects on university and college enrollment, controlling for the effects of school environment and academic ability. Data come from the National Longitudinal Survey of Children and Youth (NLSCY), conducted biennially by Statistics Canada, with the sample restricted to approximately 2000 children who were 10 to 11

years of age at initial interview (and 18 to 19 at last interview). I use logistic regression methods to learn how parental influence predicts youth participation in postsecondary education.

## **5 Shared belief of social support seeking in friendships: Situation sampling in Canada and Japan**

*K. Ito, T. Masuda, K. Hioki, & A. Komiya (University of Alberta)*

Past research in cultural psychology suggests that culturally specific norms or expectations of interpersonal relationships influence people's social support seeking behaviours (Kim, Sherman, & Taylor, 2008). To further scrutinize expectations of interpersonal relationships across cultures, we investigated social support in close same-sex friendships. In particular, Canadian and Japanese participants listed favors they have actually asked of their close same-sex friends. For each favor, the participants rated (1) trouble they have caused to their friends and (2) change in the level of intimacy in their friendships as a result of asking the favor. The results of Canadian participants showed that the level of intimacy in their friendships increased as close friends granted more troublesome favors. However, Japanese participants reported that, even when their close friends granted troublesome favors, the intimacy in their friendship decreased. We also analyzed the contents of favor by categorizing them into four types: instrumental support, emotional support, informational support, and shared activity. The results showed that the Canadian reported higher proportion of instrumental support than the Japanese though both groups reported instrumental supports most frequently. In contrast, the Japanese reported higher proportion of emotional support, informational support, and shared activity than did Canadians.

## **6 Event-related potential (ERP) activation during recognition of visual images: Investigating the underlying processes which characterize North Americans' selective attention, and its outcomes**

*T. Masuda, K. Hioki, J. Caplan (University of Alberta), K. Ito (Kobe University), S. Senzaki, K. D. Leskiw, & C. Gasior (University of Alberta)*

Previous findings in social and cultural psychology suggest that North Americans are more likely than East Asians to apply selective attention given an identifiable target in a scene (e.g. Masuda & Nisbett, 2001; 2008). To date however, the precise underlying mechanism during information processing has not been fully investigated. Thus, we conducted an ERP experiment while measuring behavioral and EEG patterns in visual perception. Participants were asked to see a variety of wild animal images with a natural scene (Phase 1), while engaging in a task which required selective attention to only the animal. Participants were then asked to engage in a recognition task (Phase 2), where they were presented with a variety of animals with either (a) original backgrounds, or (b) novel backgrounds. The results on C3 (the central area of left hemisphere) indicated that participants showed a greater negative event-related potential around 100ms and 200ms after the stimulus onset when the combination of wildlife and backgrounds are mismatched. Notably, the negative event-related potential around 100ms was larger when the target wildlife was presented with a novel background than when it was presented with its original background. The implication to cross-cultural research will be discussed

## **7 Classroom climate, normative beliefs about aggression, and peer victimization in middle childhood**

*L. C. Hoban & W. L. G. Hoglund (University of Alberta)*

Several studies have documented individual-level risk factors for peer victimization in childhood (see Rubin, Bukowski, Parker, & Bowker, 2008). Less work has examined the role of contextual processes in increasing or deflecting children's risks for peer victimization. The current study investigates how two aspects of children's classroom contexts, the emotional climate (e.g., positive, respectful relationships) and aggregate

beliefs that it is okay to aggress against someone, affect their trajectories of peer victimization over 6-months. Participants included 461 low-income, ethnically diverse children in 63 grades K-3 classrooms in 10 high needs schools. Data were collected in January, March and June of 2010. Peer relational (e.g., rumor spreading) and physical (e.g., hitting) victimization were assessed from child-reports (Crick & Grotpeter, 1996). Classroom emotional climate was assessed via structured observations (Pianta, La Paro, & Hamre, 2005). Classroom normative beliefs about aggression were assessed as the aggregate level of children's ratings of how accepting they believe their classmates are about aggression (Henry, 2008). Our findings suggest that being in more emotionally supportive classrooms may reduce children's risks for relational victimization over time whereas being in classrooms where students are more accepting of aggression may elevate children's initial risks for relational and physical victimization.

## **8 Learning from imagined experience in spatial navigation**

*M. S. Mirian (University of Alberta), E. A. Ludvig (Princeton University), & R. S. Sutton (University of Alberta)*

Many animals can quickly learn to navigate complex environments, even finding shortcuts with limited experience in the environment. Important neural substrates of this spatial navigation include the place cells in the hippocampus, which are differentially active in specific locations of an environment. These place cells also sometimes show "experience replay", where they recapitulate recent trajectories during rest periods following exposure to a spatial learning task. Inspired by this we develop a novel computational model of spatial learning. The basic idea is that animals learn the location of food through a simple associative process, both from their experience in the environment and the replayed experiences from memory. Our model suggests why these replays occur and how they make the learning process both faster and more accurate with limited experience. The model is rooted in the Dyna algorithm from reinforcement learning which allows an agent to replay its previous experiences and re-learn from them. We explore several different approaches for selecting which previous events to replay: the most surprising, the most rewarding, or as a function of recency. Through simulations, we show how our proposed model matches the patterns of replay recorded from rats' hippocampus place cells during a spatial task.

