Third Annual Cognitive Science Association for Interdisciplinary Learning

July 18-22, 1996
Hood River Hotel
Hood River, Oregon

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PROGRAM

July 18 Evening

4:30	Appetizers/no-host bar
5:15	Opening Remarks
5:30-6:00	Pierre Jolicœur Attentional and structural constraints on short-term memory encoding
6:10-6:40	Leonid L. Kontsevich Movement of attentional focus through the visual field
6:50-7:20	Bruce Milliken Attention, memory, and inhibition: Toward a unified theory of repetition deficits
7:30	Adjourn

July 19 Morning

8:30	Morning Refreshments
9:00-9:30	Randi C. Martin, Mary Lesch, & Michael Bartha Independence of input and output phonology in word processing and short-term memory
9:40-10:10	Josué J. Romero Implicit memory in individuals with Alzheimer's disease
10:20-10:50	Stanley A. Klein & Scott Slotnick Multiple judgement signal detection methodology for memory research
11:00	Break till 4:15

July 19 Evening

4:15 Appetizers

Featured Posters: Catherine L. Harris
Multi-word units in the lexicon: Evidence from letter detection, visual search and repetition blindness

And U. Turken, F. Gregory Ashby, & Leola Reese
Multiple systems in category learning

4:45-7:45 **SYMPOSIUM ON PERSISTENCE**

4:45-5:15 David I. Shore, James T. Enns, & Vince Di Lollo
Temporal integration requires attention

5:25-5:55 James T. Enns, Jamie Brehaut, & David Shore
Attention influences the apparent duration of briefly presented objects

6:05-6:35 Vince Di Lollo, B. B. Lee G. Tassinari, C.A. Marzi, & D. Campara
Magnocellular involvement in suppression of motion smear

6:45-7:15 Loftus
The last word on persistence

7:25-7:45 Wolford commentary and open discussion

July 20 Morning

8:30 Morning Refreshments

9:00-9:30 Jennifer Stolz & Derek Besner
When hard work doesn't pay off: What your mother didn't teach you about reading

9:40-10:10 Markus Damian & Randi Martin
Semantic versus associative priming under masked and above threshold conditions

10:20-10:50 Glen E. Bodner & Michael E. J. Masson
The effects of target discriminability on masked identity priming in the lexical decision task

11:00 Break untill 4:45

July 20 Evening

4:45 Appetizers/no-host bar

Featured Posters: Dale S. Klopfer
Interactions between perceptual and linguistic representations of color and of space

Harvey G. Shulman, Victor Hsieh, & Shu-Chieh Wu
Does the attention blink in RSVP reflect transient attention mechanisms?

5:30-6:00 Karen M. Arnell & Pierre Jolicœur
The attentional blink across stimulus modalities: Evidence against visual interference theories

6:10-6:40 Anne-Marie Bonnel & Bill Prinzmetal
Dividing attention between form and color: An application of the AOC (attention operating characteristic) methodology

6:50-7:20 Derek Besner & Jennifer Stolz
Debunking automaticity: More about processing in the Stroop task

7:30 Adjourn

July 21 Morning

8:30 Morning Refreshments

9:00-9:30 Regina McGlinchey-Berroth
Hare conditioning in human amnesia

9:40-10:10 Mary F. Lesch, Randi C. Martin, & Kari L. Hoffman
Are semantic representations category-specific and modality-dependent? Implications from a case-study

10:20-10:50 Edward H. Cornell & Donald Heth
Interactive and compensatory processes in human wayfinding

11:00 Break till 4:45

July 21 Evening

4:45	Featured Posters: Laura Grande Ill gotten gain: Selective attention, semantic memory and Alzheimer's disease. Michael Sullivan, Bruce Milliken, & Josué Romero The nature of identity negative priming in young and healthy old adults
5:30-6:00	Roberto Dell'Acqua & Pierre Jolicœur Structural and strategic constraints on memory encoding
6:10-6:40	Lynn C. Robertson & Dell L. Rhodes Exogenous and endogenous attentional orienting in spatial reference frames
6:50-7:20	Steve Yantis On the representational basis for visual selection: What is the stimulus that attention selects?
7:30	Adjourn
8:00	Banquet

July 22 Morning

8:00	Morning Refreshments
8:30-9:00	Mark Van Selst & James C. Johnston Dual-task interference that cannot be attributed to output interference
9:10-9:40	Tony Ro & Robert D. Rafal A transcranial magnetic stimulation study of distractor interference
9:50-10:20	Samuel Gosling, Richard Robins, & Kenneth Craik An empirical analysis of trends in contemporary scientific psychology
10:30-10:35	Adjourn

