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CONTENTS

ABSTRACTS OF PAPERS
(Presented in alphabetical order of first author)

A. Akyürek, A. van den Berg & J.A. Michon
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Case-based reasoning in planning meals

In computational systems such as CHEF and JULIA, *reasoning from cases* is formulated basically as a three-step process: (1) retrieve a previous case, (2) adapt the retrieved case to the current task, and (3) store the result obtained from adapting the retrieved case. In this study protocol analysis of the task of planning meals, adapted from Byrne (1977), was used to study reasoning from cases in humans. Direct evidence is found with non-professional subjects who use a "contrast computing strategy" to retrieve and adapt previously planned meals. Parts of old meals from memory are re-used by all subjects in generating new meals. Subjects tend to create an abstract version of the plan first, which they refine later. The goal structure guides planning at the lower levels, but decisions taken at the lower levels are also found to determine the goal structure. That is, humans plan top-down as well as bottom-up. This supports the claim that the top-down model of planning is a special case of the opportunistic model (Hayes-Roth & Hayes-Roth, 1979).

F. Askevis-Leherpeux
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Person memory and trait information processing

A major aim of social cognition has been to investigate how social expectancies influence memory. The two most influential person memory models make contradictory predictions : the schematic approach predicts better memory for expectancy-congruent information, while the associative network model predicts better memory for expectancy-incongruent information, especially under impression formation set.
One of the weaknesses the associative network model is that it was supported only by studies dealing with behavioral information.
The present research examined whether this model could also account for abstract trait information processing
Three variables were manipulated : (i) expectancy : dynamism, apathy, no expectancy; (ii) traits : related to dynamism, related to apathy, unrelated to the dimension; (iii) learning set : impression formation or memory instructions.
The most striking conclusion was that impression formation set increased memory for congruent information only and that data were more compatible with the schematic approach than with an associative network formulation.
We suggest that the motivational orientation induced by impression formation set depends on information's abstractness and that these motivational factors would be responsible for the apparent contradiction between results observed for behavioral and for trait information.

T. Bachmann
University of Tartu, Estonia

Generalized functions of visual masking.

More than 50 experimental papers on visual masking (including the classical ones) were subjected to statistical analysis and alternative generalized functions of masking are developed for various classes of the values of generalized parameters (independent variables). Respective functions are to be demonstrated and discussed. These functions can be used to reveal (1) the basic regularities which characterize the phenomenon of masking in general and (2) some constraints which the values of the variables considered pose for the design of visual information-processing experiments in particular.

A. Baddeley, R. Mahadevan & C. Thompson
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Exploring the memory of a memorist: Basic capacity or acquired expertise.

A previous study described the remarkable memory for digits of Rajan. Since he does not appear to use elaborate mnemonics, the data suggested that his performance may be attributable to a remarkable basic memory capacity, rather than to expertise. The present study investigated this issue further, in particular testing the hypothesis that Rajan has a remarkable short-term phonological memory , which allows extremely good long-term phonological learning. Rajan's performance was compared to that of six academically comparable control subjects. Immediate memory span was studied for digits, nonwords, similar and dissimilar letter sequences and sequences of long and short words. While Rajan's performance was consistently good, he was clearly better than the controls only on digits and letters, material on which he had previously been extensively tested. His phonological short-term memory appeared to be qualitatively normal, with evidence of phonological similarity and word length effects, and his excellent memory span was associated with a rapid rate of rehearsal. A test of long-term visual and verbal recall and recognition based on the Doors and faces test indicated that level of verbal and visual LTM was comparable with that of controls. A similar conclusion was reached following studies in which English-English or English-Finnish paired-associates were learned. It is concluded that Rajan has basic memory capacitites that are in the upper end of the normal range, coupled with a remarkable degree of expertise in learning and remembering.

M.T. Bajo & J.J. Canas
Universidad de Granada, Spain

Knowledge organization in memory retrieval.

Current models of memory retrieval (e.g. Gillund & Shiffrin, 1984; Hintzman, 1988; Ratcliffe & Koon, 1988) assume a search process based on familiarity or activation values that depends to a great extent on the strength between each of the cues used to access long term memory and each of the targets' represen- tations. Most of these models do not include assumptions regarding the structural relations among those representations. However, the information related to a given cue should be organised, and this organisation might influence the way in which the search process proceeds. The present series of experiments explore the effect of organisational variables such as density, number of clusters, type of relation (direct vs. indirect) within the associative set defined by a given cue. Also, the relation- ship of these variables with more traditional ones such as associative strength or the size of the associative set is explored. The organisational variables were defined through the use of a network scaling technique known as pathfinder. Results are discussed in their relationship to memory retrieval theories.

J. Barreau & D. Gaonac'h
Université de Poitiers, France

Effects of expertise in reading an instructional text.

The purpose of this study is to investigate the cognitive processes used by subjects when reading an instructional text (rules of a game) and their effects on the memorization of this text. The readers'expertise in games topic was varied, as well as the sequential organization of the text (according to the relative position of three sequences: equipment, goal, action). Reading time per sentence and recall protocols were the dependent variables.

Whatever the sequential organization, expert subjects had constant average reading times. On the other hand, in the case of a canonical organization of the text, reading times were longer for novices subjects than for experts. In the case of an irrelevant organization, there were no differences between the two groups.

Text recall was similar for the two groups with a canonical organization. In the case of an irrelevant organization, experts recalled a greater amount of sentences than novices. Experts'protocols were similar whatever the organization of the text.

We suggest that novices can integrate semantic contents only when the text is in a canonical form. But this integration process, applied to unusual contents for novices subjects, induces an extra processing time. Otherwise they cannot, at the same time, restore the cohesion of sequences. On the other hand, a high level of expertise makes possible these multiple processes in any case.

P. Benson
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Understanding facial characteristics.

A software toolset has been developed which allows rapid and flexible experimentation in the domain of facial characteristics. Full face colour or grey-scale images are manipulated in near real-time according to mathematical models of distinctiveness, gender, attractiveness, and age. Psychological assessment of these synthesised images has allowed considerable progress to be made in the understanding of social and interpersonal perceptions through the face.

It has been shown that photographic quality caricatures are both recognised better and perceived as better likenesses of familiar people than their veridical counterparts. The indication from these studies is that both metric and distinctiveness measures of feature dimensions and their configuration are coded simultaneously with respect to some notion of a population prototype.

Extensions to the modelling of facial prototypes has allowed fundamental comparisons to be made of the effects of skin texture and feature configuration under a number of conditions. The perceived age of a face can be reliably altered, and the role of surface patterns and feature position investigated systematically. An accurate model of facial composites has been constructed allowing separate analyses of the roles and importance of texture and configuration. In this way, it has been demonstrated that attractive faces are not merely 'average' but are dependent on both texture and subtle modifications to face and feature shape.

The importance of skin patterns and feature configuration has been realised in experiments concerned with perceived gender in faces where modification of these parameters have reversed the apparent gender of a face. Consequently, the categorical nature of gender perception has been examined using such synthetic images.

The prototype and composite models have wide-ranging applications most importantly in cosmetics, reconstructive surgery, forensic and telecommunication sciences.

S. Bentin & R. Ibrahim
The Hebrew University, Israel

Reading a language without orthography: New evidence for phonological mediation in visual word recognition - the case of Arabic

In the present study we have examined the phonological mediation in visual word identification using literary Arabic and one of its and spoken dialects.

Arabic is a language spoken in many dialects each characteristic to a particular geographical region. None of these dialects, however, has a written form. For writing the Literary Arabic is used. Literary Arabic is different from any of the spoken dialects, is formally taught in school but it is spoken only in formal occasions. Although some of the most common words may be shared by the literary and spoken Arabic languages, these languages differ in phonology and grammar rules. Nevertheless, written replica of spoken words can be constructed using grapheme-to-phoneme transformation rules. These orthographic patterns, however, will be very unfamiliar to the reader, and in many cases they may violate orthographic and phonologic rules of the written language, thus making Arabic analogues of phonologically illegal nonwords in English.

S. Bentin & R. Ibrahim (contd)

In the present study, senior high-school students, native speakers of Arabic who were instructed to make lexical decisions or to read the stimuli aloud. Three experiments were run. In the first, the stimulus set included words that were common to the literary language and to the spoken dialect. In the other two experiments the stimulus set included written replica of high- and low-frequency words in a spoken Arabic dialect intermixed with high- and low-frequency literary Arabic words, and with orthographically and phonologically legal nonwords. In the second lexical decision experiment the subjects were instructed to accept only regularly written words (i.e. words used in the literary form), and reject written replica of spoken words as well as the nonwords and in the third, the subjects were instructed to accept all Arabic words be they in literary or in spoken phonological sets.

The introduction of the written replica of spoken words slowed lexical decision as well as naming literary words. Lexical decisions were slower over all when the spoken words had to be rejected than when they were accepted. Moreover, despite their orthographic and phonologic irregularity, the rejection of written replica of spoken words was considerably slower than the rejection of phonologically legal nonwords. On the other hand, acceptance of spoken words was slower than acceptance of literary words which demonstrate that the written replica of spoken words were indeed unfamiliar stimuli. This pattern should not have been observed unless the phonological reality of the written replica of spoken words became available to the subject before the lexical decision was made.

Naming onset latency was longer for spoken than for literary words and the percentage of errors much higher. This difference suggests that the interference of spoken words with lexical decision can not be only at the post-lexical, decision making level. Together, these results strongly support a view claiming that phonological information is generated during the identification of orthographic patterns.

D. Bishop, J. Bird & N. Freeman
MRC Applied Psychological Unit Cambridge & Bristol University UK

Phonemic awareness and literacy skills in children with phonological disorders.

A mounting body of research has demonstrated a link between phonological proficiency in children, as measured by tasks such as rhyme judgment and phoneme segmentation, and subsequent literacy skills. However, contrary to prediction, Bishop & Adams (1990) found that 4-year-old children who had difficulties in producing phoneme contrasts (e.g. they might pronounce 'cat' as 'tat', or 'zip' as 'dit') did not have subsequent problems learning to read and write, provided other language skills were intact. Two possible explanations were proposed. First, it might be that expressive phonological abilities do not involve the same sorts of skills as tasks involving perceptual judgments about phonemes. Bishop and Adams did not use any task measuring phonological segmentation or discrimination skills in their study. Another possible explanation was that the phonological problems of most of these children had resolved by the time they were starting school. This longitudinal study set out to explore these possibilities. 32 children, aged from 5 to 7 years, who were receiving speech therapy for phonological disorders were compared with 32 control children, matched on age and intelligence. All had normal language comprehension. When first seen, they were given a battery of tasks assessing phonological processing skills, including rhyme judgment, phoneme segmentation and auditory discrimination, as well as tests of early literacy skills (letter recognition, reading and spelling of real words and nonwords). Their phonological processing skills and progress in reading and spelling were then reassessed in two follow-up phases, one and two years after initial assessment. This study did not find a clear link between early expressive phonological impairments and subsequent literacy problems, especially in spelling. It is concluded that children who have difficulty in contrasting phonemes in their own speech find it difficult to use letter-sound correspondences when learning to read and write.

P.S. Bisiacchi & M.A. Proverbio
Universita di Padova, Italy

patial distribution of costs in phasic and sustained visual attention

he spot-light analogy of attention (Broadbent, 1982; Treisman & Schmidt, 1982) kens the focus of attention to the beam of a 'spotlight' which moves in analogue ashion from one location to another. It derives that the costs of unattended positions re functions of the distance of the stimulus from the focus of attention. he gradient hypothesis (Dowing & Pinker, 1985) proposes that attentional capacity s distributed over a large part of the visual field. Some data (Tassinari et al, 1987) how that costs are particularly prominent for unattended positions contralateral to he stimulated position.
\ series of experiments were carried out to verify the deployment of visuo-spatial attention both in phasic abd sustained conditions. The variables considered were: eccentricity (4 different positions along the horizontal line) and stimulus probability. The data show an asymmetric distribution of costs over the visual field and do not support completely the two hypotheses mentioned above. An attempt to provide a unitary interpretation is made by referring to directional constraints in motor readiness.

M. Boucart, Université René Descartes Paris V, France

Semantic interferences on the processing of physical dimensions
of the form of objects

A series of experiments was carried out to test whether subjects can selectively process physical properties of the form of an object independently of semantic or name information about that object. The paradigm was a sequential matching task in which a reference outline drawing of an object was followed by two objects presented left and right of fixation. Subjects were required to decide which of the two lateral stimuli had the same previously defined physical property as the reference stimulus (for instance the size) regardless of the objects. The effect of semantic information was assessed by manipulating the relationships between the reference object, the target object (the stimulus having the same physical property as the reference stimulus) and the distractor object (the stimulus having a different physical property). The reference stimulus and the target were either physically identical, semantically related or semantically unrelated. For each of these three matching conditions the distractor and the reference stimulus were either semantically related or semantically unrelated. The tested physical properties were the followings: global shape, orientation, size, texture, motion, luminance and colour. The results showed that for judgements on global shape, size, orientation, texture and motion there was automatic processing of semantic information appearing (1) in a facilitation for semantically related target and reference stimulus relative to unrelated items and (2) in an interference effect of semantically related distractors relative to unrelated distractor and reference stimuli. No effect of semantic relations between stimuli were found in judgements on colour and luminance. The results are interpreted in terms of (1) separate processing of dimensions conveying information about form and dimensions that do not affect the form of objects, (2) differential activation of the representations of objects by form and surface information and (3) influence of global and local form information in accessing representations of objects.

6

M.A. Brandimonte & C. Passolunghi, Universita di Trieste, Italy

The effect of familiarity, distinctiveness and retention
interval on prospective remembering.

It has been recently suggested that event-based prospective memory performance depends upon properties of the target event which should trigger the action. Familiarity and distinctiveness of the cue seem to be two important factors that affect prospective remembering. In addition, there is indication that the longer the interval between the prospective memory instruction and the task the higher the prospective memory forgetting. In three experiments we attempted to disentangle the effect of familiarity, distinctiveness and retention interval on prospective memort perfromance. In Experiment 1, familiarity of the target, semantic distinctiveness, and delay were manipulated. Experiment 2 explored the effect of familiarity and perceptual distinctiveness, whereas in Experiment 3 we manipulated the nature of delay. Results indicate that each of the three factors has an effect on prospective memory (Exp. 1). However, when perceptual rather than semantic distinctiveness was present, it overwhelmed the effect of familiarity (Exp. 2). Finally, in Exp. 3, delay negatively affected prospective remembering only when it was filled with a demanding interpolated activity. Indeed, empty delay and a relatively undemanding activity (counting) were found not to affect performance in prospective memory tasks.

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Syntactic positive shift as an ERP-measure of syntactic processing.

We will present event-related brain potential (ERP) data from two experiments on syntactic processing. Subjects read individual sentences containing one of three different kinds of violations of the syntactic constraints of Dutch: (1) violations of number agreement between subject-NP and finite verb, (2) violations of subcategorization for intransitive verbs, and (3) violations of phrase structure.

The ERP-results provide evidence for a distinct electrophysiological response that is related to syntactic processing: a sustained positive shift is seen in the waveform, starting some 500 msec after a syntactic violation has occurred. This response is qualitatively different from established ERP-responses to semantic processing, and fits well with recent work by Osterhout and Holcomb (J. of Memory and Language, in press). We refer to the electrophysiological manifestation of parsing as the Syntactic Positive Shift (SPS). The Syntactic Positive Shift as an ERP-measure of syntactic processing is currently under further investigation in a second experiment, of which the results will also be reported. In this experiment, subjects read grammatically well-formed but semantically nonsensical variants of the sentences used in the first experiment. This linguistic manipulation emphasizes aspects of the ongoing syntactic analysis, and thereby provides an alternative test of the validity of the Syntactic Positive Shift.

The Syntactic Positive Shift was obtained in a setting in which no task demands were imposed on the subjects, other than the natural one, namely to read the input. The pattern of responses to the different kinds of syntactic violations suggests that the Syntactic Positive Shift indicates the impossibility for the parser to assign the preferred structure to an incoming string of words, irrespective of the specific syntactic nature of this preferred structure. The existence of the Syntactic Positive Shift next to ERP-responses to semantic processes, also suggests that during the process of language understanding, a separate level of syntactic representation is computed. The implications of these findings for further research on parsing will be discussed.   7

C. Bundesen, Copenhagen University, Denmark

Predicting selection probabilities in race models by the Luce choice rule.

A race-model of selection in which selection is determined by a parallel processing race between elements in a choice set. The winner of the race is the subject's choice. If more than one element is chosen, the winner is the first choice, number two is the second choice, and so forth. Race models have been used extensively in recent cognitive theorizing (e.g. Bundesen, 1990). The Luce (1959) choice rule is a widely used rule for predicting selection probabilities: Essentially, each element (choice object) is assigned a weight, and the probability that a particular element is (the next one to be) selected is given by the weight of the element divided by the sum of weights across all (not-yet-selected) elements in the choice set. Strong and useful relationships have been discovered between race models and the Luce choice rule. The presentation aims at explaining the meaning and implications of the relationships rather than the way in which they have been proved.

R.M.J. Byrne, University of Dublin, Ireland

Meta-deductive reasoning strategies.

How can the mechanisms underlying both human and computer reasoning develop to deal with novel or complex inferences ? The answer may lie in research in the cognitive science of *meta-deductions*. Some meta-deductions, such as the inferences we make when we try to think about what other people are thinking, are central to successful social and professional interactions, and to the interactions of people with computers. Other meta-deductions, such as the inferences we make when we try to work out the truth or falsity of alternative states of affairs, can seem both novel and complex. Consider, for example, an island inhabited by two sorts of people, knights who always tell the truth, and knaves who always lie. Suppose you overhear a conversation between two of these individuals. A asserts, *I am a knight and B is a knight.* B asserts, *A is a knave.* Can you work out whether A is a knight or a knave, and whether B is a knight or a knave?

In this talk, we will report the results of three experiments on the sorts of inferences that human reasoners make from these problems. The first experiment suggested that reasoners develop simple strategies to deal with meta-deductions: problems that could be solved by a simple strategy were easier than those that could not. The second experiment pitted the simple strategies explanation against an alternative explanation based on the underlying proof-structure of the problems: the results supported the simple strategies explanation. The third experiment examined the transfer of simple strategies. These data help us to chose from among the programs developed to simulate theories of the mechanisms underlying these inferences.

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Literal meanings and figurative images. Do they interfere?

The role of the literal meanings of the words composing an idiomatic string was investigated in two experiments using a mental image production technique and a sentence classification task, respectively. Gibbs and O'Brien (1990) claimed that people have conventional images and the knowledge associated with idioms are constrained and mirror the conceptual metaphors that motivate idiom meanings.

In the present study, the same experimental technique of Gibbs and O'Brien (1990) was used, but the experimental materials were varied in order to investigate the effects of: a) the familiarity of the idiom meaning; b) its semantic transparency and c) the role played by the concrete-literal meaning of the words composing the string. The literal meaning of the words composing the string can be totally bypassed and the figurative meaning of the idiom directly accessed or a possible interference between the figurative-abstract mental state expressed by the idiom and the literal-concrete meaning expressed by its constituent words could occur. The extent of interference should depend also upon the familiarity of the idiom string and the contribution of the semantics of the constituent words to the interpretation of the idiom. Results obtained in the mental images production task support the interference hypothesis.

J.J. Cañas, M.T. Bajo & P. Gonzalvo
Universidad de Granada, Spain

Mental models and computer programming.

Programming is a cognitive activity that requires the learning of new reasoning skills and the understanding of new technical information. Since novices lack domain-specific knowledge, many instructional techniques attempt to provide them with a framework or mental model that can be used for incorporating new information (Mayer, 1988). A mayor research question concerns how to encourage the acquisition of good mental models and how these models influence the learning process. One possible technique for providing an effective mental model is to use dynamic cues that make transparent to the user all the changes in the variable values, source-codes, output etc as the program runs. Two groups of novice programmers were used in the experiment. All subjects learned some basic programming notions in the C language (MIX C). The MIX C version of the C programming language provides a debugging facility (C Trace) designed to show through a windows' system all the program components. Subjects were either allowed to use this facility or not allowed to do so. Performance measures such as programming and debugging were taken as well as measured directed to assess subjects' mental models. Results showed differences in the way in which the two groups represented and organized programming concepts, although the performance tasks did not show parallel effects.

J. Caron & A.B. Erboul, University of Poitiers, France

Effects of connectives on the processing of semantic information in complex sentences.

The theory investigates the effect of the presence of a connective on the processing of semantic information in complex sentences.

It is assumed that, in addition to their semantic function (denoting some kind of relation, e.g. causal, between sentences), connectives play also a role in focusing some piece of information in the semantic representation of the sentence.

In order to test that hypothesis, a set of 40 French sentences were constructed. Each sentence comprised two simple clauses (in SVO form), linked by a connective:C(p.q). Nine different connectives were placed in each sentence, either at the beginning of the first clause (si, puisque, comme), or between the two clauses (si, puisque, parce que, car, donc, et); in the control condition, the two clauses were simple juxtaposed. Each sentence was embedded in a short paragraph, where the complex sentence C(p,q) was followed by a simple sentence (target sentence). This target sentence included an anaphor referring to one of the four main constituents of the preceding complex sentence (S1, O1, S2,)2).

The sentences were presented on a computer-screen, one at a time, in a self-paced reading task. reading times were measured for the target sentences.

Since the comprehension of the target sentence implied the retrieval of the anaphor's antecedent, it was predicted that reading times would vary according to the focused or non focused status of the antecedent.

Results show that significant differences appear depending on:

a) the place of the antecedent in the sentence (antecedent in the second clause give rise to shorter RTs than in the first clause; and antecedent in subject position - "topic" - entail shorter RTs than in object position - "comment");.

b) the kind and place of the connective - in conformity with the hypothesis.

J. Caron-Pargue, M-D. Fievre & H. Yessa-Tchissambo
Université de Poitiers, France

Verbal reports in problem solving: A comparative analysis of behavioral and linguistic data.

Verbal protocols were collected during the resolution of the problem of the Tower of Hanoi by 7 and 10 year old children, and by adults.

For each subject, the successive moves can be reported on a formal graph: several typical configurations can then be characterized (bents, backtrackings, etc.), which are conventionally interpreted as marking deviations from the expected strategy, or as initiating a new step in the strategy.

The aim of the study was to identify the linguistic marks which corresponded to the different configurations defined above in the behavioral graph. A number of interesting irregularities were observed, linking those configurations with linguistic features in the verbal protocol. On the basis of a model of discourse production (drawn from Culioli's theory of utterance operations), those marks can be interpreted as corresponding to reorganizations or local readjustments in the subjects' representation or planning.

The results suggest that, as a method of on-line analysis of problem-solving procedures, the study of verbal protocols can be considerably enriched by taking into account the linguistic form of the subjects' verbalizations.

M. Carreiras & M.A. Gernsbacher
Universidad de La Laguna, Spain & University of Oregon, U.S.A.

Accessing human participants and inanimate objects in sentences: The advantage of first mention effect.

Two experiments were carried out in order to investigate a primacy effect when people construct mental representations of sentences. In the first experiment subjects were presented, word by word, Spanish sentences like "Mary and Susan studied at the library", and at the end of the sentence they had to verify whether a probe word occurred in the previous material. Probe words were responded to more rapidly when they were the names of the first than the second participants. In the second experiment both sentences involving human participants like in the first experiment and sentences involving inanimate objects like "The chair and the table were made of wood" were employed. The results showed again an advantage for the first mentioned participants, but also for the first mentioned inanimate objects. The results are discussed in terms of the Mental Models and the Structure Building Framework hypotheses.

M-A. Cathiard & G. Tiberghien
Université Pierre-Mendès, France

Three benefits from the visual processing of speech.

Since coarticulation is one of the basic phenomena in speech production, the issue that speech *perception* could take advantage of it, is fundamental. The main questions we address in this paper concern the *visual* processing of coarticulatory cues. More specifically: (i) Is visual perception of coarticulation more informative than auditory perception? (ii) Does visual vowel identification benefit from vowel-inherent movements? (iii) Does speaker angle view (face *vs.* profile) significantly affect performance?

In the case of acoustic silent pauses between phrases, where vowel coarticulation on the lips is clearly *visible*, but of course *inaudible*, it was shown that: (i) Rounding can be reliably identified (95% correct) up to 160 ms before it is audible; (ii) Dynamic presentation of the vowel leads to earlier identifications than static views; (iii) In the unrounding gesture, profile views advance perception of the retraction of the lips compared to the front views.

The implications of these three previously unreported benefits for the processing of speech in natural, i.e. bimodal, and variable viewing conditions, will be considered.

J-P. Caverni
CNRS and Université de Provence, France

Self-anchoring in a real world task: Bias or expertise effect?

SUMMARY: The psychological reality of cognitive biases often has been questioned: biases might be induced by task specificity or by experimental laboratory settings.

A way to answer these questions is to search self-made biases in information real world tasks. This was the goal we pursue with two experiments turned on anchoring bias: when they make estimates by starting from an initial value, people give answers biased toward this initial value. This anchoring effect is ordinarily interpreted as a distortion: if it were not for this anchor, the subject's estimate would not be distorted.

An alternative hypothesis has been forwarded. It may be that the anchoring effect rather reveals a habitual component of expertise.

A knowledge assessment task performed by experts was employed. Two experiments have been run. The first, a pencil and paper experiment as is habitual in evaluation studies, aimed at showing an anchoring effect of information present in the beginning of a text on the final grade given. The second experiment, based on the successful outcome of the first, was computerized. The objective was of course to bring out the dynamic aspect of assessment formation.

In keeping with our interpretation, in the absence of an external anchor the expert well use information present in the beginning of a text to create an anchor. By manipulating the sequence in which information is presented in the text, the role of information present in the beginning of the text is brought out. As such a role is determined, we can assume that the subject indeed creates an anchor her/himself, in the same way s/he employs externally provided anchors, and that the anchoring heuristic plays a functional role is assessment tasks. In conclusion, we assume that this functional role deals with the properties of the subject's expertise. Finally we discuss anchoring effects in relation to primacy and halo effects.

C. Champaud, Université Paris V, France

Early occurences of tensed forms in French: the role of cognitive-semantic categories and utterance situation.

This study focuses on the analysis of naturalistic productions of monolingual French children, around two years of age and after. The main purpose is to examine the longitudinal evolution of verb inflections, corresponding or not to adult norms, and to investigate systematically how these occurrences are distributed selectively with different populations of verbs. Classifications of verbs and actions or events referred to are made according to some semantic-cognitive suggestions (e.g. Vendler, 1967, Mourelatos, 1978, Dowty, 1979, Bach, 1986, Pustejovki, 1991). So, distinctions like action-event-process/state, punctual/non punctual, durative/non durative, transition/no transition, telic/atelic, accomplishment/achievement, etc. are used. Relevant aspects concerning the situation of utterance and its relationships, if any, with the situation referred to are included: for instance, with punctual verbs the event may be anterior, simultaneous, or posterior to the moment of utterance, or the relation may be unknown or not relevant.

