SCiP 2009 Program

39th Annual Meeting of the
Society for Computers in Psychology

Boston, MA, USA
Thursday, November 19, 2009

SCiP 2009

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Notes from the Program Chair

It has been a pleasure to help put together the 39th annual conference for our society. This year's conference features 40 talks (including 2 symposia) and 13 poster presentations. I would like to offer a special thanks to Kim Vu, last year's program chair, for helping me with many of the details of conference organization. Thanks also to Roger Mellgren for help and generousity with our poster venue. Finally, thanks to Jon Kelly, this year's assistant program chair, and to members of the SCiP steering committee for valuable help with reviewing our fine submissions.

David Waller

Welcome from the President

Welcome to the 39th annual meeting of the Society for Computers in Psychology (SCiP)! The purpose of the Society is to increase and diffuse knowledge of the use of computers in psychological research, and other professional activities.

A s with the past 38 SCiP conferences, the 39th SCiP annual meeting presents high quality keynotes, symposium, talks, and posters. We are honored to have professor William Warren of Brown University as our keynote speaker this year in Boston. Prof. Warren's talk will inform us on using virtual reality to break the laws of physics and optics. In addition, I hope that you will enjoy the symposium on virtual reality, talks and posters on semantic spaces, and our other very interesting SCiP talks.

As you may have noticed, SCiP is growing along with advancement of computer technologies. These changes range from data collection (record responses, collect responses (desktop, Internet)) to augmented reality (such as virtual reality, as you will hear it from the keynote and symposium). SCiP members have used their investigations of the use of computers in psychology to provide enormous contributions to our understanding of human behavior. I would like to thank all the members who have been contributing to SCiP in the past and welcome our new members, especially for graduate students who tend to make most of the more innovated implementations possible.

The meaning of "using computers in psychology" has changed since our first SCiP meetings in the 1970s and 1980s. Keeping up with the current state of the art use of computers in our discipline has been extremely challenging for the conference organizers both in previous conferences and the current one. Thanks for David Waller, our conference chair who has contributed numerous hours in organizing this year's conference. Because of this, we have a well-organized SCiP program this year. Further, we are excited to offer you an innovative and exciting experience in Boston.

I encourage you to visit the SCiP website (http://www.scip.ws) and to meet the steering committee members during the conference. The society sincerely appreciates the guidance from our steering committee members. Between the work put in by our organizers and our steering committee, and the support of our members and sponsors, I am positive that the 39th SCiP annual meeting will be one of our most successful meetings to date.

 Enjoy SCiP 2009 and your visit to Boston

Xiangen Hu

Conference Floor Map

Society for Computers in Psychology (SCiP)
Sheraton Boston, Thursday 19 November
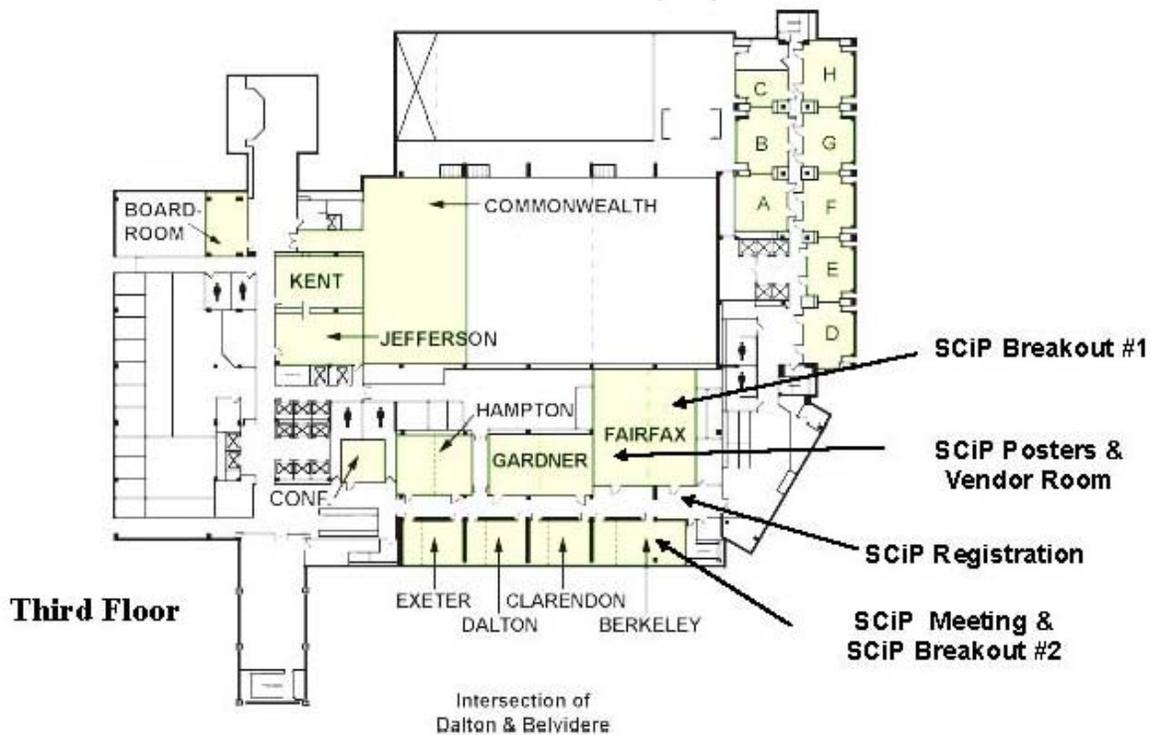
The poster session will be in the Hynes Convention Center ballroom (third level)

Many thanks to the SCiP vendors

7:30 am Registration & Refreshments – Fairfax Foyer

Fairfax B	Berkeley
Semantic models and analysis *chair: Philip McCarthy*	**Computer applications and web-based tools** *chair: Bruce Burns*

