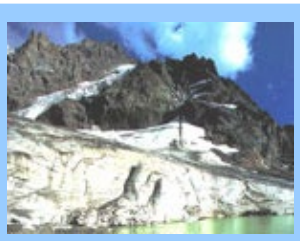

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ASIC 2005

Fourth Annual Summer Interdisciplinary Conference

Monday, July 25 -- Sunday, July 31, 2005
Brian�on, France

*Click **here** to visit ASIC 2006.*
We are now accepting papers and registration.

Announcing ASIC 2005!

The Fourth Annual Summer Interdisciplinary Conference (ASIC 2005) will be held at Alpe Hotel Club in Brian�on, France (in the Southern French Alps) on July 25 to 31. Richard M. Shiffrin of Indiana University-Bloomington is the organizer: email correspondence should be directed to or mailed to Richard M. Shiffrin at Indiana University. Select "Contact" from the menu for address.

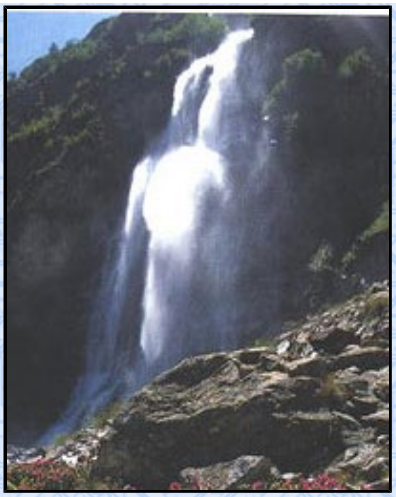
For ASIC 2005, we have chosen dates to allow coordinated travel to both ASIC and the Cognitive Science Society Conference being held July 20-23, 2005 in Stresa, Italy, on Lago Maggiore, about 2.5 hrs. travel from Brian�on.

The ASIC conference uses the very successful format of previous ASIC and AIC conferences: Days are free for leisure activities and the talks/posters are in the later afternoon/early evening, followed by dinner. The date has been chosen to make it convenient for attendees to bring family/friends. The conference is open to all interested parties, and an invitation is NOT needed to attend. However, due to the small number of spots for speakers, the organizer will select speakers, and other participants will be allowed to present posters on a day set aside for this purpose. The subject is interdisciplinary, within the broad frame of Cognitive Science.

Invitation

The conference is open to all scholars who fit the very general theme of the conference, and their family and friends. An individual invitation is NOT needed. We encourage you to send the conference information to friends and colleagues.

Conference Aims



The conference will cover a wide range of subjects in cognitive science, including:

- **neuroscience, cognitive neuroscience**
- **psychology (including perception, psychophysics, attention, information processing, memory and cognition)**
- **computer science**
- **machine intelligence and learning**
- **linguistics**
- **philosophy**

We especially invite talks emphasizing theory, mathematical modeling, and computational modeling (including neural networks and artificial intelligence). Nonetheless, we require talks that are comprehensible and interesting to a wide scientific audience. Speakers will provide overviews of current research areas, as well as of their own recent progress.

Conference Format

There is a single speaking session each day, excepting one day devoted to posters. For information on submitting proposals for presentations (speaking or posters), see our attendees and sessions page.

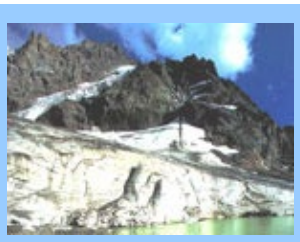
The conference will start on Monday, July 25, with registration 14:30 - 16:15, a reception 15:30 - 16:15, followed by a full session and then dinner. The following sessions, excepting Thursday, will each begin with drinks and light snacks from 16:00 to 16:15 PM, followed by a speaking session (including a brief break for drinks), followed by dinner. Thursday will be devoted to posters, beginning at 16:00 with drinks and light snacks, followed by dinner. Dinners will be buffet style, including vegetarian options, and a deluxe buffet/banquet will be held following the final session of the conference, on Saturday, July 30.

It will not escape the careful reader that this conference format frees most of the day for various activities with colleagues, family, and friends. We expect all scientific attendees and participants to attend all sessions. The time frame will allow day trips to nearby sites and cities, but travel to more distant sites should be arranged for days preceding and following the conference.

Lodging

The Alpe Hotel may be reached by telephone at 33 (0)4 92 200 200, and by fax at: 33 (0)4 92 200 143. See Travel & Lodging page for details.

Website designed and maintained by Krystal Klein. Best viewed with Internet Explorer 6.0.



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Registration Information for ASIC 2005

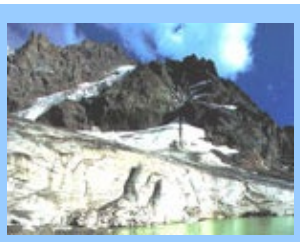
If you are planning to attend ASIC 2005, please fill out the registration form and submit your registration fee. This fee pays for room and equipment rentals, snacks, banquet, etc. This year's fee is $200 (USD).

There are two ways to pay the registration fee:

1. **Send a check for the correct amount to ASIC 2005, c/o Richard M. Shiffrin, Psychology Dept., Indiana University, Bloomington, IN 47405.**

2. **Online by PayPal (this will entail a $5 handling fee).**

Website designed and maintained by Krystal Klein. Best viewed with Internet Explorer 6.0.



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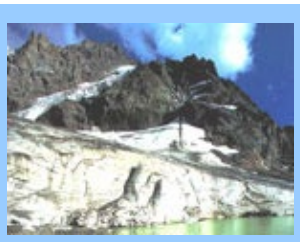
Below is a tentative schedule for ASIC 2005 (as of May 27). All times are evening (PM) unless otherwise noted.

Monday, July 25	
2:30	Registration begins
3:30 - 4:15	Opening Reception
4:15 - 6:15	Session I: *Embodied Cognition: Grounding Perception and Cognition* | **talks** |
6:15 - 6:30	Break
6:30 - 8:30	Session II: *Language and Text Processing* | **talks** |
8:30	Dinner
Tuesday, July 26	
4:00 - 4:15	Refreshments
4:15 - 6:15	Session III: *Induction of Concepts* | **talks** |
6:15 - 6:30	Break
6:30 - 8:30	Session IV: *Category and Concept Formation* | **talks** |
8:30	Dinner
Wednesday, July 27	
4:00 - 4:15	Refreshments
4:15 - 6:15	Session V: *Visual Features and Visual Processing* | **talks** |
6:15 - 6:30	Break
6:30 - 8:30	Session VI: *Perception, Action, Decision, Memory* | **talks** |
8:30	Dinner
Thursday, July 28	
4:00 - 8:30	Refreshments and Poster Session | **posters** |
8:30	Dinner
Friday, July 29	
4:00 - 4:15	Refreshments
4:15 - 6:15	Session VII: *Memory and Learning* | **talks** |
6:15 - 6:30	Break
6:30 - 8:30	Session VII: *Memory and Learning, cont'd* | **talks** |
8:30	Dinner

Saturday, July 30	
4:00 - 4:15	Refreshments
4:15 - 6:15	Session VIII: *New Methods, Results, Developments* **| talks |**
6:15 - 6:30	Break
6:30 - 8:30	Session VIII: *New Methods, Results, Developments, cont'd* **| talks |**
8:30	Banquet

Website designed and maintained by Krystal Klein. Best viewed with Internet Explorer 6.0.



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Those abstracts which have been submitted are listed below alphabetically by presenter. First author listed is the presenter except where another author is starred.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

CATEGORIZED LISTS IN SERIAL RECALL: CAN TEMPORAL ORDER OVERRULE SEMANTIC SIMILIARITY? . ***Kelly M. Addis & Richard M. Shiffrin, Indiana University, Bloomington*** **-- Intra-list similarity is known to impair serial recall performance. Specifically, given a list consisting of words from a single taxonomic category, memory for items is facilitated, but memory for order is diminished. It is unknown, however, how serial recall performance is affected by lists composed of words from multiple categories. In free recall, performance on such lists shows clustering of category items in output, regardless of whether the category items are blocked or mixed during study. In serial recall, however, the task demands that temporal order determines output. Therefore, in serial lists where items from various categories are mixed, temporal cues are in competition with category cues. In serial lists where category items are blocked, on the other hand, category cues may combine with temporal cues to facilitate recall. We present results from behavioral experiments utilizing such lists under a variety of recall conditions. The results provide important implications for feature combination in choice rules governing output order in recall models.**

THE ALGEBRAIC BRAIN. ***John R. Anderson, Carnegie Mellon University*** **-- The ACT-R theory is applied to modeling the data from a study by Qin, Anderson, Silk, Stenger, & Carter (2004) in which children learn to solve linear equations and perfect their skills over a six-day period. fMRI data show that: (a) a motor region tracks the output of equation solutions, (b) a prefrontal region tracks the retrieval of declarative information, (c) a parietal region tracks the transformation of mental representations of the equation, (d) an anterior cingulate region tracks the setting of goal information to control the information flow, and (e) a caudate region tracks the firing of productions in the ACT-R model.**

GROUNDING CONCEPTUAL PROCESSING IN MODALITY-SPECIFIC SYSTEMS: CURRENT EVIDENCE AND ISSUES . ***Larry W. Barsalou, Emory University*** **-- Accumulating evidence implicates the brain's modality-specific systems in conceptual processing. Now that modality-specific processing in conceptual tasks has become well established, it is increasingly important to assess the specific roles that this processing plays. Issues that are likely to be raised include: (1) Do multi-modal simulations play roles in implementing basic symbolic functions? (2) What are the relations between multi-modal simulations and language? (3) How does the brain represent abstract concepts? (4) What relations do multi-modal simulations have with the brain's learning systems? Preliminary ideas and empirical evidence will be offered.**

THE ROLE OF THE HIPPOCAMPUS IN MEMORY, CONTEXTUAL GATING AND STRESS . ***Sue Becker, McMaster University*** **-- The hippocampus plays a pivotal role in episodic memory formation, and in setting the context for ongoing behaviour. Its unique characteristics, including high plasticity, sparse coding and neurogenesis, make it suited to both rapid encoding and long-term retention. It also appears to be vulnerable to the deleterious effects of chronic stress and is implicated in several psychiatric disorders**

associated with hippocampal pathology. I will present a theory of hippocampal function, embodied as a computational model. The theory explains the pivotal role of the hippocampus in adapting to novel contexts, and sheds light on the nature of some of the cognitive deficits observed in people with severe mood disorders and schizophrenia.

