23rd Annual Joseph R. Royce Research Conference

March 20, 2009

Keynote Address by

Marcel Kinsbourne, New School for Social Research

Invited Presentations by

Douglas R. W. Wylie, University of Alberta

and

Wendy L. G. Hoglund, University of Alberta

Program in Brief

8:30 Coffee

8:40-10:00 Session 1 (BioSci P116)

8:40 On the prevalence of direct retrieval in autobiographical memory
T. Uzer, P. J. Lee, & N. R. Brown

9:00 Performance on mathematical equivalence problems is not equivalent worldwide
R. Watchorn, M. Lai, & J. Bisanz

9:20 The SNARC effect as a tool to examine magnitude representation during cross-talk
S. Tan

9:40 Agreeing with Google: We are sensitive to the relative orthographic frequency of phrases.
C. Shaoul & C. Westbury

10:00 Coffee

10:20-10:40 Invited Presentation (BioSci P116)

"Smart birds," "little brains," and tools
Douglas R. W. Wylie (Department of Psychology, University of Alberta)

10:40-12:00 Session 2 (Biological Sciences P116)

10:40 Event-related potential reflections of attentional load on action
G. Armstrong, & A. Singhal

11:00 The relationship between growth, brain asymmetry and behavioural lateralization in a cichlid fish
A. R. Reddon, C. Gutierrez-Ibanez, D. R. Wylie & P. L. Hurd

11:20 The nose knows: Is there correspondence between breathing and slow sleep-like brain waves?
A. V. Sharma, C. Sobsey, E. A. Clement, T. Wolansky, & C. T. Dickson

11:40 Amplifiers in Communication Across Conflicting Interests
I. Helgesen & P. Hurd

12:00-1:30 Lunch and Posters (BioSci Lobby)

1:30-1:50 Invited Presentation (BioSci P116)

Classroom climate and trajectories of peer victimization and aggression in middle childhood
Wendy L. G. Hoglund (Department of Psychology, University of Alberta)

1:50-2:50 Session 3 (BioSci P116)

1:50 The conceptual integration of the levels of lifespan development theory through Polanyi's notion of emergence
R. van Gelder

2:10 A Newly Developed Instrument for Assessing Dream Remembering
C. Svob, D. Kuiken, & T. Nielsen

2:30 Role of Co-morbidities in Moderating and Mediating Cognitive Deficits Associated with Aging and Type 2 Diabetes
G. P. McFall, B. Geall, A. L. Fischer, S. Dolcos, & R A. Dixon

2:50 Coffee

3:30 Keynote Address (BioSci M145)

The joint representation of the emotions and actions in the cerebral hemispheres
Marcel Kinsbourne (New School for Social Research)

Conference Organizing Committee

Peter Dixon (Chair)
Chris Westbury
Christina Gagné
Shawn Tan
Jianhui Song

We gratefully acknowledge the support of:

Alberta Heritage Foundation for Medical Research
Faculty of Arts
Faculty of Science
Office of Vice President (Research)

Session 1 (BioSci P116)

8:40 On the Prevalence of Direct Retrieval in Autobiographical Memory
T. Uzer, P. J. Lee, & N. R. Brown (Department of Psychology, University of Alberta)

Currently accepted theory of autobiographical memory retrieval argues that retrieval is predominantly generative (Haque & Conway, 2001). Three experiments investigated the prevalence of multiple strategies (direct vs. generative retrieval) in the recollection of personal memories. In Experiment 1, participants retrieved memories to concrete nouns and emotion words while providing concurrent verbal protocols. In Experiments 2 and 3, participants were timed as they responded to the cue words; and, on each trial, they also provided a strategy report indicating whether memory retrieval was direct or generative. In all three experiments concrete and emotional cues elicited both directly retrieved and generated memories. A multiple strategies account was supported by reaction times, with direct retrievals four times faster than generative retrievals (~3s vs. ~12s). More importantly, we demonstrate that directly retrieved memories are as common, and typically more common, than generated retrievals. This argues against generation as the canonical form of retrieval for autobiographical memories. Our findings also account for the classic result that emotional memories take longer to retrieve (Robinson, 1976) since the proportion of fast directly retrieved memories is significantly greater for memories cued by concrete words than those cued by emotion terms. Theoretical implications will be discussed.

9:00 Performance on Mathematical Equivalence Problems is Not Equivalent Worldwide
R. Watchorn (Department of Psychology, University of Alberta), M. Lai (National Chiayi University), & J. Bisanz (Department of Psychology, University of Alberta)

A great majority of North American children from Grades 2-6 fail to solve equivalence problems (e.g., 2 + 4 + 5 = 3 + __) despite having the requisite addition and subtraction skills. These children typically interpret the equal sign as an operator, meaning the total goes next, as opposed to a symbol specifying the relation between two sides of an equation. Failure on equivalence problems is related to poor performance in algebra, which in turn is viewed as a gatekeeper to higher mathematics. If children elsewhere do not fail equivalence problems to the same striking degree, we could conclude that poor performance on these problems is not a universal pattern in mathematical learning but is likely the result of culturally specific instructional practices. We presented Taiwanese children (N = 104) who had recently completed Grades 1-4 with the same equivalence problems presented to Canadian students in Grades 2 and 4 (N = 199). Correct performance was much higher for Taiwanese students (means 51-86% for Grades 1-4) than for Canadian students (7% and 17% for Grades 2 and 4). Analyses of performance on other tasks confirmed that the misunderstanding that contributes to poor performance is the same in both countries, but the much lower level of performance in North American children is likely due to specific instructional practices.