## **9 Postural effects on response time in a simulated driving experiment**

*N. V. Lubensky, M. Chan, & A. B. Singhal (University of Alberta)*

The objective of the present study was to determine if simulated driving performance differs when operated by a steering wheel, a joystick while sitting upright, or a joystick when lying down with mirror viewing as one would in an fMRI experiment. Twelve participants drove through a two-lane winding highway scenario with the driving speed set at 60 km/hr. Participants were instructed to maintain a stable position in the right lane and respond to visual targets presented in the periphery. Results showed no differences across conditions for the following performance measures: lane deviation, lane position, and response accuracy. However, response times (RT) were faster during the joystick-sitting-upright condition compared to both the steering wheel-upright and joystick-lying-down conditions. Follow-up work is required to determine if these effects are due to low level biomechanical differences associated with posture, or higher level cognitive factors. These findings are important because there has been little research to date examining the neural circuitry underlying driving behavior, and our data represent an important step in being able to address this question with fMRI.

## **10 The Method of Loci is spatial after all**

*E. L. G. Legge, B. Cheng, C. R. Madan, & J. B. Caplan (University of Alberta)*

The Method of Loci (MoL) is an ancient and well known strategy for verbal serial-order memory whereby a person imagines navigating a familiar space, placing verbal materials

as they go (Yates, 1966). One might imagine, then, that the spatial properties of the environment used would influence the efficacy of recall. Alternatively, the navigation metaphor might not affect verbal memory in any material way, but rather, serve as a hook that simply gets people to study and retrieve verbal lists better, but in the usual, non-navigational way. Our participants were briefly (5 minutes or less) familiarized with each of three environments with very different topologies: an apartment (similar to what would traditionally have been used), an open field and a radial-arm maze. Following environment training, participants were asked to apply MoL, with the just-learned environment, to five 11-word lists. Serial recall was best for the apartment environment and worst for the radial-arm maze environment, both when scoring items recalled and scoring items recalled in their correct position. This appears to be the first evidence that MoL is spatial, in that the spatial characteristics of the choice of environment has an influence on verbal serial list memory.

**11 Does cheating pay? Reexamining the evolution of deception in a conventional signaling game**

*I. M. Helgesen (University of Alberta), S. Hamblin (Université du Québec), P. L. Hurd (University of Alberta)*

The study of reliability (honesty) in communication between individuals with conflicting interests has been a major focus of game theoretical modelling in evolutionary biology. It has recently been proposed that mixed populations of honest and deceptive signallers can be evolutionarily stable in a model of conventional (minimal cost) signals of competitive ability. Evolutionary simulations have been presented to support this hypothesis. However, these results are questionable on both theoretical and methodological grounds. We have investigated these claims through the use of genetic algorithms, and found no support for the evolutionary stability of deception in this model.

**12 Emotion-attention interactions in adolescents with anxiety and depression: An ERP and fMRI investigation.**

*B. Gibson, A. T. Shafer (University of Alberta), F. Dolcos (University of Illinois Urbana-Champaign), & A. Singhal (University of Alberta)*

Understanding alterations in the neural correlates of emotion-attention interactions in adolescents with anxiety and depression is of clinical and neuropsychological interest. Emotion processing and attentional control are sub-served by two separate, but integrated networks. Emotion processing is associated with ventral structures, while attentional control is associated with dorsal structures. The attentional control network is active during goal-relevant processing, and inhibition of emotional distraction. Previous research examining emotion-attention interactions in healthy adolescents found decreases in the inhibition of emotional distraction, a pattern also identified in depressed adults. However, it remains unclear if there are alterations in neural mechanisms underlying emotion-attention interactions in adolescents suffering from affective disorders. In this study, 7 adolescent participants with depression and anxiety performed, during separate ERP and fMRI scanning sessions, visual oddball tasks containing emotional and neutral distracters. Preliminary analyses revealed activation in both emotion and attentional control networks to emotional distracters and targets, respectively. Also there were slower responses for fearful compared to sad and neutral images and this finding correlates with an enhancement of the P200 attention brainwave. Taken together this pattern of data represents a positive first step in uncovering the neural bases of mood disorders in adolescents, and the development of effective interventions.