FEATURE INDUCTION. ***Andrew Cohen, University of Massachusetts, Amherst*** **-- The main objective of this project is to utilize a number of new experimental and mathematical techniques to tackle one of the most fundamental questions of psychology: what are the basic building blocks, the features, of perception? That is, what are the parts of an object that are treated as unitary wholes when recognizing or discriminating visual objects? For a concrete example, imagine trying to determine if a facial expression is surprised or scared. The features may correspond to particular shapes of the eyebrow, eyes, nose, and mouth. When taken together, these features determine how the expression is perceived. Although the idea that visual objects can be broken into features is far from new, features are typically assumed a priori by the experimenter. The key contribution of this research is to utilize recent advances in data mining techniques, techniques that extract patterns from data, to automatically uncover the features used by human observers. That is, rather than using features defined by the experimenter, this project explores statistical methods to extract features from data. Such a method would potentially have a great impact on research in such areas of psychology as attention, search, categorization, memory, and decision-making.**

THE INTERACTION BETWEEN PERCEPTION AND CONCEPTUAL REPRESENTATIONS. ***Saskia van Dantzig, Erasmus University Rotterdam*** **-- How do people represent knowledge about concepts such as mountain or idea? According to the Perceptual Symbols Theory (e.g. Barsalou, 1999), conceptual representations are mental simulations. Thinking of a specific object involves the activation of the sensorimotor patterns that are associated with perception of and interaction with that object. Thus, conceptual representation is based on the same systems that are used for perception and action. From this assumption it follows that there should be interaction between conceptual processing/processing of mental concepts and perception or action. I will present a series of experiments in which participants perform a perceptual and a conceptual task and the interaction between the two tasks is investigated. It is hypothesised that the direction of the interaction (facilitation or interference) is dependent of the nature of both tasks and their overlap in space and content.**

AN EXEMPLAR-BASED APPROACH TO SYNTACTIC PROCESSING. ***Simon Dennis, University of Adelaide*** **-- We present an approach to syntactic processing based on the Syntagmatic Paradigmatic model (Dennis 2005) that assumes that the parse of a sentence can be viewed as a set of alignments with exemplars from memory. Alignment is achieved using a span-based version of the normalized edit distance measure (Marzal & Vidal 1993), which is more appropriate for linguistic tasks. Span similarities used in the algorithm are derived using a version of the topics model (Griffiths & Steyvers 2002) in which part-of-speech sequences are generated from their preceeding and postceeding word context. Approximate nearest neighbour exemplars are chosen using Locality Sensitive Hashing (Indyk & Motwani 1998). Parses generated by the model are compared against gold standard parses from the Penn Treebank. The method suggests that an unsupervised approach to parsing is feasible. Furthermore, the model is more directly comparable to exemplar-based accounts in other areas of cognition such memory and categorization than recursive approaches to syntax.**

OPTIMIZING TRUST FOR UNCERTAIN INFORMATION. ***Matt Dry, ; Michael Lee, University of Adelaide; Glen Smith, Defence Science and Technology Organisation*** **-- Real world decision making often takes place in environments that are both dynamic and unbounded. Providing advice to decision makers in these environments is difficult because data can be both inaccurate and uncertain, leading to an erosion of decision maker trust. This paper is based upon collaborative research between the University of Adelaide and the**

DSTO and explores how decision maker trust can be maximized by manipulating the way in which uncertain information is expressed. An experiment was performed comparing the use of ﷺAvatarsﷺ (computer-generated animated faces) and plain text displays to convey information to decision makers. Participants were required to make a series of binary guesses about the location of a target stimulus on the basis of advice conveyed by either an avatar or plain text display. Advice accuracy and uncertainty was manipulated across six conditions.

THE FACE AND THE MASK: TASK RELEVANT MASKING AND MASKED PRIMING. ***James T. Enns & Chris Oriet, University of British Columbia*** **-- It has long been known that response priming from masked visual shapes is governed by different variables than the conscious perception of the prime shapes. It is also well established that prime-mask similarity plays an important role in both these tasks. What is not known is (1) whether similarity is stimulus-based (i.e., greater feature similarity results in reduced visibility and increased priming) or whether it is task-based (i.e., only task relevant features contribute to visibility and priming), and (2) whether the rules governing similarity are the same for prime visibility versus masked priming. We examined these questions with human faces that could vary in emotional expression (anger, happy), sex (male, female), and race (Asian, Caucasian). Observers performed both a speeded priming task in which they categorized the visible mask based on one of these dimensions (separate groups of participants) and a prime visibility task in which they categorized the masked face based on the same dimension. We found first that both tasks were governed more by similarity as defined by task relevance than by shared features. Facial features that were not relevant to the imperative tasks had relatively little influence on either visibility or response priming. Second, the similarity of task-irrelevant features had a measurable influence only on the visibility of the prime; and when it did, the direction of influence tended to be different than for task-relevant features. Specifically, while task-relevant similarity always reduced prime visibility, similarity on task-irrelevant features sometimes enhanced it. This pattern of results points to another important dissociation between the visual experience of masked primes and their unconscious behavioral influences.**

MIRROR NEURONS FOR OBSERVATION, MENTAL SIMULATION, AND EXECUTION OF REACHING MOVEMENTS IN HUMANS. ***Flavia Filimon, Jonathan D. Nelson, Donald J. Hagler, Jr., & Martin I. Sereno, University of California, San Diego*** **-- The involvement of some brain areas in both observation and execution of movement has been taken as evidence for the existence of a "mirror neuron" system for actions. A similar functional overlap has been found for motor imagery and execution of movement. However, previous studies have only compared two of three conditions (observation, mental simulation, and execution of action) at a time. It thus remains unclear how the three conditions compare: whether, e.g., motor imagery elicits stronger activations than movement observation, and how those activations compare with actual movement-related activations. Here we used fMRI at 3T and cortical-surface-based techniques to map out the cortical areas and levels of activation for imagined, observed, and executed reaching movements in humans. Our results show that both observed and imagined reaching ellicit overall weaker activations than actual reaching. Activations for the three conditions overlapped primarily in dorsal premotor cortex and parietal cortex. Differences in patterns of lateralization for the three conditions as well as similarities in activation patterns will be discussed.**

A CAT IS A CAT IS A CAT. OR IS IT?. ***Robert French, Paul Quinn, Denis Mareschal, & Martial Mermillod, University of Burgundy*** **-- Three- to 4-month-old infants presented with cat or dog images form a category representation for Cat that excludes dogs and a category representation for Dog that includes cats (Quinn, Eimas, & Rosenkrantz, 1993). We have accounted for this asymmetry by positing an inclusion relationship in the distribution of features present in the cat and dog images (Mareschal, French, & Quinn, 2000). Using a combination of computational modeling and experimental testing of infants, we show that the asymmetry can be reversed or removed by selecting and manipulating stimulus images that reverse or remove the inclusion relationship. The findings suggest that categorization**

of cat and dog images by young infants is a bottom-up driven process based on learning occurring within the experimental task.