ABSTRACTS

July 18 Evening

Pierre Jolicœur
Department of Psychology, University of Waterloo

Attentional and structural constraints on short-term memory encoding

Two two critical stimuli (S1 and S2) were embedded in a stream of white letters shown using a rapid serial visual presentation paradigm (RSVP, 100 ms SOA) on a black background. In many cases, S1 was a red H or S; S2 was an X or a Y. Performance in a two-alternative forced choice (2AFC) discrimination (unspeeded) on S2 was impaired when processing of S1 was required — a result often called an attentional blink (AB). The nature of the task required for S1 modulated the magnitude of the impairment for S2. Worse performance on S2 was found for Go than for No go trials, for 2AFC than for simple RT, and for 4AFC than for 2AFC. The deficit on S2 was also found when S1 was a tone requiring a 2AFC frequency discrimination, demonstrating a cross-modal AB even with a simple tone as S1. Within each experiment and each condition, worse S2 performance was associated with slower responses to S1 — results consistent with a central single-channel capacity limitation. Several additional results from my lab will be described and used to constrain a new theory designed to account for the deficits observed in such RSVP tasks and other similar paradigms. The theory highlights the importance of masking, single-channel capacity limitations on response selection, capacity limitations on memory encoding, and hypothesizes a pipeline mechanism involved in the transfer of information from maskable (iconic/echoic) to non-maskable (STM) memory.

Leonid L. Kontsevich
Smith-Kettlewell Eye Research Institute, San Francisco

Movement of attentional focus through the visual field

The possible movement of an "attentional spotlight" across the visual field to a cued location was tested by means of a detection task. The target (a change in brightness of a small element in a low-contrast random texture) was presented with a variable delay after a bright peripheral cue. When the target was presented between the fixation point and the peripheral cue the detection probability as a function of delay steeply declined when the delay exceeded some value (20 msec for a target eccentricity of 5 degrees and 40 msec for 8.3 degrees). When the target was presented on the opposite side of the peripheral cue the detection probability was very low and approximately constant. If the peripheral cue caused a shift of attention above or below the horizontal meridian, the position where detection was best also shifted in the same direction. These experiments provide direct evidence for the existence of a moving attentional focus with a diameter not exceeding 1 degree. These experiments also provide strong evidence that attention moves in an analog manner.

Bruce Milliken
Department of Psychology, McMaster University

Attention, memory, and inhibition: Toward a unified theory of repetition deficits

Efficient attentional processing allows behavior to be directed toward relevant rather than irrelevant sources of stimulation. Many researchers of attention are particularly interested in inhibitory mechanisms that impede the processing of irrelevant information. Two empirical phenomena that have been used to examine such mechanisms are known as 'negative priming' and 'inhibition of return.' As procedurally defined, negative priming provides a measure of inhibition that is directed toward distractors to aid in selection of targets. On the other hand, inhibition of return measures inhibition that accrues to targets after they have been attended. Several experiments will be reported that blur this distinction, and that argue against the view that performance is determined by the lingering effect of inhibitory processing. Instead, the data implicate an interaction between attentional and memory retrieval systems in which inhibitory processes may indeed play a critical role.

July 19 Morning

Randi C. Martin, Mary Lesch, and Michael Bartha
Department of Psychology, Rice University

Independence of input and output phonology in word processing and short-term memory

Recent models of short-term memory based on neuropsychological findings have emphasized the close relationship between language processing and short-term memory. This relationship was investigated in a case study of a severely anomic patient who shows excellent comprehension. On short-term memory tests involving spoken output his performance is impaired and he shows no advantage for word over nonwords. A striking aspect of his list repetition is his tendency to provide circumlocutions for words in the list (e.g., "the place where kings go in" for "castle"). On short-term memory tests involving only input phonology his performance is normal. These results suggest that the patient retains semantic information in short-term memory but cannot use this to retrieve output phonology. However, his retention of input phonology is normal. The results thus support the involvement of semantic codes in short-term memory and, further, suggest a separation between the retention of input and output phonological codes.