With action verbs, we distinguish cases where the action has not begun, is beginning, has just begun, is going on, is achieving with or without a result, is achieved, etc. (These distinctions are only given here as examples and not as an exhaustive enumeration.)
Main results show clearly that telic verbs (i.e. which imply an end) appear first under forms like French "participe passé", and then "passé composé": "tombé" (fallen or fell), "cassé" (broken or broke); other action verbs, when the event or the action is ongoing, appear under the form of the French "présent": "coule" (pour), "roule" (roll). The evolution of erroneous forms like "*prendu"(for "pris", taken) is discussed.
Comparisons are made with results obtained with other languages, especially English. Final remarks insist upon the fact that computer simulations concerning this domain of language development must not be restrained to English, which is a very peculiar language, and must include relevant cognitive semantic properties.

A. Charvillat, CNRS, Paris, France

Experimental study of parsing strategies in French: "Garden-path" or parallel processing?

The study of on-line sentence parsing procedures has become a prosperous field of investigation in Anglo-Saxon psycholinguistic literature. The extension of this issue to other languages reflects growing scepticism about the generality of parsing strategies at work in English. Consequently, many authors now tend to consider cross-linguistic comparisons as crucial for the understanding of human language parser.

Locally ambiguous sentences constitute a priviledged material for the study of the temporal organization and the type of syntactic computation performed on-line. In the studies reported here, this type of linguistic materiel is presented to French adults who are submitted to a lexical decision task on words preceded by a stucturally ambiguous element.

The data are analyzed in the light of two competing hypotheses: the first one, proposed by Frazier & Rayner ("garden-path theory", 1982) assumes that ambiguous segments are processed on the basis of a preferential analysis which may be revised if necessary; the second one predicts parallel computation of both possible analyses until contextual information makes it possible to reject one of them.

It is clear that these two hypotheses have different implications for a general model of sentence processing. In fact, the preferential analysis hypothesis alone is compatible with the probabilistic model of language processing supported here: indeed, the integration of the concept of differential weight of syntactic cues in the target language seems likely to enrich the explanatory dimension of the "garden-path theory".

S.A. Christianson, University of Stockholm, Sweden

Remembering emotional events: Possible mechanisms.

This paper discusses whether emotional events are associated with persistence or extensive forgetting of detail information. Empirical evidence from real-life studies and laboratory studies is presented indicating that emotional events are relatively well retained with respect to central detail information, whereas peripheral detail information, and information preceding and succeeding traumatic events, are less accurately retained. It is suggested that attentional focusing along with an increased elaboration of those aspects attended to, is a plausible explanation to why central detail information is better retained, whereas peripheral detail information is less well retained from emotional events compared with neutral counterparts. It is also assumed, at a more speculative level, that critical characteristics of emotional events may be extracted and processed by a preattentive and automatic mechanism, which will act as an emotional prime and thus trigger attentional selectivity and controlled memory processing (e.g., post-stimulus elaboration).

P. Coirier, Université Poitiers, France

The textual setting of reasoning: explanation or argumentation operations?

Writing argumentative type of texts involves specific psycholinguistic operations related to two aspects: the textual organisation of reasoning (connectors, justification procedure) and the cognitive processing of the interlocutory situation (enunciative markings, polyphony).
Argumentative writing was studied with respect to three crossed factors: 1) the communicative intent induced by the task instructions (explain the given answer to a problem/ convince your reader that your solution is the best); 2) whether the problem presented pertains to vericonditional or axiological judgments; 3) superstructural textual models depending on the age level (10-11 vs. 15-16 year old subjects). The assignment was presented and controlled so as to ensure the equivalence of the different parameters set forth in a 2*2*2 experimental design. In each condition the subject was asked to write about a specific problem "so that the reader clearly understands the solution/ fully agrees with the locutor's point of view". Analysing the obtained protocols consisted in collecting the linguistic markers corresponding to various operations, from a pre-established grid comprising connectors, hypothetical forms, judgment modalities, discursive involvements, etc. The analysis focused on three main points: the global comparison of the eight experimental conditions; the functional dependency between the different textual operations; the individual strategies in the use of these operations.

A. Content, R. Peereman & C. Mandiaux
Université Libre de Bruxelles, Belgium

Rule-based and instance-based conversion processes in learning to read.

It has been assumed that the development of print to speech conversion processes is based on the acquisition of rules progressively growing from simple letter-sound correspondence to more complex ones. More recent empirical work (Goswami, 1986) indicated however that beginning readers were capable of taking advantage of examples to determine how to pronounce new written words. The observed benefit was more marked when the example and the target shared the rime, thus suggesting that very early on, children use correspondences bearing on complex letter groups. We present a first experiment confirming these observations with French-speaking children tested approximately 3 months after the onset of reading tuition.

In a second experiment, we examined whether the use of instance knowledge could also be observed in a more natural reading setting. We used an effect described by Peereman (1991). Normal adult readers displayed a surprising level of errors on the grapheme **G** in pseudowords looking like known words in which the G is differently pronounced (ex. **GIRNIR** vs **GARNIR**). A similar test was presented to 2d and 4th- grade children. The detrimental effect of a lexical instance on pseudoword naming increased with age, and was already significant in 2d graders, confirming that analogical processes are operating early in reading development.

The use of simple letter-sound correspondences was investigated in the same experiment. Previous results indicated that skilled readers are more likely to pronounce the letter **G** in pseudowords as /g/ than as /ʒ/. This bias is not readily explained by the frequency of either correspondence in the language. With children, a similar but more marked bias was observed, indicating that more complex correspondences are progressively put to use.

J. Crepault, Université Paris 8, France

Temporal reasoning and memory.

The aim of this research was to study the effects of the structure of the hypothetical statements (relations between duration and succession) on temporal judgements and memory. Four groups of subjects (9, 12, 15, and adult age) were interviewed individually. The information provided (*hypothetical statements*) dealt with two dimensions: 1/ beginning and end orders(inference about duration); 2/ the duration and the beginning orders (inference about ending orders); 3/ the duration and the ending orders (inference about beginning orders. Six hypothetical statements were presented under two conditions. In the first condition, the subjects was asked to make a judgement on the inferred relation and then to recall the two sentences. In the second condition the subjects was asked to recall the two sentences and then to give a judgement on the third dimension(inferred relation).

J. Crepault (contd)

The analysis of the results showed that the recall of the two sentences is very poor in 9 to 15 year subjects, except in the adult group; no significant difference was observed between the first and second condition at all ages. The recall of one sentence was very accurate at all ages. The exact judgements (inferred relation) were relatively few, except in the adult group, in the two experimental conditions. Our results suggested that the notions of duration and temporal orders led to considerable confusion in 9 to 15 year subjects, both in integrating two temporal dimensions, and remembering the relevant information. A theoretical model (stable/unstable cognitive systems, and decidable/undecidable relations) is proposed for the analysis of the patterns and the relations between duration, the initial succession order and the final succession order in non-kinematic case. From a developmental viewpoint, intersystem transformations (structural changes) and intrasystem transformations (functional changes) can be taken into account. It can be hypothesized that subjects of certain age act within a system based on several functional rules. From this perspective, there is one common structure and several "developmental trajectories".

J. Dowell, Univeristy College London, U.K.

A cognitive model of the air traffic controller's planning.

This paper reports an investigation into the planning activities of air traffic controllers. It first briefly reviews established cognitive models of planning and consideration of the tasks to which these models have been applied. This leads to identification of a further class of 'real time' planning task. Such tasks are those in which the construction of plans is performed concurrently with the actualisation of plans, in which plan actualisation can modify plan construction, and in which plans are incomplete and provisional. Often too, this 'real time' planning is performed under severe temporal constraints. The paper argues that the established planning architectures do not apply to real time planning tasks, given their assumption that planning produces complete, final and unmodifiable plans in the absence of plan actualisation (ref: Newell and Simon, 1972; Hayes Roth, 1979).

Air traffic control is a pre-eminent example of a real time planning task (Whitfield and Jackson, 1982). Yet in spite of considerable research interest, no formal model of controllers' planning has so far been produced, in part because of the difficulties of obtaining appropriate data from observation of controllers 'in the field', and in part because of the absence of an appropriate architecture. The paper proposes an architecture suitable for modelling 'real time' planning tasks, based on a modified blackboard structure. Within this architecture is presented a model of controllers' planning. The model is produced from a study of eight trained subjects controlling air traffic within a computer-based simulation. A graphical knowledge elicitation technique was used with an on-line playback of subject performance.

J. Engelkamp, University of the Saarland, Germany

Bizarreness effects in verbal tasks and in subject-performed tasks.

The hypothesis was tested that bizarreness of action phrases influences recognition only after a standard verbal learning task (VT), and not after a task in which subjects performed the actions during learning (SPT). For this purpose, subjects learned common and bizarre action phrases in a VT or in a SPT. Examples of common action phrases are "to cut the bread" or "to water the flowers". Examples of bizarre action phrases which consist of unusual verb-noun combinations are "to plant the hammer" or "to put a stamp on the dollar bill". In Experiment 1, subjects learned a mixed list and recognition was tested immediately. In Experiment 2, pure lists (of common and bizarre phrases) were used, and half of the phrases were tested immediately, the other half after delay. In addition, in this experiment half of the subjects were given an interference task during recognition (counting backwards), half were not. In both experiments, recognition was better after SPTs than after VTs. Also, in Experiment 2, recognition was better in an immediate test than in a delayed test and without interference than with. Most important, however, was the fact that in both experiments there was the expected interaction: after VTs, bizarre items were recognized better than common items, but there was no bizarreness effect after SPTs. It will be discussed that bizarreness might reflect a property of the lexicon (strength of verb-object associations) and that subjects after VTs base their recognition decision on this lexical information, whereas subjects after SPTs do not. Instead, they may use the information that they performed an action in order to decide that it was old.

E. Espéret & A. Savigny, Université de Poitiers, France

Cognitive processes in writing instructions for word processor users.

Educated adults were asked to produce a text explaining using of two functions in a small text-editor (to erase, to move).

These subjects have never before handled a text-editor; with learning by doing, they were taken a low (group 1) or high expert level (group 2) in using commands (cf Georges, 1983; Richard, 1990).

They build in this way a more or less structured and complete referential representation of the implemented procedures.

The text-editor commands (referent) have been conceived (with Hypertalk) so as to make up a controlled semantic network (Poitrenaud, Richard, Tijus, 1990).

We study in which way the characteristics of this network (objects and procedures), as well as the expert level, act on the cognitive processes involved in textual production.

These processes are inferred from pausing, obtained with on-line recording during production, and from text psycholinguistic characteristics.

Results, coming from a several studies, support the hypothesis of an effect of semantic network, and expert level, on the production of procedural text.

M.W. Eysenck, M.G. Calvo & A. Estevez
University of London, Egham, U.K. & Universidad de La Laguna, Spain

On-line inferences in the interpretation of ambiguous sentences as a function of test anxiety.

The hypothesis that test anxiety is associated with an on-line bias towards threatening interpretation of ambiguous information was explored by means of a lexical decision paradigm. Under evaluative stress conditions, ambiguous sentences were preseneted to high- and low-test-anxiety subjects. The sentences were concerned either with ego-threat, physical-threat, or non-threat events. These sentences were followed by either a disambiguating word or a non-word (which was identical to the corresponding word except for one letter). The words resolved the ambiguity either confirming or disconfirming the threat implied by the sentence. A control condition included the presentation of the words (and non-words) alone, without being implied by the ambiguous sentences. The results indicated that there was no differences in lexical decision times as a function of test anxiety when words (and non-words) were presented alone. In contrast, when words (and non-words) were implied by the ambiguous sentences, high-anxiety subjects took less time to decide that the ego-threatening confirming word was a word, and, especially, they took longer to correctly respond to the ego-threat confirming non-word, compared with low-anxiety subjects. These results suggest that test anxious subjects are likely to draw inferences with a threatening meaning when reading ambiguous sentences which predict potential ego-threat consequences. Those inferences presumably facilitate the processing (lexical decision) of words which confirm the threatening interpretation, but lead to a "garden path" effect when processing non-words similar to words which confirm the ego-threat.

M. Fayol & M. Hupet, LEAD/CNRS Faculte des Sciences Dijon, France
& Université Catholique, Louvain-la-Neuve, Belgium

Broken agreement: Where do the errors in the subject-verb agreement come from?

The subjects and verbs in French oral and written sentences agree in number. Most of the time, this apparently simple syntactic operation is correctly performed, but sometimes it derails in sentences such as The paint of the dustbins have been changed. The experiments to be reported aim at explaining and experimentally simulating some of the subject-verb agreement errors. Young children (10 years-old), young adults (18 years-old) and old normal adults (71 years-old) were presented orally with short sentences they were required to write down. The sentences were of the type "N1 de N2 V", where N1 and N2 either matched or mismatched in number. In a control condition, the sentences were orally presented one by one and had to be written down immediately after their presentation. In an experimental condition, the oral presentation of each sentence was completed by a series of five unrelated words, and the Subjects were asked to write down each sentence and as many words as possible. The general pattern of errors was the following: (1) in both groups of adults agreement errors only occurred in the added task condition; (2) Young children committed errors in both conditions, but committed more errors in the added task condition (i.e. where the recall of words adds an extracognitive load); (3) For the three groups of Subjects, the vast majority of the errors occurred in the mismatch condition; and for the adults, young or old, the agreement problems were largely restricted to the sentences of the type N1 singular-N2 plural. These observations will be compared to recent data reported by Bock and Miller (1991), and will be discussed within a theoretical framework opposing automatic and controlled processes. It will be argued that the errors are due to the automaticity of the writing processes, considering that this automaticity allows the system to devote the cognitive ressources to the planification and controlling processes involved in the retrieval of the added words.

18

L.B. Feldman & R. Frost, State University of New York at Albany, USA & The Hebrew University, Israel

Morphological processing across concatenated and nonconcatenated languages.

English and Serbo-Croatian contrast with Hebrew with respect to the principle by which the morphemes that compose a morphologically complex word are combined. In English and Serbo-Croatian, discrete morphemic constituents are linked linearly. There is a base morpheme to which other elements are appended so as to form a sequence. This principle defines a concatenative morphology. Hebrew, by contrast, relies on a skeleton of consonants or root into which a word pattern is infixed. There is no base morpheme which is preserved as an uninterrupted (phonological) pattern. That is, the word pattern actually modifies the internal structure of the word. This defines a nonconcatenative morphology. In the present study, the segment shifting task is used to examine morphological processing in languages with concatenated and with nonconcatenated morphological systems.

In the segment shifting task (Feldman, submitted), words are presented visually and subjects are instructed to segment and shift a designated segment from a source word (e.g., ER) onto a target word (e.g., PAINT) and to name the new result aloud as rapidly as possible. In all cases, the product is a morphologically complex and real word (e.g., PAINTER). The experimental manipulation exploits the fact that the same sequence of letters can function morphemically in one context (e.g., DRUMMER) and nonmorphemically in another (e.g., SUMMER) and entails comparisons between morphological and nonmorphological affixes. The effect of morphological status in the segment shifting task has been observed in English, Serbo-Croatian and Hebrew.

A. Fernandez, E. Diez, & M.A. Alonso
Universidad de Salamanca & Universidad de La Laguna, Spain

Modality-specific error patterns in recall: Temporal and interference mechanisms.

Two experiments showed that subjects prompted to recall word pairs from the end of a list made more mistakes (intrusions from other parts of the list) with visual than with auditory lists. The first experiment showed that modality-specific intrusion patterns were dependent on the length of the retention interval. The second experiment revealed output interference effects on intrusion errors. The results of both experiments are discussed in regard to current views of long-term modality effects.

19

G.B. Flores d'Arcais, Max Planck Institut für Psycholinguistik, NL

Phonological processes in a semantic task with Chinese characters.

It is an old and debated issue whether recognizing a word in a logographic writing system means obligatory access to its phonological code. Since logographs can be understood "directly", it has often been proposed that they are not processed via a phonological route. There is by now evidence that this is not the case for naming and, in general, for reading. The question asked in the present study is whether some form of phonological processing takes place even when the task does not demand any phonological recoding. The study involved a semantic categorization task with pairs of Chinese characters: the subjects were required to decide as fast as possible whether the two characters represented words belonging to the same semantic category or not. The positive pairs included two words of animals, furniture, plants, etc., while in the negative pairs the two words belonged to two clearly distinct semantic domains. The study reported consisted of two experiments. In the first the two words of the pairs, semantically related or unrelated, were either homophones or had a different pronounciation. In the second experiment a second independent variable was added, namely graphemic similarity, orthogonally combined with the preceding one, so that for each of the two type of pairs, positive and negative, there were four sets of character pairs, namely a) graphemically similar and homophones, b) graphemically similar and of different pronounciation, c) and d) graphemically different and either homophones or not. The results indicated an inhibitory effect (longer latencies for the correct No decision, and/or a larger proportion of errors) due to phonological similarity, and an independent inhibitory effect of graphemic similarity. Thus, when the two words belong to a different semantic category, but they are homophones, the "no" responses tend to be longer, or errors tend to occur. A similar effect obtains when the two characters are visually similar. The graphemic and the phonological effects turned out to be independent. The results, at any rate, indicate that some form of phonological process takes place even in what could be taken to be a pure semantic task, thus supporting the notion of an automatic and obligatory phonological recoding when characters are recognized.

U.H. Frauenfelder, Max Planck Institute for Psycholinguistics, NL

Psycholinguistic aspects of morphological parsing in Turkish native speakers.

Psycholinguists generally assume that language understanding depends upon two very different processing mechanisms. According to this view, word recognition involves locating and accessing permanently stored entries in the mental lexicon, whereas sentence processing involves parsing these entries to construct novel syntactic and semantic representations that do not pre-exist in memory. This view has emerged because psycholinguistic research has been restricted essentially to a narrow range of typologically similar languages (English, French, Dutch, Italian, etc.) all with relatively impoverished morphology. I intend to report on a study exploring morphological processing in a language with a much richer morphological structure, Turkish. It will be shown that the productivity of suffixation and the number of different resultant forms Turkish listeners must confront constitute a serious challenge to these assumptions about word recognition. In particular, the notion that all words are listed in the lexicon in an agglutinative language like Turkish will be questioned. Several on-line experiments investigating the time-course of the morphological parsing will be presented. The results suggest early and immediate activation of the phonological representation of the root as well as a sequential analysis of the string of affixes. The implications of these results for human language understanding will be considered.

R. Frost, The Hebrew University, Jerusalem, Israel

Naming in a shallow orthography is mainly prelexical: Evidence from Hebrew.

A major debate concerning the effect of orthographic depth on reading strategies revolves around the relative use of pre- and postlexical phonology in naming. The psychological reality of the orthographic depth hypothesis (ODH) was examined in Hebrew by employing pointed and unpointed print. The pointed Hebrew orthography is shallow because it represents the word's phonologic structure unequivocally. In contrast, the unpointed orthography is deep because it does not convey vowel information. A first set of experiments revealed larger frequency effects, and larger semantic priming effects in naming with unpointed print than with pointed print. These results suggest greater involvement of the lexicon in reading unpointed relative to pointed Hebrew, thus supporting the claim that prelexical assembled phonology is more prevalent in shallow than in deep orthographies.

In another set of experiments subjects were presented with Hebrew consonantal strings. These strings were considered unambiguous because there was only one vowel configuration that would allow them to be read as meaningful words. The consonants were followed by vowel marks that were superimposed on the consonants at stimulus onset asynchronies (SOAs) ranging from 0 ms (simultaneous presentation) to 300 ms from the onset of consonant presentation. The aim of this manipulation was to examine whether subjects would be inclined to delay their response until the presentation of the vowel marks. The results demonstrated that although the phonologic structure of the unambiguous words could be unequivocally retrieved from the lexicon following visual access (postlexical phonology), subjects were more inclined to delay their response and wait for the vowels to appear in the naming task than in the lexical decision task. Naming using the vowel marks was found to be mainly prelexical; smaller frequency effects were found with the shorter SOAs of vowel presentations. These results support the view that prelexical phonology is indeed the default strategy for the reader in shallow orthographies, thus providing strong support for the ODH.

I. Gati, The Hebrew University, Jerusalem, Israel

Relative weight of common and distinctive features in similarity judgments using simultaneous and sequential presentations.

Comparisons of stimuli are the basis of similarity, categorization, recognition and preference judgments. Objects, concepts, and events are generally organized and categorized on the basis of their common and distinctive features. This notion underlies the contrast model (Tversky, 1977) that expresses the similarity of objects in terms of the measures of their unique and shared features and suggests a simple procedure for assessing the relative weight of these features (Gati & Tversky, 1984). Specifically, adding a component x to both stimuli p and q increases similarity between them, this increase denoted $C(x)$, whereas adding x to only one object reduces similarity, denoted $D(x)$. Gati & Tversky (1984) found a consistent pattern using both verbal and pictorial stimuli: $C(x)$ was greater than $D(x)$ for almost all the verbal components, where D was greater than C for almost all the pictorial components.

I. Gati (contd).

Most previous studies focused on simultaneous comparisons when the objects were presented side-by-side. However, most real-life comparisons are not simultaneous, rather, a stimulus is compared to a representation of a stimulus encountered earlier. In the present study we compared the relative weight of common and distinctive features in simultaneous and sequential comparisons. Thus, we had two conditions: (a) simultaneous, side-by-side presentation; (b) sequential presentation, where one of the stimuli is presented until the subject indicates that he or she memorized it; it then disappears, and only after 3 seconds the second stimulus appears. Two sets of verbal stimuli (description of professionals and of students) and two sets of pictorial stimuli (views or a house) were displayed on a Mac-II color monitor. We carried out a two-way analysis of variance of the similarity judgments of 40 students in each condition, with stimulus modality (verbal versus pictorial) as a within-subject factor, and experimental condition (simultaneous vs sequential presentation) as a between-subject factor. The results revealed: (a) a significantly higher weight of common versus distinctive features for the verbal stimuli than for the pictorial stimuli (replicating previous findings), and (b) the relative weight of common versus distinctive components was higher in the sequential than for the simultaneous condition. The implications of the results for the study of comparison processes will be explored.

C. George, Université of Paris VIII, France

Reasoning and metareasoning:
Has the deduction vs. induction distinction a psychological validity?

An experiment addressed the question of whether people distinguish between types of arguments by some formal characteristics or degrees of conclusion plausibility only. Sixty-four subjects were administered 12 valid or invalid deductive arguments of 6 different types, and 12 inductive arguments also of 6 different types. They were asked, first to evaluate the displayed conclusion of each argument on the same 5-choice response format, and second to sort out the arguments into one or several classe(s). Globally the two main kinds of arguments elicited very different evaluations. Except for one argument, the frequency distribution of the valid deductive arguments had one or two modes at "certainly true" or "certainly false" (68% of the responses); there were 19% of "probably true" or "probably false" responses and 13% of "uncertain"ones. With one exception again, the frequency distribution of the inductive arguments had one mode at "uncertain" (46% of the responses), while there were 33% of "probably true" or "probably false" and 21% of "certainly true" or "certainly false"responses. The invalid deductive arguments elicited either the first or the second pattern. In the sorting task, 12% of the subjects sorted the arguments in one class only, and 11% in several classes by thematic content. For the other subjects, the analysis of the classifications yielded four clusters which included the following arguments: (i) inductive arguments with three forms of generalization, (ii) inductive arguments with abduction or extrapolation, (iii) deductive arguments with categorical or disjunctive syllogisms, (iv) conditional syllogisms. These clusters are interconnected by one or several of their elements, and by isolated arguments such as invalid deductive arguments with transitivity.

C. Golder, Université de Poitiers, France

Cognitive operations implied in the argumentative discourse: Supporting or negotiating.

When children are asked to produce an argumentative discourse, two major operations are implied: they support their stance (justifying their point of view), and they negotiate their point of view by using modalisations, concessive marks,.... (Golder, 1992).

In this experiment, we are trying to confirm the psycholinguistic status of these two operations: does a justifying instruction facilitate the supporting operation, and does a negotiating instruction enhance the negotiating operation ? 7 to 15 years-old children are asked to write an argumentative text in two experimental situations: the first instruction stresses on the textual articulation (a point of view has to be explained,...); the second one insists upon the necessity to present an opinion in a modulated way (other people think differently,...). Each child produces two texts (no more than 15 lines) about two referents of the same type (natural referents): pocket money and school days off. The typological argumentative marks corresponding to the operations described above (supporting procedures, collective arguments, certainty marks, prescriptive and axiological forms....) are analysed.

The findings suggest the existence of two different types of texts, according to the communicative finality assigned by the instruction.

J. Grainger, Université René Descartes and CNRS, France

Neighbourhood frequency and neighbourhood density effects in visual word recognition.

Conflicting evidence has been previously reported concerning the effects of neighbourhood density (number of words that are orthographically similar to the stimulus) on word recognition performance. The experiments to be reported here were designed to test whether these discrepancies could be attributed to variations in neighbourhood frequency (the printed frequencies of the orthographically similar words compared to stimulus word frequency). The results show that in low density neighbourhoods the presence or absence of a single higher frequency neighbour is critical. Words that are similar to one other more frequently occurring word are harder to recognize than words with no such higher frequency neighour. On the other hand, increasing the overall number of neighbours (neighbourhood density) of target words can produce facilitatory or inhibitory effects depending on the frequencies of these neighbours.

D. Green, University College Londen, U.K.

Explaining an ecological phenomenon:
Model-driven and data-driven effects.

Consider how the size of a population of foxes might vary over time. The number of foxes depends on the number of prey which in turn depends on the number of foxes, i.e. there is interdependence. Such a system can give rise to cyclical changes in the number of foxes such that the population rises to a peak, falls to near extinction only to recover again.

Can subjects' thinking be influenced by cuing them with the notion of interdependence as part of the description of the problem? In a simulation study, two groups of 25 subjects (a cued and non-cued group) were asked to envisage, by drawing graphs, how the fox population might change over time and to explain the proposed changes. Although cuing exerted various effects, it did not produce a high incidence of graphs with cyclical changes in population size explained by interdependence. In the absence of constraining data, subjects' simulations are less complex. For instance, they tend to imagine some upper limit to population size after which point it remains constant.

In an explanation study two further groups of 25 subjects were presented with a verbal description of the cyclical population change and were asked to explain it. In this case, as expected, interdependent accounts were more frequent in the cued group compared to the non-cued group. This study examined a further prediction. Assuming that the coherence of an explanation, i.e. its ability to explain the pattern of data in a systematic manner, is cognitively preferred, it was expected that when an interdependent account was proposed it would be the only account offered since it can account for all the data in a non-arbitrary way. In contrast, non-interdependent accounts would consist of a number of partial explanations (e.g. offering one account for the growth and a separate one for decline). This expectation was also borne out. The third study confirmed the cuing and coherence effects in a context where subjects were required to explain a graph of the population changes.