INTERACTIVE TOOLS FOR ACQUIRING TRANSFERABLE PROBLEM-SOLVING KNOWLEDGE. *Peter Gerjets & Julia Schuh, Knowledge Media Research Center ; Katharina Scheiter, University of Tuebingen* **-- Learning from worked-out examples is seen as a very efficient way to foster the acquisition of problem schemas. In this paper we demonstrate that computer-based instruction provides possibilities to further enhance example-based learning. In an experiment carried out with 59 pupils from a German high school we first demonstrated that a tool which prompted learners to compare examples across different problem categories in the domain of algebra fostered performance on near transfer problems, which differed from the instructional examples with regard to their surface features. However, only the dynamic visualizations of the examples' solution procedures additionally improved performance on far transfer problems, which differed from instructional examples with regard to their structural features. It is assumed that while the comparison tool supports the induction of an abstract problem schema, the visualizations help to understand relations below the category level, which is required to successfully adapt known solution procedures to changed problem structure.**

THE EFFICIENCY OF BIOLOGICAL MOTION PERCEPTION. *Jason Gold & Susan Cook, Indiana University, Bloomington; Duje Tadin & Randolph Blake, Vanderbilt University* **-- Human observers can easily extract information (e.g., gender and identity) from point-light biological motion sequences. A common assumption in the biological motion literature is that point-light displays are highly informationally impoverished relative to full-figured biological motion displays. Our ability to easily perceive point-light sequences is then taken to suggest highly efficient use of available information. Here, we use ideal observer analysis to directly test these assumptions by a) quantifying the relative information contained in full-figured and point-light biological walker displays and b) determining how efficiently human observers use the available information contained in each of these kinds of displays. Surprisingly, we have found that ideal observer performance is indistinguishable for full and point-light walker stimuli in a standard left-right walking discrimination task, indicating that each kind of stimulus carries the same amount of discriminative information. However, human performance in this same task is nearly an order of magnitude worse for point than full figured walkers, indicating that human observers use information far less efficiently in these kinds of point-light displays. We are currently conducting (and will discuss the preliminary results of) a series of follow-up experiments designed to pinpoint the sources of the relative inefficiency human observers exhibit in discriminating amongst point-light displays.**

EMPHASIS CHANGE AS A TRAINING PROTOCOL FOR HIGH DEMAND TASKS. *Daniel Gopher, Technion-Israel Institute of Technology* **-- Emphasis change is a training protocol in which subjects are required during training to systematically change their emphasis (effort, attention allocation) on sub-elements of a performed task. Emphasis levels are varied between few minute practice trials or performance durations. Experiments and application studies by several research groups have demonstrated the robustness of this protocol in improving the ability of performers to cope with high workload tasks. The talk will describe main variants of the emphasis change protocol and review major outcomes of its application. Emphasis change as a training protocol is argued to be a special and specific case of introducing variability to training. Other examples are the effects of training under uniform versus mixed trial blocks, and introducing a random noise component to the forcing function in the training of manual tracking skills. It is proposed that the introduction of variability, or multiple performance alternatives early in training, influences the formation of the general task shell within which competence is developed and exercised. Variability leads to the formation of task shells in which changes of task features and demands are an integral dimension of the shell. The acquired skill includes a developed ability to adapt to changes. High demand tasks are especially susceptible to transient and local changes in task load, and hence benefit substantially from the emphasis**

change protocol. Moreover, the systematic control over the profile of emphasis change in training, is a powerful tool in shaping up the nature of expertise and its strategic flexibility.

CHARACTERIZING ATTENTION IN TERMS OF CHANGES OF DECISION CRITERION AND SENSITIVITY. *Andrei Gorea, CNRS/Ren Descartes University; Dov Sagi, Weizmann Institute of Science* **-- Perceptual attentional effects have been characterized in terms of sensitivity or response time changes. Here we examine observers' decisional behavior in conditions thought to introduce attentional effects. We take advantage of a series of studies measuring changes of sensitivity (d') and decision criterion (zFA) between single (S) and dual (D) tasks to reveal an unexpected relationship between the decisional behavior and sensitivity. While observers adopt a quasi-optimal decision criterion (in the Signal Detection Theory sense) in single tasks, they depart from it in dual tasks showing criteria convergence. In the extreme case, observers use a unique criterion (uc) in accordance with a model whereby decisions are based on a unique internal representation. Criteria convergence correlates negatively with the d drop in the D-tasks for the lower (r=.91) but not for the higher (r=.06) sensitivity stimulus in a pair. This correlation is accounted for by a model positing that observers always use a uc (Sagi & Gorea, VSS 2004) in the D-tasks and that the observed departures from it reflect an unequal increase of the internal noises related to the two targets. According to the model, the less salient stimulus yields a larger internal noise increment relative to the more salient one. Hence, both sensitivity losses and departures from optimality in dual tasks appear to be determined by the same process and can be used interchangeably as indices of attentional dispersal. This is the first demonstration of an attentional link between sensitivity and decisional impairments in dual tasks.**

SEPARATING CONTEXT AND ITEM EFFECTS IN EPISODIC MEMORY WITH DESCRIPTIVE SAM MODELING. *David E. Huber, James P. Van Overschelde, & Yoonhee Jang, University of Maryland* **-- The Search of Associative Memory (SAM) model assumes retrieval consists of two discrete processes stages: sampling is the process of focusing on specific target memories through the use of context cues and recovery is the process of retrieving the information contained within the sampled memories. Based on this theory, successful sampling is related to correct use of context cues whereas recovery is related to knowledge of the item itself. In one line of experiments, we examined recall of high and low frequency words in pure and mixed frequency lists. Assuming a simple multinomial model of sampling and recovery, recovery parameters are estimated from pure lists and sampling parameters are estimated from mixed frequency lists. This modeling allowed us to ascertain whether various forms of item pre-exposure preferentially resulted in additional item or additional context information. In a second line of experiments, we examined both recall and recognition for the list before the last while manipulating both the number of items in the intervening list and the number of items in the target list. For both recall and recognition there was a failure to focus context on the prior list, but this failure was differentially affected by intervening list length only for recognition.**

KERNEL-METHODS, SIMILARITY, AND EXEMPLAR THEORIES OF CATEGORIZATION. *Frank J kel , Max Planck Institute for Biological Cybernetics* **-- Kernel-methods are popular tools in machine learning and statistics that can be implemented in a simple feed-forward neural network. They have strong connections to several psychological theories. For example, Shepard's universal law of generalization can be given a kernel interpretation. This leads to an inner product and a metric on the psychological space that is different from the usual Minkowski norm. The metric has psychologically interesting properties: It is bounded from above and does not have additive segments. As categorization models often rely on Shepard's law as a model for psychological similarity some of them can be recast as kernel-methods. In particular, ALCOVE is shown to be closely related to kernel logistic regression. The relationship to the Generalized Context Model is also discussed. It is argued that functional analysis which is routinely used in machine learning provides valuable insights also for psychology.**

STIMULUS GENERALIZATION IN CATEGORY LEARNING . *Matt Jones, Todd Madox, & Brad Love, University of Texas, Austin* -- **Most models of category learning make explicit assumptions about how category knowledge is generalized to novel stimuli. However, stimulus generalization in categorization has never been directly studied, due to the challenges of disentangling the effects of multiple prior stimuli. Here I describe a technique based on recency effects that allows measurement of strong generalization effects from the most recently presented stimulus. I will present a mathematical model of this process along with experimental results showing how generalization behavior can adapt to statistics of the task. Implications are dicussed for the nature of perceptual and category representations and the roles of short- and long-term memory in learning.**

ITERATED LEARNING SO FAR. *Michael Kalish, University of Louisiana at Lafayette* -- **Iterated learning is a process of information transmission closely related to the serial reproduction method of Bartlett (1932). Iterated learning is also a model for the cultural transmission of knowledge from one generation to the next, and thus also a model for the evolution of language, religion and science among other cultural artifacts. The formal properties of iterated learning have begun to be explored, and initial human experimental work has confirmed that some of these properties can be observed in the laboratory. In this talk I sketch these origins and beginnings, and present some directions iterated learning research is now taking.**

USING SIMPLE RECURRENT NETWORKS TO LEARN REPRESENTATIONS OF LINGUISTIC SEQUENCES. *Christopher Kello & Daragh Sibley, George Mason University* -- **Linguistic messages present themselves as variable-length sequences of elements. The representation of variable-length sequences has been challenging to models of language processing because they pose a binding problem: information must be learned and represented about elements, both with respect to their positions, as well as independent of them. It is also difficult to process variable-length sequences such that their ill-defined similarity structure can be used to support generalization to novel sequences. More specific to language, a variety of dependencies can exist among the elements of a sequence, and the language system must be able to learn and represent all of them. I will present an extension of the simple recurrent network architecture that is able to learn and represent variable-length sequences. In the sequencer architecture, input sequences are mapped onto output sequences via a learned, mediating level of representation that is fixed-width and stable with respect to the sequences. These properties of the mediating representations enable the use of standard vector operations and connectionist mechanisms to process sequences, even when they vary in length and structure. By virtue of these properties, the sequencer architecture addresses the long-standing problems of alignment and dispersion in connectionist learning and representation. A number of small-scale and large-scale simulations will be presented to demonstrate its efficacy and usefulness in addressing linguistic and psycholinguistic data.**

PUTTING RECENCY INTO CONTEXT. *Krystal A. Klein, Indiana University, Bloomington; Amy Criss, Carnegie Mellon University; Richard Shiffrin, Indiana University, Bloomington* -- **In everyday life, it is often important to remember not only what things have happened, but also when they happened. While some information about temporal aspects of memory encoding can be inferred from common paradigms such as free and serial recall, a more direct approach is required in order to forge a good understanding of the manner in which the timing of past events is remembered. Here we explore a task where participants study a list of words, and are subsequently presented with two studied words and are asked to judge which word occurred more recently in the studied list. The literature on these 'judgments of recency' is sparse and unconnected, and existing model proposals are vague. As such, I discuss a series of experiments using a study-test variant of the forced-choice judgment of comparative recency paradigm (Flexser & Bower, 1974); these shed light on the manner in which temporal context evolves in the course of list-learning experiments, and the extent to which this change in context allows discriminability of the order of past events.**