Josué J. Romero
Department of Psychology, Southern Illinois University-Carbondale

Implicit memory in individuals with Alzheimer's disease

The literature is equivocal as to whether implicit memory is impaired in individuals with probable Alzheimer's disease (AD). The discrepancy may relate to the encoding task used in testing. This study was designed to address A) whether implicit memory is impaired in individuals with AD, B) whether their performance is related to the nature of the encoding task, and C) whether the Process Dissociation Procedure (Jacoby, 1991) provides a better estimate of automatic and conscious memory processes than the implicit/explicit memory test methodology. In this study, healthy old adults and individuals with AD were administered explicit and implicit word-stem completion tests following a sentence completion encoding task and following a pleasantness rating encoding task. The results showed that individuals with AD were impaired on both implicit and explicit memory tests independent of the type of encoding task. However, the Process Dissociation Procedure was better than the implicit/explicit test methodology at separating conscious and automatic memory processes, but only for the healthy old adults.

Stanley A. Klein and Scott Slotnick
School of Optometry, University of California Berkeley

Multiple judgement signal detection methodology for memory research

Memory is multi-dimensional since retrieved information can vary by measures of familiarity, recollection, and source identification. We have carried out triple judgment source memory experiments which give insights into the underlying structure of the internal representation of memory. Subjects studied words from source A and source B, and were then given a memory test requiring confidence ratings on whether each word was from source A, source B, or new. Upon subsequent analysis using signal detection theory, the results show that the internal representations for both old/new recognition memory and source memory are Gaussian in nature. In addition we have developed a new method by which d' can be extracted from the usual 3×3 detection-identification data. We end with a discussion on the problems and solutions associated with the application of signal detection theory to memory research.

July 19 Evening

Catherine L. Harris
Department of Psychology, Boston University

Multi-word units in the lexicon: Evidence from letter detection, visual search and repetition blindness

A connectionist perspective on word learning and word recognition suggests that the units of lexical representation are not part of a fixed architecture, but emerge through extracting co-occurrence regularities. Data on regularities smaller than a word (such as the role of high-frequency letter clusters and neighborhood effects in word recognition) have typically been recruited to support this view. But if the size of stored units is a matter of degree, then we expect the lexicon to also store multi-word units which have become entrenched due to repeated use. Research from three experimental paradigms supporting this view will be presented.

Experiments using the Reicher task showed that letter-detection is superior in high-frequency word combinations (called collocations: next step, large part, cold war) compared to the same word occurring as part of a syntactically legal combination (neat step, large port, gold war). This held even when both letter choices made a collocation (prop/crop up, faced/laced with, next step/stop).

In a visual search task, subjects searched a display of scattered words or word-pairs for a target, which was a non-word. The time to find targets was consistent with the hypothesis that inspecting a random word-pair, as well as an associated pair such as cradle baby, requires two accesses of the mental lexicon, while inspecting a collocation requires just one lexical access.

A repetition blindness study showed that collocations presented in sentences via RSVP, compared to non-entrenched word pairs, are relatively protected from the clobbering effects of an earlier presented word. For example, frequency of report of "trial" was higher when it occurred following "fair" than when it occurred following "ugly," in both of these sentences:

Jane's ugly trial was a fair trial to the Western Community. Jane's fair trial became an ugly trial because of violence.

And U. Turken, F. Gregory Ashby, and Leola Reese
Department of Psychology, University of California Santa Barbara

Multiple systems in category learning

A biologically plausible computational model is proposed that assumes category learning is a competition between separate verbal and implicit categorization systems. The competition is assumed to be mediated by loops through the basal ganglia that incorporate the neocortex, the caudate nucleus of the striatum, globus pallidus and the thalamus. In addition to making predictions for normal adults, the theory makes specific predictions for children, the elderly, and for patients suffering from Parkinson's disease, Huntington's disease, and major depression. A connectionist model is presented in order to account for trial by trial learning. The structure of the network is based upon the cortico-striato-thalamic loops that are postulated to mediate category learning by multiple systems. The performance of the connectionist network is compared with the human data.