9:20 The SNARC Effect as a Tool to Examine Magnitude Representation During Cross-Talk

S. Tan (Department of Psychology, University of Alberta)

The SNARC effect is a phenomenon where small numbers produce faster left hand responses and large numbers produce faster right hand responses during parity judgments. This phenomenon has been used as evidence for an automatic spatial representation of magnitude. In this experiment, I use the SNARC effect as a tool to examine the effects of cross-talk using a Psychological Refractory Period (PRP) paradigm. Participants performed two experimental sessions where they were presented with two numbers separated by a variable Stimulus Onset Asynchrony (SOA). In the single-task session, participants were required to ignore the first stimulus and judge the parity of the second stimulus. In the dual-task session, participants performed a magnitude judgment to the first stimulus and a parity judgment to the second stimulus. Results indicate an overall SNARC effect for parity judgments in both sessions. In addition, there was an effect of magnitude compatibility in the dual-task session. Response times were faster when magnitudes of the first and second stimuli were compatible (both were larger or smaller than 5) than when they were incompatible. Effects of magnitude compatibility were absent in the single-task session. The results suggest that subjects automatically activate representations of magnitude when numbers are required to be processed semantically. Early representations of magnitude facilitate magnitude representations for subsequent numbers even if magnitude is irrelevant to the second task.

9:40 Agreeing with Google: We are Sensitive to the Relative Orthographic Frequency of Phrases.

C. Shaoul & C. Westbury (Department of Psychology, University of Alberta)

Much has been said about the power of the orthographic frequency of words to predict many psycholinguistic phenomena. The frequency of the written word has been shown to be integral to architectures of lexical representation and lexical processing. Does this sensitivity to orthographic frequency extend beyond single words and into multi-word phrases? To answer this question, we asked participants to judge the relative frequencies of two, three, four and five word phrases. For the majority of items, participants performed at above-chance levels. We also found that for two and three word phrases, the relative orthographic frequencies taken from a one-trillion word corpus of web pages collected by Google predicted performance on a judgment task. These results imply that phrasal frequency is available to us during language comprehension.

Invited Presentation (BioSci P116)

10:20 "Smart Birds," "Little Brains," and Tools

Douglas R. W. Wylie (Department of Psychology, University of Alberta)

Tool use, once thought to be the exclusive domain of primates, is now known to occur in several species of birds. Comparative studies of the neural correlates of tool use in birds and mammals have focused on the forebrain. However, recent studies have emphasized that the cerebellum is also important for tool use. Here,

we test whether the taxonomic distribution of tool use and feeding innovations is correlated with relative cerebellar volume and degree of folding (i.e. foliation) of the cerebellar cortex. Using data for 79 avian species from 19 parvorders and infraorders and a combination of conventional and phylogenetically based statistics, we demonstrate that tool use is significantly correlated with the degree of cerebellar foliation, but not with cerebellar volume. We suggest that the evolution of tool use is at least partially dependent upon a more foliated cerebellum and that this correlation reflects cognitive, motor and/or sensory processing requirements of tool use. Our results therefore demonstrate that tool use has not only driven the evolution of the forebrain, but also the cerebellum.

Session 2 (BioSci P116)

10:40 Event-Related Potential Reflections of Attentional Load on Action
G. Armstrong (Centre for Neuroscience, University of Alberta) & A. Singhal (Department of Psychology, University of Alberta)

An important problem in cognitive neuroscience is to understand the relationship between the action system and the attention system. Previous research has shown that visually guided and memory-guided actions are under the control of dissociable neural systems. Furthermore, much research has suggested that human attention consists of distinct systems involving voluntary control mechanisms and automatic reflexive processes. Here, we used event-related brain potentials (ERPs) to investigate the nature of the relationship between these different action and attention systems in a cross-modal dual-task paradigm. The primary task was a joystick-controlled reciprocal aiming task with memory-guided and visually guided conditions performed at various difficulty levels. The secondary task was a dichotic listening task. The two tasks were performed alone, and in combination (dual-task). Movement time (MT) and accuracy data were collected from the primary task, and reaction time (RT), accuracy, and ERP data were collected from the secondary task. The main ERPs of interest were the P300 (voluntary attention waveform) and the mismatch negativity (MMN; automatic attention waveform). The results showed that primary MT slowed as a function of task difficulty, and MT was slower in memory-guided compared to visually guided aiming. MT did not differ between aiming alone and aiming in the dual-task. Secondary RT slowed in the dual-task conditions compared to dichotic listening alone, and RT was slower in memory-guided compared to visually guided conditions. Also, P300 amplitude and latency were influenced by attentional load, and P300 latencies were longer in memory-guided compared to visually guided conditions. Finally, MMN amplitude was decreased in the dual-task conditions compared to dichotic listening alone. These data suggest that: 1) visually guided actions are distinct from memory-guided actions, 2) continuous actions are insensitive to attentional load, and 3) there are stronger cross-modal links between continuous action and voluntary attention, compared to automatic attention.

11:00 The Relationship between Growth, Brain Asymmetry and Behavioural Lateralization in a Cichlid Fish

A. R. Reddon, C. Gutierrez-Ibanez, D. R. Wylie & P. L. Hurd (Department of Psychology and Centre for Neuroscience, University of Alberta)

Cerebral lateralization, the partitioning of cognitive tasks to one cerebral hemisphere, is a widespread phenomenon among vertebrates. Despite this diversity, every species studied to date shows substantial individual variation in the strength of lateralization. The neural basis of this trait is unclear, although asymmetries in cerebral structures have been investigated for over a century. The habenular nuclei, for example, have been shown to present striking neuroanatomical and/or neurochemical asymmetries in species ranging from jawless fish to mammals. In teleost fish, these nuclei are relatively symmetrical in most species. Those teleosts that do have asymmetrical habenular nuclei, show varying patterns of asymmetry in different species. Here we investigate the relationship between individual variation of asymmetry in the habenula of a South American cichlid fish, Geophagus brasiliensis, and behaviour in a commonly used test for visual laterality in fish, the detour task. We show that the strength of asymmetry in the habenula is correlated with strength of behavioural lateralization in the detour task. Both the strength and direction of habenular asymmetry are correlated with individual differences in growth rate. We suggest that this relationship results from processes linking growth rate and sexual differentiation to frequency-dependent variation in life history strategies. To our knowledge, this is the first study to demonstrate a relationship at the individual level between neural asymmetry and lateralized behaviour in a fish.