8:00- 9:45am

Fairfax B	Berkeley
8:00 Liu et al.	8:00 Burns & Drummond
8:15 Zhao & Li	8:15 Werner
8:30 Shaoul & Westbury	8:30 Pavlas, Lum & Salas
8:45 Duran, McCarthy, & Hall	8:45 Beagley
9:00 Johns & Jones	9:00 Freeman & Ambady
9:15 McHugh, Durda, & Buchanan	9:15 Reips & Frauendorfer
9:30 McCarthy & Jarvis	9:30 Czienskowski

9:45 – 10:00 – Break

10:00 – 11:45pm

Cognitive, computational, and semantic models *chair: Christopher Wolfe*	Games and intelligent tutors *chair: Chutima Boonthum*
10:00 Renner et al.	10:00 Young, Sutherland, & Cole
10:15 Cheng & Sheu	10:15 Pavlas, Bedwell, et al.
10:30 Mewhort, Johns, & Kelly	10:30 Boonthum et al.
10:45 Wolfe & Reyna	10:45 Brunelle et al.
11:00 Recchia & Jones	11:00 Washburn, Beran, & Evans
11:15 Patton & Gray	11:15 Myers et al.
11:30 Magliano et al.	11:30 Dai et al.

11:45 – 1:00 – Lunch

Keynote Symposium (Fairfax B)	Symposium (Berkeley)
Virtual reality in behavioral and perceptual research *Organizer: Bernhard Riecke*	**Integrating methods to explore semantic relations: Perspectives from computer modeling, eyetracking, and neuroimaging** *Organizers: Michael Jones & Ken McRae*

1:00 – 2:30pm

Keynote Symposium (Fairfax B)	Symposium (Berkeley)
1:00 Creem-Regehr	1:00 Riordan & Jones
1:15 Hodgson et al.	1:15 Mirman
1:30 Durgin & Li	1:30 Yee et al.
1:45 Mohler	1:45 Rhodes, & Kello
2:00 Riecke	2:00 Jones, McRae, & Hare
2:15 Discussion	2:15 Discussion

2:30 – 3:15 Posters in Hynes Convention Center Ballroom

2:30 – 3:15

1. Bradshaw
2. Czienskowski
3. Boxberger & Reips
4. Funke & Reips
5. Matthews et al.
6. Zhao & Kohonen
7. Maclin et al.

8. Hu et al
9. Crossley, Renner, et al.
10. Crossley, White, et al.
11. Renner et al.
12. Han et al.
13. Graesser et al.

Vendor (Fairfax Foyer)
1. Psychology Software Tools

3:15 – 4:15 – Keynote Address (Fairfax B)

William H. Warren

Using virtual reality to break the laws of physics and optics

4:15 – 5:15 – Presidential Address (Fairfax B)

Xiangen Hu

Towards a unified data structure for psychological experiments

5:15 – 5:45 – Business Meeting (Fairfax B)

Many thanks to the SCiP vendors

8:00   *Cohesion analysis in Mao ZeDong's corpora.*

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Leaders always play a significant role in managing countries. Their speeches and articles reflect the country's events and challenges. Our hypothesis is that the degree of cohesion in their speeches will help to understand the leaders' intentions and the direction of a country (Pennebaker, Mayne & Francis, 1997). This paper presents an analysis with Latent Semantic Analysis (LSA) that analyzes Mao ZeDong's speeches and articles. The sample documents are Mao ZeDong's 30 years of speeches published in 1991. We investigated the relationship between cohesion and country's environment, such as politics, economics and even war.

8:15   *Cross-language priming in L1 and L2: A computational study*

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This paper presents a computational model of cross-linguistic priming effects. We implemented a self-organizing neural network model, DevLex-II, to simulate translation and semantic priming across two languages: Chinese and English. The priming effects were examined under two different situations according to our model's second language learning history (early and late L2 learning). Our simulations showed cross-language priming effects for both translation equivalents and semantically related word pairs. The results match up with previous empirical findings, in particular with respect to the magnitude of effects in types of bilinguals (more proficient versus less proficient bilinguals), and types of priming (translation versus semantic priming). Our study represents a step towards the development of a more cognitively plausible computational account of cross-language priming, and more generally, bilingual memory organizations.

8:30   *Measuring contextual similarity using HiDEx*

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Over the last decade the HAL model (Lund & Burgess, 1996) has been investigated by psycholinguists, but until now there has not been a free implementation of HAL for investigators to use. HiDEx (The High Dimensional Explorer) is the first freely available software to implement HAL and a family of closely-related models. In this paper we describe the features of HiDEx. Its various applications and limitations are discussed.

8:45 *Using statistically improbable n-gram features to reveal textual characteristics of deception in conversational discourse*

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In this study, we evaluate the phrases and thematic content that are uniquely found in deceptive conversational discourse. To do so, we use a computational technique that extracts *statistically improbable* "n-grams" (contiguous sequences of 2 or more words) that occur in deceptive speech relative to truthful speech. Mixed-model and discriminant analyses reveal that unique deceptive n-grams are used more frequently than unique truthful n-grams, and that these n-grams distinguish truth from lies. Furthermore, in a qualitative analysis, we show that deceivers tend to lie about romantic relationships and high school, and avoid lies about family and close friends.

9:00 *Testing assumptions of memory models: Do random representations accurately reflect the organization of semantic memory?*

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A common assumption that many memory models make is that lexical semantic memory can be approximated by randomly generating a semantic representation of each word. However, the use of random representations contains a hidden assumption: that similarity across random words in semantic memory is normally distributed. We explicitly test this assumption by computing similarity distributions for randomly selected words from a number of well-know semantic measures and comparing them with the distributions that prominently used random representations create. It was found that semantic similarity of random words is not normally distributed, which may have serious consequences for memory models.