SYMPOSIUM ON PERSISTENCE

David I. Shore, James T. Enns, and Vince Di Lollo
Department of Psychology, University of British Columbia

Temporal integration requires attention

Purpose: We used a visual search task to study how attention and temporal integration interact in scotopic and photopic vision. Methods: Stimuli were created from four of the seven possible segments of a digital figure 8, and were presented in an eight-position circular array. The task was to indicate which of two targets ('F' or an 'h') was presented. Set size was varied, as was the difficulty of the search task (distractor-target similarity). To study temporal integration, the stimuli were displayed in two sequential frames (F1 and F2), separated by a variable interval (ISI). Two of the segments in each stimulus were displayed in F1, the other two in F2. With ISI equal to zero, the task resembled standard visual search. Results: At zero-ISI, reaction-time (RT) search slopes over set size were steeper in the difficult than in the easy task, in both photopic and scotopic viewing. As the ISI was increased, search slopes (both accuracy and RT) increased in both the difficult and the easy search tasks. This increase was seen with ISIs up to at least 400 ms in the dark, but only 200 ms in the light. Conclusions: Temporal integration (TI) of sequential stimuli depends on attention. Previous accounts of TI have invoked only low-level processes, notably visible persistence. Our results question the adequacy of such models.

James T. Enns, Jamie Brehaut, and David Shore
Department of Psychology, University of British Columbia

Attention influences the apparent duration of briefly presented objects

Many previous studies have examined the benefits of covert attentional orienting on the detection, identification, and discrimination of spatial stimulus attributes. Only a few studies have examined the influence of orienting on temporal aspects (e.g., Reinitz, 1990; Stelmach & Herdman, 1991). These studies concur with the prevailing theories (i.e., spotlights, beams, gradients) that the benefits of spatial cuing consist of a speeded neural response (Stelmach & Herdman, 1991) or an increased temporal resolution (Tsal, Meiran & Lamy, 1995) for the target stimulus. An associated, but as yet untested, prediction of these theories is that the perceived duration of a stimulus should be increased when it is unattended.

We examined the influence of spatial attention on the perceived duration of a brief stimulus (90 ms), using the psychophysical method of constant stimuli. We found a consistent pattern of results under several different cuing conditions and a variety of cue-target time intervals: brief stimuli at an attended location appear to be on view for a longer period of time. An examination of the psychophysical ogive function showed that this was an effect of accuracy (i.e., a constant error) and not an effect of precision (i.e., response noise).

These results suggest several possible relations between the influences of attention on the apparent onset and duration of an object. We are presently testing the possibility that the perception of onset is related to a transient visual signal whereas the perception of duration is related to a sustained neural response. As such, these two effects should be separable in factorial experiments that are now in progress.

Vince Di Lollo, B. B. Lee, G. Tassinari, C. A. Marzi, and D. Campara
Department of Psychology, University of British Columbia; Max Planck Institute; University of Verona

Magnocellular involvement in suppression of motion smear

It is known that moving stimuli produce less smear than would be expected in terms of visible persistence lasting 100-150 ms. On the basis of a series of studies carried out in the mid-1980s, Hogben and Di Lollo suggested that smear is actively suppressed by stimulus-initiated inhibitory processes. We now have reason to believe that the inhibitory mechanism can be linked to the magnocellular (M) pathways which are known to be heavily involved in motion perception. The critical data came from patients affected by compression of the ventral part of the anterior visual pathway by subchiasmal pituitary adenomas. Functioning of the M pathways is believed to be selectively impaired in these patients.

Congruent with the hypothesis of selective M-pathway impairment, the patients' perception of motion was similar to that of normal controls with foveal stimuli, but was impaired with peripheral stimuli. An even more revealing pattern of results emerged from estimates of visible persistence. When estimates were obtained with stationary stimuli, the patients' duration of visible persistence was the same as that of normal controls. When tested with stimuli in motion, however, the patients revealed a pronounced deficit in suppression of motion smear under condition in which suppression was most evident in normal observers. We conclude, first, that visible persistence is a cooperative ventral-stream effect reflecting both P- (excitatory) and M- (inhibitory) activity and, second, that activity in the M-system, triggered by directional motion signal generated by low-level motion sensors, leads to suppression of motion smear.

Geoff Loftus
Department of Psychology, University of Washington

The last word on persistence

Too abstract to be abstracted using mere words.

July 20 Morning

Jennifer Stolz and Derek Besner
Department of Psychology, University of Waterloo

When hard work doesn't pay off: What your mother didn't teach you about reading

"Semantic priming" refers to the robust finding that identification responses (e.g., naming, word-nonword decision) are faster and more accurate to words that follow immediately a silently read, associated, prime word. A recent report demonstrated that this normally robust effect is not an automatic consequence of merely reading a prime word. Instead, whereas priming is obtained for short duration primes when presented in isolation, these same primes do not produce priming when intermixed with longer duration primes. We replicate and extend this report. Furthermore, new results are taken to implicate the importance of experimental set in (1) determining what codes (e.g., orthographic, semantic) guide memory retrieval for words, and (2) modulating the operation of a center-surround memory retrieval mechanism.