These studies indicate that it is possible to cue a dynamic mental model and that the sophistication of an account based on it depends on the presence of constraining data which serves to flesh-out the model. In addition, they suggest that individuals have a preference for coherence.

A.M.B. de Groot, L. Dannenburg & J. Hoeks, Univ. of Amsterdam, NL.

Word translation by bilinguals and trilinguals.

Word translation performance was investigated in three experiments. Experiment 1 looked at the role of the following nine word characteristics in translating words from a native language (L1, here Dutch) to a second language (L2, here English): frequency of the stimulus word; frequency of the to-be-produced translation; familiarity, context availability, imageability, and ease-of-definition of the stimulus word; length of the stimulus word; length of its translation; cognate status of the translation equivalents. In Experiment 2 the role of the same variables when translating backwards, from the second language (English) to the first (Dutch), was studied. A recent model of bilingual lexical representation predicts asymmetries in performance between translation directions. In a final experiment word translation between three languages was investigated, from the native language, Dutch (L1), to each of two about equally strong foreign languages, L2 and L3, and from L2 to L3. The three languages of the trilinguals either all belong to the same family of languages (all Germanic: German, English and Dutch) or they belong to two language families (Germanic: English and Dutch, and Romance: French). The only word characteristic manipulated in this study was word frequency. The data are discussed in terms of bilingual and trilingual lexical representation and processing.

H. Hagendorf, Humboldt-Universität Berlin, Germany

On selective use of visual representation in a working memory task.

Although there is much research on temporary retention of visual images the characteristics of the cognitive mechanisms involved in storage and use of images are not yet clear (Logie 1991). At least three distinct frameworks which postulate such a mechanism are in discussion (Baddeley 1990, Kosslyn et al. 1984, Treisman 1987). Two questions are in the focus of our research: (1) What are the overlapping characteristics of the postulated mechanisms? (2) Are there differences between subjects in the disruption of a translation process of visual images into a verbal-conceptual code? This paper is concerned with the second of these questions.

Because there is no prefered way to ensure progress in solving theoretical issues we investigated the interrelationship among performance, age, experience and demands (Salthouse 1991) in an task used in assessing limitations of a storage and processing system for images (Phillips 1983, Ichikawa 1983). Subjects have to reproduce random dot-in-matrix patterns with and without verbal suppression during encoding.

In this paper we report on results of four experiments carried out with three distinct age groups. In the group of middle-aged subjects we have a subgroup with extented experience in using visual codes at workplace. The results suggest that memory performance in all groups was affected by the the suppression task, but there was only a small effect of experience. The check this result we are now running a new series of experiments with a slightly changed task which allows us to seperate the influence of the secondary task on encoding and maintenance.

The results are discussed in relation to the role of experience in explaining differences in rejecting the translation of a visual code in a verbal one and in relation to the modularity-of-mind hypothesis.

H. Haider & R.H. Kluwe, Universität der Bw Hamburg

Acquisition of cognitive skill.

SUMMARY: The acquisition of cognitive skills leads to a decrease in reaction time which is best fitted by a power function (Newell and Rosenbloom, 1981). This seems to be a rather stable empirical result. However, the theoretical assumptions about the underlying cognitive processes are different. Recently, Logan (1988) has proposed a model which assumes in contrast to other models itembased changes during skill acquisition. His main assumptions are as follows: (a) reactions to a stimulus can be algorithm-based or memory-based; (b) encoding is an obligatory consequence of attention, each item is encoded together with the response in the episodic memory, such that the number of processing episodes increases over time; (c) retrieval is an obligatory consequence of attention, the exposure of an item is sufficient to activate all associated episodes in memory as well as the algorithm; (d) each time the reaction to a stimulus is determined by the fastest process. These assumptions are sufficient to explain the decrease in reaction time which is fitted by a power function. Evidence is brought up by Monte-Carlo-studies and several experiments. In order to examine the following questions, an experiment was run: (1) Is it possible to show empirically that there is a transition from algorithm to memory retrieval ? (2) If so, is only this transition responsible

H.Haider & R.H. Kluwe (contd)

for the decrease in reaction time? (3) Is transition only a function of the number of exposures? N=32 subjects had to verify correct and incorrect alphabetic arithmetic tasks (A+2=C). Subjects participated in 8 sessions, each consisted of 4 blocks with 5 repetitions of 12 different tasks. In order to examine the latter two questions a transfer task composed of 6 old and 8 new tasks followed each session. Moreover, two conditions were chosen: In group 1 the 12 tasks consisted of 12 different letters combined with one addend. The latter was replaced after 4 sessions. In group 2 the tasks consisted of 6 letters combined with 2 addends. After 4 sessions the letters were replaced. Thus, the number of exposures of each task is equal in both conditions. Group 1 tests for the transfer to a new addend; whereas group 2 tests for the transfer to new letters. In order to examine the transition (concerning question 1), all subjects additionally had to verify simple tasks (A+1=B). 40 tasks of this type were given before the first, after the fourth and eighth session. A missing difference in reaction time between these tasks and the alphabetic arithmetic tasks was seen to indicate memory retrieval. Results: (1) Under both conditions analyses of reaction time suggest a transition from algorithm to memory retrieval (Question 1). (2) Under both conditions a significant difference between the first and the second half of the sessions was found. This indicate a general training effect, which could not be explained by the transition from algorithm to memory retrieval (Question 2). Moreover, the transition from algorithm to memory retrieval seems to take place earlier in the second half of the sessions (Question 3). It is concluded that the transition is not sufficient to explain the decrease in reaction time.

N. Harvey & P. Ayton
University College London & City of London Polytechnic, U.K.

Are people always more overconfident in their own decisions than in those of others?

A medical scenario was used as a frame to study the effects of formulating a decision on confidence in its efficacy. In a first experiment, controllers (doctors) made decisions (about drug dosages) to bring to output (a diagnostic index) of a dynamic system (a simulated patient) into a target range (corresponding to health). Each controller was paired with an observer (a nurse). After each decision, both subjects in a pair independently estimated its probability of being effective. These probabilities were overestimated but this overconfidence was less in observers than in controllers. In a second experiment, the observers also made decisions and these were also assessed by both subjects. The observers' decisions were not implemented but we could calculate the effects that they would have had if they had been implemented. Now observers and controllers did not differ in their overconfidence in controllers' decisions. However, overconfidence in the observers' decisions was greater in observers than in controllers. Two further experiments showed that this pattern of results is maintained when the observers' decisions are made before rather than after those of controllers and when the observers' status is made higher (consultants) rather than lower (nurses) than that of the controllers. We discuss possible reasons for these effects.

26

A-M. de la Haye & G. Lauvergeon, Université Paris V, France

Cognitive processes in distinctiveness-based illusory correlation.

Hamilton & Gifford (1976) have brought to light the so-called "Distinctiveness-based illusory Correlation" (DIC) phenomenon, presenting it as an experimental model of stereotype formation. The phenomenon has been repeatedly borne out, and its theoretical interpretation by Hamilton has become famous as a prototypical exemplar of cognitive explanation in social psychology. However, it is not yet clear in our view, exactly which cognitive process is responsible for the phenomenon.

We present three experiments, bearing on three critical aspects of the problem. In the first experiment, we concentrated on the recall process, and came up against the difficulty to distinguish between recall rate and response strategy, a difficulty not mentioned in the literature on the topic. The second experiment focused on the relationship between memory and judgment, and suggested a reciprocal influence between them. This is at odds with the classical conception, which states that DIC appears exclusively when the judgment is memory-based. The third experiment (not yet completed) focuses on the informational structure of the item set. In the classical conception, DIC is a consequence of unequal frequencies in the stimulus matrix. We make the hypothesis that evaluative contrast between categories will operate in case of equal frequencies as well.

H. Hecht, Max Planck Institut für Psychologische Forschung, München, Germany

Understanding complex dynamical events: Perceptual learning vs heuristics.

Complex dynamical events are often misunderstood at the perceptual and intuitive level. In spite of these difficulties, experts, such as athletes or billiard players, learn to make very precise judgments about such events. This study explored the basis of such judgmental abilities using the example of rotational motions (spin) as they occur in billiards. It was hypothesized that learning about the dynamics of spin consists of acquiring procedural heuristics that apply to one salient dimension of information only.

Conceptual knowledge about the effects of spin on trajectories of billiard balls was found to be erroneous. Almost all novices and more than half of the experts tested had mistaken beliefs about one particular type of spin (english). These beliefs were mirrored in animated contexts where subjects had to observe computer-generated events of spinning balls that had possible and impossible effects. As long as the motion-context remains simple (one or two axis of spin) observers seem to base their judgments of a spinning ball's behavior on one salient dimension of information, neglecting all other information. However, once the motion context becomes more complex (three axes of spin) novices and experts perform close to chance level. Thus, experts do not acquire perceptual knowledge about the dynamics of billiard balls. Instead, they use procedural heuristics for their judgments, which may be erroneous even if they are functional.

27

B. Hemforth, L. Konieczny & G. Strube
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Aspects of cognitive parsing.

Psycholinguistic models of language understanding focus on principles of natural language processing, that can guide parsing in an efficient and resource-saving way. One of the most popular ones, the *minimal attachment principle* (Frazier), which operates on syntactic structure, will be discussed in the light of experimental data on processing *Prepositional-* and *Nominalphrase attachment* ambiguities in German sentences with Verb-second and Verb-end structure. Subjects reading verb-end-sentences did more often build a non-minimal structure at some relevant positions, measured with on on-line presentation method. As a solution to the empirical and theoretical shortcomings of *minimal attachment*, meaning-oriented parsing will be introduced based on heuristic principles such as *immediate semantic integration*. *Head attachment* (prefer attachment to phrases whose lexical heads are already available) will be shown to explain the experimental data and to be easily integrated into a *competence-based* theory of human parsing.

A. Henik, Ben Gurion University of the Negev Beer-Sheva, Israel

Automaticity in picture-word priming.

The present set of experiments examines the influence of context on processing of pictures and word. We employed the sequential priming paradigm. The prime was presented for 150 ms amd SOAs of 100 ms or 70 ms. Subjects made lexical decisions about word targets and object decisions about picture targets.

In three lexical decision experiments (targets always words) the priming effect (RT unrelated - RT related) was similar for word and picture primes irrespective of SOA. The effect was not influenced by blocking SOA or prime modality (i.e., picture or word). The same pattern emerged in an object decision experiment (targets always pictures).

In a fifth experiment we employed a single SOA (850 ms) and manipulated relatedness proportion (80% related and 20% related and 80% unrelated trials). Targets were words or nonwords and primes were words or pictures. Proportion of related trials influenced the size of the relatedness effect irrespective of prime modality.

These results suggest that context influences as amodal or conceptual stage of processing. In addition we suggest that ceratin factors that reflect automatic processing (i.e., SOA and relatedness proportion) are present irrespective of prime and target modality.

J. Hoffmann, Ludwig-Maximimilians-Universität, München, Germany

On the difficulty of detecting conditioned response outcomes.

100 years ago William James claimed that "an anticipatory image ... is the only psychic state which introspection lets us discern as the forerunner of our voluntary acts". Since then the general idea that voluntary acts are guided by anticipations of their sensory consequences has been included in several theoretical approaches. Nevertheless it has seldomly been experimentally evaluated.

Under real-world conditions the consequences of our actions depend on the conditions which they are applied on. Therefore, reliably predicting them presupposes that the given preconditions be taken into account. In the experiments to be reported, the interrelations between a cue (precondition), a first response choosen among two alternatives, and the outcome of this response (to which Ss had to react again as quickly as possible) were systematically varied. We were interested in seeing to what extent and how quickly Ss adapt to these interrelations - whether they learn to anticipate the outcome of the freely choosen response, depending on the given cue, in order to accelerate their reaction to it.

The data reveal that such conditional response-outcome contingencies are hard to learn. Only a few Ss adapt their behavior to them, and only when they are explicitly instructed to do so or when the relations are deterministic. The results are evaluated with respect to the recent discussion on implicit learning.

D. Holender, Université Libre de Bruxelles, Belgium

The ubiquitous congruity effects.

A general theory is proposed of the effects observed in tasks in which response latencies are measured with stimuli involving both relevant and irrelevant dimensions or with displays involving both relevant and irrelevant stimuli, presented simultaneously or successively. Direct and mediated congruity effects arise when the irrelevant aspects of the situation may be recoded in terms of the same descriptors as those used in the instructions for mapping the relevant aspects of the situation onto the responses. Hence, in being verbally mediated, the congruity effects arise in late decisional processes dealing with conscious mental contents. It will be argued that this explanation is sufficient for accounting for Stroop and Stroop-like effects, Garner's effects, priming effects, and complex sequential effects.

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What counts in the Simon task: Attention or the attended stimulus?

In the Simon effect, reaction time depends on task-irrele-
vant spatial correspondence of stimulus and response. Logi-
cally, the presupposes spatial coding of stimuli and respon-
ses (e.g., as left and right), which could either result
from perceiving the spatial position of the stimulus relati-
ve to some reference object (e.g., a fixation point) or de-
pend on the direction in which attention has to be (e.g., la-
terally) shifted to focus on the stimulus.

It was tried to decide between these views by testing
whether the Simon effect (implying spatial coding) would
disappear if lateral shifts of attention are prevented but a
reference object is made available on the same representa-
tional level as the target stimulus. In three otherwise
standard Simon tasks the stimulus was always accompanied
by a second object (to provide an anchor for spatial refe-
rence) and a frame was used instead of a central fixation
point (to prevent lateral shifts of attention). The inten-
sity of the stimulus relative to the reference object and
the absolute stimulus location were varied. The results do
not support the assumption of a tight coupling between
spatial stimulus coding and the control of 'attentional
movements'.

J.L. Jackson, D. Otten & F. Woonings
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Implicit and explicit memory in schizophrenic patients.

The 19 chronic schizophrenic patients taking part in this study are
involved in an 8 month rehabilitation treatment programme. Within this
programme, rehabilitation is defined as learning skills to cope with
a permanent disability. A serious problem, however, is that the
learning of new skills has been shown to rely initially on declarative
knowledge such as the remembering of instructions - and, a number of
our patients have great difficulty with such episodic memory tasks.

The study to be described explores whether other forms of memory
skills (e.g. performance on implicit tasks) remain intact in our
patient group. It employs a picture completion task similar to that
described by Parkin & Russo (1990) and the results, which are similar
to those observed in amnesics, show that while our patient group is
impaired on tasks which require conscious recollection, they perform
almost as well as the control group on tasks which depend on automatic
activation processes.

What sort of implications does this suggest for revalidation program-
mes?

A.M. Jacobs, Groupe Regard,
Laboratoire de Psychologie Experimentale, France

Interaction between letter and word recognition: A question of more or less top-down feedback?

One of the oldest but still debated questions of cognitive psychology
concerns the interaction of letter and word perception during the
reading of isolated words. Recently, this question has again
attracted the attention of researchers in our field as evidenced by
the debate between Massaro and Cohen (1991) and McClelland
(1991). The present study used a letter search paradigm to examine
the effects of context on letter detection times. Three different
contexts were used: frequent words, pronounceable nonwords, and
unpronounceable nonwords. A modified version of McClelland and
Rumelhart's (1981) Interactive Activation Model (Jacobs &
Grainger, 1992) was used to simulate the results. The good
agreement between the observed and simulated data supports an
explanation of the word advantage in terms of a positive feedback
loop from the word to the letter level. The pros and cons of
alternative explanations are discussed, as well as the question of
how much feedback is required to simulate the data.

R. Java, City University London, U.K.

The influence of conscious awareness on memory and age.

Two experiments are described that illustrate how the direction of awareness
towards and away from conscious retrieval can obtain very different results.
Each one introduces an implicit task new to research in memory and age.

Experiment 1 extends previous work that has shown the relatively preserved
memory of older adults for implicit tasks of a perceptual nature (see eg. Java &
Gardiner, 1991; Light & Singh, 1987; Light, Singh & Capps, 1986). An implicit
test or anagram solution was compared with explicit recognition, with levels of
processing as a study manipulation. Little effect of age or levels of processing
was found in anagram solution, while recognition memory was shown to be
sensitive to both of these variables.

The second experiment investigated conceptual priming and age in a word
association task which was compared with free recall. Recall and generate were
varied at study. Similar levels of priming were achieved for both age groups,
although only the younger group showed superior generation for this implicit
task. Age differences and the generation effect were shown in free recall.
Inclusion of the two implicit tasks as data driven and conceptually driven tasks,
respectively, according to the classification of Roediger, Weldon & Challis (1989)
was discussed.

G.V. Jones & M. Martin
University of Warwick & Oxford University, U.K.

Integral bias in naming phobia-related words.

There is now considerable evidence that a person's cognitive processing is influenced by emotional factors. It is less clear, however, how this bias arises. Two hypotheses are distinguished and compared in the present study. The Inferred Bias hypothesis asserts that the cognitive effects of an emotion are not, in general, inherent consequences of that emotion, but instead arise from earlier experiences in which the particular patterns of emotional and cognitive activity have tended to be associated. The Integral Bias hypothesis asserts, in contrast, that the cognitive effects of an emotion are in general a fundamental characteristic of that emotion. In order to compare these two hypotheses, the cognitive effects of a phobia in children were studied. An effect on the Stroop naming of spider-related words was detected in spider-phobic children as young as 6 or 7 years old. Furthermore, the magnitude of this effect did not differ significantly over the age range to 12 or 13 years. Comparable results were obtained in further experiments. These results can be interpreted as suggesting that in this case the cognitive effects of an emotional disturbance emerged relatively fully fledged at a young age, and as such are consistent with the Integral Bias hypothesis of their origin.

T.R. Jordan & K.M. Bevan, University of St. Andrews, U.K

Word superiority over isolated letters: The neglected case of forward masking.

When brief visual displays of words and letters are followed by pattern masks (constructed from irregular arrangements of contours), letters in words are reported more accurately than letters presented alone; when these same targets are followed by a blank field, the word advantage completely disappears. These findings have led to the popular belief that a word advantage over isolated letters critically depends on the presentation of a pattern mask after each target has been shown, which, in turn, has inspired the view that a word advantage over isolated letters reflects the ability of pattern masks to disrupt on-going processes of target perception more effectively for isolated letters than for words. Here, we report the findings of a study in which the role of pattern masks in the word advantage over isolated letters was examined using displays in which pattern masks were shown only before a target was presented, and each target was then followed by a completely blank field. According to popular belief, this sequence of mask/target presentation is particularly unsuitable for producing a word advantage. Nevertheless, strong word advantages were obtained. Implications for contemporary accounts of word recognition are presented.

R.J. Jorna, University of Groningen, The Netherlands

Connectionism, Cognitive Science and the Concept of Association: A Critical Examination.

Recent discussions of Connectionism show that some opponents of Connectionism (Fodor & Pylyshyn, 1988; Levelt, 1989) consider this endeavour to be just a new version of the old doctrine of association. In order to condemn Connectionism the argument is as follows. In the fifties and sixties of this century Cognitive Science succeeded in defeating Behaviourism. According to the history of psychology, Behaviourism was a version of Associationism. One of the weak points in Behaviourism was its foundation on the notion of association. Connectionism as a new research area in the mind-and-brain sciences also rests on the notion of association. Because Cognitive Science already showed the untenability of the notion of association as foundational for research on mind-and-brain, Connectionism is based on a mistake.

There are a number of problems with this argument. First of all the notion of association is not defined or explained. Secondly, it is not sure whether we are talking about the same notion of association in Behaviourism and Connectionism. Thirdly, nothing is said about the fact that many theories of Cognitive Science take a notion of association for granted (Anderson & Bower, 1973). Finally, we could ask the question whether Connectionism is a real challenge for Cognitive Science, if the argument above is not valid.

In my paper I will do two things. In the first place I will discuss the notion of association by asking questions concerning the nature of its relation and of the elements involved. Many interpretations of association have been suggested in the past. A conceptual analysis of the relation of association indicates that there has been much debate concerning the question whether association is based on the relation of contiguity or on that of similarity. In the second place I will examine the conceptual foundations of Connectionism in order to reveal which notion of association is used here. In my conclusion I will discuss the consequences of the analysis for the fundamental assumptions of Connectionism. For example, if the accusation of (some sort of) associationism does not hold, does this mean that Connectionism could be the real successor of Cognitive Science?

M. Kail & D. Bassano, CNRS, Paris, France

On-line error detection of word order and morphology in French sentence processing: A cross-linguistic perspective.

This study investigates the role of word order and morphological cues (such as verbal agreement) during on-line processing of sentences in French. The impact of these various linguistic cues is examined using a paradigm of error detection with the following assumption: the ability of subjects in on-line error detection should be related to cue validity and cue strength in their language.

Previous results of off-line processing in French showed that verbal agreement is a stronger cue than word order, but their complex interaction requires on-line investigation on how their strength varies over time. The present research compares the detection of two grammatical violations in the VP (which involves a modal verb with number agreement inflection and the infinitive form of the main verb): a violation of word order and a violation of verb-subject number agreement.

First results indicate an effect of the position of the VP in the sentence: late violations are detected more quickly than early ones, which corroborates our previous results obtained in Greek. French subjects' detection of word order and agreement violations is compared to their processing in other languages (Wulfeck, Bates and Capasso, 1991): English-speaking subjects showed greater sensitivity to errors of ordering, while Italians were more sensitive to errors of agreement. French subjects' results underline the complex interaction of grammatical cues in real time processing.

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Plasticity in the spelling lexicon.

In a complex alphabetic orthography such as English, correct spelling is thought to be achieved by reference to the lexicon, an established store of abstract visually-based representations of words. A necessary assumption is that these lexical entries are well-defined and stable. The validity of this assumption was explored in a quad-ruplet of studies challenging the stability of the spelling lexicon in young adults. It was found that the probability of spelling a word correctly could be respectively depressed or raised, relative to a baseline, by a single prior exposure to an orthographically incorrect ot correct version.
The 'disruptive priming' was resistant to a variation in testing procedures, consistent across individual differences in spelling ability and visual-phonological strategy bias, and persistent in time, being evident even after a lapse of three months. It seems to operate on a whole word-specific level, and reside in automatic, implicit processes, since it is stochastically and functionally independent of explicit recognition memory of exposure to 'primes'.
The ease with which spelling accuracy can be manipulated informs modelling of the spelling lexicon. The emergent picture is one not of a stable single word entry store, but of a dynamic system where variegated experience creates either multiple represen-tations, or a single amoeboid representation of varying opacity, with a central core of greater density derived from superimpositions, and translucent or transparent mobile edges.

M.T. Keane, University of Dublin, Ireland
Prior experience contributes to the judged similarity of perceptual patterns.

Similarity plays a fundamental role in many cognitive theories (e.g., in theories of concept acquisition, memory, and language). Traditionally, theories of similarity have assumed that the similarity between complex, perceptual patterns is based on their perceived features (e.g., Tversky's contrast model). We report two experiments which show that differential prior experience with perceptual patterns can influence subsequent judgements of the similarity of the patterns, in a manner that cannot be accounted for by appealing to the perceptual features of the patterns.

We used an experimental paradigm consisting of a training phase and a testing phase. In the training phase, subjects received three patterns (the target pattern --T, and two others -- A and B). The three patterns were perceptually very similar (as established by control conditions). Each pattern consisted of a set of four shapes in a two-by-two matrix. We manipulated the subjects *prior experience* with these patterns in the training phase, by requiring them to swap the shapes in the patterns according to specified instructions. In the testing phase, we showed them the set of three patterns (T, A and B) and asked them to make a forced-choice similarity judgement ("T is like A or B"). The primary finding was that when the sequence of swaps for two patterns was the same, they were judged to be more similar than two patterns for which the sequence of swaps was different, relative to controls who received no prior training. We consider the implications of these results for current theories of similiarity and we outline two alternative computational models of the phenomena (one symbolic model and one connectionist model)

34

A. Kennedy & W.S. Murray, University of Dundee, U.K.
Reading strategy, eye movement control and refreshed displays.

Text is processed less efficiently on a refreshed display (e.g. a VDU) than when presented as hard copy. We have suggested that one reason why this may be so relates to a disturbance to saccade control produced by pulsating illumination (Kennedy and Murray, 1991). There is now a considerable body of evidence suggesting that screen pulsation influences the extent and accuracy of inter-word saccades during reading. However, the dynamics of normal reading make fine-grain analysis impossible. For example the size of a saccade directed towards a word depends not only on the length of the target, but also on the launch position in the prior word. The experiment reported here controlled for some of this variation. Subjects made a series of saccades from a fixed position to check whether two words were physically identical or were synonyms. The task was carried out at four different refresh-rates (50hz, 75hz, 100hz and 125 hz) using a variable frequency raster display. Inter-word spacing was also manipulated with target words separated by one or three spaces. The results overall confirm our previous findings: saccade length is reduced at some refresh frequencies. There are also effects on the variability of both saccade length and landing position. However, the results also showed unexpected interactions with task (checking for identity of form or meaning). The disturbance to saccade control induced by screen pulsation was greater when subjects were checking meaning than checking word-form. We offer an interpretation of this outcome in terms of differences in reading strategy induced by the two tasks and relate the data to other findings which suggest that strategy influences the magnitude of adverse effects of screen pulsation.

R. Kimchi, University of Haifa, Israel
The perceptual primacy of wholistic properties.

The hypothesis about the primacy of wholistic properties in visual perception has been studied extensively in the last 15 years or so within the global/local paradigm. The issue however, is still unsettled and somewhat confused. An alternative framework for studying this hypothesis is proposed, based on a distinction between hierarchy of pattern structure and a hierarchy of properties. Lower-level properties are simple, non-relational properties (e.g., line orientation). Higher-level properties are relational properties (e.g., symmetry, closure). Contrary to the higher, more global level of pattern structure which can possess a lower-level property, wholistic properties are relational, and therefore higher-level. The purpose of the present study is twofold. First to examine the perceptual priority of higher-level, relational properties over lower-level properties. Second, to examine the relative relevance of level of structure vs. level of property for the perceptual system. The first set of experiments demonstrated that discrimination between figures that differ in higher-level property is easier than discrimination between figures that share higher-level property, regardless of the discriminability of their lower-level properties, suggesting the perceptual priority of the higher-level properties. The

35

R. Kimchi (contd)

second set of experiments involved discrimination and classification of hierarchical patterns constructed by an orthogonal combination of level of pattern structure and level of property. If the perceptual system favors higher-level properties, then such properties are expected to dominate performance regardless of the level of structure at which they are present. The relevance of the present findings to the issue of the perceptual primacy of wholistic properties will be discussed.

F. Klix & B. Krause, Humboldt-Universität Berlin, Germany
The cognitive bases of inferences.

1. The mental bases of inferences are knowledge domains and operations working on them. Knowledge domains are defined by concepts and relations between them. Operations are defined by algorithmic-like structures which compare or transform conceptual entries in human memory. Concatenations between concepts and operations generate higher order inferences. Inductive reasoning, metaphors and analogies belong to this kind of inferences.