9:15 *Validating the WINDSORS model of semantic similarity within a lexical decision ambiguous word resolution paradigm.*

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Without context to disambiguate meaning, the strength of relationship between an ambiguous word and a particular connotation depends on the relative frequency of pairing in language. Defining strength of relationship using the WINDSORS model of word similarity (Durda & Buchanan, 2008), the current study paired dominant, subordinate and unrelated primes with 96 ambiguous word targets. In a lexical decision task, 39 participants had shorter reaction times for targets preceded by dominant primes (M=654.0 ms, SD = 94.8 ms) than for subordinate (M = 669.0 ms, SD=109.5 ms) or unrelated primes (M=678.8 ms, SD=106.3 ms) [$F(2,37)$=5.58, $p<.01$], demonstrating WINDSORS' ability to realistically model language processing in vivo.

9:30   *A validation study of MTLD as a sophisticated approach to lexical diversity assessment.*

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Lexical diversity (LD) refers to the range of different words used in a text. MTLD is an approach to, and subsequent assessment of, LD. This study assesses four types of validity testing of MTLD as an LD index: convergent validity, divergent validity, internal validity, and incremental validity. The study uses two corpora, and compares MTLD to four established, sophisticated indices of LD. The results are promising, and offer compelling evidence that MTLD is a useful index, one that should be considered by researchers assessing LD.

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Session II: Computer applications and web-based tools   Berkeley

8:00 – 9:45 am   *chair: Bruce Burns*

8:00   *Herbert: An open-source web-based framework for collecting and displaying experimental data.*

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Drummond, M. G.

Many computer packages can present experiments and be used to expand the classroom experience of students. However there is usually a delay between the collection of data and the presentation of aggregated data and analysis, by which time the experiment is less salient for them. Herbert is under development as an open-source framework for running experiments written in JavaScript that supports modules for specific experimental paradigms and tools for implementing new paradigms. It exploits the tight connection between task and data provided by the design to allow immediate display of analysis of data aggregated within a class or across classes.

8:15   *Flash/XML based experimentation shells for psychological research*

Werner, S.   University of Idaho   *swerner@uidaho.edu*

GoCognitive.net is a freely accessible website that is intended as an online center for teaching materials in cognitive psychology/neuroscience. The site makes available online demonstrations, video interviews, and Flash-based experimentation shells which enable users to conduct customized experiments within the narrow scope of a particular experimental paradigm. The shells can be modified via simple XML settings and customized stimuli can be included in the experiments. Even though the shells lack the versatility of commercial scripting environments, they allow non-programmers to easily create significant modifications of basic cognitive experiments. The change detection flicker-paradigm is presented as one example of this approach.

8:30 ***Investigating the interplay between aesthetics and usability in web sites: Cognitive and visceral responses***

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Recent studies on web aesthetics have revealed that viewers assess web sites within a fractions of a second (Lindgaard, Fernandes, Dudek, & Brown, 2006). Combined with the notion of perceived usability (Tractinsky, Katz, & Ikar, 2000), this visceral perception finding provides an excellent means by which to study the inter-connected constructs of aesthetics and usability. Two studies were conducted to identify the effects of visually evident usability and aesthetic factors on user judgments of appeal, attractiveness, and usability. Usability factors had little influence on judgment within the 500 ms timeframe, though aesthetic factors such as density and creativity greatly influenced these ratings.

8:45 ***Eye Lines version 5.0: Software for research and teaching of psychophysical measurement, geometric visual illusions, and sensory-motor coordination***

Beagley, W. K.   Alma College   *beagley@alma.edu*

This completely re-written version of Eye Lines (Beagley, 1991) takes advantage of current operating systems and adds additional capabilities. One of its special abilities is automation of psychophysical measurement for geometric attributes of visual stimuli (size, angular orientation, position, point of attachment of one line on another). Measurement can be done using Method of Adjustment where the subject adjusts one figure to match another. The new version allows simultaneous adjustment of multiple attributes. Eye Lines also automates traditional pair comparison techniques including multiple simultaneous adaptive staircase, as well as other stimulus-response paradigms. The package includes materials and instructions for studying classical geometric visual illusions. Other capabilities include reverse mirror tracing and recording of drawing or mouse movement. Eye Lines runs on Macintosh and Windows and is available for free download at www.alma.edu/el

9:00 ***MouseTracker: Software for studying real-time mental processing using a computer mouse-tracking method.***

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We present software developed by the first author that allows researchers to use a mousetracking method for assessing real-time mental processing. By recording computer mouse movements while participants move the mouse into one of two response alternatives, the timecourse of mental processes is revealed. *MouseTracker* provides researchers with the real-time evolution of psychological responses by continuously sampling the competition between two response alternatives. It allows researchers to run experiments and analyze mouse trajectories. Trajectories can be processed and visualized, and measures of spatial attraction and complexity computed. We describe the software, the method, and provide details on mouse trajectory analysis.

9:15 ***The high hurdle technique put to the test: Evidence for less dropout and better data quality in web-based studies.***

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Two Web experiments on the *high hurdle technique* (Ns of 396 and 503) provide evidence that it is an effective option for controlling drop out in the design of Internet-based research, albeit with small effects. The technique interacts with the seriousness check, in that the high hurdle only works for persons indicating serious participation. The paper reintroduces a process model and derives several predictions from the model, discusses different types of burden (psychological versus technical hurdle, and different levels of implementation). It concludes that earlier empirical research may have been too narrow in focus to adequately test the high hurdle technique.