Markus Damian and Randi Martin
Department of Psychology, Rice University

Semantic versus associative priming under masked and above threshold conditions

Two experiments investigated the claim that automatic facilitation in the lexical decision task reflects associative, but not semantic properties (Shelton & Martin, 1992). Experiment 1 used an (above-threshold) list presentation paradigm. Low frequency but not high frequency semantically related pairs were facilitated. A median split based on subjects overall reaction times revealed semantic priming only in the slower half of subjects. In contrast, associative facilitation was independent of word frequency and subjects' speed of response. These findings suggest strategies as the source of the semantic priming effects. Experiment 2 used a masked priming procedure: primes were presented for 20, 30, 40, or 50 msec and immediately replaced by the target. For the 40 and 50 msec conditions, facilitation was obtained for both semantically related and associatively related pairs. The results suggest that automatic semantic activation develops rapidly at the initial stages of word recognition, but fades quickly.

Glen E. Bodner and Michael E. J. Masson
Department of Psychology, University of Victoria

The effects of target discriminability on masked identity priming in the lexical decision task

Four experiments examined the effect of target discriminability on masked identity priming in the lexical decision task. In line with Forster and Davis' (1984) lexical account of masked priming, manipulating target discriminability did not lead to an interaction of word frequency and priming. Contrary to a lexical account, however, reliable nonword priming effects were obtained. A positive nonword priming effect was observed when targets were difficult to discriminate and therefore required more analytically based processing. A negative nonword priming effect was observed when targets were easily discriminable and could be classified on the basis of fluency. We suggest that lexical decisions are influenced by the balance between the fluency provided by the prime and the amount of analytical processing required to classify the target.

July 20 Evening

Dale S. Klopfer
Department of Psychology, Bowling Green State University

Interactions between perceptual and linguistic representations of color and of space

Naming the color of the word YELLOW printed in blue takes longer than naming the color of ##### printed in blue. Similarly, naming the location of the word ABOVE presented at a 9:00 position takes longer than naming the location of ##### presented in the same place. Both exemplify Stroop interference, which is typically thought to result from response competition between independent word-reading and color-naming (or spatial relation- naming) processes. Results indicate that interference is greater when the similarity between the color of the word and the color denoted by the word is high (e.g., YELLOW in orange) than when it is low (e.g., YELLOW in blue), suggesting that some interference is due to interactions between perceptual and linguistic representations of color. Results from a spatial Stroop task in which similarity between where a word is seen and the spatial relation denoted by the word is varied are discussed.

Harvey G. Shulman, Victor Hsieh, and Shu-Chieh Wu
Department of Psychology, The Ohio State University

Does the attention blink in RSVP reflect transient attention mechanisms?

In RSVP tasks that require reporting of two target items embedded in the visual stream, report of the second item suffers a transient loss of accuracy that has been termed the Attention Blink (AB). Theoretical explanations, e.g. Chun & Potter (1995), attribute the AB to attention mechanisms that are engaged by the first target and then may be refractory when the second target occurs. These theories predict proactive effects in which only stream items following the first target can be influenced by the AB. We have conducted a series of AB experiments that include probes in stream positions both before and after the primary target item. Both ERP and behavioral measures showed effects of attention to the primary target on probes that preceded it. These findings suggest that the AB is a consequence of preparatory mechanisms related to working memory, rather than the signature of a transient attention mechanism.

Karen M. Arnell and Pierre Jolicœur
Department of Psychology, University of Waterloo

The attentional blink across stimulus modalities: Evidence against visual interference theories

Previously, investigators studying the attentional blink (AB) required subjects to identify a visual target and to detect a subsequent visual probe. The resulting deficit in probe detection during the 200 to 450 ms post-target interval has been attributed to a uniquely visual limitation — for example, the result of confusion in overloaded visual short term memory. To examine whether the underlying limitation is specifically visual, we created targets and probes defined in terms of auditory information, and used these in combination with visual targets and probes. Target modality (visual or auditory) was fully crossed with probe modality (visual or auditory). Targets and probes were presented in simultaneous, but independent, visual and auditory streams. A robust AB was found in all four modality conditions, and was just as large when the target and probe were presented in different modalities as when they were presented in the same modality. Visual probes showed larger blinks than auditory probes with SOAs of 93 ms. Further investigation revealed that the time course of AB was different for visual and auditory stimuli, with auditory streams requiring faster presentation rates than visual streams in order to produce an AB. When the target required a speeded two-alternative forced choice decision, response times to the target helped predict probe accuracy. Fast target response times were associated with higher probe identification accuracy than slow target response times. Results are discussed in terms of a central limitation of attention and the Psychological Refractory Period (PRP) phenomenon.