11:20 The Nose Knows: Is there Correspondence between Breathing and Slow Sleep-like Brain Waves?

A. V. Sharma, C. Sobsey, E. A. Clement, T. Wolansky, & C. T. Dickson (Department of Psychology, Department of Physiology, & Centre for Neuroscience, University of Alberta)

Brain activity during sleep is thought to play an important role in memory consolidation. The slow oscillation (SO), a $\leq$ 1Hz rhythm, is a signature of slow wave (non-REM) sleep in the forebrain and is present in both the hippocampus (HPC) and neocortex (nCTX). Its coordination is thought to be relevant to the neural processes underlying declarative memory. Previous researchers (Fontanini et al., 2003; J. Neurosci. 23: 7993) have suggested that the coordination of forebrain rhythms during anaesthesia and sleep may be driven by respiration; inspiration excites olfactory receptors which then excite downstream sensory neurons. This olfactory rhythm is then thought to entrain wider regions of the forebrain. To assess this, we anaesthetized rats with either urethane or ketamine and made intracranial EEG recordings in the HPC and nCTX while simultaneously monitoring respiration with a thermistor placed into the nostril. During urethane anaesthesia, rats showed spontaneous alternations of REM and non-REM like states, with the SO most prominent in the latter phase. The respiratory rhythm was uncorrelated with SO in both the HPC and nCTX, having a completely different peak frequency (nCTX/HPC: 1.33 $\pm$0.08 Hz; resp: 2.17 $\pm$0.15 Hz). During state transitions, slow irregular components of the EEG were only transiently coupled with respiration. During ketamine anaesthesia, frequencies of respiration and SO could be similar (nCTX: 1.59 $\pm$0.09 Hz; resp: 1.34 $\pm$0.08 Hz), but the rhythmic correlation between EEG and respiration was low. However, the correspondence of the SO across the HPC and nCTX was

high. Our results yield little support for the assertion that the SO is driven by respiration since no systematic relationship existed between them. We conclude that the results of Fontanini et al. (2003) may have been due to respiration artefacts (brain movements or referencing errors) or to frequency beating which can create false transient correlations.

11:40 Amplifiers in Communication across Conflicting Interests
I. Helgesen & P. Hurd (Department of Psychology, University of Alberta)

Signals of RHP, or competitive ability, form an important component of mate selection and competitive behaviors. Since the interests of the individuals involved are naturally in conflict, a means of maintaining honesty is required if these signals are to remain useful. Most research in this area has focused on the class of handicap signals , which require desirable signals to be costly in order to enforce honesty. However, a lesser known class of signals known as amplifiers , which work by accentuating differences between individuals, provides an alternative. These signals are inherently honest, allowing them to remain useful between individuals with conflicting interests even if signaling is cost-free. In this study, mathematical models and computer simulations are used to examine conditions required for such a signaling system to be evolutionarily viable.

Posters (BioSci Lobby)

1 Peer Ethnic, Relational, and Physical Victimization: The Role of Context and Race/Ethnicity in Adolescents' Adjustment Problems
N. Hosan, & W. Hoglund (Department of Psychology, University of Alberta)

The associations between relational and physical peer victimization and adjustment problems are well-established (Crick et al., 1999). Although researchers have examined experiences of ethnic discrimination among ethnic minority adolescents (Dubois et al., 2002), few studies have accounted for the overlap between ethnic and relational and physical victimization. Furthermore, despite increasing racial/ethnic diversity in Canadian classrooms, few researchers have examined the risks for ethnic victimization in the context of classroom racial/ethnic diversity (Graham, 2006). The current study examines the associations between ethnic, relational and physical victimization, and adjustment problems (depression/anxiety, withdrawal, and relational and physical aggression); and the moderating role of classroom racial/ethnic diversity with a sample of 337 grade six and seven students (79.9% European Canadian; 9.5% East/South Asian; 10.7% Aboriginal). We asked: Do experiences of peer victimization differ by adolescents race/ethnicity? Does ethnic victimization contribute uniquely to adjustment problems, beyond relational and physical victimization? Does classroom racial/ethnic diversity moderate the contributions of victimization and individual race/ethnicity on adjustment problems? Measures included both self-reports (victimization, depression/anxiety, relational and physical aggression) and teacher-reports (withdrawal, physical aggression). Results indicate that experiences of victimization differ by race/ethnicity. Additionally, classroom racial/ethnic diversity plays an important role in the association between adolescents experience with ethnic victimization and reported levels of

adjustment problems. For instance, adolescents who reported higher levels of ethnic victimization showed higher levels of relational aggression and lower levels of physical aggression, but only in more diverse, relative to less diverse, classrooms. This study highlights the need for examining the role of contextual var iables, such as classroom racial/ethnic diversity, on peer relationships and adjustment problems, particularly for adolescents from racial/ethnic minorities.

2 A Computational Model of Hippocampal Function in Trace Conditioning

E. A. Ludvig, R. S. Sutton, E. Verbeek, & E. J. Kehoe (Department of Computing Science, University of Alberta, and School of Psychology, University of New South Wales)

We introduce a new reinforcement-learning model for the role of the hippocampus in classical conditioning, focusing on the differences between trace and delay conditioning. In the model, all stimuli are represented both as unindividuated wholes and as a series of temporal elements with varying delays. These two stimulus representations interact, producing different patterns of learning in trace and delay conditioning. The model proposes that hippocampal lesions eliminate long-latency temporal elements, but preserve short-latency temporal elements. For trace conditioning, with no contiguity between cue and reward, these long-latency temporal elements are necessary for learning adaptively timed responses. For delay conditioning, the continued presence of the cue supports conditioned responding, and the short-latency elements suppress responding early in the cue. In accord with the empirical data, simulated hippocampal damage impairs trace conditioning, but not delay conditioning, at medium-length intervals. With longer intervals, learning is impaired in both procedures, and, with shorter intervals, in neither. In addition, the model makes novel predictions about the response topography with extended cues or post-training lesions. These results demonstrate how temporal contiguity, as in delay conditioning, changes the timing problem faced by animals, rendering it both easier and less susceptible to disruption by hippocampal lesions.