9:30 ***Why we need a systematic approach to the development of software for research.***

Czienskowski, U.   MPI for Human Development   *sciencec@mpib-berlin.mpg.de*

The need for psychology software, created by professional researchers who are working in this field, is occasionally disputed. In contrast to this, the significant role of professional researchers for the continuous software development in psychology will be emphasized in this presentation. Showing that the scientific state of the field depends on quality and quantity of custom research applications, it is concluded that the quality of research software needs to be improved by applying modern software engineering technologies. The .NET framework and its open source counterpart, Mono, are introduced as object-oriented frameworks and several applications are presented, indicating the versatility of these frameworks for the development of virtually all kinds of research software on a professional level.

10:00 *Automatic harmonizing of internal spelling errors to optimize assessment and feedback in intelligent tutoring systems.*

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The AIS-H (Automatic Internal Spelling – Harmonizer) system addresses the problem of user input irregularities (e.g., typos) in Intelligence Tutoring Systems (ITSs). In ITSs, user input is assessed and then feedback is provided. If misspelled words are not properly recognized, ineffective or misleading feedback can be the result. This paper introduces AIS-H, and tests its performance using various computational approaches in the context of ITS (i.e., iSTART) unedited input from high school students. The study also compares results against Soundex. Preliminary results suggest that AIS-H can be used as a pre-processor for typed input before being evaluated by the assessment algorithm.

10:15 *A random effects analysis of learning rules in cognitive models.*

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Rarely is there a cognitive model without a learning component. The linear learning rule is often adopted in cognitive modeling because it is simple and effective. The delta learning rule is a case in point. Another aspect of cognitive modeling is that, although heterogeneity in learning is widely acknowledged, it is seldom taken into account in fitting models to data. A lack of readily available statistical tools may explain the gap. In this study, we propose a random effects approach to modeling inter-subject variability in (linear) learning. Our method formulates cognitive models as nonlinear regression models with random effects by exploiting the recursive property of the linear learning rules. We illustrate our method by considering three examples: the stochastic learning model of Bush-Mosteller, a Hullian model for avoidance learning, and a decision making models for the Iowa gambling task.

10:30 *Applying the permutation tests to factorial designs.*

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Kelly, M.   Queen's University

The permutation test follows directly from the procedure in a comparative experiment, does not depend on a known distribution for error, and can be more sensitive to real effects than the corresponding parametric test. Nevertheless, the permutation test is seldom (if ever) applied to factorial designs. Here, we apply orthogonal contrasts in a repeatedmeasures (withinsubjects) design and show that, when combined with Gill's (2007) algorithm, the factorial permutation test is practical, efficient, and easy to calculate.

10:45 *Using Excel formulae to assess semantic coherence and logical fallacies in joint probability estimates*

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"Semantic coherence" is a metric describing whether a constellation of probability judgments is consistent with the relationship among sets described in the problem statement. Using integers, there are over one hundred million possible permutations of two probability estimates and their conjunctive and disjunctive probabilities. However, this entire problem space can be reduced to six theoretically meaningful patterns: logically fallacious (conjunction or disjunction fallacies); identical sets; mutually exclusive sets, subsets, overlapping sets; or inconsistent overlapping sets. This analysis can be automated using Excel spreadsheet formulae. This paper describes the logic behind these analyses, and provides the specific formulae used to categorize conditional probability judgments.

11:00 *Encoding sequential information in vector space models of semantics: Comparing circular convolution and random permutations.*

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Encoding sequential information about the order in which words typically appear has been shown to improve the performance of high-dimensional semantic space models. This requires a binding operation capable of binding together vectors in an order-sensitive way. Although circular convolution and random permutations have both been enlisted for this purpose, these operations have never been systematically compared. In Experiment 1, we compare their storage capacity and probability of correct retrieval; Experiments 2 and 3 compare their performance on semantic tasks when integrated into existing models. We conclude that random permutations are a scalable alternative to circular convolution with several desirable properties.

11:15 *SANLab-CM: A tool for modeling CPM-GOMS*

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SANLab-CM is a new tool for modeling CPM-GOMS which supports stochastic operations. In this paper, we discuss some of the tools SANLab-CM provides and how they can be used to expand on CPM-GOMS models built by Gray, John, & Atwood (2003) in Project Ernestine. Introducing variability into the model generates many more critical paths than the single, static path of the Ernestine model, generating 55 unique paths with different frequencies. This variety shows that even given the same strategy for task completion, the telephone operators modeled by Gray et al. could have followed a variety of critical paths to complete the same objective.

11:30 *Changing how students process and comprehend texts with computer-based self-explanation training.*

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This study assessed the extent that RSAT, a computer based assessment tool for reading strategies, can detect changes in comprehension processes as a function of computer-based reading training provided by iSTART. High school and college students received iSTART and were administered RSAT prior to and post training. Analyses of the processing and comprehension measures provided by RSAT indicated that iSTART led to a stronger correlation between comprehension and theoretically important inference processes than what was observed prior to training.

Session IV: Games and intelligent tutors   Berkeley
10:00 – 11:45 p m   chair: Chutima Boonthum

10:00 *Studying choice in a first-person-shooter video game*

Young, M.   Southern Illinois University at Carbondale   *meyoung@siu.edu*
Sutherland, S. Southern Illinois University at Carbondale
Cole, J.   Southern Illinois University at Carbondale

Typical choice experiments involve choosing among simple options in which all of the information is immediately available. Within the context of a video game, however, the choice environment is much more complex -- events occur in time, the amount of information about options is only gradually revealed, and choosers can decide how to acquire this information. I will discuss the advantages and challenges of studying causal attribution, impulsivity, and related behaviors within the context of a first-person-shooter video game, and how this approach relates to the study of choice in other species.