2. An approach is outlined from which a taxonomy of inferences seems to be derivable. We distinguish between (a) lower order inferences (i.e. autonomous operations of information gain from memory units or concatenations and activation of associative chunks), and (b) higher order inferences due to derivations by controlled operations. Examples for (a) are similarity judgements between concepts or connections between events and possible consequences and for (b) are inductive inferences or analogical reasoning.

3. It is often argued (see Sternberg, 1983) that analogous reasoning is a special kind of inductive reasoning. Evidence is given in the report that this conclusion is wrong. A formal definition of inductive inferences is given in comparison with a definition of the structure of analogies. Similarities and differences will be discussed and demonstrated.

4. Convincing examples concerning the defined specifity of inductive inferences are given by experimental findings. The quite different specificity of analogical reasoning is shown by some historical examples: by analogical proofs in Galilei's work and by the famous Maxwell equations, and is compared with the inductive conclusion on the structure of the atom.

M. Knopf, Max Planck Institut für Psychologische Forschung, München, Germany
Does action memory rely on motor representation?

Although it has fairly often been demonstrated that performing an action while enacting leads to a better memory performance level than verbal encoding of similar actions, the reason for the superiority of memory for subject-performed tasks (SPTs) is less clear. Some theories postulate that the representation of motor information (motoric codes) is crucial for the occurrence of this effect; an alternative theoretical account states that SPTs are encoded multimodally, resulting in a rich conceptual representation. Motoric representation may be part of these multimodal encodings. The goal of our studies was to test whether motor information plays a crucial role for memory performance for SPTs. Technically this was realized by using an encoding procedure where the actions had to be planned by the subjects with the goal of their realization. However, the motoric realization was delegated to other persons. Thus, subjects underwent the conceptual stages of action planning without actually performing the actions. The findings show that memory performed after planning actions with the commitment to be performed is equivalent to memory performed after enacting. This can be seen as strong evidence against theories that postulate motoric influences on action memory. It rather supports a view that the high levels of action memory performance are based on conceptual representation of motivational and volitional cognitions.

R. Kolinsky & J. Morais, Université Libre de Bruxelles, Belgium
Intermediate representations in spoken word recognition: Evidence from word illusions.

A major issue in the comprehension of spoken word recognition concerns the nature of the mapping from sound to lexical representations. We describe a new technique to approach this issue.

The task consists in detecting a target word from among two simultaneously presented pseudowords, each to one ear. When the target is not present, subjects report sometimes to have heard it. Such errors are induced by presenting pairs in which the information necessary to the perception of the target (e.g., BIJOU, /biʒu/) is distributed between the two ears (e.g., /kiʒu-bɔtõ/). The combination of parts of information of one input representation with temporally contiguous parts of information from the other input creates the illusion. The distribution of information was manipulated experimentally in order to test the relevance of different word constituents as units of speech recognition: phonetic features, phonemes, and syllables. Moreover, taking into account previous work that indicates that speech segmentation may depend on the phonological characteristics of the native language of listeners, we tested both French and Portuguese native speakers in their own language.

While both languages present syllabic-based rhythms and relatively stable accentual structures, Portuguese speakers, unlike French ones, reduce the vowel in unstressed syllables. Since vocalic reduction creates many long consonantic sequences in Portuguese, we expected the respective roles of phonemes and syllables not to be the same as in French.

A. Larsen, University of Copenhagen, Denmark
Efficiency of holistic template matching in visual pattern recognition.

Psychological evidence suggests that simple visual patterns can be recognized by using internal representations as holistic templates, but the efficiency of holistic template matching in recognition of real-life patterns such as handwritten characters has been doubted. To clarify this issue, we measured the efficiency of holistic template matching in machine recognition of totally unconstrained handwritten digits. Our learning and recognition algorithm was simple; no previous knowledge concerning handwritten digits was presupposed, and preprocessing was limited to Gaussian smoothing and normalization with respect to position, size, and orientation. For patterns presented in a known orientation, recognition rates were .69, .77, and .88, respectively, when about 5, 10, and 50 templates had been learned for each type of digit. For patterns presented in unknown orientations, recognition rates were slightly lower. High levels of reliability could be attained by discounting classifications based on weak evidence. Apparently, in high-reliability recognition, holistic template matching can be used as a first-phase operation by which recognition is achieved for most handwritten digits seen in real life.

A. Laudanna & A. Caramazza, Istituto di Psicologia del CNR Roma, Italy
& The John Hopkins University, USA
Morpho-lexical representations and reading.

In previous experiments we obtained strong evidence in favor of the hypothesis that lexical entries are stored in morphologically decomposed form (Caramazza, Laudanna and Romani, 1988; Laudanna, Badecker and Caramazza, 1989; in press).
However, all of these studies were based on the lexical decision paradigm which according to some investigators is not the best procedure to assess lexical access. To circumvent this criticism of the experimental procedure employed in our previous research, we extended our studies to an experimental paradigm - naming - which is not open to the criticism that has been levelled against the lexical decision task. In a new set of two experiments, we replied our previous studies on inflectional verbal composition (Caramazza et al., 1988) by evaluating the effect of the morphological structure in naming non word stimuli composed of verbal stems and/or suffixes.
The results confirmed that there is a level of lexical representation (in our interpretation the Orthographic Input Lexicon) at which inflected words are analyzed in terms of their inflectional stems and affixes. Some differences between lexical decision and naming, leading to partially different results on the processing of inflectional verbal morphology, are discussed.

38

J-F. Le Ny, Université Paris-Sud, Orsay, France
Elective decay in semantic representation after comprehension.

Activation models of language comprehension postulate that lexical units, inter alia, are activated at various levels during comprehension. It has been previously shown that response times collected in probing (immediate word recognition) can be used as a fair index of such activation levels. This technique has previously yielded evidence that a gradual increase of response times as a function of elapsing time or interpolated text takes place for all words immediately after processing. This increase is interpreted as a decay of activation levels. Two distinct experiments, run in French and Japanese with verbatim probes, showed that this time increase (or activation level decrease) is steeper for words having a case role referring to circumstances in a sentence than for agents or patients. This was interpreted as elective decay of different types of information in semantic representation as a function of their usual importance. Similar results were recently found in an experiment with semantic probing: probes were there different from any word in the previous sentence but had a meaning correspondance with some part of the target sentence. Half probes referred to circumstances and the other half to the central event. In addition, determined constituents of some sentences were triply bracketed to emphasize them. Time increase was steeper for probes corresponding to circumstances than central events, and non-emphasized than emphasized constituents. These results are consistent with the assumption of elective decay, and suggest that some form of on line assessment of an importance value to each piece of processed information, and tagging of it, takes place during comprehension. Such importance tags are assumed to control conservation of information in active memory, and presumably later.

Y. Levy, The Hebrew University, Jerusalem, Israel
'Closed' systems in the acquisition of knowledge.

The development of language in children with congenital, left-hemisphere brain infarcts reveals a surprising advantage to formal aspects of language (Levy, Amir & Shalev, 1992). Similar advantages have been noted in normal children acquiring languages with rich morphologies, as well as in other populations of retarded children (e.g. Curtis, 1990; Cromer, 1986).
It is suggested that in learning there is an advantage to systems which are 'closed' in the logical sense of the term. A closed system is a system which is "informationally encapsulated" in the Fodorian sense. Unlike Fodor, the claim here does not directly concern the modularity of the mind. Rather we argue that parts of the input data that make up 'closed' systems, will be learnt early and with less errors. It is suggested that structurally independent, internally defined, less 'relevant' sub-systems, constitute easier learning problems, at least in the case of language acquisition.
Linguisic sub-systems are never completely closed; rather, they vary in the extent of their closure. It is predicted that morphology in highly inflected languages, as well as parts of syntax which are formal and meaning-independent, will be learnt early despite their lack of communicative import. We offer this hypothesis as an explanation for the data reported above.

39

J. Leybaert & J. Charlier, Université Libre de Bruxelles, Belgium
Rhyme generation in deaf children: The influence of communication method.

It is well known that deafness hinders adequate perception and production of oral language and, therefore, of the cognitive processes based on speech representations. Several studies have shown a relationship between deaf subjects' phonological abilities and speech intelligibility, reading level, and degree of hearing loss. However, the influence of the communication method has been largely neglected so far.

The fact that lipreading provide deaf individuals with impoverished representations of the phonological structure of oral language has led some people to imagine communication methods in which manual handshapes produced simultaneously to speech allows the deaf receiver to desambiguate the lip-read information. Such methods might help deaf children in acquiring accurate phonological representations. Several studies have been devoted in our Laboratory to investigate the effect of one of these methods, Cued-Speech (CS) on the cognitive development of deaf subjects.

In earlier studies, deaf children exposed to CS were found to exhibit,detrimental effects of phonological similarity and word length in short-term memory experiments as did control hearing subjects and to be able to judge whether two drawings rhyme or not. These effects were not observed in deaf subjects educated with a traditional oral method.

In a new study, we compared deaf children educated with CS, deaf children educated with a traditional oral method and hearing children of a similar reading age in their ability to generate written rhymes in response to pictures and written words. Deaf children exposed to CS showed a similar sensitivity to phonological structure than did normally-hearing children: 82% of their responses were correct rhymes, and half of the correct responses were orthographically dissimilar to their target (e.g. riz, nid, pris), indicating an ability to generate rhymes independently of orthographic structure. The proportion of correct responses and correct orthographically dissimilar rhymes was higher than in our orally-educated deaf subjects. The error analysis also gave some insight about the basis on which deaf subjects generated rhymes. In about half of the incorrect responses, subjects educated with Cued-Speech seemed to rely on a partial phonological cue (same vowel with a different consonant, as in homme-Pologne, or same consonant with a different vowel, as in pomme-dame). In conclusion, the data suggest that the ability of deaf subjects to develop a sensitivity to word phonological structure is enhanced by exposure to a communication method like Cued-Speech. The implications of these results for the development of oral and written language and the understanding of the origin of phonological representations in deaf subjects are discussed.

A. Lian, University of Oslo, Norway
Interhemispheric transmission time in two auditory choice reaction tasks.

An assymmetry of interhemispheric transmission time (IHTT) of audiomotor information is demonstrated in two experiments with right-handed subjects who performed in a unimanual choice reaction task. Subjects released a central ready button and pressed a target button on their right or left side depending on the ear in which they heard a tone. Transfer of information from the left hemisphere (side of stimulus entry) to the right hemisphere (side of response generation) is faster than in the reverse direction. This assymmetry is enhanced by a visual warning signal (WS) in t] right visual field, and eliminated or reversed by a WS presented in the left visual field.

L. Colombo, Universita di Padova, Italy
Role of neighbourhood, stress and frequency in word naming.

The role of several factors that have been shown to influence the pronunciation of words is investigated in a series of experiments in the Italian language, using the naming task. The factors include the role of stress, the influence of neighbourhood the role of strategies and of frequency. Aim of the experiments was to verify to what extent subjects use neighbourhood information as a cue to the assignment of stress and to the word's pronunciation. Words were presented either in blocked or in mixed conditions, to see whether subjects could exploit information given by the experimental context, with the consequence of magnifying or nullifying the stress effect (e.g., the difference in naming time between words with dominant and infrequent stress). The data show that subjects can adjust to the characteristics of the experimental context and material, but do not use the same type of information to the same extent in all conditions.

The implications of these results for single process or dual route models of reading are discussed.

G. Lukatela, University of Belgrade, Yugoslavia
On oral reading in a shallow orthography.

The traditional form of the orthographic depth hypothesis assumed that readers of shallow orthographies always use assembled phonology in order to recognize printed words and readers of deep orthographies use only direct visual 'route'. A more contemporary form assumes that-- regardless of the orthographic depth--for oral reading and lexical access both high familiarity regular words and all exception words make advantage of the direct route, whereas low familiarity regular words rely on the indirect phonologically mediated route.

In a series of recent experiments I tried to find evidence of direct visual access in the Serbo-Croatian shallow orthography. The outcome was negative: Serbo-Croatian subjects read high familiarity words without making contact with the internal lexicon. On the other hand, the same subjects did contact the addressed phonology when they read phonologically ambiguous words. From these data a new model of written word recognition in shallow orthographies is emerging: the reading of all regular (i.e., phonologically unambiguous) words relies only on assembled phonology; however, an interaction between the assembled and addressed phonology takes place whenever the visually presented word is phonologically ambiguous.

S.J. Lupker, P. Brown & L. Colombo, University of Western Ontario,
Canada & Universita di Padova, Italy

Two routes or not two routes?: That is the question.

In the classical dual-route model of reading, there are two independent ways to name a word, by applying grapheme to phoneme translation rules (the assembly route) or by using the complete letter string to access lexical memory and then "looking-up" the appropriate pronunciation (the lexical route). One piece of evidence supporting this conceptualization was reported by Baron and Strawson (1976). Using pencil and paper tasks, Baron and Strawson classified subjects as good or bad on each of these two routes and then demonstrated that performance on naming irregular words is much more difficult for the subjects who tend to rely on the assembly route ("Phonecians") than for subjects who tend to rely on the lexical route ("Chinese").

In the present study we attempted to extend the Baron and Strawson results by using more complete pencil and paper tests and by examining the performance of our "Phonecian" and "Chinese" subjects in a variety of naming tasks, some of which are presumed to rely more on the lexical route and some of which are presumed to rely more on the assembly route. As predicted, Phonecians were much better than Chinese (having lower overall RTs and showing smaller effects) on assembly route tasks (naming one- and two-syllable low frequency words and nonwords). Contrary to predictions, however, Phonecians were also better on lexical route tasks (naming irregular words of various frequencies).

The data were much more consistent with Seidenberg's (1985) time-course model in which the influence of phonology (and, hence, the size of most effects) is a direct function of the subject's overall RT. The only exception was the effect caused by using irregularly stressed, two-syllable words. Implications of these results for various versions of the dual-route conceptualization will be discussed.

L.T. McCalley & D.G. Bouwhuis, Instituut voor Perceptie Onderzoek,
Eindhoven, The Netherlands

An age comparison study using resource allocation models of visual selective attention.

To date, no distinction has been made between
young and old in attentional resource models.
The study reports results of two experiments,
and the intervening pilot studies, indicating
age changes in the pattern of attention allocation.
Experiments tested the effect of a spatial cue on
the allocation of attention in the visual field
using a cross-sectional age comparison paradigm.
Response Time (RT) cost and benefit patterns were
analyzed across four SOAs as to which of three
current quantitative models of attention best
explained results for each group. The differing
SOAs were utilized in order to explore between-
group differences in the temporal course of
processing. Theoretical implications for cognitive
research, as well as applications to reading, are
discussed. In addition, age considerations for
visual and cognitive interactions in complex
experimental visual arrays are addressed. Model
fit was found to be a sensitive tool for assessing
age differences in visual selective attention.

S. Magnussen & M.W. Greenlee, University of Oslo, Norway &
Universität Freiburg, Germany

Visual short-term memory for simple and complex spatial frequency information.

Visual short-term memory for spatial frequency information was assessed by measuring delayed discrimination thresholds for briefly (200 msec) exposed luminance gratings, using a two-interval forced-choice procedure with 1-10 sec inter-stimulus intervals (ISI). Stimuli were simple gratings, complex gratings whose frequency components differed by two octaves, or duplex (side-by-side) gratings with a two-octave difference in spatial frequency. Two memory tasks were tested: In the single-judgement task the subject knew beforehand which frequency component was varied and decided which stimulus interval contained the higher spatial frequency. In the dual-judgement task, on half of the trials the higher frequency component and on the other half the lower frequency component was varied, and on each trial the subject had to make two decisions: First, which frequency component differed, and second, which stimulus interval contained the higher value of that component. Irrelevant stimulus factors that might assist discrimination and memory were randomized across trials.

Confirming previous findings Weber-fractions of 3-5% were found for simple gratings and for the discrimination of single frequency-components in complex gratings; in the dual-judgement task discrimination thresholds were 15-20% for both complex and duplex grating stimuli. This threshold increase in the dual-judgement task is several times larger than prediced by stimulus uncertainty. The lower discrimination performance could be due to limited perceptual processing resources or to factors associated with the decision process, but not to degradation processes in short-term memory: There was no effect of ISI in any of the stimulus/ task conditions. Thus, spatial frequency information is maintained in short-term memory with the precision which it is processed for visual discrimination.

T. Mäntylä, University of Stockholm, Sweden

Activation and self-initiation as prerequisites to successful prospective remembering.

Mechanisms underlying event-based prospective memory were examined in two experiments. In both experiments, older and younger adults generated associations to a large number of words. Parallel with this task, subjects performed an action when a semantically defined target word occurred. In Experiment 1, the degree of self-initiated processing was manipulated by using words with varying semantic typicality as target items. The results of Experiment 1 revealed an interaction between age and item typicality, suggesting that age differences in prospective memory are determined by the degree of self-initiation required. In Experiment 2, semantic activation was manipulated by using a separate category-fluency task, in which younger and older adults generated exemplars to half of the semantic categories that were used as cues in the subsequent prospective memory task. The results of Experiment 2 revealed priming effects in prospective memory. These findings are discussed in terms of activation, cue distinctiveness and self-initiated processing.

G. Mazzoni, Universita di Firenze, Italy

Encoding conditions determine memory predictions' accuracy.

SUMMARY: Two types of memory predictions are considered here, JOL (judgments of learning) and FOK (feeling of knowing). The aim of this research is to examine the information used for JOL and FOK, and its role on accuracy.

JOL Begg's et al (1989) hypothesis that JOLs are based, on the ease of processing (EoP) the items, and that JOL accuracy is determined by the match between variables relevant for EoP and variables relevant for retrieval is compared here with the hypothesis that JOLs are sensitive to the encoding conditions.

The influence of the encoding condition on judgments' accuracy is examined here by manipulating a) items' attributes that influence EoP, b) acquisition conditions (intentional vs incidental), c) depth of processing. Results confirm that JOL judgments are more accurate in the intentional condition, while, whithin each condition, accuracy is determined by the match between the variables used during encoding and the variables that determine recall. EoP heuristic is confirmed by our data, but only in an intentional conditions JOLs are accurate.

FOK Two theories concerning the information used for making the FOK judgment are contrasted here. a) FOK is based on some accessible information (mainly structural) of the item target (Schacter & Worling, 1985). b) FOK judgments are determined by a heuristic process, based on cue familiarity (Schwartz & Metcalfe, 1991), without any access to the target. Cue familiarity, target familiarity and encoding conditions are manipulated in these experiments. the relevant. Our results show that intentionality, level of processing and target familiarity interact in determining FOK accuracy. Our data are in agreement with the "target access" theory.

A.S. Meyer & K. Bock, Max Planck Institute for Psycholinguistics, NL

The tip-of-the-tongue-phenomenon: Inhibition or facilitation of word retrieval?

Tip-of-the tongue states may represent the momentary inhibition of an otherwise accessible word or the weak activation of an otherwise inaccessible word. In three experiments designed to address these alternative views, subjects attempted to retrieve rare target words from their definitions. The definitions were followed by cues that were related to the targets in sound, in meaning, or in neither. The distributions of correct responses and TOT states across the cuing conditions were examined. The first two experiments found that related cue words facilitated rather than inhibited lexical retrieval relative to unrelated cues, and that sound cues were more effective facilitators than meaning cues. This reverses a previous conclusion (Jones, 1989) that is shown in the third experiment to stem from a small group of unusually difficult

target definitions. It is argued that the findings are more consistent with a facilitatory view of lexical retrieval according to which word forms are selected when they have accrued more activation than alternative forms, than with an inhibitory view, according to which word forms are selected when they have become highly activated themselves and, in addition, have suppressed their competitors.

J-M. Monteil, Université Blaise Pascal, Clermond-Ferrand, France

Intergroup differentiation and individuation processes.

Numerous studies concerning intergroup behaviours (see: Brewer, 1979; Hogg and Abrams, 1988; Messick and Mackie, 1989; Tajfel, 1982; Turner, 1982; Wilder, 1986), have shown that dividing people into two different groups was enough to produce an intergroup bias. Therefore in a recent work (Monteil, in press) we have shown that it was possible to cancel this intergroup bias, under conditions of social deprivation immediately followed by an attribution of positive value. several informers (such as perception of the distance between one's and others, quality of the self categorization) enabled us to envision this phenomenon of intergroup bias cancellation as being contemporary with a process of individuation.

In order to test the relevance of such an explanation used an experimental paradigm inspired by Perdue, Doviedo, Gurtman et Tyler, (1990). We aimed at finding out if ingroup designators (e.g. we, us) and outgroup designators (they, them) elicit a positive or negative predisposition among deprived and non-deprived subjects. We also tested pronominal forms (him, I, you, me, designators of individuation) in order to find out the individuation phenomenon.

In a first experiment nonsense syllabes were paired with ingroup designators and outgroup designators over a series of trials in a lexical task. Subjects were presented with a pair of letter of one word and one non sense syllable. They were asked to indicate, by presssing a key, whether the real word was the left or the right member of the pair. Then the subjects rated the pleasantness of the nonsense syllables. A second experiment used the task of semantic priming. The different ingroup and outgroup designators (we, they, us them) and the different "individualisation designators (him, me I, you) were presented briefly and then visually masked by positive or negative trait adjectives. The dependent measure was the latency to decide whether the trait was positive or negative.

The results show that:
- The subjects whose group was sbmitted to a social deprivation preceding and attribution of positive value are not sensitive to group designators. On the contrary, these same subjects are sensitive to designators of individuation, whereas the others are not.

This experiment has drawn attention to the cognitive reality of individuation processes and to the cogntive impact of social deprivation. The discussion puts the emphasis on the limits of social identity theory in accounting for the cancellation of intergroup bias and for the emergence of individuation in a situation of intergroup differenciation.

W.S. Murray & K.I. Forster, University of Dundee, Scotland
& University of Arizona, USA

What the word frequency effect tells us about lexical access.

The most ubiquitous effect in studies of word recognition is that of word frequency. High frequency words appear to be identified both more rapidly and more readily than low frequency words. The actual form of the relationship which links word frequency and identification time has, however, remained somewhat unclear. It has generally been assumed that it is roughly logarithmic in nature, as frequency differences at the low end of the scale appear to exert a much larger influence than equivalent differences in the high frequency range, but the precise nature of the relationship, and why it might be expected to take such a form, have not been clearly specified. However, instead of taking this effect as simply a phenomenon which any viable model of word recognition must be able to account for in some manner, it is possible to relate the precise form of the effect to the hypothesized processes incorporated in various models and to use it as a diagnostic tool in their evaluation. The present paper reports the results of studies which have examined the relationship between frequency, rank order and reaction time for a large sample of English words. The results show a clear and consistent form to the word frequency effect which, it is argued, is most readily and straightforwardly explained by a lexical access procedure incorporating a rank ordered serial search.

E. Necka, Jagiellonian University, Poland

Is attention a unitary concept?

There are two traditions of the psychological study of attention. The first one deals with the problem of selectivity, whereas the second one is connected with the problem of capacity and resource availability. According to these traditions, different research paradigms have been elaborated and used by experimental psychologists. The problem arises whether both traditions concern the same psychological phenomenon, and therefore, whether one term instead of two separate notions is allowed. It seems quite easy to unite both traditions at the theoretical level of analysis. As to research paradigms, however, the problem is not so simple. The presentation aims at unification of the concept of attention at the empirical level of analysis. An especially devised experimental task will be presented and discussed. The task requires subjects to discriminate stimuli that are consistent with a target from those that are not consistent. This task is performed in various conditions of different difficulty levels. One of these conditions introduces a secondary task to be performed simultaneously. Thus, it is possible to analyze the level of performance of both tasks under easy and difficult conditions. The results from three experiments are presented and analyzed in order to seek answer to the basic question: is the selectivity aspect of attention so closely related to the capacity aspect that one unitary concept is sufficient?

A. Nguyen-Xuan & J. Shao, Université de Paris 8, France

Inference rules in weight seriation with an insensitive balance.

Weight seriation is an important Piagetian task for studying reasoning in children. In the classical weight seriation task, the subject is asked to rank a set of objects by their weight using a Roberval balance which is sensitive enough to differentiates between any pair of objects. Hence, the transitive inference ("if A>B and B>C, then A>C") is the only logical rule that is needed to be applied. The problem is made more difficult if the balance is not very sensitive: i.e. for

A. Nguyen-Xuan & J. Shao (contd)

certain pairs of objects, the balance does not tilt, although the subject knows that all the objects are different by their weight. In order to demonstrate why this new task, called "Insensible Balance", is more difficult, the problem situation was formalized in terms of inference rules that must be applied. This formalization made explicit four elementary inference rules, and many interesting macro-rules for infering the order between the objects. The classical seriation task and the "Insensible Balance" task were given to 64 pupils of French secondary school (11-15 years). The formalization was used to analyze the observed protocols. The main results showed that the "Insensible Balance" was more difficult and gave rise to new seriation strategies.

L-G. Nilsson, University of Umeå, Sweden

The science of mechanics and priming.

A patch-light technique with luminous spots on the main joints of the human body has been used for presenting natural and distorted actions for subjects at a study trial, a recognition test and an action decision test. In the former test subjects were asked to recognize those actions that had been presented at study; in the latter test subjects were asked to decide whether the information shown depicted natural actions or not. The results showed significant priming effects for real actions but not for distorted actions. Contingency analyses revealed statistical independence between action decision performance and recognition performance. These results are compared to those demonstrating priming for (a) line drawings of objects that are possible in the three-dimensional world but not for impossible objects, and for (b) symmetrical but not asymmetrical polygons. The basic mechanisms behind these results are explored in a series of new experiments on priming distinguishing kinematics from dynamics of motion.

L.G.M. Noordman & T.J.M. Sanders, Tilburg University, The Netherlands

Coherence relations in the processing of text.

A characteristic of a text is the coherence between its sentences. If a reader understands a text, the relations between the sentences are identified and processed. These coherence relations are cognitive relations; they express knowledge structures.

Knowledge is organized in terms of different relations, such as causal, concessive, contrastive and additive relations. In general it is assumed that causal relations play a central role in the organization of knowledge.

Accordingly, it is assumed that causal coherence relations in text have a stronger structuring effect in the discourse and play a more central role in the psychological processes in discourse understanding than, for example, the weaker additive relations.

This paper focusses on causal and additive coherence relations. The role of coherence relations will be investigated both in off-line reproduction and verification tasks and in on-line reading tasks. In the experiments a particular target sentence is related to the previous

text either by means of a causal relation or an additive relation. Because of the privileged role of causal relations, it is predicted that causally related target sentences are better reproduced than additively related target sentences. Predictions with respect to the processing time for the target sentences are less clear. Assuming that readers try to construct a coherent representation, one may predict that the reading time for stronger coherence relations is shorter than for weaker relations. On the other hand stronger relations are more informative and may therefore require more processing time.