NEURAL NETS AS MODELS OF COGNITIVE FUNCTIONS: WHAT DO THEY TELL US?. *Peter R. Krebs, University of New South Wales* -- **Many activities in Cognitive Science involve complex computer models and simulations of both theoretical and real entities. Artificial Intelligence and the study of artificial neural nets in particular, are seen as major contributors in the quest for understanding the human mind. Cognitive functions, like learning to speak, or discovering syntactical structures in language, have been modelled, and these models are the basis for many claims about human cognitive capacities. Problems arise when cognitive concepts that belong in the `top-down' approach are conflated with models grounded in the `bottom-up' connectionist methodology. Merging the two fundamentally different paradigms within a single model can obfuscate what is really modelled. When the tools (simple artificial neural networks) to solve the problems (explaining aspects of higher cognitive functions) are mismatched, models with little value in terms of explaining functions of the human mind are produced. The ability to learn functions from data-points makes ANNs very attractive analytical tools. These tools can be developed into valuable models, if the data is adequate and a meaningful interpretation of the data is possible. The problem is, that with appropriate data and labels that fit the desired level of description, almost any function can be modelled. It is my argument that small networks offer a universal framework for modelling any conceivable cognitive theory, so that neurological possibility can be demonstrated easily with simple models. However, a model demonstrating the possibility of implementation of a cognitive function using a distributed architecture, does not necessarily add support to any claims that the cognitive function in question, is neurologically plausible**

A SUDDEN APPEARANCE MODEL FOR THE EVOLUTION OF HUMAN COGNITION AND LANGUAGE. *Susan J. Lanyon, University of New South Wales* -- **The debate over the evolution of an innate language capacity seems to divide into two principle schools of thought. Jackendoff has argued that language processing is based on three autonomous generative components, phonological, syntactic, and semantic/conceptual and he is committed to the view that they evolved incrementally through natural selection. Pinker also sees no reason to doubt that the principle explanation is the same as for any other complex instinct or organ, Darwin 's theory of natural selection'', when theorizing about language evolution. An alternative approach has been taken recently by Hauser, Chomsky and Fitch. They argue that the property that makes human language unique (recursion), may be a recent emergence in hominid evolution. It follows from this line of thought that most of the anatomical characteristics that support language (e.g. vocal tract and controlled breathing) may be merely variations of previously evolved biological structures, and not of a different kind. Leaving aside the argument of whether these structures evolved gradually, they did not evolve nor were they tuned'' to serve the faculty of language. Here I argue that hominins evolved through major evolutionary leaps, which may have numbered only two or three significant mutation events''. Neoteny (the retention of infant or juvenile growth rates) has been the major force in the evolution of our primate ancestors and this process can explain the sudden emergence of many of the traits that define what it means to be human.**

SOME APPLICATIONS OF BAYESIAN INFERENCE IN PSYCHOLOGY. *Michael Lee, University of Adelaide* -- **We outline the objective Bayesian approach to statistical inference advocated by Jaynes (2003), describing how it analyzes all of the available information in a principled way, based on probability theory. We then describe the key probability statements that follow from such an analysis, and are likely to be useful for an empirical science like psychology. These include prior distributions over parameters, prior predictions about observations, posterior distributions over parameters based on data, posterior predictions about observations based on data, the relative probability of data under competing models, and predictions about observations based on several models. We then present a set of applications to psychological phenomena, including something like: measuring inter-observer agreement, fitting and comparing response time distributions, analyzing signal-detection theory accounts of memory, understanding human decision-**

making on an optimal stopping problem, and inferring how many kegs a beer factory has in circulation. (Okay, the last one is not really psychology, but it was a fun consultancy, and maybe brewing counts as an allied science).

BOUNDARIES OF KNOWLEDGE PARTITIONING. *Stephan Lewandowsky & Leo Roberts, University of Western Australia* **-- Knowledge partitioning refers to the theoretical notion that knowledge can be held in independent non-overlapping parcels, which may result in people making contradictory decisions for identical problems in different circumstances (e.g., Lewandowsky & Kirsner, 2000). We report three experiments that examined the boundary conditions of knowledge partitioning in categorization. The studies examined whether or not people would partition their knowledge when categorization rules were or were not verbalizable, and when the to-be-categorized stimuli were comprised of psychologically separable or integral dimensions. With one exception, partitioning occurred across all combinations of verbalizability and integrality/separability, suggesting that knowledge partitioning is of considerable generality. The only situation in which partitioning was not observed involved a condition in which people learned the task very rapidly, suggesting that complexity plays a critical role in the emergence of partitioned knowledge.**

EXEMPLAR-BASED RELATIONAL CATEGORY LEARNING. *Bradley C. Love, University of Texas at Austin* **-- Research in category learning and analogy has proceeded independently in part because models cannot address findings from both areas. Category learning models can replicate learning curves and address generalization data, but can only be applied to studies involving spatial or featural stimuli. In contrast, models of analogical comparison focus on how people align representations containing relations (e.g., part-of, causes). Here, a model is presented that spans these two areas. The model extends an exemplar-based connectionist model of category learning, ALCOVE (Kruschke, 1992), to processing relational stimuli. The model contains three competing attentional pools. As attention shifts to and from the relational (object defined relative to other objects), object (object as symbol), and featural (object as bundle of properties) attentional pools, the model's notion of similarity changes. The model is successfully applied to a series of data sets from the analogy and category learning literatures.**

PHASE TRANSITION IN SPEED-ACCURACY TRADE-OFF. *Han van der Maas & Eric-Jan Wagenmakers, University of Amsterdam* **-- Sequential sampling models of choice reaction time predict a continuous trade-off between speed and accuracy. In this talk, a phase-transition model is proposed, in which sudden changes in reaction time and accuracy occur as function of small changes in payoffs for speed and accuracy. Two experiments were conducted. In the first experiment subjects were required to behave in a way that is intermediate between guessing and accurate responding. According to the RWM, such behavior requires an adjustment of the bounds of the decision process. According to the PhTM, this behavior amounts to sampling from two different states. The results demonstrate bimodality, which supports the PhTM. In the hysteresis experiment, payoffs were slowly varied between values favoring guessing and values favoring accurate responding. As predicted by the PhTM, jumps between the states differed in position depending on the direction of change in the payoffs. New data-analytical techniques are used in order to analyze hysteresis. Also, the possibility of new sequential sampling models for a discontinuous trade-off will be discussed.**

ARE CONCRETE AND ABSTRACT SENTENCES UNDERSTOOD IN TERMS OF UNDERLYING FORCE PATTERNS?. *Carol J. Madden & Diane Pecher, Erasmus University Rotterdam* **-- Many events can be broken down into patterns of stronger and weaker forces in opposition, yielding situations such as allowing rest, allowing action, forcing rest, and forcing action (Talmy, 1988). Our ability to understand these patterns of "force dynamics" relies heavily on our own physical experiences with forces in the environment as well as our psychosocial experiences of situational tendencies towards action or rest in the face of opposing forces. Two experiments test the idea that concrete and abstract event descriptions**

are understood in terms of our embodied experiences with patterns of forces in the environment. In the first experiment, abstract and concrete event descriptions were preceded by concrete event descriptions with the same or different patterns of force dynamics. For instance, in the following concrete sentence, "The elastic band kept the poster rolled up," the elastic band is a stronger force that imposes rest on the poster, a weaker force tending towards action (unrolling). This could either be preceded by a sentence with a similar force dynamic pattern: "The fish couldn't go anywhere once trapped in the fisherman's net;" or a sentence with a different force dynamic pattern: "He cut the string, allowing the balloon to float into the sky." In the second experiment, abstract and concrete event descriptions were preceded by animations of events (two shapes interacting) with the same or different patterns of force dynamics. The results are discussed in terms of embodied theories of language comprehension

HEARING SILENCE IN MUSIC. *Elizabeth Margulis, Northwestern University* **-- Silences in music are often expressively powerful, despite the absence of a sounding stimulus. How can musical context make silence speak? To address this question, untrained listeners were played excerpts featuring periods of silence and asked: first to press a button when they heard the silence begin and another when they heard it end; second to move a slider to indicate changes in perceived tension across the excerpt; and third to answer a series of direct questions about their experience of the excerpt. Context was shown to affect duration estimates for silent periods, reaction times to silence onsets and offsets, perceptions of musical tension and perceptions of metricity during silent periods, as well as reports about the expectedness and salience of silent periods. Repercussions are discussed for representation, memory, and expectation in music.**

PSYCHOLINGUISTIC AND CORPUS INVESTIGATIONS OF VERBAL EVENT STRUCTURES. *Gail McKoon & Roger Ratcliff, Ohio State University* **-- Lexical semantic, decompositional representations for verbs are proposed. The hypothesized representations differ in their complexity across classes of verbs. This differential complexity is demonstrated empirically in four ways: with lexical decision response times, with STM and LTM, and with sentence comprehension times. These data converge in their theoretical interpretation with statistics of naturally produced sentence structures from a large corpus.**