**13 Cultural influence on visual attention and its acculturation processes during movie perception**

*S. Senzaki, T. Masuda (University of Alberta), & K. Ishii (Kobe University)*

Using eye tracking method, we found that European-Canadians fixated more on the focal objects area than did Japanese, while Japanese fixated more on the background area during movie perception. Furthermore, results with multicultural background participants (Asian-Canadians and international students in Canada) demonstrated that the patterns of eye movements tended to be influenced by both cultural dominant ways of perception.

**14 Neuroimaging of phonological and orthographic processing in children**

*Y. J. Wong, A. Singhal, & C. K. Varnhagen (University of Alberta)*

This fMRI study is a first attempt to examine the neural circuitry underlying phonological and orthographic processing in children. In adults Crosson et al. (1999) found bilateral anterior cingulate (ACC) and dorsolateral prefrontal (dlPFC) cortex activation during phonological working memory, and left dlPFC activation during orthographic working memory. Moreover, the dlPFC activation was more anterior (covering BA9) for phonological compared to orthographic working memory (which covered BA46). Since spelling is highly reliant on orthographic processing, the present study asked if children of different spelling abilities rely on the same areas shown identified by Crosson. In this study fourteen children (ages 8-13) were scanned while they completed phonological choice (paive - jaive), orthographic choice (grolf - gblof), and visual choice (knee - gnee) tasks. Each experimental task was performed in eight 20s blocks alternating with a letter choice (kxltw - &#@!) control task. Due to high intersubject variability, we selected the ACC, dlPFC (BA9 and BA46) and the hippocampus as regions of interest, and correlated the activity in each area with spelling ability. We expect that children of weaker spelling abilities may use more working memory resources, leading to fewer differences between active areas for both orthographical (BA46) and phonological (BA9) conditions.

**15 Seeing co-speech gestures with Cantonese words makes people think of verbs**

*C. Lam, E. Nicoladis, & P. Marentette (University of Alberta)*

Does seeing gestures help people learn foreign words? In Kelly et al.'s (2009) study, participants learned more Japanese verbs when the instructor defined them while making congruent gestures (CG) than when the instructor presented speech only (WO). In this study, we partially replicated Kelly et al.'s (2009) study and examined whether CG would help English monolinguals learn Cantonese verbs and nouns. There was no difference by condition on the number of Cantonese words learned. Interestingly, participants remembered significantly more verbs and fewer nouns when they were presented with CG. We also tested whether symbolic and/or movement information led to a reduced noun bias. The results showed that movement cues led to a reduced noun bias while symbolic information in another modality did not. These results raise questions about the importance of the symbolic nature of gestures in speech interpretation.

**16 Allometry of neural encoding for alarm calls: ZENK expression encodes for threat in black-capped chickadees**

*M. T. Avey, M. Hoeschele, M. K. Moscicki (University of Alberta), L. L. Bloomfield (Algoma University), & C. B. Sturdy (University of Alberta)*

Black-capped chickadees (*Poecile atricapillus*) have been shown to use a complex signaling system to indicate the threat level of predators, but where threat is encoded in the brain is unknown. We explored whether the perception of the threat of predators by vocal signals could be detected within two auditory nuclei, the caudomedial mesopallium and the caudomedial nidopallium, by the expression of the immediate early gene ZENK. We presented black-capped and mountain chickadees with mobbing calls made to predators

and the corresponding calls of the predators separately. ZENK activity increased as the threat level of the mobbing call or predator call increased and within the same threat level there was no difference in ZENK activity between mobbing calls and the corresponding predator call. We also hand-reared a small number of black-capped chickadees with other chickadees but who had no experience with predators. We found no correspondence of ZENK activity between mobbing calls and predator calls within the same threat level and found that predator calls induced no more activity than control calls indicating that threat is learned.

**17 Teacher burnout, social support, pedagogy, and classroom climate**

*K. Klingle and W. Hoglund (University of Alberta)*

Teachers' feelings of job-related burnout, perceived support from colleagues, their pedagogical practices, and the quality of the classroom climate can each contribute to the quality of schooling children experience (e.g., NICHD ECCRN, 2003, 2005; Hamre & Pianta, 2005). The extent to which teachers' experiences of burnout and social support, their teaching pedagogy, and the quality of their classroom climate are interrelated is less clear. The current study examines the associations among teachers' experiences of burnout and social support, their pedagogical practices, and the observed quality of the classroom climate. We also examine whether teacher (age, years teaching), classroom (class size, grade level taught), and school (school size, high needs index) characteristics contribute to differences in teacher burnout, social support, teaching pedagogy, and classroom quality. Participants included 44 teachers of grades K-3 in 10 ethnically diverse, high needs public elementary schools. Data was collected on three occasions between January and June 2010. Data include teacher-reports of job-related burnout, perceived social support from colleagues, and pedagogical practices, and observer-reports of classroom emotional, instructional, and organizational quality. This study has implications for understanding how teachers' experiences and their pedagogy relate to the observed classroom quality.