Coherence relations are cognitive relations that a reader can identify in text, even if they are not linguistically marked as such by a conjunction. However, one may assume that the linguistic marking by the conjunctions facilitates the process of constructing a coherent representation. Accordingly, it is expected that the target sentences are processed faster if the relations with the preceding discourse are linguistically marked than when they are not marked, but that, once they are processed, there is no effect of the linguistic marking anymore in the reproduction of the target sentences.

The results of experiments to test these hypotheses suggest that the cognitive structure of the information in the text has a long lasting effect both in on-line tasks and in off-line tasks, whereas the linguistic marking of the structure has only an effect on the processing and not on the storage of the information.

C. Pacteau, Laboratoire de Psychologie Differentielle, France

Analytic and holistic modes of category learning in children.

It is generally assumed that developmental trend in category learning reflects a shift from grouping objects on the basis of family resemblance (holistic categorization) to grouping objects on a single or more attributes (analytic categorization). This view has been questioned in studies showing that what process is elicited during category learning is the result of an interaction between a goal-directed individual with given competences and an environment with specific and meaningful properties.

In a first series of experiments patterned after Kemler Nelson's procedure (1984), we looked for indices which testify for genuine gestalt like processes in the learning of categories structured according to family resemblance principles (categories of faces). Such indices —including identifications of facial elements and response times— called us for a critical reappraisal of the notion of holistic responding in previous studies on face classification. Further work identified some situational (format of face representation, condition of learning) and individual (age, preference) factors linked to analytic and holistic modes of processing.

Results will be discussed in the framework of a pluralistic, decentralized conception of cognitive development.

J-M. Passerault, D. Chesnet & D. Gaonac'h, Université de Poitiers, France

Integrative processes in fast and slow readers.

We present findings that provide some explanations for differences between slow and fast readers in the implementation of integrative processes (Cf. Haberlandt, Graesser & Schneider, 1989). Integrative processes require to maintain text segments in working memory before doing more global integration (Passerault & Gaonac'h, 1991):

In experiment I, we examine recall of a text displayed with a RSVP procedure (Rapid Serial Visual Presentation; See Juola, 1988). Slow and fast readers improve their recall when short pauses are introduced during text display, only when these pauses are located at the end of sentences. These findings are consistent with now classic observations: end of sentences segments are the prime sites for carrying out integrative processes.

In experiment II, a text was displayed with a "self-paced" procedure. Mean reading time of segments indicates that slow and fast readers differ maximally for end of sentence segments.

In experiment III, we examine for each reader, the pattern of reading times for three kinds of segments (segment before the end of sentence; last segment; first segment of next sentence). Observed patterns indicate that there is a relationship between reading ability and reading time variation across segments.

R.F. Pohl, Universität Trier, Germany

Hindsight bias: Experts and novices of cognitve psychology show the same memory distortion.

After having answered difficult knowledge questions and after having received the solutions, persons tend to "remember" better answers of their own. This phenomenon-is known as "hindsight bias" and appears to be very robust. Most theoretical explanations favor reconstructive processes as source for the observed distortion. One major variable influencing memory search and subsequent decision processes is the quality of one's knowledge base. With a rich and well-structured, domain-specific knowledge base, experts (as compared to novices) should be more successful in reconstructing their own estimate given earlier. As a consequence, their hindsight bias should be reduced or even absent, while novices' recollections should show the usual distortion.

In the present experiment, experts and novices of Cognitive Psychology were compared with respect to the quality of their recollections. The results show differences in the number of correctly recalled answers, that is, experts recalled more answers perfectly than novices did. But for non-perfect recollections, the amount of hindsight bias was equal in both groups, that is, the memory distortion was independent from domain-specific knowledge. This finding—once more—points to the automaticity of the observed phenomenon. Persons are apparently unable to ignore outcome knowledge when trying to reconstruct earlier knowledge states.

J.P. Poitou, Université de Provence, France

An anthropological approach to cognitive psychology: a proposal.

SUMMARY : Computers, and more recently Artificial Intelligence, have provided dramatic evidence of the fact that machines can "think". I would argue here that human intelligence has always been artificial, and that human thinking has always needed, and will always need, the help of machines of some sort.
When considering societies which are very different from ours, the word *machine* may not be quite appropriate to describe the kind of device used to help the human brain carry out its cognitive tasks. *Artefact* (or the French *dispositif*) is both more accurate and broader in scope. I will present some examples of such *cognitive artefacts*, pointing out for each one, in a not exceedingly metaphorical manner, such features as a class of data, a data base, a language for encoding the data, an operating system and programs for processing the data, and some sort of power supply for the processing.
For instance, what anthropologists describe as *"mythical thinking"* is a class of cognitive artefacts. The data to be processed are physical phenomena, botanical and zoological species, social relationships and individual beings. The data base is the collective memory filled with individual observations and mythical narratives. Encoding languages are usually made up of a subset of the data base. Elements of one or several classes of data are used to encode all the other data. The operating system is what Levi-Strauss calls the structure of the myth. Narratives are the programs, and they are used in order to organize and regulate pratical action. Rituals are behavior designed to supply power for the mythical processing.
Other examples are discussed, with reference to the work situation. Implications for cognitive psychology and Artificial Intelligence are presented, and related to ongoing research programs in computer supported cooperative work and the management of knowledge.

F.H. Poletiek, Tilburg University, The Netherlands

Normative models for testing behavior.

It is generally assumed by authors studying testing behavior that testing one's ideas should be directed at trying to falsify them. The theoretical standard is Poppers theory about falsification. That theory states that science progresses best by permanently refuting theories. Similarly, people should try to reject their hypotheses in daily reasoning. However, it seems rather difficult to translate Poppers theory in a model for behavior. What should be understood by a falsifying strategy in terms of behavior? I.e. how should we operationalize Poppers model of testing in cognitive psychology?

In this presentation, I first will argue that Poppers theory of falsification has often been badly translated into behavioral models in experimental research on hypothesis testing. This translation is not in accordance with the essence of Poppers theory. Experimental data will be presented in which subjects express that this naive translation of Poppers theory of falsification is not adequate for describing behavior. Second, other theories on testing, i.e. confirmation theories will be presented as relevant alternative models for studying testing behavior. Third, it will be demonstrated that the confirmation theories, as well as the theory of falsification can be translated in the same empirical model for testing behavior. This model is convenient for studying testing behavior. It states that subjects should not 'confirm' or 'falsify' their theories (as meant in every-day language), but that hypotheses should be tested with predictions that are specifically relevant for the hypothesis being tested.

Thus, the two most opposite theories on testing (one prescribing confirmation, the other falsification) boil down to the same psychological model. Interesting new experimental research on hypothesis testing may be conducted based on this model.

P.M.A. Rabbitt & Q. Yang, University of Manchester, U.K.

Information processing rate and age.

Many studies show that decline in IQ Test Scores and other cognitive skills in normal old age is accompanied by slowing of information processing speed; (Salthouse, 1991). It is less clear whether age associated loss in memory efficiency can also be modelled as a secondary consequence of slowing of mental performance. We describe four experiments and data from longitudinal survey of 2000 individuals aged from 50 to 96 years which indicate how far changes in learning, retention and forgetting are associated with, and how far they are disassociated from concomitant changes in information processing rate with age.

M. Radeau, Université Libre de Bruxelles, Belgium

Sequential processing of printed words incrementally presented.

The time course of lexical access in printed word recognition is examined by comparing words with early and with late uniqueness point (UP). Experiments using a normal (simultaneous) presentation of the letters of a word under three different tasks (gender classification, naming and semantic classification) provided no evidence for sequential processing.

However when the letters of a word were presented incrementally, one at a time, words with early UP were recognized faster than those with late UP. Evidence for sequential processing was also found with syllable by syllable and phoneme by phoneme incremental presentation.

C. Rechea, D. Ponte & A. Risso, Universidad de Santiago, Spain

Practice and similarity combined effect in a hybrid, visual and memory search task.

This study deals with the conditions in which subjects can search in parallel for more than one element in a hybrid visual-memory search task. This kind of search may be explained by the conjoint effect of two factors, practice and similarity. We ran three conditions: (1) Three elements in the target set defined by features belonging to different dimensions (size, slope and curvature). (2) Two targets defined by different features from the same dimension (the biggest and the smallest element). (3) Three different targets defined by the same feature (letters O, D, Q). With little practice (1st Experiment, 240 trials), similarity among targets and dissimilarity between targets and distractors improved the subjects' performance. With practice (2nd Experiment, 2,160 trials), we found a characteristic effect in Condition 3: subjects were able to look for a single feature instead of three elements as if they had built a template. In a similarity condition (3rd Experiment, only one distractor for each condition), subjects were able to perform a parallel search through memory set in all three conditions. Therefore, practice is needed to achieve a parallel search through memory set, but similarity produced a real effect that improves or impairs the subjects' performance in that task.

J.F. Richard & S. Poitrenaud, Université Paris VIII, France

A constraint model of problem solving.

The representation of a problem is described as an ordered set of constraints, generated by five different processes: (i) interpretation of instructions (including misunderstandings), (ii) analogical transfer of procedures, (iii) general heuristic rules, (iv) generation of goals and subgoals, (v) constraints due to memorization of moves to be avoided.

The effect of a constraint is to limit the subset of moves allowed for any state of the problem. Constraints are implemented as filtering tables in which the colums stand for the states of the problem, the lines represent the moves and the cells contain a boolean value indicating whether the move is prohibited (1) or allowed (0) in the state. The effect of the whole set of constraints is a global filtering table which is the sum of the tables for each constraint: 0 means that the move is allowed, 1 or more means that the move is prohibited.

It may happen that in a given state, due to the combined effect of static and dynamic constraints, no move is allowed. These events are impasses: it is necessary to violate a constraint in order to have a move available. Impasses are occasions for memorization: the state and the move made in violation of a constraint are assumed to be memorized. The decision mechanism is: choose among the available moves for the current state and, if no move is available, drop temporarily the last constraint in the list, until a move becomes available.

Constraints are well adapted to simulate restrictive interpretations, transfer of inadequate procedures or use of inadequate heuritics which result in a reduction of the problem-space with no solution (fixation effects). Violation of constraints are occasions for problem restructuration. In that model learning how to solve a problem consists of two processes: dropping the inadequate constraints, introducing relevant ones. Given an ordered list of constraints it is possible to simulate the behavior of individual subjects. The analysis of protocols consists in finding out a list of constraints able to simulate the protocol. This has done for the tower of Hanoi and of the missionaries and cannibals problem. It is shown that the chaotic behavior of subjects on the surface is consistent with a set of constraints. We have been able to detect quite unexpected interpretations of instructions (such as: it is not allowed to jump over a peg). It will be shown that this model incorporates the rule-production models proposed in the literature:actually the Anzai and Simon model can be rewritten whithin the present model.

J.T.E. Richardson & R.C.B. Chan, Brunel University, U.K.

The constituent structure of subjective memory questionnaires: Evidence from multiple sclerosis.

A number of different instruments have been developed for investigating individual differences in memory on the basis of subjective reports. However, there has been relatively little attention given to the constituent structure of such reports. To obtain data on this, a postal questionnaire was sent to individuals on a register of patients with multiple

J.T.E. Richardson & R.C.B. Chan (contd)

sclerosis, a condition which is known to be associated with objective impairments in cognition and memory. A similar questionnaire was enclosed to be completed about each patient by a close relative. Completed pairs of questionnaires were returned by 115 patients and relatives. The patients' and relatives' responses were found to share a factor structure identifying memory problems in five areas: communication; routine actions; face recognition; route finding; and vocabulary. These were dominated by a single second-order factor representing subjective memory impairment. There were minor differences between the patients and relatives on some of the factors, but there was generally a high degree of concordance in their responses.

L.C. Robertson, University of California, Davis, USA

Global advantage and global interference in patients with full commissurotomy: An extension of Navon.

There is growing evidence that interference effects and the RT advantage that one property of a figure has over another need not be correlated. For instance, in patterns with global and local levels (Navon, 1977), slowing of local response when global and local forms are inconsistent is not predicted from the RT advantage to identify a global or local form (Lamb & Robertson, 1989; Lamb, Robertson & Knight, 1990; Robertson & Lamb, 1991). Data from brain damaged patients with right or left hemisphere damage and from laterality studies in normals have revealed two different pathways in the human brain that are biased toward global or local identification respectively (Martin, 1979; Robertson, Lamb & Knight, 1988, Sergent, 1982). However, the global or local advantage in RT as a function of side of the lesion does not change the amount of interference in patient groups (Lamb, Robertson & Knight, 1989, 1990). We hypothesised that the interference effect was supported by a different neural mechanism than global or local identification, the most likely candidate being a pathway across the collosum that supports level integration. To test this hypothesis three patients with complete commissurotomy were tested. Navon's (1977) stimuli and task were used with minor modification. The data from the patients supported the hypothesis. The interference effect was completely eliminated in all three patients. In addition, a correlation between the degree of level advantage and global interference in normals revealed zero correlation corroborating the hypothesis that even in normals the effects are separate. These data will be discussed as they relate to the use of speed of processing to predict the direction and magnitude of interference.

M.J. Rodrigo & M. de Vega, Universidad de La Laguna, Tenerife, Spain

Why front-back judgments are easier than left-right judgments? Exploring mental models of spatial dimensions.

This paper explores how subjects deal with narratives involving shifts of perspective. Franklin and Tversky (F&T, 1990) demonstrated that subjects who read descriptions of scenarios with landmarks, are able to mentally compute the positions of the landmarks after the text "reoriented" the reader's perspective. However, the spatial dimensions were not equally accesible. For instance, front-back spatial judments were faster than left-right judgments. In this paper we explore whether the dimensions non-equivalence is a conceptual phenomena or a linguistic one. The former hypothesis sets the locus of non-equivalence at the mental model stage. The linguistic hypothesis imply that it is the encoding of the labels "left" and "right" what takes longer, whereas the accesibility to spatial directions is equivalent.

To test this hypothesis subjects initially learned narratives similar to F&T's materials. After the learning stage, some subjects were given spatial cues (left, right, front or back) to mentally focus the corresponding landmarks (The standard F&T's task). The other subjects were given the name of landmarks with instruction to mentally focus its direction. The second demand did not involve any verbal encoding of directions. Results show the standard pattern (front-back < left-right) in both conditions, suggesting that dimension non-equivalence is a mental model phenomena rather than a linguistic one. An additional experiment was run with children in order to explore developmental trends. The results confirm the mental model hypothesis.

J. Rönnberg, Linköping University, Sweden

Cognitive characteristics of skilled tactiling: The case of GS.

In a case study, the cognitive characteristics of a person (GS), who is extremely proficient in visual speechreading with tactile support, was investigated. His method of Tactiling involves placing his palm on the speaker's shoulder and his thumb on the neck/collar-bone. By this method he is able to pick up prosodic elements of speech, and particularly in speechreading of meaningful materials, such as "tracking" of connected discourse (DeFilippo & Scott, 1978), he is outstanding. Compared to an age-matched control group, GS can be characterized as having (a) normal short-term memory for simple forms of testing, but vastly superior skills for complex working memory functions, (b) excellent verbal inference-making skills, and (c) normal access speed in various lexical aspects of his long-term memory. It was concluded that when Tactiling, GS is endowed with cognitive skills that promote perception of higher order meaning units, which can be effectively handled in working memory by means of flexible, intelligent guesswork. The clinical implications of this study are also addressed.

S. Rousset, Université de Sciences Sociales Grenoble, France

Familiarity as perceptual fluency: The episodic nature of repetition priming effects.

Abstract : An episodic connectionist model of face identification (FaceNet) is briefly exposed with respect to the modeling of the familiarity mechanism it specifies. In FaceNet (Schreiber, Rousset & Tiberghien, 1991), the familiarity feeling is modelised as being the result of the rapidity of perceptual adaptation, this adaptation being measured by an input/output comparator. This specification is consistent with the perceptual fluency hypothesis advanced by Jacoby & Dallas (1981). Contrary to the abstractive models of face recognition (Bruce & Young, 1986; Burton, Bruce & Johnston, 1990), this specification of the familiarity mechanism does not involve any abstractive units (the so-called Face Recognition Units or Person Identity Nodes) but proposes that any increase of familiarity is due to the learning of the exemplars previously presented. The episodic nature of the memory structure that underlies familiarity decisions was tested by the repetition priming paradigm. Results showed that the priming effect is larger when a complete face has been presented as prime than when only half of the face has been previously presented. This indicates that the priming effect depends on the compatibility between the exemplars presented and is not the result of the implication of abstractive units. The explanation of the priming effect in terms of perceptual fluency in an episodic memory is moreover supported by the finding of a larger priming effect when the prime is presented in a flicker condition (which necessitates strong perceptual adaptation), than when it is presented in a stable condition. These results are discussed with reference to the FaceNet episodic model and to recent studies concluding that priming is not due to episodic memory (Brunas, Young & Ellis, 1990; Ellis, Young & Flude, 1990).

J.M. Ruiz-Vargas & I. Cuevas, Universidad Autonoma de Madrid, Spain

Concreteness effects and phonetic processing: A dual processing view.

The aim of this research was to evaluate the role of distinctive vs relational information in producing concreteness effects at the level of phonetic processing. An experiment was carried out in which subjects were tested in various incidental conditions of retrieval subsequent to phonetic orientation tasks and explicitly relational tasks. The level of word concreteness (high-imagery concrete vs low-imagery abstract words) and the retrieval task employed (intra-list cued recall vs extra-list recall with semantic cues) were used as independent variables. Concreteness effects were obtained in both recall conditions, with no interaction effects between the two independent variables (i.e. concreteness and retrieval type). These results support the main tenet of the relational-distinctive approach, namely, that dual processing facilitates concreteness effects on recall. However, they also seem to cast doubt on the supposedly facilitatory role of relational information during retrieval. On our view, distinctiveness might play a key role in retrieval as far as concreteness effects on phonetic processing are concerned. The results of our experiment are further discussed in terms of dual coding processing (Marschark & Cornoldi, 1991), dual coding (Paivio, 1986) and structural accounts (De Groot, 1989; Schwanenflugel & Shoben, 1988).

P. Saariluoma, University of Helsinki, Finland

Functional explanations in apperception research.

Apperception was one of the main problems of pre-experimental psychology, but it has never really been studied experimentally. The difficulties in the operationalization of apperception have partly been associated with the definition of the concept and partly due to problems in the practice of experimenting itself.

Human representation is normally sensible, which means that each part of the representation can be explained functionally. Each part of the representation has its own function or role in the whole and there always exist some reason(s) or ground(s), why this particular part is needed and why some other possible parts are not relevant. In chess, for example, it is possible to show that only certain types of moves are can be relevant in encoding problem subspaces because these moves fill certain functions. The functions of the moves explain also why human chess players need not generate 700 000 moves a second like computers do to find good moves. Apperception is the core cognitive process in encoding such functionally organized representations and consequently functional explaining must be taken as one of the most important goals in apperception research.

Though the idea of functional explanation seems very natural in representation theory, it is seldom used. Some reasons for the neglect of functional explanations may be inbuild in the very practice of experimenting itself. Usually, in a psychological experiment the experimenter gives strict instructions to a subject to control negative sources of behavioral variation. However, in this way he often unintentionally fixates the field of apperception of his subject. The experimenter defines what in the perceptual field forms the set of the sensible objects and how they must be semantically interpreted. As a consequence, no variation of apperception can take place and the problems relevant for understanding apperception and the functional structure of encoded representation are put under the mat. The neglect of functional explanations in current experimental practice is not a necessary consequence of experimenting but an unintentional tacit assumption and therefore by paying attention to the problems of functional explanation apperception can experimentally be studied.

R. Sanchez-Casas, B. Suarez Buratti & J.M. Igoa, St. Louis University
Madrid & Universidad Autonoma de Madrid, Spain

Are bilingual lexical representations interconnected?

In a recent study using a Spanish-English translation task, Sánchez-Casas, Davis and García-Albea (1992) have found that while cognate words (e.g. rich/rico) did not differ significantly across the two translation directions, noncognate translations (e.g., hand/mano) did. According to Sánchez-Casas and her colleagues, this differential effect is consistent with the claim that cognate words are listed together, while noncognate translations are not (Davis, Sánchez-Casas and García-Albea, 1992). Cognate translations can be then made on the basis of the information within the common entry, while noncognate translations possibly require a time consuming inference in order to be found. Using also a Spanish-English translation task, the experiment reported in this paper constitutes an additional test of this claim, investigating whether performance in an unrelated secondary task affects

R. Sanchez-Casas, B. Suarez Buratti & J.M. Igoa (contd)

differenttly cognate and noncognate translation response times. If noncognate translations are listed separately, and require some extra inferential process, then it might be expected that the performance in this secondary task would slow down this process, thereby increasing translation response times. Cognate words being jointly listed would not be possibly affected by the load effects of a secondary task. The results are interpreted in terms of the interconnectivity of bilingual lexical representations.

W.X. Schneider, University of Munich, Germany
Visual attention and Eriksen-interference.

The Eriksen-paradigm (Eriksen & Eriksen, 1974) shows that reaction time (RT) to a target stimulus is severely slowed down by distracting and action-related stimuli ('incompatible distractors') which are spatially close to the target. This delay of RT is called Eriksen-inference. The imperfect selection performance can be interpreted as a "failure" of the visual attention mechanism. In a series of experiments it was investigated how this mechanism influence distractor processing and therefore the degree of interference. The basic paradigm is consists of a modified Eriksen-experiment (e.g., color as an attribute for target selection) and a manipulation of attention by spatial precueing (e.g. Posner, 1980). One of the main results shows clearly that the amount of interference is determined by precueing.

R. Schumann-Hengsteler, K. Seitz & U. Demmel,
Universität Mainz, Germany
Effects of visual complexity on memory for spatial information in children and adults.

In order to investigate how and how well the combination of visual and spatial information is represented temporarily, a picture reconstruction task was used in a series of experiments. In this task subjects have to recognize objects (visual information) and locate them in a two-dimensional space according to a display seen before (spatial information). We repeatedly found a 'location phenomenon': Kindergarten children did not show lower performance in the spatial component of the task than older children. However, they showed lower performance in the visual component. We took this as evidence for separate representations of the visual information (object identity) and the spatial information (critical loci).

To separate spatial and visual components of our task more clearly we modified the task by controlling for visual information, i.e. , we used diplays with four and six identical objects, respectively. Data of 84 children (6, 8, and 10 year-olds) and adults are presented. The data do not fully confirm our previous pattern of results: Now, depending on presentation mode of the material we find different age trends for spatial memory performance. The results can be related to the discussion about age-dependent encoding strategies and preferred types of representations for spatial information in various age groups.

M.V. Sebastian & J. Menor, Universidad Complutense de Madrid &
Universidad Oviedo, Spain
Levels of encoding, indirect and direct memory tasks and test awareness.

In the first and second experiments, it was examined whether normal subjects with different levels of encoding (semantic versus perceptual) perform indirect (stem completion task) and direct memory tasks (recall and recognition tasks) in a similar way. Semantic analyses enhanced recall (measured by either indirect or direct tasks) recognition.

In the third experiment, it was examined whether normal subjects with different levels of encoding can perform the stem completion task "becoming or not aware" that the test items were previously encountered in the study phase. Most of the subjects who reported awareness that the test items were previosly encoded belonged to semantic level and showed better priming than subjects belonged to perceptive level. On the contrary, most of the subjects who reported unawareness belonged to perceptive level and showed equivalent priming than subjects belonged to semantic level. In general, the unawareness subjects showed a poorer performance than awareness subjects.

E. Service & F. Craik, University of Toronto, Canada
Foreign-language word learning in younger and older adults.

We studied the effects of age on memory for foreign words. We assumed that foreign-language word learning is affected by at least two factors. One is the ability to quickly find meaningful associations between two concepts. For instance the pseudoword "belthy" can bring to mind "filthy" that helps one to remember the pseudoword. This ability was expected to facilitate the learning of foreign-language equivalents to native-language words. It was also assumed to be a general factor in all verbal learning, which is known to be negatively affected by aging. The second factor is the ability to represent previously unfamiliar and strange-sounding new word forms in working memory. This ability was assumed to be more specifically related to language learning, as opposed to memory in general. We had no previous knowledge to suggest what the effect of age on this factor might be.

E. Service & F. Craik (contd)

The subjects' task was to learn foreign-word equivalents for a list of unrelated English (native-language) words. The foreign words were either real Finnish words or pseudowords that sounded like English words. We also used a task with pairs consisting of real words. In this the subjects heard a list of word pairs. Afterwards they had to recall the second word in each pair when the experimenter said the first. This task gave us an estimate of how efficient the subjects were at relating meaningful concepts to each other. Their ability to represent word forms in working memory was tested by asking them to repeat unfamiliar Finnish words.

The results suggest that both the ability to make connections between meaningful concepts and the ability to represent novel word forms in working memory deteriorate with age, and that both these factors affect foreign-language word learning.

T.M. Sgaramella, P.S. Bisiacchi & M.L. Amoroso,
Universita di Padova, Italy

Prospective memory in elderly: Evidence from planning.

The main concern of the present research is on planning ability in aging. A plan has been defined as mental simulation, as evaluating the consequences, selecting the optimal actions and the optimal order for executing them (Cohen, 1988). Planning ability depends on a good functioning of a working memory buffer store, needed to hold plans while they are evaluated, revised and executed. From a neuropsychological point of view planning depends on frontal lobe performance. Since some evidence of decreased function of prefrontal lobe areas in the elderly has been reported in cerebral blood flow studies (Warren et al., 1985), it would be relevant to have a behavioral measure of frontal lobe performance.

The purpose of this study is twofold: (a) to examine age differences in some aspects of prospective memory (i.e.planning), and (b) to examine the relations among working memory, prospective memory and frontal lobe performance. To assess these issues, 4 groups of subjects (ranging in age from 22 to 86) were tested on digit span test, Wisconsin Card Sorting Test and planning task. The planning task consisted of a map, subjects were asked to produce a plan for completing as many as possible of the errands proposed in the instructions moving around an hypothetical town showed in the map.

Both memory and planning tasks performance decreased with increasing age. A qualitative analysis of errors across tasks showed a weaker aim directed planning behavior and misleading strategies at work in the elderly. Finally, as shown by the error types, an involvement of frontal lobe emerged with increasing age was found, showing a correlation between Wisconsin Card Sorting Test and planning errors.

B. Shanon, The Hebrew University, Jerusalem, Israel

Metaphor: from selection to generation.