HUMAN SPATIAL MEMORY AND NAVIGATION. *Timothy P. McNamara, Vanderbilt University* **-- In this presentation, I will summarize the results of a program of research that has examined how spatial relations among objects in the environment are represented in memory and how remembered spatial relations are used to guide navigation. This research has led to the development of a new theory of human spatial memory and navigation. According to this emerging theoretical framework, navigation in familiar environments relies on two subsystems: An egocentric subsystem computes and represents self-to-object spatial relations at sensory-perceptual levels for the purpose of guiding locomotion. These representations are transient, and decay rapidly in the absence of perceptual support. An environmental subsystem is responsible for representing the enduring features of familiar environments. In this subsystem, the spatial structure of the environment is represented in an orientation dependent manner using an intrinsic reference system. Interobject spatial relations are specified with respect to a small number (typically 1 or 2) of intrinsic reference directions or axes. As a person locomotes through a familiar environment, two types of updating occur. The momentary egocentric self-to-object spatial relations needed to control locomotion are updated as long as there is perceptual support. This updating process is efficient and requires minimal attentional control. Spatial updating in the environmental subsystem consists of keeping track of location and orientation with respect to the intrinsic reference system used to represent the spatial structure of the environment. The body is treated like any other object in the environment. Environmental updating requires more attentional control than does egocentric updating. Experimental tests of this theory and alternative theories will be discussed.**

HOW DIAGNOSTIC ARE SPATIAL FREQUENCIES FOR FEAR RECOGNITION? *Martial*

Mermillod, University Pierre Mend&#65533;s France; Nathalie Guyader, University College London; Patrix Vuilleumier, Laboratory of Neurology & Imaging of Cognition, Geneva; David Alleysson & Christian Marendaz, University Pierre Mend&#65533;s France -- **Vuilleumier, Armony, Driver & Dolan (2003) have shown that amygdala responses to fearful expressions is more activated by intact or low spatial frequency (LSF) faces than high spatial frequency (HSF) faces. The fMRI results suggest that LSF components processed by the magnocellular layers of the lateral geniculate nucleus (LGN) might be conveyed by a subcortical pathway activating the pulvinar, superior colliculus and the amygdala. The purpose of the present study is to test the usefulness of LSF information as compared to HSF information in a visual classification task performed by an artificial neural network. This model links a computational model of visual perception and a back-propagation classifier. The basic idea is i) to compress visual information by means of a perceptual model of vision and ii) to provide a distributed model of cognition with the above mentioned visual inputs. The results show that visual information conveyed by LSF faces, which is processed very fast by the human perceptual system, allows a distributed neural system to correctly categorize fearful or neutral faces. This is not the case for HSF components. These results suggest that high-speed connections from the magnocellular layers to the amygdala might be a fast and efficient way to recognize fearful faces.**

A COMPARISON OF EYE MOVEMENTS IN STATIC AND DYNAMIC VISUAL SEARCH **.** *Adrian von M&#65533;hlenen, Thomas Geye, & Hermann J. M&#65533;ller , Ludwig-Maximilians-University* -- **The role of memory in visual search has lately become a controversial issue. Horowitz and Wolfe (1998) asked observers to search displays for a letter T among letters L in two experimental conditions: In the static condition, the displays remained unchanged, whereas in the dynamic condition, all letters were randomly re-located every 100 ms. If search involves a memory-based mechanism that keeps track of the previously examined locations, observers would be expected to have great difficulties searching the dynamic display. Surprisingly, search performance did not differ in the two conditions, from which they concluded that memory is not involved in the static condition. Another explanation is that observers adopted in the dynamic condition a sit-and-wait strategy (i.e., attending to a region of the display and waiting for the target to appear). This hypothesis is supported in an eye movement study, showing that observers make fewer fixations in the dynamic than in the static condition.**

THE MIRROR EFFECT AND THE SPACING EFFECT. *Bennet Murdock, University of Toronto* -- **The mirror and spacing effects are two rather surprising effects found in simple item recognition-memory studies. They illustrate a &#65533;leapfrog&#65533; effect where a weaker or older item jumps over a stronger or more recent item after a single presentation. I recently proposed a simple model based on a linear combination of excitatory, inhibitory, and context factors which was able to fit the data reasonably well with the same parameter values for both effects. I will report the results of several experiments dealing with the spacing effect for low- and high-frequency words which were roughly consistent with the predictions of the model.**

LOCAL SHAPE AND REFLECTANCE STATISTICS OF NATURAL SURFACES. *Richard Murray, University of Pennsylvania* -- **Shape from shading (SFS) is the problem of recovering 3D shape from intensity variations across 2D images. SFS is a difficult computational problem, because it is underdetermined: any given 2D image could have been produced by any of an infinite number of arrangements of lighting, surface geometry, and surface reflectance patterns. Thus, to solve SFS unambiguously, any natural or artificial visual system must incorporate assumptions, at least implicitly, about what 3D interpretations of 2D images are plausible or implausible. To determine what statistical regularities are found in natural surfaces, I examined a database of around eighty high-resolution 3D digital scans of randomly chosen objects. I considered views of these objects from randomly selected viewpoints, and examined how the orientation and reflectance of small surface patches changed from place to place in these random views. The results were as follows. (a) The histogram of orientation changes over small displacements was very**

regular. There was a peak at zero orientation change, a second peak at a small but nonzero orientation change, and then a smooth falloff out to an orientation change of ninety degrees, beyond which point orientation changes were rare. (b) The histogram of reflectance changes over small displacements was also very regular, with a peak at zero reflectance change, and a rapid falloff at higher reflectance changes. (c) Orientation and reflectance changes were moderately correlated. I will discuss the implications of these findings for a Bayesian understanding of the human visual system's ability to solve SFS.

THE EMERGENCE OF "CAUSAL REASONING" IN PRESCHOOLERS: BAYESIAN STRUCTURE LEARNING OR RECEDING RETROACTIVE INTERFERENCE?. *Serban C. Musca, University Pierre Mendes; Gautam Vallabha , Carnegie Mellon University* **-- Sobel, Tenenbaum & Gopnik (2004) investigated the development of causal inferences in preschoolers in three experiments with tasks adapted from conditioning literature (backwards blocking and screening-off) and concluded from this indirect evidence that children develop a mechanism for Bayesian structure learning. We suggest instead that (a) the differential performances in the two tasks are more likely due to differential memory demands, and (b) the observed developmental differences between 3" and 4"-year old children may be due to maturation of the memory system, with higher retroactive interference in younger children and lower retroactive interference in older children. This account is supported by simulations with Ans & Rousset's (1997, 2000) memory self refreshing neural networks architecture. The implications of the account proposed here on a theory of causal relation learning are discussed.**

BAYESIAN ADDITIVE CLUSTERING. *Daniel J. Navarro, University of Adelaide; Thomas L. Griffiths, Brown University* **-- The additive clustering model is widely used to infer the features of a set of stimuli from their similarities, on the assumption that similarity is a weighted linear function of common features. Existing methods for inferring these features assume that the number of features is fixed. Determining the correct number of features becomes a model selection problem, requiring multiple runs of the algorithm and often relying on approximate selection criteria. To address this, we develop a fully Bayesian formulation of the additive clustering model, using methods from nonparametric Bayesian statistics to allow the number of features to vary.**

HOW EXPERIENCE AFFECTS PERCEPTION AND MEMORY. *Angela Nelson & Richard Shiffrin, Indiana University* **-- Differences in lifetime exposure to events, objects and concepts have a large impact on performance in cognitive tasks like perception and memory. A well known example is word-frequency, but word frequency is corrrelated with numerous other variables, making it difficult to isolate the effects of experience per se. Some studies aimed to isolate the effects of experience differentially trained novel items like pseudowords. However, such stimuli are imperfect for this purpose because they carry forward aspects of wordness: E.g. they match words in bigram and phoneme frequency, and may remind subjects of similar words. We therefore decided to train subjects on Chinese characters, likely to be novel on most dimensions. Borrowing a task from Shiffrin and Lightfoot, subjects searched for Chinese characters in visual displays for several weeks-- the characters were trained to differential degrees, with exposure frequencies varying geometrically. Training did produce learning, measured both by slopes and intercepts of the response-time by display-size function. Following training , subjects were tested with a perception task (pseudo lexical decision-- " have you ever seen this character?") and a recognition memory task ("have you seen this character on the list just studied?").. The results qualitatively matched those for word frequency-- High frequency characters exhibited faster pseudo lexical decision, and lower recognition accuracy (with a mirror effect). Thus, pure experience is shown to play an important role in both perceptual and memory tasks.**

INTUITIVE EXPERIMENTAL DESIGN. *Jonathan D. Nelson, University of California, San Diego* **-- Several evidence acquisition tasks can be described probabilistically, as decision problems in which the goal is to ask questions that maximize subjective expected utility.**

Candidate utility functions include Bayesian diagnosticity, log diagnosticity, information gain, KL distance, impact, and probability gain. Several simulations reveal properties of these functions. Previous experiments on categorization, covariation assessment, medical diagnosis and Wason's card selection task do not discriminate between these utilities as descriptive models. However, new empirical data strongly contradict Bayesian diagnosticity and log diagnosticity. The feature difference strategy, which has been observed in multiple experiments, is not a suboptimal heuristic (as has been claimed). Rather, this strategy exactly implements impact. Both behavioral and eye movement experiments can address important issues in future work in this area.