10:15 *Games for learning: attributes and outcomes.*

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The study of serious games has been growing at an astounding rate. However, scientific investigations into the effectiveness of serious games have thus far been largely focused on discovering whether games are effective in conveying learning rather than investigating how they are effective. To address this gap, two experimental game platforms were developed in order to investigate how variations in game attributes affect diverse learning outcomes. The first game was employed during Marine Corps courses on planning, while the second was used to teach basic immunology to a general population. Variation in attributes was found to have significant effects on learning outcomes such as motivation and knowledge organization.

10:30 *iSTART-ME: Enhanced learning through a game-based environment.*

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iSTART-ME (iSTART-Motivationally Enhanced) is an adaptation *of iSTART* to a *game-based environment*. iSTART is an intelligent tutoring system (ITS) designed to improve student's reading comprehension through self-explanation and reading strategies. Studies have shown that iSTART helps students to improve comprehension of challenging text. Nonetheless, over time (e.g., a semester or academic year), iSTART becomes repetitious and boring to students. The iSTART-ME game-based environment provides students the opportunity to earn points, advance through levels, purchase game rewards, personalize a character, or even play an educational mini-game (designed to use the same strategies as in practice). Our goal is to merge ITS and gaming technologies to improve both learning and engagement in tutoring systems.

10:45 *MiBoard: iSTART metacognitive training through gaming*

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McNamara, D.S.	University of Memphis	*dsmcnamara1@gmail.com*

MiBoard (Multiplayer Interactive Board Game) is an online, turn-based board game, which is a supplement of the iSTART (Interactive Strategy Training for Active Reading and Thinking) application. MiBoard was developed to provide game-based training in iSTART, and thereby test the hypothesis that integrating game characteristics (point rewards, game-like interaction, and peer feedback) into iSTART will significantly improve students' enjoying of the learning process, and potentially improve learning. MiBoard is a computer-based version of a board game (Rowe, 2008) called iSTART: The Board Game. MiBoard was developed to eliminate constraints on locality while retaining the crucial practice components that were the game's objective. MiBoard gives incentives for participation and provides a more enjoyable and social practice environment compared to the online individual practice component of the original trainer.

11:00 *Are monkeys "playing" when they're working on game-like computer tasks?*

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Beran, M. J.	Georgia State University	
Evans, T.	Georgia State University	

When children are tested on computerized tasks, fun animation and story-like contexts are used, but when nonhuman primates are tested, the visual displays tend to be more simple and sterile. Data will be presented to show that rhesus monkeys are sensitive to game-like elements of computerized tasks, showing preference for animation and competitive demands that aren't explained exclusively by nutritive reward schedule. It appears that, at least on some tasks, the monkeys are "playing" in the everyday sense of this word. The implications of these findings for task design will be considered.

11:15 *The bit in the middle and why it's important: An analysis of the cohesion and difficulty of middle paragraphs*

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Writing Pal is an Intelligent Tutoring System (ITS) that teaches students writing strategies. One of these strategies is cohesion, the extent to which ideas in a text are made apparent to readers. This study examines the relationship between the cohesion of middle paragraphs and the total of number paragraphs in student essays. Results suggest a significant (but weak) correlation between total number of paragraphs and a variety of cohesion indices for middle paragraphs; and mixed-effect models indicate that student essays with 5-7 paragraphs tend to be more consistently cohesive than essays with 3, 4, 8, and 9 paragraphs. In sum, the findings suggest that paragraph total is important when considering cohesion assessment.

11:30 *The Writing Pal intelligent tutoring system: Pedagogical and technical guidelines*

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The Writing Pal is an intelligent tutoring system (ITS) designed to provide high school students with instruction and practice using strategies to facilitate essay writing. This paper presents an overview of the ITS as well as the pedagogical principles and technical requirements that have guided the development of the system architecture. The architecture meets requirements such as configurability, reusability, flexibility, learning process tracing, data security, multiple platform support, and break-point restoration.

Keynote Symposium: 1:00 – 2:30   Fairfax B

Virtual reality in behavioral and perceptual research

Organizer: Bernhard Riecke

There is an increasing interest in using Virtual Reality (VR) in behavioral and perceptual research across multiple disciplines. Part of this interest in VR is based on the possibility of running tightly controlled and reproducible experiments using (if desired) fairly naturalistic multi-modal stimuli, making VR a highly versatile and powerful tool for experimental research. In this symposium, we will combine recent findings with a discussion of the bigger picture and potential issues that arise from using VR as a research tool in behavioral/perceptual research and beyond.

1:00 *Improving distance judgments in virtual environments: What have we learned about perception?*

Creem-Regehr, S.   University of Utah   *sarah.creem@psych.utah.edu*

It is now established that 1) observers underestimate absolute egocentric distance in head-mounted display virtual environments and 2) specific manipulations of displays and response feedback can improve these judgments in some circumstances. A broader question involves the underlying spatial perception mechanisms that allow for these changes. An empirical manipulation of the quality of graphics, which selectively changes verbal but not walking-based distance judgments, will be discussed in the context of understanding the internal representations informing distance estimations. We relate these results to other studies which also use the virtual environment as a tool to examine the nature of the information used in distance perception.

1:15 *Redirected walking during unconstrained navigation*

Hodgson, E.	Miami University	*hodgsoep@muohio.edu*
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Three experiments are presented that build on a new technique, called redirected walking (Razzaque, 2005), which imperceptibly steers participants towards the center of a tracking space (and away from walls). Redirected walking can extend the navigable space within a virtual environment (VE) without specialized equipment. The present research extends findings from simulated users and small-scale redirection to dynamically redirect real participants freely exploring a large VE. Performance on a spatial task during normal and redirected simulations were compared to assess any detrimental affects of steering. Broad implications for spatial cognition research and other areas are discussed.