3 Effects of Instruction on Memory Judgments of Order

M. Chan, Y. Lui, B. Ross, G. Earle, & J. Caplan (Department of Psychology, University of Alberta)

Memory often requires knowledge of the order of events. Findings on short-list, immediate judgments of relative order are variable with respect whether participants search memory in the forward direction (starting from the first item in a list and progressing toward the end item) or backward direction (starting from the end of the list and progressing toward the start). We asked whether differences in instructions could be influencing participants' search direction. Participants viewed lists of 3-6 sequentially presented consonants and for each list judged a 2-item probe to determine which probe was presented earlier (Earlier instruction) or later (Later instruction) on the list. "Earlier" participants fit the forward-scanning strategy while "later" participants fit the backward-scanning strategy. Instruction did not substantially influence overall accuracy or response times. Our findings suggest that participants have multiple equivalently effective strategies for short-list judgments of order and that subtle differences in the wording of instructions can bias memory search either in the forward or backward direction. A follow-up study suggests that the effect of instruction may be more subtle for longer lists.

4 Continuity of Reflective Awareness between Dreaming and Waking Experiences

M. N. Lee & D. Kuiken (Department of Psychology, University of Alberta)

According to the continuity hypothesis, which has been consistently supported by empirical research (Domhoff, 1996), most aspects of dream content correspond with waking experiences. However, there is little empirical evidence supporting the specific hypothesis that waking reflective awareness is predictive of or continuous with dream reflective awareness. We propose that, by examining reflective awareness within different types of impactful dreams following loss and trauma, we may enhance our understanding of the self-transformative potential of dreams and their connection with waking life. We conducted a 2 (loss/trauma experiences) X 3 (timeframe: within the preceding 6 months, within the preceding 6-24 months, over 3-7 years ago) cross-sectional study to examine reflective awareness within impactful dreams and the changes in waking thoughts and feelings induced by such dreams. One-hundred and seventy-eight students who had experienced impactful dreams on a frequent and intense basis participated in this study for partial course credit. After excluding those who did not appropriately complete all research sessions and those who could not be precisely classified into one of the six research groups, 87 participants' data (63.2% female, 36.8% male, mean age = 19.85 years) were included in the subsequent analyses. The results suggested that, the experiences of loss or trauma were predictive of reflective awareness within dreams. Specifically, the ratings of depersonalization items were higher in the trauma groups than they were in the loss groups; the ratings of lucid ineffectuality were higher in the loss groups than they were in the trauma groups. Furthermore, reflective awareness during the dream was predictive of changes in waking reflective awareness, but this association varied depending upon dream type. The hypothesized continuity in reflective awareness across dreaming and waking experiences was partly supported, and the implications of this pattern for post-traumatic growth will be discussed.

5 Effect of Learning Disabilities on Instructional Technology Use

L. M. Yang (Department of Psychology, University of Alberta)

This study will examine attitudes toward instructional technology use in freshmen students with learning disabilities, specifically those that impede the acquisition and use of reading and writing (e.g., dyslexia, dysgraphia). Existing studies establish that students with such learning disabilities show higher academic anxiety and lower confidence in scholastic abilities than those without. Increased emphasis on indiscriminate instructional technology use can heighten this anxiety, as several forms of instructional technology demand highly efficient and accurate reading and writing skills, in both academic and social aspects. Such specialized considerations among students are seldom acknowledged and no measures are currently taken to reflect such usability issues into courses that rely heavily on instructional technology. The study addresses the confidence and ease with which students with learning disabilities employ the instructional technology made available to them in academic and non-academic settings.

6 The Effects of Changes in Virtual Location on the Use of Allocentric Information

R. Van Kroonenburg & D. Heth (Department of Psychology, University of Alberta)

University undergraduates estimated the distance and direction to 12 landmarks on the university campus by virtually placing themselves at a given location and facing a given direction. Two different locations were used: one at the center of the campus and one towards the periphery. Using the estimates as polar coordinates, we tested the hypothesis that landmarks close to the centre of the campus would be better located.

7 The Mathematical Principle of Inversion: How Alien Is It?

C. Piatt, A. Matejko, R. P. D. Watchorn, & J. Bisanz (Department of Psychology, University of Alberta)

The concept of inversion (a + b - b must equal a) reflects an understanding of the relation between addition and subtraction and is central to understanding arithmetic. Despite evidence for preschoolers sensitivity to the principle of inversion, many school-aged children use inversion inconsistently, and the extent to which they generalize their use of inversion has not been established. Methods of assessing inversion are often limited to problems that could be solved via covert calculation, leading to inflated estimates of inversion. To address these concerns we tested students in Grades 2 and 4 using (a) inversion problems with conventional Arabic symbols or with "Alien" symbols and (b) problem solving and evaluation tasks. Children solved inversion problems with Arabic symbols successfully regardless of grade, but performance on Alien problems was considerably worse: Using a combined criterion based on accuracy and self-report, only 3 of 20 Grade 2 children and 7 of 19 Grade 4 children showed an understanding of inversion with the Alien symbols. In the evaluation task children were asked to judge whether certain answers were correct or incorrect. At both grades performance was above chance for both Arabic and Alien symbols. Using the combined criterion, 11 of 20 Grade 2 children and 15 of 19 Grade 4 children understood inversion with Alien symbols. These results indicate that children s use of the principle of inversion varies depending on the contexts and tasks, in addition to age. Although an understanding of the inversion principle may appear by Grade 2 in the context of Arabic symbols, performance in other contexts (e.g., Alien symbols) reveals that the conceptual underpinnings of inversion are still tenuous. This context-dependent nature of conceptual understanding underscores the importance of measures and theories that are sensitive to subtle changes in mathematics and, more generally, development.