THE ORIGINS OF SPATIAL KNOWLEDGE . *Nora Newcombe, Temple University* **-- Debate in developmental psychology concerning the origins of knowledge often centers on the question of what capabilities are available at the start of life. While this question is important, understanding the mature cognitive architecture to which the developing child is headed also has crucial implications for the origins debate. This paper will consider the evidence on two contrasting approaches to the origins of spatial knowledge. In a modular view, various sources of spatial information are processed independently. In adaptive combination models, information sources are combined, using mechanisms that weight sources based on their potential usefulness.**

HYPOTHETICO-DEDUCTIVE THINKING AS A METACOGNITIVE KNOWLEDGE-ACQUISITION STRATEGY IN INQUIRY-BASED LEARNING ENVIRONMENTS. *Renate Otterbach, University of San Francisco* **-- Science, with its focus on experimentation, is a domain that favors inquiry-based learning. An inquiry-based learning environment is any problem-solving situation where the problem is ill-defined and where problem-related and domain-specific knowledge is limited. Swanson's (1990) study indicated that metacognitive strategies, specifically hypothetico-deductive thinking, contributed to the successful completion of inquiry-based learning tasks. This study builds on Swanson's finding by investigating how high and low hypothetico-deductive thinking students construct knowledge, in the absence of direct instructions, when faced with a novel task. This study also investigates how scaffolding can be used to mediate inquiry-based environments for low hypothetico-deductive thinking students. Students, identified as high and low hypothetico-deductive thinkers, were asked to play twelve increasingly difficult games of Mastermind. The low hypothetico-deductive thinking students were divided into two groups, one group received support through scaffolding, and one did not. Scaffolding consisted of leading questions that structured and simplified the problem. During the games, it was observed that the high hypothetico-deductive thinking students used two very distinct strategies. Data analysis showed that each of the four groups had very distinct patterns over the course of the twelve games. Both high groups identified the code in fewer moves than the low groups; however, whereas one high group increased hypothetical deductive thinking as the codes became more complex, the other high group increased in the number of moves needed to find the code. Of the two low groups, only the low group that received scaffolding improved over the twelve games, the other low group did not show any improvement over time.**

THE ROLE OF PERCEPTION AND ACTION IN CONCEPTUAL REPRESENTATIONS. *Diane Pecher, Erasmus University, Rotterdam* **-- According to the embodied view of cognition (e.g., Barsalou, 1999), sensory-motor simulations underlie the representation of concepts. Support for this view is given by findings of similar phenomena in perception and cognition. In a property verification task (e.g., APPLE-green) responses were slower after a modality shift, supporting the view that sensory-motor simulations play a role in the representation of concepts. Representations are also affected by recent experiences with the same concept. Concept names (e.g., APPLE) were presented twice in a property verification task with a different property on each occasion. Verification times were higher if the previous presentation had a property from a different than from the same modality. Finally, we found that pictures of objects were recognized faster if the concept name had been presented with a visual property than if it had been presented with a property from another**

modality.

REVERSING THE PROBABILITY WEIGHING FUNCTION BY EXPRESSING PROBABILITIES IN FORMATS WITH STEVENS EXPONENTS HIGHER THAN ONE. *Jose Quesada, Nick Chater, & Enrique Molina, Warwick University* **-- Prospect theory introduced the idea that probabilities are transformed into decision weight in a nonlinear way: small probabilities are overweighted, and large ones are underweighted in an inverse-S-shaped probability weighting function (PWF). However, recently (Hertwig et al., 2004; Weber, Shafir, & Blais, 2004) a new "decision by experience" paradigm for choice has appeared where people do exactly the opposite: they underestimate small probabilities. This would be an important finding because, none of the one-parameter functional forms for the PWF (Prelec, 1998; Tversky & Kahneman, 1992) can explain the reversal. However, this S-shaped PWF has not been investigated thoroughly. We adopted an idea from the proportion judgment literature (Hollands & Dyre, 2000; Spence, 1990): In a proportion judgment people judge the magnitude of one item divided by the sum of the magnitudes of that item and its complement. Substituting Stevens' power-law in the proportion equation Hollands and Dire (2000) reached a well-known functional form for the PWF (Karmarkar, 1978). The PWF is then dependent on the magnitude estimation curve of the modality in which probabilities are presented. In proportion estimation experiments, Stevens exponents higher than one render S-shaped curves. Here we reverse the curve by presenting prospects where probabilities were displayed in different non-numeric ways. The results add evidence against the two explanations for the effect proposed by Hertwig et al. (2004): unlikely sampling of rare events in small samples, and lower probability of rare events in the recent past (recency).**

LATENT MARKOV MODELS FOR CATEGORIZATION. *Maartje Raijmakers, University of Amsterdam* **-- Latent Markov models, among which latent class models, have been successfully applied in detecting rules and strategies in reasoning tasks (e.g., Jansen & VanderMaas, 1997). I will present two studies in categorization research where I apply latent Markov models to describe the strategy use of participants in a robust and systematic way. The first study concerns a free categorization task with 4 to 12 year old children and adults. In contrast to the holistic-to-analytic-shift theory, participants of all ages appear to apply one-dimensional classification rules. Moreover, I will show why holistic rules found in earlier studies (e.g., Smith & Kemler, 1977) are an artifact of the earlier analysis techniques. The second application concerns the studies of category learning by Johansen & Palmeri (2002). With latent Markov models representational shifts during the category learning task can be modeled in a robust and systematic way. New results will be presented about the kind of changes that appear during the learning process. More in general, it is shown how the latent variable models are useful to apply in the field of category learning.**

THE ROLE OF CONSOLIDATION IN MEMORY: COMPARISON OF GENERAL VS. SPECIFIC INTERFERENCE USING MIDAZOLAM. *Lynne Reder, Joyce Oates, Anderson, Dickison, Dulik, Ferris, Gyulai, Hobday, Jefferson, Lorang, & Quinlan, Carnegie Mellon University* **-- Wixted's recent Annual Review of Psychology suggests that most of forgetting should be attributed to general interference that blocks consolidation rather than specific interference. One of the sources of evidence he mentions is research using benzodiazepines that create temporary anterograde amnesia. However, that research did not carefully compare general versus specific interference. The work I will present is intended to rectify that omission.**

MODELING ALPHABETIC RETRIEVAL AND SEARCH . *Hedderik van Rijn, University of Groningen* **-- Retrieval of letters from the alphabet is a prototypical instance of retrieval from overlearned series. Klahr et al. (1983) described alphabetic retrieval as chunked serial search process. Scharroo et al. (1994) argued that a Dutch replication did not show effects of serial search and that a model consisting of simple associative strengths explains all effects. Analyses of mixed effect models of a new Dutch replication study show a preference for a model including a factor related to Klahr's alphabetic chunk notion. However, a**

computational model of this task showed that both associations and serial search are necessary to account for the human data.

MATERIAL REPRESENTATIONS: FROM THE GENETIC CODE TO THE EVOLUTION OF CELLULAR AUTOMATA. *Luis Rocha, Indiana University* **-- We present a definition of the concept of representation that relies on a study of the origin of the types of structures that are used to store memory in evolving systems. This study is based on what we know about genetic memory in Biology, and from our own novel experiments in the evolution of Cellular Automata to solve nontrivial tasks. Our key observation is that representations need to be inert structures that encode information used to construct appropriate dynamic configurations. Unlike what is commonly understood in Cognitive Science, we argue that evidence from Biology shows that representations are not stand-ins in dynamic processes, and also do not need to refer to situations external to a given organism or dynamics. We propose criteria to decide if a given structure is a representation by unpacking the idea of inert structures that can be used as memory for arbitrary dynamic configurations. Using a genetic algorithm, we evolved Cellular Automata rules that can solve non-trivial tasks related to the density task (or majority classification problem) commonly used in the literature. We present the particle catalogs of the new rules following the computational mechanics framework. We discuss if the evolved cellular automata particles may be seen as representations according to our criteria. We show that while they capture some of the essential characteristics of representations, they lack an essential one. Our goal is to show that Artificial Life can be used to shed new light on the existing computation versus dynamics debate in Cognitive Science, and indeed function as a constructive bridge between the two camps. Our definition of representation and Cellular Automata model are proposed as a complementary approach, with both dynamics and informational modes of explanation.**

SUPPORT VECTOR MACHINES OUTPERFORM CLASSIFICATION IMAGES IN INDUCTION OF FEATURES. *Adam Sanborn, Richard Shiffrin, & Chen Yu, Indiana University* **-- In a typical two-alternative forced-choice classification image experiment, noise is added to a visual stimulus and an observer classifies the noisy stimulus. The noise added to each stimulus on each trial is binned according to the combination of the stimulus and response. After many trials, the noise images in each bin are averaged and combined with a summing and differencing operation to produce a single "classification image". This "difference" classification image provides a visual representation of the relative influence that each pixel had on the observer"s responses over the course of the experiment. Alternatively, this same representation can be computed using linear support vector machines (SVMs). We trained SVMs to produce observer responses using signal plus noise data. In simulated experiments, the classification image template and SVM template were compared to the true generating template. The SVM template was able to achieve the same accuracy as the classification image template using fewer trials, when observer internal noise and accuracy were similar to values found in experimental situations. The advantage for SVMs is typically greatest when the analysis is applied to the raw data consisting of both signals plus noise. A concern with the SVM approach is that training on signal plus noise can in some cases bias the template toward the signal, rather than extract the "true" features used by the observer. SVMs trained with few trials and high observer performance do show a bias, but the results are quite robust and show little bias for numbers of trials and levels of observer performance typical of real experiments.**

NOISE PRODUCES DIFFERENT NEURAL CORRELATES OF UPRIGHT AND INVERTED FACES: EVIDENCE FOR WITHIN CLASS INHIBITION. *Bethany Schneider, Jordan Delong, & Thomas Busey, Indiana University, Bloomington* **-- In four experiments, we added noise to upright and inverted faces. If neurons with similar properties respond to both orientations, then adding noise should have similar effects. If a separate class of neurons responds only to upright faces, then adding noise should differentially affect the response to orientation. In Experiment 1, we examined upright and inverted faces across two contrast levels and one signal to noise ratio, yielding a crossover interaction of the N170**

wave. When presented in noise, the amplitude of the inverted face was smaller than the upright face. In Experiment 2, we showed that wave reversal was robust for full but not partial faces across all noise levels. In Experiment 3, we varied contrast to see if reversal was a result of degrading a face. We see no reversal effects. Thus, across conditions, adding noise to full faces was a necessary and sufficient condition for the N170 reversal. This corresponds with a model which describes inhibition occurring between neurons processing noise and inverted, but not upright, faces. In Experiment 4, we delayed onset of the upright/inverted face presented in noise. We replicated the smaller N170 for inverted faces at no delay, but observed partial recovery of the N170 for inverted faces at longer delays. These data support a model in which neurons responding to noise inhibit those responding to inverted faces with inhibition waning to produce selective recovery. Thus, a separate neuronal population may respond to inverted faces and receive intra-class inhibition from neurons responding to noise.