1:30 *Controlled interactivity in the study of perception*

| Durgin, F. H. | Swarthmore College | *fdurgin1@swarthmore.edu* |
| Li, Z. | Swarthmore College | |

We will discuss two examples of how the use of interactive virtual reality (VR) can facilitate understanding of the interaction of visual perception and proprioception. We used wide-area head-mounted VR to study optic flow perception with a walking observer whose visual world is tightly controlled. We have measured changes in psychometric functions for flow-speed, contingent on self-motion using repeated trials In VR. The stimulus is, essentially, a perception-action coupling. More recently, we have used VR to look at failures of orientation constancy to show that they partly derive from biases in the proprioception of head/gaze orientation.

1:45 *Avatars in immersive virtual environments*

| Mohler, B. | MPI for Biological Cybernetics | *Betty.Mohler@Tuebingen.MPG.de* |

Few head-mounted-display (HMD) virtual environment (VE) systems display a rendering of the user's own body. Subjectively, this often leads to a sense of disembodiment in the VE. In a recent study (Mohler et al., submitted to Presence), we found that the presence of an avatar changed the typical pattern of distance underestimation seen in many HMD studies. Users showed an increase in distance estimations with avatar experience, especially when the avatar was animated in correspondence with their own body-movements. I will discuss the potential for VEs to investigate embodied perception.

2:00 *Spatial perception and orientation in virtual environments – is virtual reality real enough?*

| Riecke, B. E. | Simon Fraser University | *ber1@sfu.ca* |

While Virtual Reality (VR) offers many experimental advantages including stimulus control and interaction in flexible, naturalistic multi-modal environments, there is mixed evidence whether humans perceive and behave similarly in computer-simulated environments. I will present and discuss several recent studies suggesting that care should be taken when using VR for perceptual/behavioral research: While naturalistic visual cues can, in principle, be sufficient to allow for real-world-like spatial orientation performance in VR, there is often a strong influence of both the content displayed (e.g., naturalism and cues available in VR) and the context (e.g., display type, size, and FOV).

2:15   *Discussion*

Symposium: 1:00 – 2:30   Berkeley

Integrating methods to explore semantic relations: Perspectives from computer modeling, eyetracking, and neuroimaging

Organizers: Michael Jones & Ken McRae

Recent experimental research has emerged that strongly questions current theories of semantic learning and representation. To address this new research, and to better understand semantic structure in the human mind, we introduce new computational techniques for probing mental structure including computational model comparison, computational analyses of timecourse data, and new paradigms that make use of eye-tracking and fMRI methodologies. Our goal is to discuss how knowledge from these new methods may be integrated to better understand the mechanisms that humans use to organize meaning in memory, how semantic information is represented in the brain, how this information is recruited in cognitive tasks, and how it degrades with brain damage.

1:00   *Redundancy in perceptual and linguistic experience: Comparing feature-based and distributional models of semantic representation.*

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Jones, M.   Indiana University, Bloomington   *jonesmn@indiana.edu*

Since their inception, distributional models of semantics have been criticized as inadequate cognitive theories of human semantic learning and representation. A principal challenge is that the representations derived by distributional models are purely symbolic and are not grounded in perception and action; this challenge has led many to favor feature-based models. We argue that the amount of perceptual and other semantic information that can be learned from purely distributional statistics has been underappreciated. We compare the representations of three feature-based and nine distributional models using a semantic clustering task. Several distributional models demonstrated semantic clustering comparable with feature-based representations.

1:15   *Contrasting effects of near and distant semantic neighbors on word processing in aphasia*

Mirman, D.   Moss Rehabilitation Research Institute   *mirmand@einstein.edu*

Two experiments investigated the integrity of semantic processing in aphasia by examining the opposite effects of near and distant semantic neighbors on word processing. Like unimpaired adults, aphasic patients were slower to recognize words with many near neighbors and faster to recognize words with many distant neighbors. Aphasic patients also made more semantic errors when naming targets with many near neighbors and fewer semantic errors when naming targets with many distant neighbors, but there was no effect on the proportions of phonological errors. Computational modeling work is investigating what kind of impairment would give rise to this pattern.

1:30 **Overlap of semantic representations: Converging evidence from eye-tracking and fMRI adaptation**

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Drucker, D.
Huffstetler, S.
Thompson-Schill, S. L.

Distributed theories of semantic memory predict representational and neural overlap of objects that share semantic features. We used eye movements and fMRI-adaptation to test predictions of these theories. Results of eye-tracking studies revealed that activating one object leads to the activation of other objects similar in sensorimotor (shape) or abstract (function) features. We then used fMRIadaptation to measure brain activation as participants read words related via manipulation, shape, or function. Both degree of manipulation similarity and degree of function similarity correlated with neural activation. Overall, these results converge to suggest that objects sharing semantic features have overlapping representations.

1:45 **Epoch-based analysis of power law behavior in free recall**

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Free recall tasks with a duration of one minute are employed diagnostically in several clinical domains. Recent work demonstrated a power law structure in free recall tasks with a twenty-minute duration, suggesting short durations may poorly represent behavior. Similar longer series are divided into epochs of varying duration and location. Multi-model inference is used to determine how distributional properties depend on epoch length. Epochs of duration shorter than three minutes show the canonical exponential behavior, while epochs of longer duration show power law behavior. Results generalize to other categories and verbal fluency tasks. Implications for modeling are discussed.