8 Generation of Subjective Age Estimates

D. Vargas, N. Galambos, & N. Brown (Department of Psychology, University of Alberta)

In exploring the multitude of changes that occur during emerging adulthood (approximately ages 17 to 27), subjective age (i.e., how old one feels) has been used to indicate self-perceptions of maturity. Research has shown that during adolescence, most individuals feel older than they actually are but at some point during emerging adulthood there is a crossover wherein most individuals start to feel younger than they actually are. The reason for this shift is unknown, but one possibility is there may be a change in the reference group to which individuals compare themselves as they move toward adulthood. However, this possibility

assumes that individuals use reference groups as a means for generating estimates for how old they feel. The present study examined how individuals generate estimates of their subjective age. Twenty participants were asked to think aloud before deciding on their subjective age. Subjective age was measured either in absolute terms (asking participants to provide a specific age that represents how old they feel) or in relative terms (asking participants to answer using a scale from "feeling younger than I am" to "feeling older than I am"). Their responses are in the process of being analyzed to (1) identify the potential sources of influence on subjective age estimates; (2) whether comparisons with reference groups are made; and (3) whether the pattern of responses is the same for absolute vs. relative estimates.

9 Beliefs about Aging and Alzheimer Disease in Three Domains

T. Rust & S. Kwong See (Department of Psychology, University of Alberta)

This study examined undergraduate students (n=117) beliefs about aging and Alzheimer disease (AD) in the cognitive, physical, and social domains. Students rated their perceptions of typical 25 year olds (young target), typical 75 year olds (old target), and typical institutionalized persons with AD (AD target) on 46 statements about cognitive, physical and social abilities. By comparing students ratings (perceptions) of the young and old targets it was found that beliefs about aging were generally negative in the cognitive and physical domains but positive in the social domain, consistent with the age stereotyping literature. Interestingly by comparing ratings of old and AD targets beliefs were found to be generally negative in the cognitive and social domains but positive in the physical domain. AD is perceived to be a disease primarily of the mind but in comparison to normal aging, physical prowess is enhanced. Being able to identify people s beliefs is necessary to be able to alter people's behaviors toward and expectations of older adults and persons with AD which could in turn have significant effects on the health and wellbeing of these groups.

10 Emotion Hinders Relational Learning

C. R. Madan, C. S. M. Lau, J. B. Caplan, & E. Fujiwara (Department of Psychology, Department of Psychiatry, & Centre for Neuroscience, University of Alberta)

Emotional stimuli are remembered better than neutral stimuli (i.e., single items). However, it is unclear how emotion affects memory for associations involving emotional items. A recent study using incidental learning instructions tested item and associative memory and found an enhancement of emotional item memory, but an impairment of relational learning between emotional and neutral parts of complex scenes (Touryan et al., 2007). We asked whether these findings generalize to intentional association-learning and only moderately arousing materials.

We conducted a verbal paired-associate learning task using different types of word pairs. We manipulated the pairings of emotional and neutral words and direction of recall probes. Direction of cued recall probes (e.g., of PAIN-WHISTLE) was either forward (PAIN-_____) or backward probe (_____-WHISTLE). Pairings consisted of pure word pairs (EMOTIONAL-EMOTIONAL or NEUTRAL-NEUTRAL) and mixed word pairs (EMOTIONAL-NEUTRAL or NEUTRAL-EMOTIONAL). To estimate separate emotion effects on item versus association memory, we fit the data with a simple probabilistic model. The model had free parameters reflecting probability of retrieving associations as a function of pair

type (associative memory parameters) and retrieving items as a function of target-word type (item memory parameter).

Results and best-fitting model parameters suggested that emotionality had two opposing effects on memory retrieval: Emotion enhanced memory for target items but impaired memory for associations between items. This pattern suggests that previous incidental memory findings (Touryan et al. 2007) generalize to the conditions of our study; namely, no information was peripheral and association learning was intentional. Our findings suggest that a simultaneous boost in item memory and reduction in association memory could apply to everyday, subtle modulations in emotionality of experiences.

11 Effects of Conscious and Nonconscious Goal Regulation on Responses to Emotional Stimulation: From Younger to Older Adults

S. Dolcos & R. Dixon (Department of Psychology, University of Alberta)

Emotion regulation (ER) is an important part of everyday human behaviour. ER undergoes lifespan transformations, with an apparent peak efficiency occurring in older adults. Recent evidence suggests that healthy aging is associated with a positivity bias in processing emotional information. By emphasizing positive aspects of stimuli, older adults may display an enhanced ability to control emotional responses to problematic events. Although automatic regulatory processing may be responsible for enhanced emotion control, most previous ER research has focused on deliberate, conscious forms of regulation. Little is known about automatic or nonconscious forms of ER, associated neural correlates, and older adults responses. We examined effects of deliberate and automatic forms of ER in healthy younger adults, and we are currently comparing them to those of healthy older adults. We also test whether the effects depend on overlapping or dissociable neural mechanisms. The experimental design manipulated both the goal of regulating emotion (conscious vs. nonconscious) and the intensity of the emotional challenge (high vs. low). Participants were instructed or nonconsciously primed to suppress responses to pictures varying in emotional content (from the International Affective Picture System). To date, younger adult participants have rated the emotional content of negative and neutral pictures, while brain activity and skin conductance responses were also recorded. Analyses of behavioral data (n = 23) have indicated that both deliberate and automatic ER decreased subjective responses to low-intensity emotional pictures. However, only deliberate ER was effective in suppressing responses to high-intensity emotional pictures. Overall, for young adults automatic ER might be less effortful and less costly, but it might also be less effective in managing highly challenging negative situations. We are currently investigating these phenomena in older adults. The expected results will clarify whether the positivity bias is linked to changes in the same neural networks as in younger adults.