Anne-Marie Bonnel and Bill Prinzmetal
Department of Psychology, University of California Berkeley

Dividing attention between form and color:
An application of the AOC (attention operating characteristic) methodology

In order to evaluate capacity limitations in vision, most experiments using the AOC (attention operating characteristic) methodology (concurrent tasks, manipulation of instructions, and contingency analysis) have studied the effect of dividing attention between spatially distinct objects. We tried to examine this question when attention must be divided between stimulus attributes other than spatial location, i.e., two separable dimensions of a given object such as form and color of an object.

In a first experiment subjects had to identify the color(blue or green) and the form (F or T) of a letter (blue F, blue T, green F, green T). The data, whatever the priority instructions (50C/50L 20C/80L or 80C/20L) are the same for each of the 6 subjects:

1 Accuracy, (or d') remains the same when subjects have to make two identifications (form and color) instead of one (form or color)

2 There is a strong positive dependence between accuracy in each task. These data suggest that form and color may be coordinated (if not integrated) by focusing attention to the presented object.

In a second experiment, we used the same subjects but separated form and color judgments in space, with the opposite results, for each of them.

1) The single task (only form or color) is much easier than the preceding, which led us to reduce the stimulus duration (only 3 refresh cycles instead of 5 in the preceding experiment).

2) The dual task is impossible. We observe a general cost of concurrence together with a negative contingency, whatever the priority instructions. This suggests that only one dimension (color or form) is is processed during the trial (switching strategy).

These results give support to object (and space) models: Within an object (or a location), divided attention is easy and selective attention is impossible. Between objects (or locations), selective attention is easy and divided attention is impossible. Further investigations should allow us to differentiate between attention mechanisms derived from object-based and space-based models.

Derek Besner and Jennifer Stolz
Department of Psychology, University of Waterloo

Debunking automaticity: More about processing in the Stroop task

It is a received idea that linguistic processing in the Stroop task cannot be prevented despite the fact that the subject is asked to ignore the word. We demonstrate that this conclusion is false.

July 21 Morning

Regina McGlinchey-Berroth
Geriatric, Research, Education and Clinical Center, Brockton

Hare Conditioning in Human Amnesia

A prominent characteristic of amnesia is the anterograde deficit, which limits an individuals' ability to form new complex memory representations. We have completed several studies investigating associative learning using classical eyeblink conditioning techniques in amnesic patients. In the delay conditioning experiment, the unconditioned stimulus (US) and conditioned stimulus (CS) terminated simultaneously, whereas in the trace conditioning experiment, the CS terminated before onset of the US. Animal studies have shown that the cerebellum is necessary for acquisition of conditioned responses, and that the hippocampus is necessary for acquisition in the trace paradigm. Similarly, we found that bitemporal patients were intact in delay conditioning, and impaired in trace conditioning. These findings suggest that the hippocampal memory system in humans is necessary to associate two temporally separated stimuli. Alcoholic Korsakoff's patients were impaired in delay conditioning, and surprisingly, so was a group of recovered chronic alcoholic subjects. This deficit is attributed to cerebellar degeneration that occurs following years of alcohol abuse. Overall, these findings demonstrate that predictions based on the animal model can be successfully applied to the study of human amnesia.

Mary F. Lesch, Randi C. Martin, and Kari L. Hoffman
Department of Psychology, Rice University

Are semantic representations category-specific and modality-dependent? Implications from a case-study

Category-specific deficits have been reported for a number of brain-damaged patients suggesting that semantic memory is organized in terms of shared semantic features. The present case, JJ, showed a deficit in the comprehension of specific categories (numbers, shapes, body parts) with auditory-verbal input, but not with visual-verbal input. Such a pattern would seem to suggest that access routes to semantics are category-specific — an unlikely hypothesis on the face of it. An alternative explanation hinges on two findings. First, the disrupted categories have few semantic features and, second, JJ has a severe deficit in retaining phonological information. The data are interpreted in terms of an interactive-activation model of retrieval and repetition (Martin & Saffran, 1992) in which activation over lexical-semantic nodes feeds back to reinforce decaying phonological representations. In the face of rapidly decaying phonological representations, members of categories with few semantic features provide insufficient feedback from the semantic level to support JJ's performance in picture-auditory word matching tasks.