By and large, most models of metaphor entertained in the contemporary cognitive literature assume that metaphor is a relationship between two given entities whose attributes (features, semantic distrinctions, aspects) are defined prior to the relationship established between them. The metaphoric sense, it is assumed, is produced through the selection of a subset of these attributes. In this paper I take issue with this view. The discussion is based on the consideration of metphors taken from literary prose, patterns pertaining to judgements of similarity, synaesthesia and child development. An alternative characterization of metaphor is proposed which regards the metaphoric relationship not as one that selects attributes or distinctions, but rather generates them. Indeed, it is argued that metaphor is a key mechanism for the generation of novelty. This view is couched in a broader context of a non-representational view of mind. The functional significance of metaphor is underlined and a pluralistic perspective of metaphor is proposed.

H. Shibuya, University of Copenhagen, Denmark

Modeling the constraints and time course of visual selection: Partial report in duplex condition and conjunction condition.

The fixed-capacity independent race model (FIRM) for visual selection by Shibuya and Bundesen (1988) was further extended and tested. The basic assumptions of FIRM are:
(a) Elements are processed in parallel;
(b) processing times for individual elements are independent stochastic variables and exponentially distributed;
(c) both storage capacity and processing capacity are fixed;
(d) the processing capacity is selectively allocated to each element in proportion to the strength of the evidence that the element is a target (weight).
FIRM has accounted for performance in a partial report experiments in which the number of targets, the number of distractors, and the exposure duration were systematically varied. FIRM was extended by adding a simple assumption concerning the weight of the element: Each element has a basic weight common to all the elements, and an additional weight will be given if the element has a feature that is characteristic for the targets. The extension of FIRM, FIRM[+] was tested in a partial report experiment with four selection conditions: color condition, class condition, duplex condition (the targets and the distractors differed both in color and alphanumeric class), and conjunction condition (the target differed

H. Shibuya (contd)

from the distractors either in color or in alphanumeric class). FIRM[+] accurately accounted for both redundancy gain in duplex condition and the effects of the combinations of the numbers of two kinds of distractors in conjunction condition.

F. Simion, C. Umilta, E. Valenza & E. Paiusco
Universita di Padova, Italy

Inhibition of return in newborn infants.

SUMMARY: Inhibition of return is a reduced tendency to orient toward a previously attendend spatial location and reflects an attentional bias toward novel locations. It is indexed by an increased latency and/or a reduction in the probability of an eye movement to the inhibited location. Previous research had indicated that inhibition of return develops between 3 and 6 months. Our work suggests that instead it may be present in the first days of life.

We submitted 15 babies (mean age: 84 hours) to about 6 trials each. A trial consisted of a pretest phase (a single visual stimulus, shown for 2 s at 30° from fixation), a 2-s interval, and a test phase (2 stimuli, shown in the 2 visual fields at 30° for 5 s). We recorded the direction and latency of the first eye movement in the pretest and test phases.

On 37 trials, in the pretest phase there was a movement toward the stimulus. Then, in the test phase, on 25 trials the eye movement was in the opposite direction, whereas on 12 trials it was in the same direction (p<0.05). On 23 trials, in the pretest phase there was a movement away from the stimulus. Then, in the test pahse, on 11 trials the eye movement was in the opposite direction, whereas on 12 trials it was in the same direction . On 32 trials, in the pretest phase there was no eye movement. Then, in the test phase, on 18 trials the eye movement was in the direction opposite to where the stimulus had previously appeared, whereas on 14 trials it was in the same direction. Response latencies showed only one significant difference (p<0.01). When no eye movment was observed in the pretest phase, then latency was faster for a movement in the same than in the opposite direction with relation to where the stimulus had previously appeared (1.4 vs 2.7 s).

If one regards inhibition of return as an attentional effect, then the present results seem to show that spatial attention manifests itself at 84 hours after birth.

P.T. Smith & J. Cockburn   Rivermead Hospital Oxford, U.K.

Prospective memory, ageing and anxiety.

133 elderly people (age range 70 to 90) completed the Rivermead Behavioural Memory test, and the items assessing Prospective Memory were analyzed in detail. One particular item (remembering to ask for an appointment) gave rise to a range of responses:
a) fully correct;
b) spontaneously asked for return of a belonging (confusion of this item with another in which return of a belonging should be requested);
c) spontaneously remembered that they had to ask for something but could not say what that something was;
d) no response until prompted, and then fully correct;
e) no response even after prompt, or incorrect response after prompt.

Canonical discriminant analysis was used to identify subjects with different patterns of responses. The first canonical variate discriminated subjects who did well on this task: not surprisingly such subjects were younger, brighter and had better retrospective memories. The second canonical variate highlighted those subjects who got the item right, but only after a prompt: such subjects tended to live in sheltered housing, had good retrospective memories and rated themselves as anxious on a visual-analogue scale of anxiety. This variate in particular correlates positively with every retrospective memory item on the Rivermead test, but with none of the prospective memory items. The third canonical variate picked out those subjects who knew they had to ask for something, but could not say what that something was. Such subjects tended to be older, intelligent, with poor retrospective memories and high on self-rated anxiety.

These results demonstrate that (1) retrospective and prospective memory skills can be functionally independent; (2) prospective memory tasks can be decomposed into components, and different sorts of people fail different components; (3) anxiety is a correlate of prospective memory failure. These findings are incorporated in a model of ageing.

P. Tabossi, C. Burani & D. Scott, Universita di Bologna, Italy

Segmentation cues in connected speech in Italian.

Understanding spoken language relies crucially on the listener's ability to segment utterances into their component parts. The difficulty of this task is well recognised and is the topic of a growing research effort.

The scope of the segmentation problem in Italian has been explored in two cross-modal experiments. In the first of these, subjects listened to randomly presented sets of sentences like the following:

Appropriate: Le circostanze rendevano inevitabili visite* di altri membri della commissione.
   (The circumstances rendered inevitable visits of other members of the committee)
Inappropriate: Le circostanze rendevano inevitabili visi te*diati e stanchi.(The circumstances rendered inevitable faces bored and tired)
Control: Le circostanze rendevano inevitabili vendite* di altri immobili.
   (The circumstances rendered inevitable sales of other real estate)

P. Tabossi, C. Burani & D. Scott (contd)

At the point in time marked by *, they were presented with a visual target (e.g. PARENTI - *parents*), semantically associate to the preceeding word in the appropriate condition. Their task was to make a lexical decision to the target. The results of this experiment revealed that RTs to the target were faster in the first two conditions than in the third. The second experiment showed that the faciliation effect in inappropriate condition was due to a difficulty in word-boundary detection, and not to the the residual activiation of *visite* triggered by the initial part of *visi*.

Taken together, the results of these two experiments show the difficulty in segmenting spoken Italian in the absence of contextual information, even in conditions that are expected to be least problematic, ie. polysyllabic content words. This raises the question of whether, and when, Italian listeners make use of available acoustic cues to word boundaries. We investigate the ability of listeners to rely on phonetic differences between cases such as *di amanti* vs. *diamanti* in a futher series of experiments, and discuss the contribution of these results to the ongoing debate regarding cross-linguistic differences in the type of cues used to segment connected speech.

J. Theeuwes, TNO Institute for Perception, Soesterberg, NL

Selective search for color and form.

Can subjects selectively attend to just the known-to-be-relevant feature during parallel search? Subjects viewed multi-element displays in which one item had a unique color and another item had a unique form. Different groups of subjects were asked to selectively search for one of these features. Results showed that selectivity depended on the relative discriminability of the stimulus dimensions: the presence of an irrelevant item with a unique color interfered with parallel search for a unique form, and vice versa. The results are in line with a model which assumes that attention is automatically attracted by the most mismatching feature describing perceptual selectivity solely in terms of bottom-up processing.

T. Baccino & J. Pynte, University of Dundee, U.K. &
Université de Provence, France

Role of the spatial code in co-reference processing.

Reading can be taken to lead to a mental representation of the principal objects, properties or events to which a text refers. This representation can be considered as memory for content, in the sense that linguistic relations, but not precise surface forms, are preserved. On the other hand, it is certainly the case that readers are able to preserve in memory some surface forms, describing the main referents of a text and, in particular, anaphoric expressions. In addition, there is evidence that readers maintain a mental representation which preserves information as to the spatial position of text items on the page or screen.

Two experiments show that this spatial code allows the reader to detect more efficiently the co-referential link between anaphoric expressions. In the first experiment, it appears that non-spatialised presentation

T. Baccino & J. Pynte (contd)

of text involves many confusions (more errors and longer response latencies) when there is an anaphoric relation between two words (one word is the superordinate of the other). In the second experiment, the subject's task was to point to a target word with a 'mouse' interfaced to a computer. The subject moved the mouse from a target word to the screen location of that word defined in a previous reading. The results show that anaphoric relations influence the time to localize targets.

A. Garriga-Trillo & H. Peraita, UNED Madrid, Spain

On analysing n x r contingency tables obtained from natural categories data.

SUMMARY: In the study of natural categories one often starts with an $n \times r$ contingency table in which many cell frequencies, f_{ij} ($i = 1,\ldots,n; j = 1,\ldots,r$), are zeros. This is a problem when you need to measure the strength of statistical association between qualitative attributes for further application of those indexes in multivariate analyses. This work proposes a solution in which if we call n the number of original categories and r the number of attributes we will have: 1). an $n \times r$ table subdivided for analysis in $n(n-1)/2$ new 2x2 contingency tables. 2). the new tables deal with two categories analyzing if they coincide or not with respect to the different attributes given by the subjects. 3). a simple pairing index is calculated. 4). if many zeros still appear the Jaccard (1986) correction is applied. 5). a final rescaling procedure is done assigning 0 to the lowest value obtained and 1 to the highest one. This solution has been applied successfully in Peraita, Garriga, Linares and González Labra (1991) for principal components and factor analysis.

Y. Tsal, L. Mevorach & R.E. Lubow, Tel Aviv University, Israel

Directional effects of attention on perceptual judgments.

Two series of experiments showed significant effects of attention on perceptual judgments. In one study we found that attention reduces perceived contrast between a small grey square and the surrounding background.

In the second study we found that attention reduces the perceived length of a small vertical line. We further demonstrated that this phenomenon is sensitive to the nature of stimulus presentation as well as the presence of context.

These results indicate that attended and unattended judgments are mediated by two distinct modes of processing, and that attention serves as a corrective device that improves the resolution of simple stimuli.

P. Tudela & J.J. Sanchez, Universidad de Granada, Spain

Semantic priming under masked primes.

Our research tried to assess empirically some of the criticisms raised against the existence of semantic priming without conscious awareness when the prime is centrally masked. A lexical decision task was used in which the prime and the target could be categorically related or not. All the experiments consisted of two phases. In Phase 1 the prime-mask SOA value corresponding to either detection (Experiments 1,2,3) or identification (Experiments 4 and 5) threshold was estimated for each subject. In phase 2, the threshold value obtained in the previous phase was used to mask the prime in the lexical decision task. Experiment 1 compared the priming produced by unmasked primes with that produced by primes masked under two different prime-mask SOA conditions, one corresponding to a threshold based on 60% correct detection responses and the other corresponding to a threshold based on 50% correct (objective threshold). Similar levels of significant semantic priming were obtained under the three conditions. Experiment 2 used a prime-mask SOA corresponding to objective threshold and introduced detection trials mixed with lexical decision trials during Phase 2. Again, the masked primes produced reliable semantic priming while performance on detection trials remained at chance level. Experiment 3 was similar to Experiment 1 but instead of using a prime-mask SOA value based on a 60% correct response threshold, a subjective threshold value, was employed. Experiment 4 was similar to Experiment 3 except that an identification rather than a detection threshold was used. Again, every type of prime produced reliable priming in the two experiments. Experiment 5 used an identification threshold on Phase 1 and both, the stimulus on Phase 1 and the prime on Phase 2 was randomly presented at one of two possible locations. The priming effect produced by the unmasked prime was significantly higher than that produced by the masked primes. In addition, only priming under a prime-mask SOA value corresponding to subjective threshold reached significance.
Our results show that, despite widespread criticisms against it, the effect originally reported by Marcel (1983) remains reliable even when the prime-mask SOA value corresponds to objective detection or identification threshold. They also suggest that semantic priming when the prime is masked according to an objective threshold condition may depend upon the spatial orienting of attention.

J. Tzelgov & J. Berger,
Ben Gurion University of the Negev Beer-Sheva, Israel

Components of Stroop control.

Several investigators have shown that the magnitude of the Stroop effect is sensitive to expectations.
It happens even when the expectations are about the language of the stimulus in a bilingual version of task (Tzelgov et al., 1990), and when the proportion of color words vs. neutrals is manipulated (Tzelgov & Henik, 1990). These manipulations provide no information about the relevant dimension and they affect only the inhibitory components of the Stroop effect. Recently we have run two series of experiments in which we employed additional operations that affect the Stroop effect. In one series, we manipulated the proportion of stimuli in a given color. Inhibition was smaller for stimuli in the expected color than for stimuli in the unexpected color. The facilitation was not affected by the manipulation. In another series, a prime stimulus that provided information whether the target is going to a color word or a neutral, appeared before the target stimulus that could

66

J. Tzelgov & J. Berger (contd)
be either congruent incongruent or neutral. The validity of the prime was also manipulated. RTs to incongruent stimuli were clearly shorter in the valid condition than in the invalid and control conditions. The results for congruent stimuli were less clear but in any case RTs in the valid conditions were not shorter than in the invalid conditions.
These results provide further evidence for different processing mechanism of facilitation and inhibition and for the controllability of the Stroop effect.

A. Vandierendonck, University of Ghent, Belgium

Towards a model of secondary generalisation in concept learning.

Exemplar models of categorisation (e.g., Medin & Schaffer, 1978; Nosofsky, 1984) assume that new instances are categorised on the basis of a combination of the similarities of the new instance to already stored exemplars. These similarities depend on the (primary) generalisation gradient of each stored instance. Prototype and rule models, on the contrary, assume that new instances are compared to already combined information, residing in long-term memory. According to some of these models, another form of exemplar generalisation—viz., secondary generalisation—is responsible for the judged similarity between the new instance and the categorical information in the knowledge store. A family of secondary generalisation models based on a productions systems methodology, has been developed. The paper presents these models, and experimental data critically comparing predictions of primary and secondary generalisation. It discusses the results with respect to theoretical and metatheoretical problems concerning category representation.

M. Vion & F. Canoz, Université de Provence, France

Encoding and maintaining reference in oral discourse.

This study deals with reference encoding modes in oral narration. It focuses on the use of co-textual referential linguistic devices, which from the comprehension standpoint, are considered as instructions that define the links between the elements of the discourse (mental model of discourse, Oakhill, Garnham & Vonk, 1989). Two determining factors of information management and reference maintenance are examined. The first is the distance within a sequence of events or facts between the first occurrence of an item and its later occurrence. The second is whether or not that item is subject to a change in focus.

French-speaking adult subjects were asked to tell stories from comic strips that the listeners were unfamiliar with. Different versions of the same comic strip were generated. A given version was either short (3 frames) or long (8 frames), and repeatedly showed the same character throughout the comic (maintained focus) or simply presented that character in the first and last frames (changed focus). The devices used to refer to that character were studied.

The productions obtained for the last frame were analyzed with respect to the marking of the given/new feature of the character. In the case of a known character, we were interested in finding out how subjects mark the degree of accessibility of the referent. For example, the use of a definite description (art + N) explicitly marks the referent as poorly accessible in memory, whereas the use of a pronoun reflects high accessibility (Ariel, 1988, 1990).

The results showed that (1) on the whole, the character was generally marked as given, regardless of what version of the comic strip was being narrated. This was more often true, however, when the focus on that character was maintained. Length had no effect in this case. In contrast, when the focus changed, the givenness of the character was more readily marked in the short version. (2) When the character was marked as given, the least explicit mark (high accessibility) was only used when the focus was maintained. Explicit marking (low accessibility), on the other hand, was found with both maintained and changed focus. It was usually employed with a focus change, and more often with the short version than the long version, where the character became unknown.

This study illustrates and further refines Chafe's (1976) intuitive contention that topic changes in a discourse and the number of statements in which an item is not mentioned interact in determining whether the speaker assumes that the listener has lost track of an item in memory and decides to stop treating it as given.

67

W. Vonk & M.E.C. Van der Voort, Max Planck Institute of
Psycholinguistics & University of Nijmegen, The Netherlands:

What syntactic flexibility and compositionality disclose about the processing of idioms.

Although the semantic interpretation of an idiomatic expression is generally assumed to be noncompositional (e.g. in "kick the bucket" it is not possible to specify the contribution of the individual words to the meaning of the idiom as a whole), idioms do in fact vary in their degree of compositionality. For instance, in "pop the question", 'pop' conveys the notion of 'ask suddenly' and 'the question' is a suitable proposal. Idioms also vary in the extent to which they are syntactically flexible; i.e., whether they can undergo syntactic modification without losing their idiomatic meaning. For example, the internal modification in "He popped the *inevitable* question" does not affect the idiomatic status of the expression, whereas an analogous internal modification in "He kicked the *last* bucket" makes the idiomatic reading impossible.

For an adequate account of the processing and representation of idioms both notions are important: If an idiom is represented in the mental lexicon as a single item (as in the Lexical Representation Hypothesis) any syntactic modification should affect the access of idioms, and if compositional idioms, like literal sentences, are accessed compositionally (as in the Decomposition Hypothesis), a syntactic operation that modifies a part of an idiom should affect the access of noncompositional idioms but not compositional ones.

Results of experimental research will be presented. The materials included four types of idioms, that differed in compositionality, and three versions of each idiom: one with no modification, one with an internal modification, and one with an external modification (as in --in Dutch word order-- "He kicked *yesterday* the bucket"). The experimental paradigm was based on the finding that a word is processed faster in an idiomatic than in a nonidiomatic context. It was assumed that if a certain syntactic modification makes subjects unable to access immediately the idiomatic meaning of a candidate idiom, a lexical decision on a target word should take longer in the modified than in its unmodified counterpart.

Processing was slowed by internal but not by external modification, relative to results for no modification. Most interesting, the results for compositional and noncompositional idioms did not differ. The results will be discussed in relation to different theories about the processing of idiomatic expressions.

D. Vorberg, Technische Universität Braunschweig, Germany

On the dynamics of visual attention: Switching between the levels of multilevel stimuli.

Our visual attentional system enables us to concentrate on an abject's global shape as well as on its details. What happens when we switch attention between the levels of an object description? How fast can this be done, and what are the factors that determine the switching time? I will describe a series of reaction-time experiments with a new paradigm that makes it possible to estimate the time necessary for an intentional switch between the levels of multilevel stimuli. The findings can be summarized as distance, directionality, and consistency effects: Switching time depends on the distance in stimulus size, the direction of the switch (focusing "in" vs. "out"), and the consistency of the stimulus information on attended and unattended levels. The effects of the stimulus information on attended and unattended levels. The effects obtained for intentional switching are modulated by preattentive processes, e.g. those controlled by visual onsets and offsets. A neural network implementation of an attentional spotlight model will presented that can account for the findings.

J. Vrooman & B. de Gelder, Tilburg University, The Netherlands

Lipreading and the coarticulation-compensation mechanism of speech perception.

When hearing speech, listeners compensate for coarticulatory influences of one speech sound on another. We examined whether lipread information can penetrate into this low-level perceptual compensation mechanism. Experiment 1 replicated that when an [as] or [aʃ] sound preceded a [ta]-[ka] continuum, more velar stops were perceived in the context of [as] (Mann & Repp, 1981; Repp & Mann, 1981). Experiment 2 investigated whether the same phoneme boundary shift would be obtained when the context was lipread instead of heard. An ambiguous sound between [as] and [aʃ] was created and it was dubbed on a video of the speaker articulating [as] or [aʃ]. Subjects relied on the lipread information in the identification of the ambiguous fricative sound, but there was no boundary shift in the following [ta]-[ka] continuum. The results suggest that the coarticulation-compensation mechanism is not influenced by lipread information. This is evidence that the heard and lipread signal are integrated relatively late in speech processing.

J. Wagemans, W. Fias & G. d'Ydewalle, University of Leuven, Belgium

Priming of perceptual organisation.

In the most general sense, priming refers to the situation (technique as well as result) where the processing of information is influenced by previous processing of related materials. A particular instance is the finding that a stimulus is processed more rapidly when it is presented for the second time ("repetition priming"). Another typical result is the more efficient processing of semantically related materials (e.g., "bread" and "butter" in a lexical decision task). Of course, many other levels of processing could be "primed" depending on the relation between the stimuli and the task.

Our aim was to provide some evidence for the occurrence of priming at the level of perceptual organisation, that is the level intermediate between feature detection and object recognition concerned with figure-ground segregation, perceptual grouping, regularity detection, etc. To our knowledge, this is a rather unexplored kind of priming.

In one experiment, subjects had to detect regularity (bilateral and skewed symmetry) in dot patterns. Priming was measured as a sequential effect from trial t on $t+1$. Subjects were therefore unaware of prime-target relationships. Considerably faster response times were observed when two consecutive trials presented identical types of symmetry (e.g., both perfect symmetries about the vertical axis). Somewhat smaller priming effects were found when patterns shared only an identical axis or similarly oriented virtual lines (connecting the symmetrically positioned dots) but not both. The results provide clear evidence that at least some aspects of perceptual

J. Wagemans, W. Fias & G. d'Ydewalle (contd)

organisation can be primed. In addition, this priming paradigm promises to offer a useful tool to study processes and representations involved in subtasks of perceptual organisation such as regularity detection.

In a subsequent experiment, we will present line drawings of objects and instruct subjects in one condition to say whether they are symmetrical and in another to name the pictures. By varying the relations between primes and targets and by manipulating stimulus onset asynchronies between them, we will try to show that perceptual organisation precedes object recognition.

M.R. Waldmann & K.J. Holyoak,
Universität Frankfurt, Germany & UCLA, USA

Beyond associationistic learning: The role of abstract causal models in category learning.

Associationist models of animal learning, which have been adapted to attempt to explain higher-order types of human learning such as categorization and causal induction, are inherently insensitive to the semantic interpretations of cues and responses, including the basic distinction between causes and their effects. In contrast, causal-model theory postulates that people tend to learn directed causal relationships, and that such relationships play a central role in the acquisition of category structure. Two basic causal schemata are distinguished: a *predictive common-effect* schema, in which causes are used to predict effects, and a *diagnostic common-cause* schema, in which effects are used to infer their causes. In a series of experiments we show that the relative difficulty of learning two types of category structures -- a linearly separable structure with independent features, and a non-linearly separable structure with correlated features -- is reversed depending on which causal schema is evoked by the context. Under a diagnostic common-cause schema, feature correlations are a natural consequence of an essentially linear underlying causal model, so the correlated structure is acquired easily; whereas under a predictive common-effect schema, feature correlations represent a disordinal interaction among causes, rendering the correlated structure more difficult to learn. These causal schemata strongly affected category learning even for a completely unfamiliar domain, for which subjects lacked any specific prior knowledge. Our results reveal inadequacies in purely associative models of category induction, and extend the evidence for theory-based influences to a more abstract level.

H. Wermus, University of Geneva, Switzerland

Transformations of cognitive representations and production of meanings.

I intend to analyse to some extent this Piagetian doctrine. Mental meanings are generated from sets of cognitive representations i.e. from cognitive semantic nets. The different properties of these nets like egocentrism, prototypical images, amalgamations, etc. describe features of the representational state of the mind. This representational basis undergo different kinds of transformations : focusing, differenciation, forgetting, activations of several types, etc. In addition to these "molecular" transformations there are more extended interrepresentational processes such as inferential moves (reasoning), transfers of meanings, metaphors, comparisons, etc. which .form the core of the thinking procedures.
It's well known that all these processes are strongly related to the so called intentional subsystem of the mind. Intentional functors like beliefs, desires, attitudes bring about relations between different representational semantic nets. Cognitive meanings may be seen as sets of these relations. So thinking appears as a transformation of meanings which are generated by application of intentional functions to the semantic nets.

If time allows, I will also try to show some examples which may illustrate the foregoing ideas.

A.M. Wing, MRC Applied Psychology Unit Cambridge, U.K.

Cognitive load and rhythmic timing of movement.
In studies of the psychology of movement a commonly employed index of movement difficulty - of the complexity of processes underlying action - is variability of the product. In the case of timing, it has been suggested that variability, eg, in attempting to produce a series of equal intervals, arises in two distinct sources. One source is an adjustable timing process (an internal "clock"), the other is the motor execution delay that arises between the initiation of action by the timer and the occurrence of the overt response that delimits the produced interval. This conception of central and peripheral processes in timing has received support from research demonstrating selective influence of factors affecting central and peripheral components. The interesting question then arises as to the relation of the internal "clock" to the cognitive system?
To address this question an experiment was designed to place varying cognitive demands on subjects as they regulated the timing of movements in rhythms of varying complexity. Subjects were asked to produce repetitive finger flexion movements to define a series of taps which coincided with a train of visual stimuli appearing at predetermined intervals. These intervals were either all equal (isochronous 250,250,250... ms) or comprised a cycle of two or more unequal intervals (rhythmic, eg, 250,500,250... ms). The dependent measure was the

variability of the intervals when the visual pacing stimuli stopped. It was found that a given interval, eg. 250 ms, was more variable in a rhythmic context than in an isochronous sequence. This might be interpreted as reflecting cognitive demands of switching the clock value between the different target intervals. The effect of adding various secondary tasks was therefore investigated. However, while these elevated variability overall, there was no differential effect on intervals in the rhythmic context. The implications of the findings for models of timing control will be discussed.

D. Zagar & J. Pynte, Université de Bourgogne and CNRS, France

The role of semantic information and of attention in processing syntactic ambiguity: Eye movement study.

The Garden-Path theory of parsing proposed by Frazier (1987) involved two important characteristics.

The first one is the immediacy of the syntactic processing: in Frazier's model each word is attached to the current syntactic structure as it is encountered. One important consequence is when the sentence is locally ambiguous the readers commit themselves in only one interpretation (usually the "preferred" one) producing a "garden-path" effect. But this effect was not systematically observed in previous self-paced reading experiments. One possible explanation is that immediacy of processing and therefore commitment would be under some general behaviour or strategy (and more precisely the level of attention payed to the sentence).

So we used little text including temporary ambiguous sentences like (1) and recorded eye-movements during reading.

(1) Un journaliste aborda l'avocat de la chanteuse
<u>qui paraissait plus</u> confiant/confiante que les autres/de
raison.   (The ambiguous part is underlined)

Subjects were instructed either to read the text with attention in order to answer to very precise questions on it, or just to read it, no question at all being asked.

A second characteristic, often disputed, is that the parser is not sensitive to semantic information, at least during the first step of processing. So, following Altmann and Steedman (1988), we designed quite compelling contexts able to induce one or the other of the two interpretation allowed by the local ambiguity.

The analysis of the "first-pass" eye fixations showed a garden-path effect with the "Attentive" condition but not with the "Not attentive" and no effect of context. This suggests that:

-1'/ the immediacy of processing (and particularly syntactic processing) is partially determined by the reader's goal;

-2'/ the parsing is not inflenced by contextual manipulations.

M. Ziessler, Humboldt-Universität Berlin, Germany

The structure of movement sequences: Interaction between perception and motor programming.