12 Gender as a Variable in College Students' Perceptions of Suicide Symptoms

M. Bullock & H. Looy (Department of Psychology, The King's University College)

Previous research examining college students' perceptions of suicide (Mueller & Waas, 2002) focused on the role that empathy plays in attitudes, evaluations, and responsiveness to suicidal symptoms. There were gender effects i.e. females were more willing to provide direct assistance and talk with the hypothetical friend than

males. However,the study was not designed to make cross gender analyses possible and their observations were qualified by interactions between gender and empathy level. Is there an interaction between the gender of the rater/perceiver and the gender of the target peer demonstrating suicidal symptomatology? The present study had university students complete one of two online surveys that presented two scenarios reflecting suicidal symptoms: one affective, and one behavioral. They responded using four scales developed by Mueller and Waas--the Perception of Suicide Seriousness, the Suicide Helpfulness Scale, the Self-Efficacy Questionnaire, and the Outcome Expectancy Questionnaire. Female and male participants responded to scenarios that were either about a hypothetical student of the same or of a different sex, in order to determine whether gender of respondent, hypothetical student, or an interaction of the two affected perceptions of suicide risk. Reference: Mueller, M.A. & Waas, G.A. (2002). College students' perceptions of suicide: The role of empathy on attitudes, evaluation, and responsiveness. Death Studies, 26, 325-341.

13 Detecting cognitively relevant oscillations across species and brain state.

A. M. Hughes, T. Whitten, C. T. Dickson, & J. B. Caplan (Department of Psychology, Centre for Neuroscience, University of Alberta)

Recent years have seen an explosion of interest in cognitively relevant neuronal oscillations (rhythmic electroencephalographic activity, EEG). While specifying the cognitive function of an oscillation is difficult, objectively detecting the occurrence of oscillations in the first place is challenging. The major drawback faced by popular methods is that not only are they sensitive to oscillations, but also to transient non-repeating signals (think of ERPs). Furthermore, brain activity has a stereotypical "coloured noise" background spectrum which means that different frequencies of oscillation have to be evaluated based on different criteria. These issues pose particular problems when trying to connect data across species, which is becoming increasingly important. To address these confounds, Caplan et al. (2001) introduced an oscillatory episode detection method that can conservatively identify epochs of rhythmic EEG activity and put different frequencies of oscillations and different recordings on the same scale by correcting for the coloured-noise background. The method searches for epochs of heightened power at a given frequency sustained for a minimum number of cycles. Because the method uses the recording channel's own background spectrum to tune the detection parameters, it could be ideal for comparing oscillations across species. However, until now, the method had only been tested on human data. Here we applied the oscillatory episode detection method to EEG recordings from urethane anesthetized rat hippocampus, which is known to have three alternating states, each with its own frequency characteristics. The oscillatory episode detection method succeeded in detecting theta oscillations and was robust to how one estimated the background spectrum; if the spectrum was estimated in data that combined two states, the method still worked quite well. This suggests that first, the method can be applied to rat hippocampal recordings, and second, the method can be used to analyze state changes rather than being undermined by state changes.

14 Trait Emotion Regulation Promotes Attentional Avoidance of Negative Information

J. Arndt & E. Fujiwara (Department of Psychiatry, University of Alberta)

Many recent studies have explored the cognitive mechanisms and the related physiology underlying the instructed use of specific strategies to regulate emotion. Most of these studies focus on the emotion regulation concepts of reappraisal (i.e., cognitive reinterpretation of emotional experiences) and suppression (behavioural inhibition of emotional reactions). The instructed use of reappraisal seems to be more successful in down-regulating negative emotional experiences than suppression, and it spares cognitive functions such as episodic memory. Two aspects of emotion-cognition interactions in the context of ER have not been studied well: First, although memory seems sensitive to some types of ER, little is known about attention. Secondly, in addition to instructed use of ER strategies, we know little about effects of trait-ER on cognition. Thus, in two studies we investigated relationships between trait-ER variables (including reappraisal and suppression) and selective attention to angry faces (assessed with an emotional dot-probe task). Correlation analyses of data in Study 1 showed that trait-suppression was related to early attentional avoidance of angry faces, while reappraisal showed no consistent relationship to attention. Implicit ER (assessed with an Implicit Association Test) was related to late attentional avoidance. In Study 2, we directly compared selective attention to angry faces in groups of high trait-suppressors and high trait-reappraisers. Since reappraisers are also low trait-anxious and suppressors are high trait-anxious, non-specific ER high- and low-anxious control groups were included. Consistent with findings from Study 1, trait-suppressors had lower selective attention to angry faces than non-regulating high anxious controls. Interestingly, trait-reappraisers in Study 2 showed a pronounced vigilance for angry faces. We suggest that suppression as a stable trait reduces attentional threat biases that would result from similar but unregulated high anxiety levels. Conversely, trait reappraisal combined with low anxiety may allow (and possibly even require) individuals to prioritize threat in attention.

15 Repressors Show Superior Voluntary Memory Suppression in the Emotional Think/No-Think Task

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Individuals with a so-called repressive coping style, characterised by high defensiveness combined with low self-reported anxiety, are better able to forget negative memories. While negative explicit memories seem reduced in repressors, implicit memory is spared. Therefore we asked whether repressors are more effective than non-repressors using deliberate, voluntary memory suppression to forget negative information. Using Depue et al.´s (2006; Psychological Science) emotional think/no-think paradigm, we compared voluntary emotional memory suppression in repressors and non-repressors (high anxious, low anxious, defensive high anxious). After successful learning of neutral face-emotional scene pairs, individuals were repeatedly shown the face cue and were either asked to rehearse or suppress their memory for the previously associated scene. In a subsequent test phase, participants were again shown each face and asked to recall the previous scene. Compared to non-repressors, repressors were superior in forgetting negative materials and needed fewer suppression attempts. Only repressors showed forgetting below baseline after suppression training. Furthermore, a post-test

suppression strategy survey indicated that briefly reminding oneself of the to-be-suppressed materials promoted forgetting in repressors while promoting recall in non-repressors. Repressors are highly efficient in voluntary emotional memory suppression and they use different strategies than non-repressors.