PERVASIVE STATISTICAL STRUCTURE IN THE ENVIRONMENT. *Lael Schooler, Max Planck Institute of Human Development* **-- Anderson & Schooler (1991) showed that human memory performance plausibly reflects patterns with which environmental stimuli (e.g., words) occur and reoccur. However, some have questioned whether the previous analyses are representative of the environment in which we live. In response to this concern, I analyzed the ranging behavior of drivers tracked by GPS devices. The results show that the places we visit by car (and perhaps the places that Baboons and Howler monkeys visit as well) share statistical structure with the previously studied domains. This pervasive statistical structure supports the plausibility of a domain general memory system, which some have argued against on the grounds that different domains lack a common statistical structure.**

MODELING ADHD WITH STOCHASTIC RESONANCE AND DOPAMINE AUTO-RECEPTORS. *Sverker Sikstr&#65533;m, Lund University* **-- Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder characterized by inattention, impulsivity, and hyperactivity. It is believed to involve a deficit of dopamine neurotransmitters that modulates the signal to noise ratio in neural cells. Stochastic resonance (SR) is the empirical phenomena that a signal presented under the detection threshold can be detected in presence of moderate noise. The role of SR and ADHD is investigated. A computational model is suggested where the dopamine level modulates the signal to noise ratio in SR. Consistent with the model, experimental data show that ADHD children benefit from auditory noise whereas performance is attenuated for controls. Furthermore it is suggested that auto-receptors up-regulates the phasic dopamine response in ADHD where the tonic dopamine level otherwise are low. This makes performance in ADHD highly sensitive to the presentation rate whereas controls are robust against this manipulation.**

WHEN INDUCTION MEETS MEMORY: THE DEVELOPMENT OF INDUCTION AND CATEGORIZATION. *Vladimir M. Sloutsky, Ohio State University* **-- Induction is crucial for learning: upon learning that a cat has a particular biological property, one could expand this knowledge to other cats. Recently, Sloutsky and Fisher (2004) demonstrated that while adults induce on the basis of category information, 5-year-olds induce on the basis of similarity. However the developmental course of this category-based induction remains unclear and the goal of the reported research is to elucidate this course. In Experiment 1, following induction, 5-year-olds, 7-year-olds, 12-year-olds, and adults were presented with a recognition task. Decrease in memory accuracy exhibited a developmental trend, with 5-year-olds being most accurate and adults being least accurate. Experiment 2 indicated that after being trained to perform induction in an adult-like manner, memory accuracy of 5-year-olds and 7-year-olds dropped to the level of adults. In Experiment 3, we introduced novel items and recognition accuracy of adults increased to the level of children. Finally, in Experiments 4-5, we presented young children with various training regimes. Results indicated that simple associative training may result in category-based induction in young children. Overall results indicate that children do not spontaneously perform category-based induction, but it is rather a product of learning and development. The results also**

suggest reciprocal relationships between categorization and recognition categorization leads to poorer memory of item-specific information.

DEFINING AND USING ACCURATE CONFIDENCE JUDGMENTS . *George Sperling, University of California, Irvine* **-- The confidence-rating scale procedure has been widely used in psychological experiments. However, subjects are not explicitly taught the use of confidence intervals nor is the accuracy of their use measured. Here we demonstrate a confidence rating procedure for two-alternative choice tasks that requires the subject to choose a calibrated bet. High-risk bets have large rewards and even larger penalties. They have a high expected utility only when subjects legitimately have high confidence. Low-risk bets with low expected utility have greatest expected utility when subjects have low confidence. For a given likelihood ratio of the two alternatives, there is an optimal decision (bet). Two experiments tested how accurately subjects learned and how consistently they used optimal criteria. In Task 1, subjects were given numerical IQ scores chosen from one of two equally likely normally distributions (means 100, 120), and they used a six-point rating scale with calibrated bets to indicate their guesses. Task 2 was formally equivalent, except that the information was conveyed by the length (in pixels) of the side of a displayed square, i.e., there was additional sensory uncertainty. The results of Expt 1 demonstrate that subjects indeed learn to make consistent, nearly optimal confidence judgments. We use the variability of a subject's confidence criteria in Expt 1 to derive a more accurate estimate of his/her sensory noise (versus decision noise) in Expt 2.**

CLOCK TIME NAMING: COMPLEXITIES OF A SIMPLE TASK . *Simone Sprenger, Max-Planck-Institute for Psycholinguistics; Hedderik van Rijn, University of Groningen* **-- Relative clock time naming (pronouncing 3:50 as 'ten to four') allows to study the production of complex utterances without extensive pre-experimental training or instruction. We extend the currenlty existing models of clock time naming (Meeuwissen, Roelofs, Levelt, 2003) by testing three more refined hypotheses about the factors that determine clock time naming latencies: physical distance, arithmetics, and frequency of the expression. Three experiments and a corpus analysis that test these hypotheses are presented. Regression models of speech onset latencies for an extended set of clock times show clear contributions of all three factors.**

PREDICTION AND CHANGE DETECTION. *Mark Steyvers & Scott Brown, University of California, Irvine* **-- We measure the ability of human observers to predict the next datum in a sequence that is generated by a simple statistical process undergoing change at random points in time. Accurate performance in this task requires the identification of changepoints and prediction of future observations based on the observations following the last changepoint. We assess individual differences between observes both empirically, and using two kinds of models: a Bayesian approach for change detection and a family of cognitively plausible fast and frugal models. Some individuals detect too many changes and hence perform sub-optimally due to excess variability. Other individuals do not detect enough changes, and perform sub-optimally because they fail to notice short-term temporal trends.**

LEARNING RELATIONAL SYSTEMS OF CONCEPTS. *Josh Tenenbaum & Charles Kemp, Massachusetts Institute of Technology; Tom Griffiths, Brown University* **-- We present a computational framework for learning abstract relational knowledge, with the aim of explaining how people acquire intuitive theories of physical, biological, or social systems. Our approach is based on a generative relational model with latent categories, and simultaneously determines the kinds of entities that exist in a domain, the number of these latent classes, and the relations between classes that are possible or likely. This model goes beyond previous psychological models of category learning, which consider attributes associated with individual categories but not relationships between categories. We apply this domain-general framework to several specific tasks, such as learning the structure of kinship systems and learning causal theories.**

PERCEPTUAL AND MOTOR REPRESENTATIONS IN LANGUAGE PROCESSING: INSTRUMENTAL OR ORNAMENTAL?. *Rolf Zwaan, Florida State University* **-- I will review recent research from my laboratory that has focused on the role of perceptual processes and representations and motor processes and representations in language comprehension. The evidence shows a range of compatibility effects between the meaning of a linguistic unit and concurrently or subsequently performed perceptual or motor tasks. The question I will consider is whether this perceptual and motor activation is essential to language comprehension or whether it is just ornamental, with the real work being done by abstract amodal representations.**

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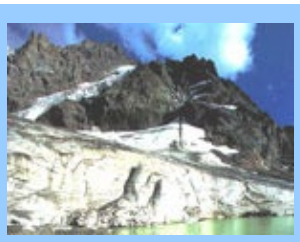

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Travel and Lodging Information for ASIC 2005

Travel to Brian&#65533;on

Brian&#65533;on (pop 11,300) is most accessible from the following airports: Grenoble: 1.5 hrs; Milan, Lyon, Marseille 2.5 hrs; and, it is approximately 2.5 Hrs from Stresa (Cog Sci) by car. Although Brian&#65533;on is served by both buses and trains, most attendees will want to rent a car. I encourage each of you to use a service like Mapquest to plan a route from your own starting points to Briancon. Generally speaking, the distance from Milan, or Malpensa airport, or Stresa, to Briancon is about 150 miles. The path from Milan involves major portions on E64-A4, E70-A32, Ss24, and N N94. The path from Stresa involves major portions on A26, A4, A32, Ss24, and N94. However this listing leaves out important details.