Structural properties play an important role in the programming and execution of movement sequences. They allow an effector independent representation of movement sequences in memory and enable the subjects to prepare a movement on a more abstract level even if the specific elements of the sequence are still unknown (Ziessler, Hänel & Sachse 1990).

With the present experiments it was investigated which factors have an impact on the development of movement structures. One source for the structuring of movement sequences should be the relations between the movement elements in the sequence. That is, repetitions, identities, or any other regularities are assumed to be used to structure a movement sequence. Besides this it is suggested that its structure depends also on the perception of the sequence by the subject.

In the experiments the subjects had to learn a cyclic finger tapping sequence. To learn the sequence a stimulus was presented to the subject. This stimulus had to be responded to with the first movement element. The response triggered the next stimulus, which required the next response, and so on up to the end of the sequence. After a number of trials the subjects could perform the tapping sequence independently on the stimulus sequence. Two factors were variied orthogonally: The first factor was the start element. The movement sequence could start at different points within the cyclus. Taken the start element as a given boundary for the formation of substructures this should change the structure of the sequence. The second factor were the structural relations between the elements of the stimulus sequence. At the beginning of the learning procedure the subjects perform the tapping sequence in response to the stimulus sequence. At the same time the stimulus sequence appears as a result of the movement sequence. Both, the given conditions for a movement and its sensory consequences, are considered part of the movement planning. By this way it can be assumed that also the structural relations between the stimuli have an influence on the structuring of the movement sequence.

The results show that the learning of one and the same movement sequence, the speed of its execution, and its structure depend on both factors.

H.D. Zimmer, University of the Saarland, Germany

No LOP-effects with subject-performed tasks? They are here!

In two experiments subjects incidentally learned action phrases under different orienting tasks and two encoding conditions. One group had a standard verbal condition and the other an enactment condition. i.e., they symbolically performed the actions. The orienting tasks in Experiment 1 were to assess (a) letter triplets, (b) purposes of the actions or (c) the movement pattern; and in Experiment 2 (d) to read the phrase, (e) to assess action context or (f) to assess syllables. Memory after enactment was generally better than after verbal encoding. In recall, 'depth' of processing comparably influenced the two encoding conditions. In both conditions, recall was worse with 'shallow' processing (a, d, and e) than with 'deep' processing (b, c,

H.D. Zimmer (contd)

and f). The same relations held true for recognition after standard encoding, whereas after enactment in recognition no differences were observed between the different orienting tasks. A dual mechanism model of recall is used to explain these results.

P. Zwitserlood, A. Bolwiender & E. Drews
Max Planck Institute for Psycholinguistics Nijmegen, The Netherlands

The processing of Dutch complex verbs.

Dutch has morphologically complex verbs, consisting of a verb and a particle, that differ from English complex verbs in a number of respects. In infinitival and past participle form, the particle is prefixed to the verb (opstaan, get up). In all other cases the particle is separated from the verb and moves to a position following the verb, allowing an almost infinite amount of linguistic material to intervene between verb and particle (Hij stond tijdens de vergadering die al drie uur aan de gang was plotseling op; He suddenly got during the meeting that had already lasted for three hours up). Semantically, these particle verbs can be transparent or opaque. The meaning of transparent verbs can be derived from the meaning of their component parts, as with opstaan (get up); for opaque verbs this is not possible: afstaan (hand over or yield). A series of experiments will be reported in which the processing and representation of such verbs was studied as a function of their semantic transparency. Short-lagged partial repetition experiments revealed differential amounts of priming due to semantic transparency. An experiment with spoken sentences as primes for the two verb types showed a more complex picture, indicating that transparency vs. opaqueness is not an all-or-none phenomenon.

Symposium on "The Cognitive Psychology of Proper Names"
Conveners: T. Valentine and S. Brédart

Although there is a long history of scientific interest in proper names, the interest of cognitive psychologists is comparatively recent. In the last few years, however, proper name processing has emerged as a theoretically rich area. Much of this work has been carried out by European researchers. Therefore, a symposium on the cognitive psychology of proper names is timely and particularly appropriate for a European conference.

The papers making up this symposium bring together work using a variety of different methods and theoretical perspectives: Experimental, computational and neuropsychological studies will be discussed. Valentine *et al.* will argue that recognition of proper and common names can be mediated by the same lexical representations. The remaining papers are more concerned with production and learning of proper names rather than recognition of proper names. Much of the interest in common name processing has been driven by the observation that proper names are particularly difficult to recall. Three different (but not necessarily mutually exclusive) accounts for the differences between proper and common name processing have been proposed. Burton has suggested that proper names are difficult to recall because they are usually unique. Cohen has argued that proper names are difficult to recall because they are meaningless. Semenza has suggested that the status of proper names as pure referring expressions is critical in accounting for the selective impairment of retrieval of proper names. Brédart will evaluate a new proposal for the relative difficulty found in retrieval of proper names.

T. Valentine, B. Flude, V. Moore, A. Young & A. Ellis,
Universities of Durham, Lancaster & York, U.K.

Repetition priming and proper name processing: Do common nouns and proper names prime each other?

Three experiments are reported in which a repetition priming technique was used to investigate whether recognition of a person's surname which is also a known word (e.g. Baker) is mediated by the lexical representation which also mediates word recognition.

Experiment 1 showed that a familiarity decision to familiar full names produced an effect of repetition priming on subsequent lexical decision to words which were presented in the pretraining task as surnames. (For example, deciding that 'Kenneth Baker' (a

T. Valentine, B. Flude, V. Moore, A. Young & A. Ellis (contd)

British politician) is a familiar name primes lexical decision to 'baker'). Conversely, Experiment 2 demonstrated that lexical decision in the pretraining phase primed the RT of a subsequent decision in the pretraining phase primed the RT of a subsequent familiarity decision to the full name of a celebrity whose surname had served as a stimulus in the prior lexical decision task.

Experiment 3 showed that repeating the same task during pretraining and test did not produce a larger repetition priming effect than that obtained when the task at test differed from the pre-training task (name familiarity decision vs. lexical decision or vice versa). The results are interpreted as support for the view that repetition priming is due to repeated activation of an abstracted representation which is accessed by both words and names.

C. Semenza, Universita di Padova, Italy.

Proper names in aphasia: Selective impairment and sparing.

Evidence for independent processing of proper names with respect to common names is reviewed vis-a-vis aphasiological literature. The value is stressed of the double dissociation between proper names anomias and a case of selective sparing of proper names within an otherwise disrupted speech. It is argued that data from aphasia support a model of naming where common and proper names follow independent pathways from the semantic system throughout the lexicon to activate the articulatory form. The single quality distinguishing proper names from common ones is their acting as pure referring expressions.

S. Brédart, University of Louvain-la-Neuve, Belgium.

Why is face naming difficult? Another simple explanation.

Several authors have reported that the incidence of TOTs for peoples' names is higher than the incidence of TOTs for object names. The aim of the present paper was to evaluate two factors that might contribute to making the retrieval of peoples' names relatively difficult. First peoples' names are generally "multi-units" labels which include a first name and a surname while object names more typically consist of a single lexical unit. The second factor deals with the fact that face naming usually requires the retrieval of one specific label: the name of the seen person. This constraint is not so strong in object naming for two reasons. Firstly, object names may have synonyms. Secondly, labels from different levels of categorization of an object may be appropriate to name an object (e.g. trousers, jeans, levis 501). Such a degree of freedon does not exist in naming people. Data from three experiments suggest that the latter factor but not the former factor makes a significant contribution to the difficulty of naming people.   76

A.M. Burton & V. Bruce, University of Nottingham, U.K.

Naming faces and naming names: Exploring an interactive activation and competition model of name retrieval.

Functional models of face recognition (e.g. Bruce and Young, 1986) typically separate storage of names from storage of other personal information (e.g. nationality, profession etc). Evidence from studies of reaction time, everyday errors, face-learning and neuropsychology all suggest that names are accessed after other personal information, and may not be retrieved in the absence of this information. Recently, we have proposed an alternative explanation for this phenomenon (Burton and Bruce, in press). Using an interactive activation and competition model of face recognition, we argue that names may be stored together with other personal information. The apparent difficulty of name retrieval is due to the fact that many names are unique, whereas other information (e.g. nationality) is shared by many of the people we know.

In previous work we have concentrated on retrieval of names only from facial input. In this paper we present a development of the model which allows input from names. We demonstrate that this model can account for patterns of interference found in the literature. We also describe experiments addressing the hypothesis that uniqueness may account for the relative difficulty of name retrieval.

G. Cohen, Open University, U.K.

Retrieval of proper names: Testing the models.

The predictions from two theoretical models of names retrieval were tested in two experiments. The Bruce and Young (1986) model assumes serial access, first to semantic information about a person and then to the person's name. According to this model, names are harder to recall than semantic information because access to the name occurs after, and is dependent on, access to the semantic information. The Interactive Activation and Competition model (Burton and Bruce, in press) has an architecture which ensures that information which is unique or highly distinctive receives less activation. According to this model, names are harder to recall because they are more distinctive than semantic information. Experiments 1 and 2 tested the serial access assumption by comparing recall of names and occupations when presented singly or together, and tested the uniqueness assumption by manipulating the distinctiveness of the names and occupations. Comparison of recall in single (name only or occupation only) conditions with recall in dule (name and occupation) conditions yielded results which were not compatible with the serial access assumption. And, contrary to the predictions of the IAC model, distinctiveness was found to confer an advantage on recall of both names and occupations.

The notion of "mental models" was initially established by P. Johnson-Laird (1983) to deal with data coming from the field of deductive reasoning as opposed to the rationalistic or ruled-based approach to thinking. Deductive reasoning is explained in terms of building and updating a model of the premises as well as searching for counterexamples in order to falsify and eventually substitute the model. Mental models involve some sort of structural correspondence with the referent of premises. Thus, quantifiers are represented in models as sets of individual tokens rather than as logical operators.

In former times, the framework of mental models has been extended to other cognitive domains as comprehension, problem solving, artificial intelligence, and predictive judgments. For instance, comprehension is conceived as the processes of building a representation or model of the referent of the text (the objects, characters, events, and processes described in the text) rather than -or in addition to- a representation of the text itself (e.g., Sanford & Garrod, 1982; Johnson-Laird, 1980, 1983; Garnham, 1987; Glenberg et al., 1987). Some well known phenomena of comprehension such as anaphoric resolution, thematic and elaborative inferences, the foregrounding of relevant concepts, the integration of text meaning, or the representation of spatial relationships can be explained in terms of mental models rather than a more surface representation of the text.

The notion of mental model has gained considerable empirical support, however, many issues are still ill-defined and controversial and it is worth trying to explicit the state of the art in the framework of this symposium.

M-F. Ehrlich & H. Tardieu, EHPE & Université Rene Descartes, France.

Conceptual models in text comprehension.

Johnson-Laird (1983) proposed a typology of mental models and made a basic distinction between "physical" models representing the physical world (with tokens related to spatial, temporal ... kinematic relations) and "conceptual" models representing more abstract entities. Up to now, experimental studies focused on text comprehension have investigated the properties of "physical" mental models constructed from stories and descriptions. The aim of the present work is to discuss the relevance of "conceptual" models constructed from expositions dealing with scientific concepts. Two series of experiments will be reported. The first series showed that performance differences attributable to domain-specific knowledge result from differences in the construction of mental model. The second series focused on the role of illustrations. Results showed that illustrations favor the elaboration of a mental model in specific conditions only. Taken together, these findings provide empirical evidence for conceptual models. The functional and structural properties of these models will be discussed.

A. Garnham & J. Oakhill, University of Sussex, U.K.

Toward a realistic theory of anaphoric processing: A mental models approach.

This talk will begin with a very brief overview of the mental models theory of text comprehension and of why it is the most appropriate framework within which to develop specific accounts of comprehension processes.

In the rest of the talk I will outline an account of anaphoric processing, developed within the mental models framework, that is both theoretically and empirically "realistic".

The development of the account has been guided by the results of several series of experiments carried out both in our own laboratory and in a series of collaborations. In particular, studies on the following topics have influenced our theorising: the use of implicit causality information in the interpretation of pronouns; the processing implications of the distinction between deep and surface anaphors; the understanding of so-called "conceptual" anaphors; the ease with which references into "anaphoric islands" are understood; the use of stereotype information in the interpretation of gender-marked pronouns.

Findings from these experiments provide strong constraints on the kinds of representation used to interpret anaphoric expressions, though their implications for the processes involved are often less clear.

T. Sanford, L. Moxey & M. Carreiras, University of Glasgow, U.K. & Universidad La Laguna, Spain.

Focus and mental models for quantifiers.

The logical description of quantifiers like "some' requires that both necessary and possible relations are specified. The mental model approach of syllogistic reasoning given by Johnson-Laird includes these relations also, though there is scope for mental models which are incomplete in that they may not contain both necessary and possible information. In this paper, we shall discuss the psoblem of what is represented in mental models of premises, and, more generally, quantified statements in general. This will include both logical quantifiers, and nonlogical ones such as a few and not many. A number of existing studies in the literature will be reported, and experimental evidence of our own introduced which shows that different quantifiers highlight different parts of the logical model. The consequence: of this for reasoning are discussed, and the generality for a variety of languages is discussed.

K.F. Wender, Universität Trier, Germany.

Restrictions on mental models of spatial relations.

The idea of mental models has been around for some time and apparently it has considerable appeal to many people. Presumably this is the case, because there is a great deal of correspondence among ones introspection and mental models. On the other hand, the term is often used in a rather vague manner.

This paper proposes a more rigorous definition for the concept of mental models in the context of spatial relations. In addition to an isomorphism between a spatial configuration and a representing relational system two functions are included. One that is induced by the experimental method and a second one corresponding to the hypothetical mental processes. If these functions satisfy a certain monotonicity criterion then the relational system is called a Mental Model. The idea is illustrated by a model combining inter-point distances and reaction times.

This paper subsequently discusses the problem of stability of mental models, i.e. whether the isomorphism remains invariant or should remain invariant over different observational methods. Examples from several experimental studies are presented that show stability in some cases but lack of stability in others.

M. de Vega, Universidad La Laguna, Spain.

Mental models of characters in spatial scenarios.

Subjects who read narratives describing environments are able to build up analogical frameworks of spatial relationships Some studies suggest also that in text involving a change of perspective readers recalculate the spatial relations according to the new viewpoint. On the other hand, characters are central entities in narratives, and readers take advantage of them in order to build a representation of referent. Thus, main characters are more available in the reader's mind throughout the text, and the introduction of a new character in the text demands additional mental resources.

In this talk I will analyze how comprehenders of narratives represent characters and their spatial perspective. I will outline a theoretical framework based on some results obtained in our laboratory with a paradigm wich manipulate both shifts of perspective and shifts of character in texts. According to this framework the representation of characters and their spatial perspectives are independent and both demand specific mental resources.

Symposium on "Categories, concepts and knowledge representation."
Conveners: D. Dubois, CNRS, France & H. Peraita, UNED
Madrid, Spain.

D. Dubois & J.C. Sontag, CNRS, Paris, France.

Cognitive structures and symbolic systems.

The interdependancies between hypothetical cognitive structures and processes for categories and concepts, and types of material representations within symbolic systems (mainly graphics vs. linguistics) will be discussed both theoretically and empirically. Methodological consequences for experimental research on natural categorization are drawn.

The argument first stands on a series of experiments run on photographs of road environments and allows us to validate the generality of the hypothesis of typicality structure for such complex objects as well as the variability of categories according to perceptual vs goal-oriented processing. The results are discussed along the challenge on typicality conceived either as "bottom-up" "objective" similarity from the "real world", or as theory based.

As a second point, further experiments run on experimentally constructed materials such as pictures of the "same" objects but with represented at different levels of schematism, lead us to question further the notion of "realism" of symbolic representations. The results gave arguments to account for the structural and formal properties of symbolic systems in categorization.

Properties of drawings as well as langages (les langues) should be seen as the necessary theoretical "interface" between perceptual and theory-based constraints on conceptual structures. One chance of the European cognitive community is that it have an experimental panel of langages which allows further comparative studies on the role of linguistic constrains on knowledge structures, and more specifically on typicality effects within concepts and categories.

J. Hampton, City University London, U.K.

Combining prototype concepts.

Studies are reviewed in which people are asked to categorize a list of words first with respect to each of two categories, (e.g. PETS and BIRDS) and then with respect to the conjunction of the two (i.e. PETS WHICH ARE ALSO BIRDS). A common finding in these studies is over-extension of the conjunctive category; that is, people are inclined to categorize items as belonging to the conjunction that they did not rate as belonging to one of the categories considered on its own. New data will be reported investigating possible accounts of this phenomenon, by using visually presented stimuli which can be classified with fuzzy criteria.

H. Peraita & A. Garriga, UNED Madrid, Spain.
Psychological approach to different kinds of semantic relations.

In a large number of representational experimental tasks in Cognitive Psychology, the results obtained are explained through a series of theoretical constructs based on the semantic relations supposedly represented in the subject's mind. Specifically, in practically all reserach work on semantic memory, language comprehension, etc, in which the subject has to carry out either verification tasks - synonimity, class inclusion, antonimity - or analogy detection, these relationships are used more or less explicitly.
At present there exists a series of attempts, and debates, both from the field of semantics/psychosemantics and AI (Winston, Shiffrin & Hermann, 1988; Chaffin & Hermann, 1990; Tversky & Hemenway, 1990), to describe and explain the nature of these relationships and to systemize them.
The study we propose is located within this framework. Starting from empirically controlled data in controlled linguistic production tasks, within the framework of natural category formation and classification we intend to explain the psychological - and not strictly linguistic - nature of some of the conceptual relationships found.
At the same time, we will attempt to establish a correspondence between some of these relationships and the statements which linguistically code them, and to analyse their incidence as a function of age, other subject's characteristics, and conceptual hierarchies.
A theoretical framework will be proposed, but the basic analysis will be focused on part-whole ("is-a-part-of" or "has-a"), taxonomic ("is-a-kind-of"), evaluative, ("is..." and functional relationships, ("is-used-for").

E. van der Meer, Humboldt-Universität Berlin, Germany.
Temporal information in concepts.

Human behavior is linked to temporal relations existing in our world. We are interested in understanding how these sequential contingencies of reality are represented in conceptual LTM. The actually proposed theoretical frameworks such as scripts, scenarios, etc., do not specify this aspect in sufficient detail.
Knowledge about the sequential order of events has different origins : perception or personal experience, communication, inferences. Therefore we also suppose different modes of its conceptual representation.
A number of priming experiments were carried out to check this assumption. Ss had to detect meaningful relations between event-related concepts. We manipulated : (1) the type of relation between event-related concepts (time, finality, meaningless), (2) SOA (200 ms vs. 1000 mas), (3) the time order between event-related concepts (prospective, i.e. corresponding to the natural order of events in our world, or retrospective, i.e. corresponding to the reverse order). The results indicate that temporal information processing is based on automatic as well as controlled processes. The underlying specific conditions are discussed and conclusions concerning conceptual knowledge representation in general are advanced.

P. Vrignaud & J. Lautrey, INETOP & Université Paris V, France

The typicality gradient: One or several processes?

Aim: This research deals with the methodological and theoretical problems raised by the estimation of the typicality gradient (graded structure) in the categorization of natural objects.
Method: Subjects were fourth grade pupils (mean age: 15 years). Two experimental paradigms were used: a production task of names of instances of the category primed by the name of the category, and a typicality rating task on a scale of representativeness for instances proposed by the experimenter. Both paradigms were replicated with the same subjects, at a two month interval. For both paradigms, we estimated the intra-individual stability, the level of interindividual agreement (by comparing the typicality gradient of all the subjects taken two by two), and the between-group correlation (by comparing the mean gradient of two subgroups of randomized subjects).
RESULTS: For the production paradigm, no substantial relationship was found between the production order of the names of instances for the same subject on both occasions, nor in the level of interindividual agreement. However, between-group correlations were higher than .90 and thus absolutely comparable with results previously published by others authors.
With the typicality rating paradigm, we found fair intra-individual stabilities , lower levels of interindividual agreement and once again high between-group correlations.
DISCUSSION: From a methodological point of view, these results warn against the confusion often encountered in the literature dealing with the typicality gradient, that consists of using between-group correlation to estimate intra-individual stability and interindividual agreement. We propose the notion of a personalized gradient.
From a theoretical point of view, the fact that we find high between-group correlation with both experimental paradigms, but supported by high intra-individual stability in one case (typicality rating task) and with weak intra-individual stability in the other case (production task) leads us to think that different processes are solicited by these two paradigms. A hypothesis based on the nature of the different processes that could sustain the typicality gradient is discussed.

D. Alvarenga, Université de Paris VIII, France

L'accent en Portugais - une approche cognitive.

SUMMARY: SELON LA PHONOLOGIE METRIQUE, LES ACCENTS PEUVENT SE DISTRIBUER EN ACCORD AVEC UN PRINCIPE GENERAL BINAIRE QUI CREE UNE COURBE PROSODIQUE AVEC UNE SUITE DE CONTRASTES ENTRE DES SYLLABES FORTES ET SYLLABES FAIBLES DONT LA TETE SERA A DROITE OU A GAUCHE SELON LES PARAMETRES DE CHAQUE LANGUE. LE PRINCIPE DE SAILLANCE OU DE PROEMINENCE RELATIVE Y AYANT UN ROLE IMPORTANT.

A PARTIR DE CES PRINCIPES PHONOLOGIQUES ON PEUT SUPPOSER QUE LES PARAMETRES D'UNE LANGUE PARTICULIERE OBEISSENT A UNE ECHELLE DE CANONICITE ET SONT A LA BASE DE L'EXPLICATION DES DEFFERENCES DE TEMPS DE DENOMINATION D'ITEMS CONSTITUES DE DIFFERENTS ACCENTS (TOUTES CHOSES EGALES PAR AILLEURS) ET DE LA FREQUENCE DE CHANGEMENT D'ACCENT.

L'EXPOSEE A POUR BUT DE MONTRER DES RESULTATS DE TEMPS DE DENOMINATION ET LES DIFFERENCES DE TAUX DE CHANGEMENT D'ACCENT POUR LE PORTUGAIS. JE VEUX MONTRER QUE LES TEMPS DE DENOMINATION SONT EN RAPPORT DIRECT AVEC UNE ECHELLE DE CANONICITE ACCENTUELLE ET CROISSANTS SELON L'ELOIGNEMENT DES STRUCTURES ACCENTUELLES CANONIQUES: 1° - DES MOTS A ACCENT SUR LA PENULTIEME SYLLABE; 2° - DES MOTS A ACCENT SUR LA DERNIERE SYLLABE; 3° - DES MOTS A ACCENT SUR L'ANTEPENULTIEME SYLLABE. JE VEUX MONTRER AUSSI QUE LES TAUX DE CHANGEMENTS D'ACCENTS OBEISSENT A CETTE MEME ECHELLE: IL N'Y A PRESQUE PAS DE CHANGEMENTS POUR LES PAROXYTONS; IL Y A DES TAUX MOYENS POUR LES OXYTONS; IL Y EN A PLUS IMPORTANTS POUR LES PROPAROXYTONS.

C.J. Alvarez, M. Carreiras & M. De Vega,
Universidad de La Laguna, Tenerife, Spain

Syllable frequency and visual word recognition in Spanish.

The main goal of this research is to examine the role of syllable frequency on word recognition in a shallow language: Spanish. Some connectionist models of visual word recognition (Seidenberg, 1987; 1989) suggest that structures such as syllables are not a necesary stage in processing and the effects of such units derive from bigram frequency (higher frequencies for bigrams within syllables than for bigrams between syllables). The effects of word frequency and syllable frequency were tested using a naming task and a lexical decision task. Stimuli (words and pseudowords) with low and nigh syllable frequency and with low and high word frequency (only for words) were selected. Frequencies of the bigrams within syllables were similar to those of the bigrams between syllables. Syllable and Bigram frequencies were obtained from two dictionaries of frequency (Alvarez, Carreiras y de Vega, in press a, in press b). The results of these experiments suggest that syllable plays an important role during visual word recognition for Spanish readers. This result cannot be explained by the orthographic redundancy hypothesis. In a further experiment we tested the possible differences among the syllable positions and the relation with lexical candidates. The results are discussed in terms of the syllable as a processing unit.

G. Aschersleben & W. Prinz
Max-Planck-Institut fur Psychologische Forschung, Munchen, Germany

The influence of delayed feedback on sensorimotor synchronization.

In synchronization tasks subjects are instructed to synchronize temporally a regular sequence of stimulus events with a motor response. The relationships between the onset of the guiding signal and the onset of the response signal are then measured. What is usually found is a response pattern where the motor event precedes the sensory event by about 30-50ms (z.B. Dunlap, 1910; Fraisse, 1980).

This observation suggests that afferent rather than efferent movement codes get superimposed on the afferent codes that result from the guiding signal. These movement-related afferent codes may result from tactual/kinesthetic, auditory or visual feedback from the tapping movement. Basically the results of our studies with different experimental variations (e.g. referring to the intervall duration of the guiding signal, limbs involved, nature of feedback involved) support this view. We report evidence from one type of experimental manipulation: delay of feedback.

Finally we discuss some of the theoretical implications of these delay experiments for modeling the underlying mechanisms of sensorimotor synchronization.

C. Beauvillain, Paris V, France

Lexical access and eye movements in reading isolated words: effects of word-initial and ending letter sequence.

A great deal of recent research has indicated that word initial letters are of special importance in visual word recognition. This word beginning superiority could be a consequence of the strong tendency for readers to fixate near the middle, or about halfway between the beginning and the middle of words. Another reason for this word beginning superiority could be due to lexical access process that operates faster with the beginning part of words. One version of the hypothesis of lexical access based on initial letter sequence of a word maintains that ease of lexical access increases whenever the size of potential word candidates is limited by beginning letter information. To test this hypothesis, we varied the degree of lexical constraint imposed by the initial and ending letter sequence. To allow clear specification of which part of the target word was available earlier to the visual system, the following technique was used. Subjects' eye fixations in a target word were examined as a function of the spatial distribution of luminance within word in peripherical vision. The results make clear that the spatial luminance distribution within target word affects the amplitude of the saccades and the initial landing position on the beginning or ending part of word. Fixations durations showed that the consequences of the position of the eyes within word depend strongly of the word-initial and word-ending information. The results limits the simple notion of a left-to-right directional mapping of visual information onto lexical representation.

M. Bernoussi, Université Rennes 2, France

Cognitive arithmetic: The role of the sign.

Over recent years, research in the area of cognitive arithmetic has reported that adult subjects solve simple arithmetic problems by retrieving results (sums and products) from long term memory. Arithmetical facts are assumed to be stored in a network memory (see for review McCloskey & al., 1991 ; Lemaire & Bernoussi, 1991). Empirical results have shown that addition and multiplication facts are stored in an interrelated memory network.