2:00 **Event-based priming in semantic spaces**

Jones, M.   Indiana University, Bloomington   *jonesmn@indiana.edu*
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Hare, M.   Bowling Green State University   *mlhare@bgsu.edu*

Recent research in semantic priming has demonstrated that pragmatic knowledge about generalized world events is encoded in lexical representations. We present simulations of event-based priming experiments demonstrating that semantic space models are capable of explaining noun-noun (Hare et al., 2009) and noun-verb event priming (McRae et al., 2005). Importantly, these effects cannot be explained by normative association or by the surface structure of language. The added benefit is in the algorithm used to learn from the language, and this type of comparison allows evaluation of various algorithms as plausible mechanisms used by humans to learn from both language and world events.

2:15 **Discussion**

1.   ***The ePsych advantage***

Bradshaw, G.   Mississippi State University   *glb2@psychology.msstate.edu*

ePsych is an electronic text designed as an alternative to printed introductory Psychology textbooks. It differs from many competitors in that it has been designed for computer delivery from the beginning. ePsych incorporates a wealth of psychological research on how to improve student learning. To measure its effectiveness, a comparison was made between ePsych and a traditional printed textbook. 42 participants read the text during the first session, then returned two days later to complete a 33-item multiple-choice test over what they had read. ePsych readers scored 10% higher on the test and readers who took longer to process the material scored higher on the test. No correlation between reading time and test performance was observed for the printed text.

2.   ***On the accuracy of web-based and lab-based response time measurements.***

Czienskowski, U.   MPI for Human Development   *sciencec@mpib-berlin.mpg.de*

Response times are among the most widely used outcome variables in psychological research. However, there is still much confusion about the actual accuracy of response time measurements, particularly in the case of web applications or custom local programs. In this presentation, a distributed system for the evaluation of the effect of different hardware and software environments on time measurements is described. Basically, the system collects precise timestamps for critical Windows events with the least possible latency by interrupting Windows system calls. This allows to evaluate and compare the accuracy of response times collected by Web applications (using current browsers and APIs on Windows) as well as Windows programs (written in different languages and frameworks), across computers and input devices with different features.

3.   ***Forced response and orderliness of web design in web surveys: Biases from reactance and dropout.***

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Forced response is often implemented in web surveys to guarantee complete datasets. In a quasi-experimental Internet-based study Stieger, Reips, and Voracek (2007) found more random answering behavior for instances of forced response, as expected from Reactance Theory. Furthermore, forced response was associated with increased dropout. In the present study we investigated forced response experimentally to avoid potential confounds. Forced-response mode was crossed with a second factor, orderliness of web design. It was expected that lack of orderliness would increase reactance effects from forced response. Analyses reveal the expected increase in dropout in the forced response condition, and a further increase if there is a lack of orderliness in the web design. Further analyses are currently being conducted. Effects of psychological reactance through forced response and other possible influences in Internet-based research are discussed.

4. *Making small effects observable: Lowering error with visual analogue scales.*

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With categorical rating scales there is often no answer option that perfectly reflects respondents' actual true values. Visual analogue scales (VASs) – continuous graphical rating scales – allow precise answers, resulting in a theoretical formatting error of zero. This should find expression in smaller standard errors. In a personality test standard errors with VASs were lower than with 5-point categorical scales, $F(1,78) = 10.21$, $p = .002$, $\eta^2 = .12$. Overall, VASs thus facilitate the detection of small effects that would not be observable with categorical scales. Surveying with VASs can be more efficient regarding sample size and survey costs.

5. *A computational exploration of semantic fluency in schizophrenia.*

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Semantic incoherence is a core symptom of certain types of schizophrenia and other neurological disorders. However, assessment of this behavior is usually subjective due to a lack of a realistic representation of semantic relatedness. Using a semantic fluency task and a co-occurrence representation of semantic organization (Jones & Mewhort, 2007), process models of semantic fluency were evaluated for individuals with schizophrenia and controls. Individuals with schizophrenia produced more coherent transitions, consistent with previous findings of hyperpriming and higher sensitivity. Additionally, individuals with schizophrenia made less use of frequency information, and produced items with a higher semantic neighborhood density than controls.

6. *A contextual self-organizing map of Chinese words*

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Kohonen, T.   Helsinki University of Technology

In this study we present a computational model of semantic representation of Chinese words. The model relies on the analyses of contextual information extracted from text corpus, specifically, analyses of word co-occurrences in large-scale computerized database of the modern Chinese language. The primary computational tool for doing this is the self-organizing map (SOM, Kohonen, 1995), an unsupervised neural network model that provides efficient data extraction and representation methods. Here a target word is represented as the combination of the average of all the words preceding the target and that of all the words following it. Due to its topography-preserving features the SOM projects the statistical structure of the context onto a 2-D space, such that words with similar meanings cluster together, forming groups that correspond to lexically meaningful categories. Such a representation system can be used for a variety of purposes, e.g., for computational modeling of language acquisition and processing.

7. ***Word Star Vocabulary Builder: Putting the science into GRE vocabulary learning.***

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Performing well on standardized verbal tests such as the GRE is important academically. Many students prepare using rote methods such as cue cards containing the word and the definition, however there are many proven scientific methods of learning such as stimulus equivalence, errorless learning and fading. We developed a computerized system using a combination of these learning principles to develop semantic associative networks using match to sample. The benefit of the match to sample is that both direct (trained) and derived (untrained) relationships can be learned. Performance using the match to sample was compared to standardized word - definition learning using a sub section of a GRE test. Results are discussed in terms of ease of learning, judgments of learning, and overall engagingness of the task.

8. ***The learner's characteristics curves (LCC).***

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Morgan, B.   University of Memphis

The Learner's Characteristics Curves (LCC) serves as a simplified student model for natural language learning environments. The student model from LCC is provided by four distinct calculations describing the student's understanding of the material based on their most recent answer and previous answers. This comparison creates indices for relevant-new, relevant-old, irrelevant-new, and irrelevant-old. LCC is enough for the system to offer appropriate feedback and question selection. For example, a non-decreasing trend in Relevant-new could indicate active construction of answers, while positive values of Irrelevant-new indicate knowledge deficits for the answers.