**18 The relationship between ERPs at encoding and retrieval of memory**

*Y. Y. Chen, K. Lithgow, J. A. Hemmerich, & J. B. Caplan (University of Alberta)*

Explaining the brain-basis of memory entails understanding the relationship between memory-related event-related potentials (ERPs) at study (subsequent memory effect, SME) and at test (old/new effect, ONE). Studying SMEs and ONEs separately, previous researchers have suggested various cognitive functions of SME and ONE ERP components. For example, the Late Positive Component (LPC)-SME and the FN400-ONE have been linked to shallow levels of processing (Karis et al., 1984 Warren, 1980), whereas the slow-wave-SME and the Late-Parietal-Component-ONE have been linked to deep levels of processing. We tested the emerging hypothesis that the LPC-SME and the FN400-ONE reflect common information encoded and retrieved in memory, and likewise for the slow-wave-SME and Late-Parietal-Component-ONE, by correlating mean ERP amplitudes during a word-recognition task across 80 participants. We substituted retrieval-success (RS = hits-misses) for ONE for more behavioural relevance during retrieval stage. The Late-Parietal-Component-RS correlated positively with slow-wave-SME; yet contrary to our hypothesis, the Late-Parietal-RS also correlated significantly with the LPC-SME (Spearman's  $\rho(72)=0.267$ ,  $p<0.05$ ). This partial support and partial challenge for the emerging story suggests that relating memory ERPs to one another can inform us about their possible cognitive functions, complementing conventional approaches that manipulate them with known cognitive variables.

**19 Children's peer networks and internalizing problems in middle childhood**

*N. E. Hosan & W. L. G. Hoglund (University of Alberta)*

Sub-clinical symptoms of internalizing problems (e.g., depression and anxiety) occur in 15-20% of children (CMHS, 1998). Research has identified individual-level risks for

internalizing problems in childhood, including aggressive behaviours and negative peer experiences (Leadbeater & Hoglund, 2009). However, few studies have examined how qualities of children's peer networks influence changes in their risks for internalizing problems over time. We investigate how negative (aggression) and positive (school engagement) qualities of children's peer networks contribute to changes in their internalizing problems over 6 months. We also examine gender differences in these associations. Participants included 461 low-income, racially/ethnically diverse children in grades K-3 in 10 high-needs schools. Data were collected in January, March and May of 2010. Depression and anxiety were assessed using child-reports (Behaviour Assessment System for Children; Reynolds & Kamphaus, 2006). Peer networks were assessed by asking children to identify groups of classmates who play together (Social Cognitive Map; Cairns, Perrin, & Cairns, 1985). Peer network qualities were assessed using aggregate levels of children's self-reported aggression (Social Experiences Questionnaire; Crick, 1995) and school engagement (Furrer & Skinner, 2003). This study will add to understanding of peer group contributors of childhood depression and anxiety, particularly for low-income, racially/ethnically diverse children.

**20 The two dimensions of change: Measuring the material and psychological impact of life transitions**

*C. Svob, N. R. Brown, T. Uzer, P. J. Lee, & J. R. Reddon (University of Alberta)*

Although there is much transition research, this work is not well integrated and has not culminated in a general theory. One reason for this is the absence of a method for studying the transitional characteristics of a given event. In this paper we introduce a scale, the Transitional Impact Scale (TIS), designed to remedy this situation. Factor analysis (Principal Components; Varimax Rotation) of this scale confirmed a two-factor solution. The two-factor structure includes: (1) Material Change (e.g., "This event changed where I live"), and (2) Psychological Change (e.g., "This event changed the way I think about things"). Each factor accounted for roughly 24% of the overall variance, and the subscales derived from each factor demonstrated high internal consistency (Cronbach's alpha: .88 and .86, respectively). The instrument demonstrates that transitions can impact lives in two different ways; they can change the way that people live (i.e., they can produce material change), or they can change how people feel and what they believe (i.e. they can produce psychological change). This scale provides a new tool for studying transitional events, demonstrates the importance of material change, and suggests that material transition plays a central role in the organization of autobiographical memory.

**21 Relative order memory is accessed differently depending on instruction**

*Y. S. Liu & J. B. Caplan (University of Alberta)*

People often need to judge the relative order of a pair of experiences. We previously found that both error rates and response times to "which item came earlier" favour earlier serial positions whereas responses to "which item came later" favour later serial positions, both subspan (Chan et al., 2009) and supraspan. Here we test whether these effects can occur at retrieval by asking participants to judge relative order of pairs of letters from the alphabet. The instruction effect was found in both latency and error rate; thus, instruction can influence not only encoding, but also access processes. The generality of this congruency effect suggests that everyday judgements of order may depend on a person's orientation to the target, and demands an additional bias be added to scale-invariant, temporal-distinctiveness models of memory for order.