Edward H. Cornell and C. Donald Heth
Department of Psychology, University of Alberta

Interactive and compensatory processes in human wayfinding

Interactive/compensatory models have been especially useful to describe complex cognitive performance such as comprehension during reading. The experiment reported here is part of an effort to develop an interactive/compensatory model of human navigation during wayfinding. Strategic wayfinding is synergistic, involving a knowledge base that may include survey representations of the environment, automatic processes such as recognition of landmarks, and deliberate and conscious mental operations such as the confirmation of expectancies about route events. The experiment reveals attentive processes that allow children to compensate when a landmark has been surreptitiously moved at an intersection. Recognition and navigation performance of 8-year-old children is disrupted relative to that of 12-year-old children who confront the moved landmark. Twelve-year-old children recognize the intersection as familiar, know the way to proceed, and report using more landmarks and stable landmarks. The use of compensatory information by the older children may be the result of the development of automatic scanning skills.

July 21 Evening

Laura Grande
Geriatric, Research, Education and Clinical Center, Brockton

Ill gotten gain: selective attention, semantic memory and Alzheimer's disease

The processing of unattended semantic information was investigated in 13 patients with Alzheimer's Disease (AD) and 23 normal control (NC) subjects using a selective attention, priming task. Two vertically aligned pictures of objects served as primes and object names served as targets. Subjects were instructed to attend to only one picture, defined by color, in the prime display. NC subjects showed facilitation only for target items that were the name of the attended prime picture, while AD patients showed facilitation from the attended and unattended prime pictures. We propose several accounts of these data. Two posit a deficit in the initiation of the selection component of selective attentional processing in AD. Based on spotlight theories, a third account posits a deficit in AD patients' ability to adjust the scope of the selection "beam." Lastly, facilitation of attended and unattended information may be due to crosstalk between accurately selected and unselected information. These findings also have implications for overt language function.

Michael Sullivan, Bruce Milliken, and Josué Romero
Aging and Alzheimer's Center, Oregon Health Sciences University

The nature of identity negative priming in young and healthy old adults

In conventional tasks of identity negative priming, participants are asked to name one of two concurrent stimuli that occur in a prime and subsequent probe display. Relative to a control condition, participants are slower to name a probe target that occurred as a previous prime distractor. This slowing has been attributed to the function of an inhibitory mechanism thought to operate on the prime distractor. Current theories of identity negative priming in old adults suggest there is an age-related decrement in the function of this inhibitory selection mechanism. Several experiments using a procedure that did not require participants to select against a distracting prime item will be reported. Results parallel studies using conventional identity negative priming tasks and show that strength of prime processing modulates the finding of identity negative priming in young adults, but not old adults. These results suggest that the age-related decrement may not be related to an impaired inhibitory mechanism that operates during prime target selection, but to a deficient controlled attentional process that operates during probe target selection.

Roberto Dell'Acqua and Pierre Jolicœur
Department of Psychology, University of Waterloo

Structural and strategic constraints on memory encoding

Three series of experiments are reported in which two different stimuli (each requiring a different response) were presented at variable SOA. In the first series, the first task consisted of a 2AFC speeded response to a tone, and the second task required an unspeeded whole report of a briefly presented one, two, or five-letter string.

- The whole report performance was poorer as the SOA between the tone and the letter-display was decreased;
- the whole report performance and the tone-RTs were inversely correlated, namely, faster tone-RTs were associated to a better whole report performance;
- and the tone response was unaffected by the SOA manipulation.

In the second series, the order of the stimuli was switched, so that one or three letters or one or three symbols, were displayed and followed by the presentation of the tone. The tone required a speeded 2AFC decision, while the characters required an unspeeded whole report after the tone response. The results from the second series of experiments showed that reversing the order of presentation of the stimuli (tone as second stimulus) now produced a cost on the tone response that increased as the SOA between the first visual display and the tone was decreased. In the third series, two visual displays were presented sequentially. The first display consisted of one out of four different items (the letters H or S, an & or a blank field), and the second display consisted of either one or five letters. The task on the first display was to detect the presence of the letters H or S, and a whole report was required for the second display. Both tasks were unspeeded. The results from the third series of experiments showed that whole report performance was affected by the task to be performed on the first stimulus. Reporting letter identity (H vs S) produced a decrement in whole report performance on the following display compared with performance following the & (which subjects were instructed to ignore) or the blank display. We will argue that the results provide strong support for the view that encoding a visual event into memory requires a process of short-term consolidation and that this consolidation process is susceptible to dual-task interference.