16 Cultural Variation in Altruistic Motivation between Brazil and the United States: Helping Others in the Self-Sacrifice and the Non-Sacrifice Situation

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By developing a culturally sensitive altruism scale consisting of behavioral scenarios, the present study aimed to resolve inconsistencies of past cross-cultural studies involving altruistic tendencies. The scale was specifically developed to assess altruistic motivation in university students in Brazil and the United States. In addition to culture, we anticipated that different types of helping situations (i.e., self-sacrifice vs. non-sacrifice situations) would influence motivation to help others. The present scale manipulated the amount of risk involved in the helping situations; self-sacrifice situations contained risks such as losing one s states at work or being late for a class by helping others, whereas non-sacrifice situations contained no risk in helping situations. As expected, Brazilians altruistic motivation was more affected by higher levels of risk involved in the helping situations than that of Americans. Being more collectivistic, Brazilians were also expected to report higher altruistic motivation toward in-group members than out-group members, while Americans altruistic motivation was expected to be less affected by the level of social connection. Our results revealed that both Brazilians and Americans reported higher levels of altruistic motivation toward in-groups than out-groups. Finally, individuals competitiveness was also measured, which was considered to predict lower levels of altruistic motivation. Americans presented significantly higher competitiveness than Brazilians, yet the level of competitiveness did not correlate with the altruistic motivation scale. Current findings indicate that the altruistic motivation and competitiveness are not two ends of a single dimension; rather, situational factors are of greater influence on altruistic motivation.

17 What is the Best Digit Ratio?

J. Noble, R. Yan, P. Hurd (Department of Psychology, The King's University College, & Department of Psychology, University of Alberta)

The relative length of the index and ring fingers, the 2D:4D digit ratio, is sexually dimorphic in humans. Women tend to have higher 2D:4D than men. This ratio is widely-used in research as a measure for the organizational influences of hormones in fetal environment. Individual variation in this ratio is thought by many to indicate relative exposure to hormones in utero, and androgens in particular. Some authors have suggested that women have relatively longer index fingers compared to men due to increased prenatal estrogen exposure, and shorter ring fingers than men because of less testosterone exposure. Other authors have suggested ratios other than 2D:4D (such as rel2, the ratio of the second digit to the sum of digits 2, 3, 4 and 5) provide a more sensitive measure of the 2D:4D effect. Here we examine the magnitude of sexual dimorphism in various digits ratios in a sample of X men and Y women. We find that rel2 and rel5 are just as strongly dimorphic as 2D:4D, but not more so. We further examine this data for evidence

that variation in the different digit ratios all reflects one dimension of hand shape variation, contrary to the idea that one finger length reflects testosterone's effects, and another estrogen's. The evidence on this point is mixed, suggesting several sources of variation are involved in producing different finger length ratios within the same hand.

18 The Method of Loci: Virtual vs Real

E. Ng, E. Legge, & J. Caplan (Department of Psychology, University of Alberta)

The Method of Loci is an ancient mnemonic used to aid memory recall by placing ideas within a navigated environment and later using the environment to aid recall. Previous studies on the Method of Loci have found it to be an effective strategy for serial-list memory, even when the loci points (locations where ideas/objects are placed) are provided instead of self selected. Our goal is to determine the specific advantages and disadvantages that the Method of Loci has in memory for ordered lists. We developed a novel, virtual navigational training procedure to control the spatial environment participants used in the our study and compared this to a group of participants who were instructed to use a familiar environment for Method of Loci and a group of participants who were not asked to use a specific strategy. Our results suggest that serial-list memory using a virtual environment rather than a self-chosen, familiar environment for the Method of Loci was quite similar. Specifically, lists of imageable words were better recalled by both groups. Our findings suggest that the Method of Loci does not depend on the use of a highly familiar environment and the virtual-environment training procedure opens up a large range of future studies to determine the specific relationship between the toplogical and visual properties of the environment on memory for verbal, ordered material.

Invited Presentation (BioSci P116)

1:30 Classroom Climate and Trajectories of Peer Victimization and Aggression in Middle Childhood

Wendy L. G. Hoglund (Department of Psychology, University of Alberta)

Children spend the majority of their waking hours interacting with classmates in the classroom. Alarmingly, this is where 10% to 30% of children are persistently victimized or bullied by peers (Nansel et al., 2001). On average, rates of peer victimization and bullying increase during middle childhood and account for a majority of the aggression that occurs within the peer group (Olweus, 1993). This insight into the developmental course of peer victimization and aggression has drawn primarily from cross-sectional research, discrete panel data that address mean level changes, and attention to individual-level correlates of victimization and aggression, such as externalizing and internalizing problems. There is an emerging recognition of diversity in the developmental trajectories of victimization and aggression (Pepler, Jiang, Craig, & Connolly, 2008), as well as the need to better understand the role of contextual factors, such as the climate of children's classrooms, on heterogeneity in the trajectories of victimization and aggression. The classroom climate is defined by the broad set of supportive, respectful relationships that exists among groups of children and their teacher

(Pianta, 1999). Previous research suggests that in classrooms where the overall quality of relationships is unsupportive, children's risks for experiencing peer victimization and aggression is heightened (Gazelle, 2006; Hoglund & Leadbeater, 2004). The current paper investigates: 1) the developmental trajectories of peer victimization and aggression over the course of grades 3 and 4 with a large sample of low-income, racially/ethnically diverse children; and 2) the contributions of classroom climate to diversity in the trajectories of peer victimization and aggression over two-years. The implications of the classroom climate and universal, school-based interventions for altering the developmental course of peer victimization and aggression will be discussed.