**22 Investigating the effect of low-level form cues on motion coherence**

*J.-F. D. Nankoo, C. R. Madan, M. L. Spetch, & D. R. Wylie (University of Alberta)*

Form and motion are thought to be processed independently at the early stages of visual processing in the brain. However, it has been shown that a sequence of independent Glass

patterns gives the perception of coherence to incoherent motion. Glass patterns are static stimuli that consist of local signals (dot pairs) that are integrated spatially to create the perception of a global form. In this study, we used Glass patterns to investigate the influence of low-level form cues on the perception of motion in humans. We identified the signal-to-noise sensitivities of different static Glass patterns and compared these to sensitivities to corresponding patterns of form-driven implied motion (i.e., dynamic Glass patterns) and optic flow patterns. This study furthers our understanding of the mechanisms involved in form and motion perception in humans.

**23 The association between teacher-student relationship quality and subtypes of peer victimization and racial/ethnic differences**

*A. Graf-Dunseith & W. Hoglund (University of Alberta)*

Some research suggests that the quality of the student-teacher relationship may affect children's risks for peer physical and relational victimization (Shin & Kim, 2008). However, little is known about how student-teacher relationship quality relates to levels of peer ethnic victimization. The present study examines the associations between student-teacher relationship quality and peer physical, relational, and ethnic victimization over 6-months. We also examine ethnic differences in the associations between student-teacher relationship quality and peer victimization. Participants included 461 low-income, ethnically diverse children in 63 grades K-3 classrooms in 10 high needs schools. Data were collected in January, March and June of 2010. Peer physical (e.g., hit, pushed, or shoved), relational (e.g., friendship withdrawal, rumour spreading) and ethnic (e.g., teased about cultural celebrations, color of skin, language spoken) victimization and student-teacher relationship quality (e.g., can talk to teacher about a problem) were assessed using child-reports (Crick & Grotpeter, 1996; Fisher et al., 2000). Child race/ethnicity was reported by parents: ethnic minority (44.4%) and Caucasian (55.6%). Our findings suggest that student-teacher relationship quality is associated with ethnic but not physical or relational victimization, with some modest differences between ethnic minority and Caucasian children.

**24 Household and school mobility, parent involvement in schooling, and adjustment problems**

*S. Richards and W. Hoglund (University of Alberta)*

Research indicates that household and school mobility can increase risks for both internalizing and externalizing problems in middle childhood (Hoglund & Leadbeater, 2004; Milan, Pinderhughes, & CPPRG, 2006). However, when parents are more supportive and encouraging in their parenting practices and maintain a high level of involvement in their child's schooling multiple household and school moves may have little influence on children's adjustment. Alternatively, when parents are less supportive and encouraging in their parenting and less involved in their child's schooling multiple moves may adversely affect children's adjustment. We examine parenting practices and parent involvement in schooling as potential moderators of the association between mobility and children's adjustment. Participants included 461 low-income, ethnically diverse children in grades K-3 in 10 high needs schools. Data were collected in January, March and April of 2010. Parents reported on household and school mobility, parenting practices (e.g., encourage child; Shelton, Frick & Wooton, 1996), involvement in schooling (e.g., attending school events; CPPRG, 2001), and children's internalizing (symptoms of depression and anxiety) and externalizing (aggressive, hyperactive behaviors) problems (Reynolds & Kamphaus, 2002). Findings from this study will contribute to understanding of under what conditions mobility may be particularly detrimental for children's adjustment in middle childhood.

**25 Neural mechanisms underlying the impact of emotion on memory: A fMRI investigation of the role of resource availability at encoding.**

*A. T. Shafer, D. LaFreniere (University of Alberta), & F. Dolcos (University of Illinois at Urbana-Champaign.)*

An important open question in the emotional literature concerns how the immediate impact of emotion and attention during perception influences delayed effects of emotion on memory. While investigations of attention and encoding (via dual task paradigms) found emotional memory to be more resilient to decreases in attention, it is unclear how manipulations in demand necessary to perform a perception task may influence the subsequent memory for task-irrelevant emotional distracters. This was the focus of the current investigation. Behavioral and Event-related fMRI data were recorded while participants performed a perception task where emotional content of task-irrelevant distracters and attentional demand of the main task were manipulated. This was followed by a surprise memory task for the task-irrelevant distracters. Preliminary analyses showed that emotional distraction was greatest when attentional demand to perform the task was low. However, emotional memory was the greatest when attentional demand to perform the task was high. These results suggest a possible dissociation of the mechanisms underlying the immediate vs. delayed effects of emotion on cognitive processes, as opposed to a direct relationship between the mechanisms involved in the initial response to emotional distraction and those involved in the long-term memory for the distracters themselves.