Lodging: Alpe Hotel Club

Address

Avenue du Dauphine, 5100, Brian&#65533;on - Serre Chevalier, France
About 800m from the old fortress town, Vieille Ville, at 1026m.
Between Parc National des Ecrins (west) and Parc Naturel Regional du Queyras (south)
Teleferique nearby to Prorel - 2566m

Amenities

- **Rooms Feature: TV, Hair Dryer, Bath, Phone.**
- **Hotel Features: pool, fitness room, sauna, Turkish bath.**

Reservations

At this late date it is best to contact the hotel by phone or fax to make lodging reservations or changes , and to arrange payments. The conference coordinator at the hotel is assistant manager Jean Michel. Telephone: 33 4 92 200 200. When you hear the recorded mesage start, press 2. This will get to the front desk (sometimes the staff is out and won't answer, and you must try again later). Ask to speak to someone who speaks English (unless you speak French). Fax: 33 4 92 200 143.

The hotel under new ownership is still arranging new email service, and an email address is not currently available.

Dates

July 25, Mon to July 31, Sun (all 90 rooms reserved until Nov. 1. At that time I must give a firm estimate and release rooms, so please let me know if you are likely to come, and please book early.

Rates

- **Double occupancy 52E/pers/night, half board, double room, or 312E/6 nights**
- **Single occupancy: 72E/ngt, or 432E per 6 nights**
- **They have some triples and quads as well.**
- **Children: 1st child (0-11 yrs) w 2 adults: free**
- **2nd child (0-3 yrs) w two adults: free**
- **2nd child (4-11 yrs) w 2 adults: -70% of adult rate**
- **3rd person in room, any age > 11: -40%**

Meals

- **Buffet style; continental breakfast, and dinner included in above rates; drinks extra; vegetarian options included**
- **The Alpe Hotel has said they are able to provide meals to conference attendees who are not lodging at their hotel, according to the following prices: Breakfast: 8 euro/day; Dinner: 18 euro/day.**
- **Final banquet (deluxe buffet, plus wine, beer, drinks) part of registration fee, but extra persons pay a fee**

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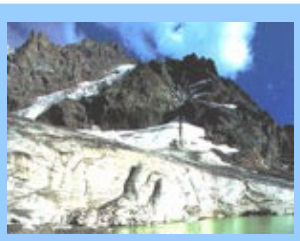

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Activities in the area of Brian&#65533;on

Local Site Information

Brian&#65533;on has an historic old walled city called Vauban to the south/southeast of the new city and the hotel. The Hotel is on Avenue du Dauphine which is an extension of Avenue de Provence which is an extension of N94.

Brian&#65533;on is at an altitude of 1200 meters, sitting at the start of a valley, Serre Chevalier, that rises steadily in elevation to the northwest following route N91. On the west side of this valley is France&#65533;s 4th largest ski resort, with four cable cars spaced along the valley: at Brian&#65533;on (1200 m to top at Prorel, 2360 m), Chantamerle (1350 m to top at Serre Chevalier 2491 m), Villeneuve (1400 m to top at 2300 m)) and Monetier (1500 m to a top at 2177 m). These cable cars are open in the summer. There are also mountains on the east side of the valley (without cable cars) ranging from 2000 m to 3000 m in height.

There is a large wilderness/mountain park not far to the west of Brian&#65533;on (just over the initial range of ski mountains) called Parc National des Ecrins, with many high peaks, topped by Barre des Ecrins at 4102 m. There is another park not far to the southeast of Brian&#65533;on called Parc Naturel Regional du Queyras. Both parks are replete with botanical treasures, wildlife, scenery, trails, and so forth.

You can learn more about Brian&#65533;on on the city's tourism site: http://www.briancon.com.

Activities

The area has numerous opportunities for leisure activities. There is a tennis club, swimming club, bowling, and a large health club/fitness center. The real attractions of the area are the many types of outdoor adventure. Both the Tour de France and the Giro (Tour of Italy) typically are routed through Brian&#65533;on, and go over its various nearby mountain passes, giving bicyclists opportunities to mimic their favorite heros. In addition, there are a large number of marked bike touring routes (VTT). There are hiking trails everywhere, some right from town, though the most impressive are probably in and about the two national parks. There are quite a few Via Ferrata in the near area. There is sailing at Lac de Serre Poncon (Europe&#65533;s largest lake) an hour or so south of Brian&#65533;on. There is rafting, kayaking, airboats, canyoneering, parapenting, mountaineering, rock climbing, and caving, among other activities, with plentiful firms and local guides to take people on these activities.

Rogier van Rijn ( ) the brother of one of our attendees, Hedderik van Rijn, is in training near Briancon to be a guide. He has offered his help and advice to our conference participants. He prepared some information about activities in the Briancon area, which follows. Feel free to contact him for more information of all kinds. (Click to access the pamphlet in pdf format)

Possible activities in Brian&#65533;on:

Hiking
Mountaineering
Biking
Fitness/HealthClub
Via Ferrata
Rock Climbing

Rafting **Kayaking** **Parapenting**
Air boats **Canyoneering** **Bowling**
Wildlife/botanical touring **Swimming** **Caving**
Tennis **Sailing**

Firms/Guides/Stores (Brian&#65533;on)

- **Tennis Club de Brian&#65533;on: 04-92-20-19-20;**
- **Centre International de Preparation Physique en Altitude: 04-92-20-17-60;**
- **Le Bowling: 04-92-21-43-53**
- **Centre Aquatique Ludique: 04-92-20-04-04; http://www.vert-marine.com**
- **Hautes-Alpes Ski de Fond: 04-92-20-15-09 (Glacier Skiing)**
- **Action 3: 04-92-20-56-56 (Biking; Canyoneering; Hiking; Flora and Fauna Tours)**
- **Visa Trekking: 04-92-21-25-25; http://www.visa-trekking.com (Hiking, Touring)**
- **Club Alpin Francais: 04-92-20-16-52; ; http://perso.wanadoo.fr/caf.briancon/; (Rock Climbing, Caving, Mountaineering, Parapenting, Via Ferrata, Biking)**
- **Bureau des Guides et des Accompagnateurs: 04-92-20-15-73; Biking, Rock Climbing, Mountaineering, Touring/Hiking, Via Ferrata)**
- **Serre Che Eaux-Vives: 04-92-24-79-00; http://www.serreche-eauxvives.com ; (Rafting, Kayaking, Airboat, Hydrospeed)**
- **Canoe Kayak Club Brian&#65533;onnais: 04-92-20-17-56; (Kayaking, Rafting, Airboat, Speedboat)**
- **Vertige et Canyon: 06-60-82-46-50; http://www.vertigeetcanyon.com; (Rock Climbing, Via Ferrata, Canyoneering, Touring, Biking)**
- **L&#65533;Echappee: 06-30-47-70-77; (walking, hiking, touring)**
- **Velo-Crampons: 04-92-20-04-72; ; (Biking)**
- **Intersport: 04-92-21-10-00 (Sports Store for Via Ferrata, Mountaineering, Rock Climbing)**
- **Riquet Sport Twinner: 04-92-20-48-48; (Sports Stores for Via Ferrata, Biking, Rock Climbing, Mountaineering, Canyoning)**

Maps

The Michelin 1:200000 Regional Map 523 covers the Briancon area and will be useful. The local 1:25000 topographic maps of use include the iGN maps 3535OT and 3436ET (Ecrins National Park), 3537ET and 3637OT (Queyras National park) and 3536OT (Briancon imediate area).

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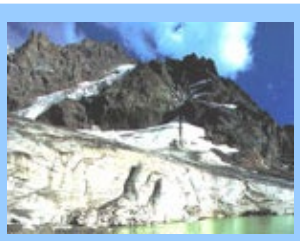

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Contact Information:

Conference Organizer

Rich Shiffrin
Indiana University - Bloomington

Address Correspondence to:

Annual Summer Interdisciplinary Conference (ASIC 2005)
c/o Prof. Richard Shiffrin
Psychology Department
Indiana University
1101 E. 10th St.
Bloomington, IN 47405

Webmaster/Conference Coordinator

Please direct questions concerning the website to the webmaster:

Krystal Klein
Indiana University - Bloomington

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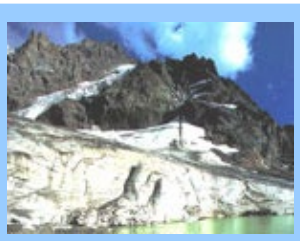

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The ASIC Yahoo! Group

A Yahoo! group has been set up for ASIC in order to provide attendees with the ability to find potential roommates and activity partners, and coordinate ride or rental car sharing for the conference this summer.

Instructions:

1. **Follow the link http://groups.yahoo.com/group/ASIC2005.**
2. **In order to post messages or reply to others' messages, you must join the ASIC Yahoo! group. Click on the text "Join this group", which should appear on the upper right.**
3. **This will take you to a login screen. If you have any kind of Yahoo! account (mail, chat, photo, etc.), then you will be able to login here. If not, you will be able to quickly and easily sign up for an account by clicking the text "Sign up now."**
4. **Once you have logged in, return to the ASIC2005 group page. Make selections on the left sidebar menu in order to read or post messages.**
5. **Optional: Click on "Edit my membership" to modify if and when Yahoo! Groups sends messages to your registered email address.**

Contact Krystal ( ) if you have any questions or concerns about the forum.

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