Lynn C. Robertson and Dell L. Rhodes
Veteran's Administration and Department of Neurology, University of California Davis; and Department of Psychology, Reed College, Portland

Exogenous and endogenous attentional orienting in spatial reference frames

For reasons that are not quite certain, a right-sided bias has been observed in several studies of attention in young normal participants. Robertson recently reported a right-sided bias in a letter discrimination task that was also observed in scene-based reference frames rotated 90 degrees from upright around fixation. Exploiting the fact that the rightward bias occurs in scene-based coordinates, we report that endogenous but not exogenous attentional orienting shows a rightward bias in both upright and rotated frames. The role of spatial frames in guiding attention will be discussed.

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On the representational basis for visual selection: What is the stimulus that attention selects?

Visual attention is a mechanism that selects relevant or salient visual input and delivers it to higher visual centers for recognition and action. Until the early 1980s, the representational basis for visual selection was usually assumed to be visual space itself. More recently, the importance of object-based representations for selection has been recognized. I will review recent evidence for object-based visual selection and discuss the relation between perceptual organization, which parses the retinal image into visual object representations, and visual attention, which selects among these representations. The evidence comes from experiments in visual search, apparent motion perception, and perceptual completion of partly-occluded objects.

July 22 Morning

Mark Van Selst and James C. Johnston
NASA Ames Research Center, Moffett Field

Dual-task interference that cannot be attributed to output interference

Fundamental information processing limitations constraining human performance are revealed by having subjects attempt to perform two tasks concurrently. The results from a modified (Task 1) Go/No-go procedure provide compelling evidence localizing a processing bottleneck at response selection. The first stimulus presented on each trial was to be responded to with whichever of two Task 1 Go responses was appropriate (2:2 mapping for the Go trials) or was not to be responded to (2:0 mapping for the No-Go trials). The second stimulus always required a response (4:2 mapping). Task 2 response times (RTs) were dramatically slowed with decreasing Task 1:Task 2 SOA. This slowing was more pronounced for Task 1 Go trials than for Task 1 No-go trials. The Task 2 slowing for Task 1 No-go trials is not attributable to inhibition of a default Go response because there were multiple alternative Go responses. Manipulation of the response-output requirements (hand-hand; hand-foot; verbal-hand; hand-verbal) produce results consistent with this conclusion.

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A transcranial magnetic stimulation study of distractor interference

The roles of the superior prefrontal cortex (SPFC) and the superior parietal lobule (SPL) were investigated in a color discrimination, flanker task using transcranial magnetic stimulation (TMS). A TMS pulse was administered before, simultaneous with, or after the onset of the display and the flanker was either contralateral or ipsilateral to the TMS. Normal interference effects were observed when TMS was over the contralateral and ipsilateral SPFC or the contralateral SPL. When the flanker was presented ipsilateral to the stimulated SPL, however, a biphasic effect was observed: TMS prior to display onset increased flanker interference and TMS simultaneous with display onset decreased interference effects. The biphasic effects in the current experiment suggest that parietal TMS first produces inhibition and then disinhibition of the opposite hemisphere. Since the observed effects were restricted to the field ipsilateral to TMS, however, the results do not accord with a simple hemispheric rivalry account.

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An empirical analysis of trends in contemporary scientific psychology

Which of the existing schools of thought in psychology are currently influential and what recent trends can be identified? To move beyond the lively polemics surrounding this issue, the present study examined trends in the prominence of four widely recognized schools in scientific psychology: cognitive psychology, neuroscience, psychoanalysis, and behaviorism. The results, which replicated across two measures of prominence, support the following conclusions. First, the cognitive perspective has shown a steady upward trajectory since 1967 supporting the claim that there has been a *Cognitive revolution.* Second, contrary to prevailing beliefs, we find no evidence that the recent prominence of neuroscience is reflected within psychology. Third, current psychoanalytic work is virtually unnoticed within scientific psychology, but continues to be prominent in the broader intellectual community. Finally, behavioral psychology, and its associated concepts of conditioning and reinforcement, has declined markedly in prominence. We discuss these findings in the context of different views of scientific prominence and scientific progress.

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