**26 Perceptual mechanisms involved in delayed action planning**

*G. Armstrong, S. Pollon, & A. Singhal (University of Alberta)*

Delayed action planning requires processing of stored perceptual representations. The N170 is an event-related potential (ERP) component that reflects visual perceptual processes and has a generator in the lateral occipital cortex, a brain area which is active during delayed action planning. In this ERP study, we investigated if the processes reflected by the N170 are involved in delayed action planning. Participants were first presented with a picture of a tool. After the picture was removed, participants either pantomimed using the tool (go) or did nothing (no-go). Go trials were separated into trials that were pantomimed well (good) and trials that were pantomimed poorly (bad). No differences in N170 amplitude were found between go and no-go trials; however, N170 amplitude was smaller for good go trials than bad go trials. These results suggest that the processes reflected by the N170 are not involved in delayed pantomime action planning.

**27 Predicting individual differences in narrative length among children**

*L. Smithson, L. Rützen, E. Armstrong, M. Chornell, S. Wiebe (University of Alberta)*

Narrative length is a common measure of narrative quality (Minami, 2008), and typically increases with age (Berman & Slobin, 1994). Within an age group, longer narrative length is associated with more advanced linguistic abilities and more complex narrative event packaging (Allen, 1994). In the present study, we tested two predictors of individual differences in narrative length among monolingual children: working memory and gesture use.

Preschool children between 3 and 6 years of age completed a working memory span task and, later, watched two Pink Panther cartoons and retold the stories to an examiner. During the storytelling task, their gesture production and the length of their stories (measured as the number of word tokens produced) were assessed. Iconic gestures were the only type of gesture coded. These gestures are thought to be strongly associated with speech production (Goldin-Meadow, 2003).

Preliminary results from 16 participants suggest that both working memory and the number of iconic gestures produced are significant predictors of narrative length.

Interestingly, narrative length is associated with the total number of gestures produced but not with gesture rate. These results suggest that nonverbal aspects of storytelling should be taken into account when assessing children's narrative productions.

**28 Is risky decision making driven by extreme values?**

*C. R. Madan (University of Alberta), E. A. Ludvig (Princeton University), & M. L. Spetch (University of Alberta)*

When faced with risky decisions, people tend to be risk averse for gains and risk seeking for losses (the reflection effect). Studies examining this risk-sensitive decision making, however, typically ask people directly what they would do in hypothetical choice scenarios. A recent flurry of studies have shown that when these risky decisions include rare outcomes, people make different choices for explicitly described probabilities than for experienced probabilistic outcomes. We conducted a series of three experiments examining experience-based decision making with equiprobable outcomes. Participants made choices between risky and safe options, which resulted in either gain or loss outcomes. People preferred risky gains to fixed options when that risky gain contained a locally extreme outcome, even when the expected value of the two options was the same. Similarly, people avoided risky losses to fixed options when that risky loss contained a locally extreme outcome. This patterns of results indicates that experience-based decision making may be biased by an enhanced memory for extreme outcomes. Additional mathematical modeling suggests that this pattern of behaviour follows from a utility function that exaggerates the magnitude of extreme outcomes.

**29 Mapping the development of working memory in preschool children**

*M. Khoei, S. Lebeuf, A. Gordon, R. Visscher, M. Coret, & S. A. Wiebe (University of Alberta)*

Working memory (WM) is the ability to keep information in mind and manipulate it to guide behaviour (Baddeley & Hitch, 1974). WM span is easily assessed in adults using tasks like the Digit Span, but adult tasks may be less sensitive in preschoolers, who tend to score in the lower ranges.

Our goal was to develop an age-appropriate task to precisely measure WM span in preschoolers. The Map Task – modified from Nutley et al.'s (2010) visuospatial WM task – uses a 3x3 grid where each section represents a playground activity, and utilizes sublevels of task difficulty to differentiate between spans. Children were instructed to move a "Little People" game-piece to the same series of map locations as the experimenter's game-piece, in either the same or reverse order. We also administered established WM tasks, Word Span (WS) and Delayed Alternation (DA), to examine convergent validity.

The sample included 28 2½- to 6-year-old children. Preliminary results show Map Task performance significantly correlated with WS and DA tasks even when age was controlled. All WM measures were positively correlated with age. Overall, the Map Task is a promising measure of WM for preschoolers.