Session 3 (BioSci P116)

1:50 The Conceptual Integration of the Levels of Lifespan Development Theory through Polanyi's Notion of Emergence

Ruben van Gelder (Department of Psychology, University of Alberta)

The lifespan approach to developmental psychology unites considerations of different levels of being, many of which have been focused upon in isolation as models of development by other older schools of thought. The past contest between these differing schools concerning the sources of development are increasingly being put to rest in favour of more combinatory considerations. For example, it is now widely admitted that neither nature nor nurture is causally predominant over the other, but that it is rather their confluence that is important. Here, the synthesis of different factors and perspectives of consideration in lifespan development theory is pursued, applying Polanyi s notion of emergence as a unifying principle between higher and lower levels.

2:10 A Newly Developed Instrument for Assessing Dream Remembering

C. Svob (Department of Psychology, University of Alberta), D. Kuiken (Department of Psychology, University of Alberta), & T. Nielsen (Department of Psychiatry, Université de Montreal)

Studies of the predictors of dream remembering, such as personality traits (e.g., openness to experience) and biological states (e.g., REM sleep), have pre-supposed a uni-dimensional theory centering on voluntary recall frequency (Blagrove & Akehurst; 2000, Schredl, 2008; Schredl & Reinhard, 2008; Schredl, 2007). By focusing on voluntary recall, the diverse ways in which dreams penetrate waking consciousness have been overlooked. To investigate dream remembering beyond this constraint, we designed a questionnaire to measure and explore the dimensionality of dream remembering. We anticipated that, rather than a uni-dimensional model, a multi-dimensional model would be required. In an initial study, we administered a 44-item dream remembering questionnaire to 512 participants. Using exploratory factor analysis (Principal Components, Varimax rotation), we identified nine dimensions of dream remembering. The nine-factor model includes: (1) vivid dream revisualization (including recall frequency), (2) affective-motivational carryover, (3) the frequency of sleep disturbing dreams (e.g., nightmares), (4) liminal dream re-entry, (5) dream/reality blending, (6) cued daytime dream recall, (7) lingering sensory acuity, (8) persistent paralysis, and (9) dream recall consistency. Cronbach's alpha for subscales based on these factors ranged from .49 to .83, suggesting that some of these scales require modification

or elaboration. None of the subscales were positively correlated with socially desirable responding. As a first step toward construct validation, we found that reported overt enactment of the dream scenario during awakening (e.g., emotional expressions, gestures) was highly correlated with the affective-motivational carryover (.55), indicating that dream enactment behaviours are more likely to follow impactful dreams than either nightmares (.31) or sleep terrors (.20). These initial results affirm the importance of examining aspects of dream remembering that depend upon a variety of memory processes, including cued recall, implicit memory, and déjà vu.

2:30 Role of Co-morbidities in Moderating and Mediating Cognitive Deficits Associated with Aging and Type 2 Diabetes

G. Peggy McFall (Department of Psychology, University of Alberta), Bonnie Geall (Department of Psychology, University of Alberta), Ashley L. Fischer (Department of Clinical Psychology, Simon Fraser University), Sanda Dolcos (Department of Psychology, University of Alberta), and Roger A. Dixon (Department of Psychology, University of Alberta)

Certain health conditions and lifestyle choices may exacerbate general aging-related cognitive decline. Type 2 diabetes is both increasing in prevalence in North American older adults and linked to a heightened risk of dementia. A cross-sectional study (Yeung et al., 2009) from the Victoria Longitudinal Study (VLS) indicated an increased diabetes-related risk of cognitive deficits in neurocognitive speed. A 3-year longitudinal follow-up (Fischer et al., in press) confirmed this pattern and detected further losses in speed-intensive executive functioning. Neuroepidemiological research has identified potential covariates relevant to the interpretation of diabetes-cognition effects. We examine 13 health, biomedical, lifestyle, and affective factors for their potential roles as: (a) covariates, (b) moderators, or (c) mediators.

Our participants are from Sample 3, Wave 1 of the VLS collected in 2002-03 (n=580, age range = 53 to 85 years). The diabetes diagnoses followed a documented multi-step process. Four exclusionary criteria were: (a) type 1 diabetes, (b) Alzheimer s or related dementias, (c) MMSE score < 26, and (d) indication of neurological, cardiovascular, or selected psychiatric conditions. Our final sample consisted of diabetes (n = 41, M age = 68.6) and control (n = 465, M age = 67.5) groups.

Three main results are reported and discussed. First, of the 13 potential covariates, ANOVAs identified six significant covariates (i.e., depression, negative affect, blood pressure, gait/balance, and subjective health). Second, using established regression methods (e.g., Wahlin et al., 2006), we conducted the following moderator analyses: Block 1: diabetes status, Block 2: potential moderator variable, and Block 3: diabetes-moderator interaction. Our results show depression and negative affect moderate the effect of diabetes on reaction time and semantic speed, respectively. Third, mediator analyses are presented (Wahlin et al., 2006), with preliminary results showing gait/balance and subjective health mediating the relationship between diabetes and a variety of cognitive variables.

Keynote Address (BioSci P145)

3:30 The Joint Representation of the Emotions and Actions in the Cerebral Hemispheres

Marcel Kinsbourne (New School for Social Research)

Classically, emotions have been regarded as distinct from, and detrimental to, rational action. Yet, like cognitions, emotions are represented at the highest, cerebral level. My general model locates joint cognitions and emotions at the stage of action preparation. Positive emotions are the subjective aspects of successful matches between expectation and outcome, and encourage continuing ongoing activity, whereas mismatches result in negative emotion, arrest of ongoing activity and its reconsideration. Stages of goal-directed activity can be referred to distinctive loci in each hemisphere. Aspects of major psychopathologies may be the expressions of distinct dysfunctions of the match/mismatch operation, which result in false positive or false negative matches. I will refer to supporting data from the literature and from my laboratory.