9. ***Semantic spaces in Writing Pal: Empirical studies, lesson development, and automatic feedback.***

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Writing Pal (W-Pal) is an intelligent tutoring system designed to improve writing strategy use and overall writing proficiency. This poster presents the various studies, lessons, and feedback mechanisms in W-Pal that have been informed through Latent Semantic Analysis (LSA) as well as various other computational linguistic indices provided by Coh-Metrix. Specifically, we discuss our use of LSA and Coh-Metrix in distinguishing high proficiency and low proficiency essays and how we have used these methods to analyze the effects of cohesion on human essay scoring. We also present our uses of these techniques in developing interactive practice lessons in W-Pal (brainstorming, paraphrasing, and cohesion lessons). Lastly, we present algorithms for essay evaluation that include LSA indices.

10. ***The effects of elaboration and cohesion on human evaluations of writing proficiency***

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This study examines the effects of cohesion and elaboration on essay scores. Students wrote two essays and then added examples to clarify their main points in each of the essays. Coherence was measured in the original and elaborated essays and then augmented by incorporating increased noun overlap and resolving anaphors across sentences. Human raters then scored the essays. Essay scores showed main effects for added cohesion and elaboration, indicating that greater cohesion and elaboration led to higher scores. There was also an interaction, indicating that the highest scores were given to essays with both improved cohesion and elaboration.

11. ***Evaluating semantic assessments in computerized learning environments.***

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Computerized interpretation of the meaning of users' raw input is critical for intelligent tutoring systems (ITSs), which depend on accurate natural language processing in order to scaffold instruction and interact adaptively to students. One well-established approach for the automatic creation of semantic representations, called Latent Semantic Analysis (LSA), uses singular value decomposition to reduce high dimension vector spaces in order to determine higher-order regularities. This study reviews the implementation of LSA into the feedback algorithm in iSTART, an ITS that provides students with self-explanation reading strategy training. We primarily recount the evolution of the iSTART algorithm from its initial inception with LSA and word-based components and detail the validation of the iSTART assessment by comparison with human assessments. The current paper also explores the independent value of the algorithm in evaluating self-explanations from new texts that iSTART had not been trained on. Finally, the robustness of the algorithm is examined with regard to user typographical errors.

12. ***Implementing AutoTutor Lite in learning environments***

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AutoTutor Lite is an adaptable tutoring system that facilitates incorporation natural language communication with pedagogical animated agents into E-Learning environments.The system implements this communication using a lightweight language analyzer. This language analyzer was implemented to produce a simple student model, called the Learner's Characteristics Curves (LCC). Altogether, there are 4 curves which represent what a student knows about an expected answer to a seed question given by the agent. The curves are measures of the student's quality of information for an expected answer. The specific qualities illustrated by the four curves are relevant-new, relevant-old, irrelevant old, and irrelevant new.

13. ***ARIES (Acquiring Research Investigative and Evaluative Skills).***

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Millis, K. K.   Northern Illinois University
Halpern, D. F.   Claremont McKenna University
Wallace, P.   Northern Illinois University
Forsyth, C.   University of Memphis
Butler, H.   Claremont McKenna University

ARIES is an intelligent tutoring system which teaches scientific inquiry skills in a game-like atmosphere. Students interact with two pedagogical agents during the interactive module. The agents' dialogue is tailored to each individual student's specific level of prior knowledge. Students will be able to interact with both agents by holding mixed-initiated dialogs in natural language that mimic real interactions between human tutors and students. An electronic text book is included which is based off of Diane Halpern's "Thought & Knowledge: An Introduction to Critical Thinking" (by permission from the publisher, Lawrence Erlbaum Associates). In the Active Application Module, students will be asked to evaluate a research study in order to bring about "learning by evaluating". For more information, please visit our website at: http://sites.google.com/site/ariestutor/.

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Join us in St. Louis next year!

SCIP 2010 — November 18th

Keynote Address

William H. Warren
Brown University

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Using virtual reality to break the laws of physics and optics

Immersive virtual reality is the research tool many of us have been waiting for, because it enables us to carry out rigorous experimental studies of natural behavior. Most simply, it allows us to manipulate realistic visual environments easily while collecting continuous measures of ongoing behavior. But its greater potential lies in the ability to test psychological theories by breaking the laws of physics and optics. I will describe several studies in which we use ambulatory VR to (a) manipulate gravity, (b) manipulate the optics, (c) manipulate the visual-motor gain, and (d) create a non-Euclidean world. I will also discuss some limitations of the current technology.

Presidential Address

Xiangen Hu
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Towards a unified data structure for psychological experiments

As members of the field of experimental psychology, we need work together for the advancement of its future. In this talk, I will layout one specific way that we can do this by creating a standardized method of archiving our observations for future psychologists.

The importance of data: Psychologists have conducted hundreds of thousands of experiments in the years since the founding of the discipline. The collection, analysis, and interpretation of all the data in these experiments have contributed to the advancement of the science of psychology. But little of this data is still available in a usable form.

Practical questions: Can we re-analyze data collected 30 years ago, 20 years ago, 10 years ago, 5 years ago, or even from your previous publication? It is likely that the old data is no longer accessible. It would be ideal if researchers can get assess to *the data*, not just reported statistics and possibly biased interpretations.

A proposal: Start creating a common *standard* that allows data collected psychological experiments to be accessible and re-analyzable for future scientists.

Need your help: As SCiP president, I am proposing one potential solution. However, it can only work with your active participation.

Business Meeting