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**Invited Presentation (BioSci P226)**

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**1:00 Idiom literality judgments in younger and older adults: Testing the inhibition deficit hypothesis**

*Chris Westbury (University of Alberta)*

Idioms are phrases with figurative meanings distinct from the meanings of their component words; for example, *kick the bucket* or *spill the beans*. Idioms differ from each

other on several dimensions. We focus on their *semantic decomposability*, the extent to which an idiom's component words share meaning with its figurative interpretation. We investigated the role of decomposability in idiom comprehension in two studies. In the first study, we compared performance on younger and older adults on an idiom judgment task, using idioms that have both a literal and a figurative meaning. We found a pattern of results that suggested that decomposability effects occur late in processing, after both meanings have been processed and one needs to be inhibited. In a follow-up study we experimentally confirmed that the age-related effects in the first study reflect a deficit in general inhibition by showing that explicit measures of inhibition predict performance on the idiom judgment task in young adults. I will briefly discuss the implications for both aging and general idiom processing.

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### Session 3 (BioSci P226)

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#### **1:20 Autobiographical memory under siege: Investigating the organization and distribution of autobiographical memory in older Bosnians**

*C. Svob & N. R. Brown (University of Alberta)*

This study examines the effect of conflict on the organization and temporal distribution of personal memories. A two-stage procedure was used. First, participants responded to cues by recalling memories. Then, they thought aloud as they dated each. Data were collected from two groups: Bosnians in the younger group were 33-45 years old during the Siege of Sarajevo; those in the older group were 47-62. Both groups produced a tri-modal set of memories, with one mode corresponding to the formative years (10- to 30-years of age), one to the war years (1992-1995), and one to the recent past (approximately, the past five years). Distance between modes was greater for the older group. In addition, participants almost always referenced the war when dating events from the 1990's, indicating that it played an important organizational role. More generally, it appears that autobiographical periods are spawned by major transitional events and that this is true regardless of whether the transitions are personal and normative or unexpected and collective.

#### **1:35 Availability of constituents' conceptual representations during the processing of opaque and transparent compound words**

*K. A. Marchak, C. L. Gagné, & T. L. Spalding (University of Alberta)*

Compound words (e.g., snowball) are decomposed into their constituents (e.g., snow and ball) at the lexical level (Libben et al., 2003; Zwitserlood, 1994). However, conceptual representations of opaque compounds (e.g., hogwash, whose meaning "nonsense" is unrelated to the meaning of its constituents) appear not to be activated (Sandra, 1990; Zwitserlood, 1994). As an alternative interpretation of this data, we propose that the representations are activated, but then suppressed due to a conflict between the constructed meaning and the retrieved meaning (Gagné, Spalding, & Gorrie, 2005; Ji, 2008; Libben, 2005).

To investigate whether conceptual representations are available, we conducted three semantic priming experiments using a lexical decision task. We compared reaction times to targets (e.g., colour) preceded by compound primes with a constituent that is either related (e.g., blacklist), or unrelated (e.g., sandman). Across the experiments, we manipulated whether the target was related to the first or second constituent and the kind of opaque and transparent compounds used as primes. Participants were faster to respond to the target after a related prime, however this effect was mediated by the

transparency of the second constituent. These results suggest that the conceptual representations of the constituents of opaque compounds are available during processing.

**1:50 Info Lit v. 2.0: Providing psychology students with foundations for academic searching, reading, and writing**

*L. K. McCoy, A. L. Schwanke, & C. K. Varnhagen (University of Alberta)*

Information literacy, as defined by the Association of College and Research Libraries (ACRL), is the ability to recognize when information is needed and to have the ability to locate, evaluate and effectively use that information. In 2003, the Department of Psychology at the University of Alberta integrated an information literacy component into introductory psychology courses. The program was aimed at teaching information search techniques, developing critical appraisal skills and incorporating information into academic writing according to APA stylistic recommendations. However, as computer technology progressed so did students' internet searching abilities and subsequently, wide scale revisions were necessary to maintain the perceived relevance of the information literacy component. With the ACRL Information Literacy Competency Standards for Higher Education serving as a framework, new information literacy online tutorials were generated and piloted in 2010 and implemented in the Winter 2011 semester. The aim of the revised tutorials is to impart the importance of searching for comprehensive and trustworthy information, reading critically and citing information correctly; these skills are relevant not only for first year psychology courses but throughout the entirety of students' academic career.

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**Session 4 (BioSci P226)**

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**2:20 Therapeutic hypothermia influences cell genesis and survival in the rat hippocampus following global ischemia**

*G. Silasi & F. Colbourne (University of Alberta)*

Delayed hypothermia salvages CA1 neurons from global ischemic injury. However, the effects of this potent neuroprotectant on endogenous repair mechanisms, such as neurogenesis, have not been clearly examined. In this study, we quantified and phenotyped newly generated cells within the hippocampus following untreated and hypothermia-treated ischemia. We first show that CA1 pyramidal neurons did not spontaneously regenerate after ischemia. We then compared the level of neuroprotection when hypothermia was initiated either during or after ischemia. Treatment efficacy decreased with longer delays, but hypothermia delayed for up to 12 hr was neuroprotective. Although BrdU incorporation was elevated in ischemic groups, CA1 neurogenesis did not occur as the BrdU label did not co-localize with NeuN in any of the groups. Instead, the majority of BrdU labeled cells were Iba positive microglia, and neuroprotective hypothermia decreased the delayed generation of microglia during the third postischemic week. Conversely, hypothermia delayed for 12 hr significantly increased the survival of newly generated dentate granule cells at 4 weeks postischemia. Thus, our findings demonstrate that CA1 neurogenesis does not contribute to hypothermic neuroprotection. Importantly, we also show that prolonged hypothermia positively interacts with postischemic repair processes, such as neurogenesis, resulting in improved functional outcome.

**2:35 Thrombin and iron, components of intracerebral hemorrhage, cause striatal neurons to atrophy**

*J. Caliperumal & F. Colbourne (University of Alberta)*

Intracerebral hemorrhage (ICH) is one of the devastating types of stroke, which leads to high mortality and significant morbidity in survivors. ICH is caused by rupture of blood vessel inside the brain. Bleeding causes brain injury by mechanical trauma (blood dissecting through tissue and cerebral edema) along with secondary damage (e.g. Iron released from degrading erythrocytes). Thrombin production, an essential step in clot formation, may also be harmful, as it is known to cause cerebral edema and cell death. In this study, we wanted to look at various blood components like thrombin and iron and see their effects in striatal neurons morphology, whether they are affecting the neuronal architecture in the peri-infarct region. We used Golgi-Cox staining to trace the neuronal shape. Our results from this study suggests that iron or thrombin induced lesions cause marked dendritic atrophy of peri-hematoma neurons likely slows behavioral recovery after ICH.

**2:50 The ladies look left: Investigating lateralized behaviour in convict cichlids in a social environment**

*M. K. Moscicki, A. R. Reddon, & P. L. Hurd (University of Alberta)*

Cerebral lateralization, the partitioning of cognitive function preferentially into one hemisphere of the brain, is a trait ubiquitous among vertebrates. Some species exhibit population level lateralization, where the pattern of cerebral lateralization is the same for most members of that species; other species show only individual level lateralization, where each member of the species has a unique pattern of lateralized brain function. The pattern of cerebral lateralization within a population and an individual has been shown to differ based on the stimulus being processed. It has been hypothesized that sociality within a species, such as shoaling behaviour in fish, may have led to the development and persistence of population level lateralization. Here we assessed cerebral lateralization in convict cichlids (*Archocentrus nigrofasciatus*), a species that does not shoal as adults but that shoals briefly as juveniles. We show that both male and female convict cichlids display population level lateralization when in a solitary environment but only females show population level lateralization when in a perceived social environment. We also show that the pattern of lateralization differs between these two tasks and that strength of lateralization in one task is not predictive of strength of lateralization in the other task.

**3:05 Octave generalization in humans: Designing a task for comparative study with animals**

*M. Hoeschele (University of Alberta), R. G. Weisman (Queen's University), & C. B. Sturdy (University of Alberta)*

Octaves are intervals between two notes of the same name. The notes forming these intervals have a ratio of 1:2, in other words, an octave occurs every time frequency doubles. The use of the octave in music is a human universal found in all musical systems. Octave generalization refers to treating notes separated by an octave as perceptually similar. In some cases, humans show octave generalization readily. For example, when a child sings along with their father at a higher frequency but seemingly the same pitch, the child is showing octave generalization. This kind of pitch perception (i.e., treating notes separated by an octave as the same pitch class) is called chroma perception and has proved difficult to test in animals. In the current study, we designed an operant go/nogo task in humans that allowed us to show octave generalization without verbal instruction or musical cues. We show that this phenomenon is robust when faced with contradictory contingencies. These results both help us better understand under what circumstances octave generalization occurs in humans and gives us a new opportunity for cross-species comparative work.

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## Keynote Address (BSM 1-49)

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### **3:30 The network organization of recent and remote memory**

*Paul W. Frankland (Canada Research Chair in Cognitive Neurobiology, Hospital for Sick Children Research Institute)*

While the hippocampus may play an essential role in the expression of memories soon after encoding, expression of the same (or at least equivalent) memory may become independent of the hippocampus at later time points. One predominant view is that the transition of the memory from a hippocampus-dependent to hippocampus-independent form reflects a time-dependent process of reorganization, leading to the permanent storage of the memory in cortical networks. Our lab uses molecular, behavioral and graph theoretical approaches to understand this consolidation process, and, in my talk, I will highlight our new studies aimed at 1) identifying the broad network of cortical regions supporting remote contextual fear memories, and 2) understanding how the structure of this distributed network impacts its function.