The aim of this work is to investigate the role of the sign, and his effect in the RT in solving simple additions and multiplications. The hypothesis is that the presentation of the sign before the operands may permit a differential access to either of the facts (addition or multiplication).

The procedure used is a verification task (true/false), with measure of RT to solve simple addition and multiplication problems (e.g. 3+4=7). In the first condition the sign is presented before the operands (with delay) , and in the other, the sign is presented without delay.

According to the results obtained, we may assume that :

1 - When the sign is presented before operands (with delay), RT's are faster than in the other condition (difference = 200 ms).

2 - In these two conditions, RT's for multiplication are faster than the ones for addition.

N. Bonnardel, Université de Provence, France

The functions of evaluation in design activities.

The role of evaluation has been little studied in activities in which it does not constitute the principal end. This is particularly true for design activities. The evaluation process must, however, play a decisive role in design problem solving. Indeed, the designer deals with uncertainties, due principally to an initial representation of the goal which is incomplete and imprecise. He is obliged, moreover, to choose between various alternatives throughout the design activity, both because of the lack of pre-established problem solving methods and because of the diversity of possible solutions to any problem.

In order to determine the functions of the evaluation process in this context, we analyzed several design activities relating to aerospace equipment. The results, obtained using various methods (observations, analyses of dialogues between designers), enabled us to

identify two principal functions of the evaluation process. These functions differ according to the nature of the objects undergoing evaluation. These objects may be design solutions or "evaluative referents" (i.e. criteria, constraints). The evaluation process allows the designer to appreciate the quality of the solutions which have been envisaged and to judge the status and the relative importance of the evaluative referents. These two functions enable the evaluation process to contribute to the advancement of the design activity. Indeed, the results of the evaluation process determine the stage of the design activity which follows the stage of solution evaluation, and establish an order of priority between the evaluative referents. Such an order of priority is taken into account both during the period of solution evaluation and during the period of solution generation (so some of the "evaluative referents" may be "generative referents" as well).

The existence of these different functions implies that evaluation should occupy an important position, not only in models of the design activity, but also in training programs for novice designers and in design aiding systems.

C. Boujon, Université de Rennes, France

Deficit of visual selective attention in aged adults.

Among the processing mechanisms involved in memory impairment in old age, the reduced attentional capacity and the cognitive slowing (as processing speed) have been shown before (Saltouse, 1988; Light, 1991).

From the Early-Selection model (Broadbent, 1958), the attentional selectivity of relevant visual information has been revealed as sensitive to age (Madden, 1990; Plude, 1990).

I suggest taking as a starting-point: the continuation of the two-stage model of the Feature Integration Theory (Treisman & Gelade, 1980):

1. In order to confirm the differences related to age in identification performances during the feature integration stage (Plude, 1981; 1985; 1990).

2. In order to reduce the importance of visual eccentricity in the perceptual processing compared to the performances decrease in aged adults (Cerella, 1985; Scialfa, 1990).

3. In order to disprove the cognitive slowing as a factor which accounts for the differences in the performances according to age (Salthouse, 1982; 1984; 1988).

A visual search paradigm is applied to a simple object, the target, among a variable number of distractors which differ from the target in one or two features. This research belongs to cross-sectional type. It includes two cohorts: 23 young adults (age average: 21) and 8 old adults (age average: 68).

1. RT's are always higher in old adult than in young adult, whatever the perceptual stage.

2. In the feature integration stage, RT increase in both groups in proportion to the complexity of information.

3. The attentional cost is higher in old adults than in young adults.

4. The eccentricity (as extrafoveal acuity) is not the main explanation of the increase of RT in old subjects.

5. The increasing of RT may be explained by the correlative increasing of attentional resources rather by a cognitive slowing in aged adults.

J. Brebion & M-F. Ehrlich, Université René Descartes, Paris, France
Working memory in older subjects: evidence for a decrement in the processing component.

Two studies investigated the age-related decrement in working memory capacity by evaluating the processing and storage components separately.

In the first experiment, young and older subjects were submitted to the Daneman and Tardif (1987) task. Subjects had to combine short words into a new word according to a specific rule and maintain it in memory while processing the next series of short words. No difference was observed on the two measures (number of new words produced and response times) for processing capacity, but recall performances were lower in older subjects. Nevertheless, the intercorrelations suggested that the age-related decrement was linked to the processing component.

In the second experiment, subjects had to detect incongruity in sentences. Complexity of processing was varied by manipulating the distance between the incongruous word and the word that made it incongruous (0-6-12 intervening words). While processing, subjects were required to maintain an increasingly greater number of words in memory (3, 4 or 5 words). The results showed that increasing complexity of processing was more detrimental to older subjects, but that increasing concurrent load affected both groups similarly.

These findings are discussed in relation to the Baddeley (1986) and Craik, Morris and Gick (1991) view on the role of aging in the trade-off between the two components of working memory.

M.G. Calvo, M.W. Eysenck & M. Carreiras
Universidad de La Laguna, Tenerife, Spain & University of London
Reading regressions as a function of test anxiety.

According to the efficiency theory (Eysenck & Calvo, in press), high-anxiety individuals employ a greater amount of cognitive resources or strategies to get a similar performance level to low-anxiety individuals. A specific prediction of this theory is concerned with the use of regressions while reading, as a kind of such strategies. High- and low-test anxiety subjects read several texts, sentence-by-sentence, either with articulatory suppression, with a concurrent audition, or with no concurrent task. Reading was self-paced and subjects had the possibility to make backward movements (reading regressions) within the text. Subjects were unaware that the number and duration of their regressions were being registered. High-anxiety subjects employed many more regressions and spent more time in regressions, compared with low-anxiety subjects, but there were no differences in comprehension effectiveness between these groups of subjects. Differences in regressions remained highly significant even after working memory span and vocabulary knowledge differences were partialled out. These results are consistent with the hypothesis that: (a) anxiety typically promotes the use of strategic activities to compensate for the interference of worry, in order to keep performance effectiveness unimpaired: and (b) that, by doing so, anxiety reduces processing efficiency, as the amount of resources employed to attain a certain performance level is increased.

P.J. Castaneda & M.J. Rodrigo, University of La Laguna, Tenerife
Mental models integration in predictive tasks with visual & semantic contents.

The elaboration of Mental Models in predictive tasks involves the integration of different sources of information in order to reach a predictive outcome. Two sources were provided in each predictive task: a quantitative source (distribution data) and a qualitative source (individuating information representative of an outcome). The between-sources congruence as well as the type of content (visual or semantic) were manipulated. Subjects from two age groups (5,7,9 and 17,19,21) were also given a spatial rotation test. The dependent measures were the subjects choices, the subjective probabilities and the verbal reports. The results showed that children's predictions are based on the between-sources congruence in task with visual contents but not in task with semantic contents. Adults' predictions are based on the between-sources congruence in both types of contents. The effect of the spatial abilities in children are shown in the proccessing of the qualitative source, whereas in adults they are shown in the integration of both sources. The results are disscussed in terms of both the heuristic approach and Mental Models approach.

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Universidad de La Laguna, Tenerife, Spain
Memory of interpersonal relationship variables in narratives, by means of interpersonal action schemes.

According with the structure of the interpersonal action schemes, this paper estudies, on the one hand, the memory of subjects of interpersonal variables explicits in texts. On the other hand, how subjects are able to make same inferences and predictions about the outcome of the action resolution, depending on the positivity/negativity of this resolution.

We made two experiments: In the first one, the relationship between actors (referent) was positive in all texts (i.e. friends, relatives, etc.) versus the second one, negative always (unfriends, competitives, etc.). The present state of the interpersonal relationship in both experiments had two versions: positive (the tendency to improve the relationship) and negative (the tendency to worsen it). In the presence of a reason to make actors to get into interaction, our proposal is that subjects simultaneously active two schemes (positive vs. negative) about the way the interaction will be happen.

The results show that in the retrieval fase, there is interference between both schemes, depending on the degree of competence between them. In this way, if the positive scheme of interpersonal action is very active vs. the negative one, retrieval of interpersonal relationship variables explicits in texts is easier. On the contrary, if the negative scheme is the most active, the degree of competence is higher and retrieval is worse.

A. Charles, Université Bordeaux II, France

Are generated words more elaborated?

SUMMARY: The generation effect refers to the finding that verbal material generated by the subject from a word fragment is subsequently better remembered (on explicit tests of memory) than material simply read (Slamecka & Graf, 1978; Rabinowitz & Craik, 1986; Kinoshita, 1990...). One possible explanation holds that the generation effect is related to an increased semantic elaboration of the generated word. More specifically, we hypothesize that the defining and caracteristic features of the generated words are automatically activated; this activation increases, generally, the discriminability of the generated words (the generation effect). However, in a recognition task, a lure would be more frequently confounded with a generated than with a read word if this lure correspond to the semantic elaboration of the target. This negative generation effect would not be observed in the case of lures corresponding to other semantic features (i.e. members of the same category that the generated word). A 36 word length list (18 complete words and 18 fragments) was presented to 24 subjects: each word was presented during 3 sec. Immediatly after the acquisition phase, the subjects were given a recognition test of 36 words: 18 target words (e.g. bee) were interspersed with 18 lures; a third of the lures were non-related to the targets (e.g.bud), a third correspond to a property or a caracteristic of the target word (e.g. honey) and a third to an other example of the same category (e.g.wasp). The results are threefold: firstly, we observed a classical generation effect (more hits in the case of generated than read items, 90% and 77% respectively); the second result is consistent with our hypothesis: for the non-presented words corresponding to the defining features of presented words, the correct rejection is significantly lower in the case of generated than in the case of read word (88% and 98%, respectively); thirdly, there is no such a difference if the lure is an element of the same category as the target or in the case of "new words".

E. Clément & J.F. Richard, Université de Paris 3, France

The understanding of the instruction in isomorph problems.

The comparison of isomorphs is an interesting paradigm to study how the problem-space is elaborated by the subjects, more precisely how the operator is interpreted. Actually the results of two experiments we have done, suggest that the main difficulty in puzzle-like problem solving is to understand the meaning of the operator mentioned in the statements

We studied three isomorphs of the Tower of Hanoï problem. A move problem (Tower of Hanoï), two change problems analogous to Simon and Kotovsky's ones (85). The only difference between problems was the operator presented in the statements:
- "to move " from one place to another (3 places for 3 objects with different size)
- "to exchange" objets with different size.(3 sizes for 3 objects with different places : left, middle, right)
- "to change" the size of objects.(3 sizes for 3 objects with different places : left, middle, right)

Our hypothesis is that an action may be understood from two points of view (Richard 90) : as a change of state or as the process leading from the initial state to the final one. In the first case the focus is on the result of the action, in the second case the focus is on the type of transformation leading to this result. To solve puzzle-like problems like the Tower of Hanoï, only the first point of view is consistent with the solution.

Despite the fact that problems share the same structure and identical condition of presentation, change and exchange problems were found to be much more difficult to solve. This supports Kotovsky and Simon's data.

In the move problem, the operator was understood in an adequate way : there were few violations of instructions. In the exchange and change problems there were many violations and many errors : the prerequisites of the operator (the condition for loosing a size and the condition for taking a new one) were very difficult to understand. The change of size was understood as a continuous process which means that the focus is on the transformation This interpretation is inappropriate with the nature of the problem which requires to consider only the initial and final state, not the transformation, since the prerequisites are the conditions upon the initial and final states. So the operative knowledge of actions (prerequisites and products of transformation) used by the subjects was inconsistent with the solution processes of both change problems, because of the unfamiliarity of this way of change.

P. Cole, Université de Niçe, France

Morphological families and visual word recognition.

Models accepting that morphological information is stored in the lexicon can be divided into two sets. Either morphologically complex words are stored as whole word forms and the morphological relations among words are represented within morphological families (affixed words sharing the same stem (Cole, Beauvillain and Segui, 1989) or morphologically complex words are stored as the combination of stems and affixes (Taft and Forster, 1975 and 1976). In both models, the representation of affixed words are organized around the representation of the stem which composes them. The use of morphological simple words corresponding to stems of affixed words can offer a way to test this last hypothesis. These words can be described with regard to two kinds of frequencies, the lexical frequency (the frequency of the word as a lexical item, without reference to its stem status) and the stem frequency (the frequencies of all affixed words that share the same stem, that is the frequency of the word with regard to its stem status). If the representations of morphologically complex words are organized around the representations of stems, lexical decision times to morphologically simple words which can stand as stems of affixed words should be affected by their stem frequency and consequently will be faster for words with high stem frequencies than for words with low stem frequencies.

Two experiments conducted in french, used pairs of words which possess an identical lexical frequency but differ in stem frequency. As an example, the verbs POUSSER and TOUCHER are of the same lexical frequency but POUSSER unlike TOUCHER is of a higher stem frequency. One of the observed results showed a stem frequency effect. Words with higher stem frequency were responded to significantly faster than words with low stem frequency, suggesting that access to this kind of morphophonemic word can be affected by its morphological status. As a stem of an affixed word, however, this result was obtained only for pairs of words with lexical frequencies lower than stem frequencies (example REDUIRE / PROUSSER). No such effect obtained for pairs of words with lexical frequencies higher than stem frequencies (example POUSSER / TOUCHER) suggesting an interference effect due to the lexical item status. This set of results suggests that morphologically simple words corresponding to stems which possess a lexical frequency lower than their stem frequency would be accessed as one particular element of a morphological family activated by its identification. On the contrary, morphologically simple words corresponding to stems with a higher lexical frequency than their stem frequency would be accessed as one particular element of the lexicon, without exploiting its morphological properties encoded within a morphological family.

D. Coquin, Université de Poitiers, France

Comprehension of Arithmetic Word Problems.

Arithmetic word problem solving has long been considered as the selection / instantiation of a schema, followed by the implementation of a solving procedure defined by this schema (Escarabajal, 1984). Presently, we rather refer to the building of the meaning of the problem situation (Escarabal, 1988; Richard, 1990), and we use text reading/comprehension models to study the reading/comprehension of arithmetic statements (ex: Kintsch & Greeno, 1985; Dellarosa, 1988...).

By testing six graders on two-transformations addition problems, we pointed out a continuum of diverse reading : from the most "narrative" to the most "structural". In narrative reading, children remember details in the narrative which are useless for solving the problem (the color of the little girl's dress, the weather,...), whereas in structural reading, they recall only the elements strictly necessary for the building of the problem schema, or even only numeric data. These opposed types of reading imply different solving strategies, reflecting more or less the concrete historical unfolding of the narrative.

Furthermore, we notice that in their representation of the statement, the best problem solvers retain more than the single structure of the instantiated schema of the problem, whether immediately after reading the statement or after solving the problem.

C. Dasi, S. Algarabel, A. Pitarque & J.C. Ruiz
Universidad de Valencia, Spain

Long-term duration of episodic priming generated at short stimulus onset asynchronies with stimulus repetition.

Den Heyer (1986) didn't find episodic priming in tasks using short stimulus onset asynchrony. This finding has been took as experimental support of Tulving's (1972) distinction between semantic and episodic memory.

In our experiments we have found episodic priming with massive stimulus repetition (50 presentations) in naming tasks, both with long and short SOAs. According to the data, the repetition of semantically related stimuli produce higher levels of priming than repetition of episodic related stimuli do. This difference persists even after 200 stimular repetitions.

Furthermore, after three months the original episodic priming effect still remains.

In general, the data call into question the empirical support of den Heyer's experiments to Tulving's distinction.

S. Delord, M. Boucart & C. Bonnet, Université de Paris V, France

Contrasting 'pattern' and 'noise' masks: effect of the spatial frequency content on the visual masking magnitude.

The structure of the masking pattern has been shown to be a critical factor in studies investigating visual masking. Particulary, masks having a structural similarity with the target ("pattern" masks) have been contrasted with masks having little or no structural relationship with the target ("noise" masks) in terms of interference effects on the processing of the target: A "pattern" mask has a stonger masking effect than a "noise" mask on the identification of a target. This effect has been accounted for in terms of different levels of processing affected by the two types of masks. A "noise" mask affects low levels of processing concerned with the integration of spatial frequencies and a "pattern" mask interrupts high level processes because of a competition for common processes due to the stuctural similarity with the target. However, the structural similarity has never been clearly defined. We choose a spatial frequency (Fourier) model to investigate this factor. The experiments involved identification of easily nameable fragmented objects. Four different types of masks were used: A "pattern" mask composed of the same fragments as the targets and three "noise" masks varying on the size of the black dots (1 pixel, 2x2 pixels, 4x4 pixels). A two-dimensional Fast Fourier Transform performed on the stimuli and the masks showed that the "pattern" mask and the "noise" mask composed of large dots (4x4 pixels) had a similar spectrum in terms of low spatial freqency components. The results showed that identification was differentially affected by the four types of masks. As predicted by the Fourier analysis, equivalent performance in terms of masking magnitude was found for the "pattern" mask and the "noise" mask composed of large dots. The two "noise" masks composed of small dots showed little masking effects. These results suggest that both a "noise" and a "pattern" mask can affect low and high levels of processing depending on their spatial frequency content. The results are discussed in terms of visibility of physical information made available for cognitive processing.

J.M. Diaz & M. De Vega, Universidad La Laguna, Tenerife, Spain

Reading times, comprehension, and reading efficiency.

A set of reading efficiency evaluations are considered. The starting point is the work by Jackson & McClelland (1979). Those authors proposed an "Effective reading speed score", i.e. the reading speed multiplied by the percentage of correct answers in a later comprehension test.
In our investigations, the reading times of each sentence included in a set of five texts were recorded. This allowed us to have not only the global reading time, but also a measure of variability in the times corresponding to each sentence. This measure could be considered as an indicator of the influence of low-level variables (i.e. lexical and sub-lexical) in reading process. So, we introduced it in our reading efficiency formula.
The predictive value of our estimation of reading efficiency is considered, not only for experimental tasks involving verbal material (e.g. lexical decision), but also for other kinds of variables, like academic assessments.
Finally, we compare this reading efficiency evaluation with other measures of comprehension capability.

N. Doonskaya, Independent Union for Brain and Behavior Research
Moscow, Russia

New theoretical grounds for Fitt's Law.

To better understanding of cognitive aspects of motor behavior it is important to know what are the physical principles of a moving control. The Fitt's law is described by the relationship $T = a + b \log_2 (2A/W)$, where T is the average time of movement from one target zone to another, A is the amplitude of the movement. W is the width of the target zones. This relationship is an empirical fact permitting different theoretical explanations. Our supposition is that the principle of time optimality lies in the base of the movement organization. It concerns to not only the movements where Fitt's law is hold but to other fast movements.

The first consequence of this supposition is that the Fitt's law has to be described by the relationship $T = a + b \sqrt{2A/W}$ instead of traditional one. It follows from the control theory, where it was stated that the time optimal control for one limb is the step function of time with one switch. It means that at first the limb is accelerated by the highest possible constant force h, then the switch of the control sign happens and the limb is decelerated by the opposite force $-h$. To stop the limb in the target zone the right moment of the switch has to be found by learning process. The analysis of electromiogramms patterns as well as of the experimental data dealing with the relationship between the T, A and W confirms our hypothesis.

P. Duclos, Paris-Sud, Orsay, France

Decay and reactivation of the semantic representation.

This study examined the state and evolution of the semantic representation constructed while reading a short paragraph. It compared two techniques : probing, i.e. immediate test recognition and priming , i.e. recognition of a word after a prime word. We used a semantic recognition task : the target word, when it was positive, had a semantic relation with a group of words contained in one of the sentences and subjects had to judge if the meaning of this word corresponded to a part of the information provided by the paragraph. Comparison was obtained by using three kinds of prime which could be a verbatim word either from the target sentence (near prime) or from the other sentence of the paragraph (far prime), or it could also be the word "neutral". This latter condition amounted to a probing paradigm. Lags were obtained by interpolating a counting task of variable length between presentation of the last

P. Duclos (contd)

sentence of the paragraph and test. Response times and accuracy were recorded. Results differed according to the type of prime preceding the target. For target words preceded by a neutral prime they showed a gradual linear increase of response times as a function of elapsed time. This increase was interpreted as a decay of the semantic representation in memory reflecting its progressive deactivation. The two other kinds of prime showed different effects : on immediate recognition, near primes had no effect, whereas far primes unexpectedly produced response times longer than in the neutral condition : this was interpreted as an interference effect from the prime word. For intermediate lags (10 seconds), response times were in no case different from those in the neutral condition. For long lags (20 seconds), response times for both near and far primes were shorter than in the neutral condition, which was interpreted as conventional reactivation.

K. Erngrund, University of Umeå, Sweden

Source recall as a function of age.

The data which will be presented here is from one memory task of the longitudinal study "Betula". The task selected, includes a test of both episodic and semantic memory regarding knowledge of an item, as well as knowledge about the source of this information, i.e. how this information was acquired.

The subjects tested are 35, 40, 45 ... and 80 years of age respectively, at the time of this test. There are 100 subjects in each cohort, randomly sampled from the citizens of Umeå, a city in Northern Sweden.

The results presented are cross-sectional and they show that knowledge of an item not always also will mean knowledge of how the information was learnt, despite the fact that testing was done immediately after study. The results support the distinction between episodic and semantic memory.

O. Espino, I. Leon, H. Marrero, E. Gamez & M.D. Castillo
Universidad de La Laguna, Tenerife, Spain

Deductive reasoning in the interpersonal relationship domain.

The aim of this research was to show that people, reasoning with sylogisms of social contents, do not fit Johnson-Laird's (1984) hypothesis according to which subjects place medium terms of first and second premises following a temporal proximity criterion.
This would mean that people, when reasoning use a type of model, genuinely social, of experiential nature, which is not included in Johnson-Laird (1983,1991) proposal of mental models.
In our experiment we have first tested the Johnson-Laird hypothesis, and we have found that it does not account for the results. Our hypothesis is that people do not represent the sylogism by establishing identities between actors as Johnson-Laird has proposed. However, the results suggest that subjects, reasoning interpersonal relationship, establish a causality link between thoses actions that occur in the relationship and their results.

A. Estevez & M. De Vega, Universidad de La Laguna, Tenerife, Spain

Reading ambiguous words in context: Activation and suppression of meanings.

Two experiments were performed in order to investigate the activation and suppression of meanings of ambiguous words. When comprehenders read a ambiguous word various potential meanings are accessed. Eventually, one meaning is selected for a response and the activation of that meaning leads to the suppression of other meanings. In the first experiment ambiguous words were presented twice in short texts with the same meaning in one condition, and with different meanings in the other condition. At the end of the text, subjects had to decide whether a string of letters was a word or a nonword. When it was a word its meaning could be appropriate, inappropriate or neutral in relation to the meaning of the second presentation of the ambiguous word. We measured the activation of meanings at two intervals: immediate and delayed. A second experiment was carried out in order to gain a better control. The appropriate and inappropriate targets used in the first experiment were presented to each subject preceded by appropriate, inappropriate contexts and two weeks after preceded by a neutral context. The results demonstrated that at the immediate rate, both appropriate and inappropriate meanings are activated, regardless of semantic context, but when the activation is measured after a short delay, the inappropriate meanings become less activated than unrelated concepts. Only the appropriate meanings stay activated. Results are interpreted in terms of models of lexical ambiguity.

P. Fernandez, F. Lopez & P.L. Cobos, Universidad Malaga, Spain

A qualitative model of interaction schemes/data in the context of covariation problem solving.

This paper emphasizes the weak points of formal and rule models in the context of covariation problem solving. It advocates a qualitative model of interaction schemes/data (Alloy y Tabachnik, 1984). It contrasted empirically experiments the limitations of rule models to explain the integration between the information and subjects' previous knowledge as well as to explain the later use of the resultant knowledge. The empirical results obtained point out that the inferences that the subjects made did not follow the rules of reasoning that they presumably had. The subjects made their estimations following their own everyday life theories, instead. Nevertheless, this did not occurred to the extent that their opinions remained unchanged before the empirical evidence. The information given to the subjects influenced their inferences, softening them about the ones they would have made without any kind of data.

M. Fernandez-Lagunilla, A. Anula, J. de Dios, M. Belinchon, J.M. Igoa & C. Pendones, Universidad Autonoma de Madrid, Spain

A modular approach to the analysis of syntactic disturbances in Spanish.

The purpose of this study is twofold: first, it is an attempt to test the empirical usefulness of the GB ("government and binding") grammatical theory (Chomsky, 1981) as a tool to describe and assess the linguistic disturbances found in various clinical populations with different kinds of speech pathologies (e.g. schizophrenics, aphasics and so on); second, it aims at providing empirical support for a modular approach to the description of the system of knowledge which underlies both normal and disturbed patterns of language use. According to these aims, a typology of syntactic errors in Spanish was elaborated along the lines of the GB modular grammar and put to test by analyzing and classifying a corpus of spontaneous syntactic errors made by a group of 20 schizophrenic patients and a group of 20 normal controls, under different language production tasks. In view of its success for classificatory purposes, and following proposals by some scholars in the field of language pathology (Grodzinsky, 1990), our GB-based typology is now being applied to analyze the patterns of speech deficits of Spanish aphasic patients by means of experimentally controlled tests on the language comprehension and production abilities of these patients.

L. Ferrand, Université René Descartes, Paris, France

The time course of phonological and orthographic code activation in visual word recognition.

Some experiments using masked nonword primes in the lexical decision task, investigate the effects of orthographic and phonological prime/target overlap with SOAs (stimulus onset asynchrony) ranging from 16 msec to 80 msec. We compare performance between orthographically similar pseudohomophone prime-target pairs (e.g. lont-LONG, pronounced identically in French) and unrelated controls (tabe-LONG) as well as between orthographically similar but phonologically dissimilar prime-target pairs (e.g. lonc-LONG) and unrelated controls (tabe-LONG). The studies indicate an orthographic facilitation from 16 msec to 48 msec and a phonological facilitation over and above orthography from 48 msec on. The results are discussed in terms of the time course of phonological and orthographic code activation in visual word recognition and within the framework of an interactive activation model.

P. Feyereisen & M. Van der Linden, University of Louvain, France

Working memory for three kinds of hand movements in young and elderly subjects.

Memory span for words, for symbolic gestures, for blocks pointed to, and for meaningless, static hand configurations was analyzed in two groups of 24 subjects (aged 19-25 and 59-71, respectively) by means of serial recall tasks. Each material was presented under three conditions: one control and two interference conditions (articulatory and spatial suppression). Dependent variable was the number of items recalled in the correct order. A 2 x 4 x 3 ANOVA with repeated measures on the second and third factors showed main effects of age, material, and condition. All the first-order interactions were significant whereas the second-order interaction failed to reach the critical level (p .08). These results indicate that first, different kinds of gestures involve different components of working memory and second, that aging does not affect working memory in an unitary way.

C. Frenck-Mestre, Université de Provence, France

Numerical processing in bilinguals.

Subjective reports by bilinguals indicate a distinct (first) language preference for performing any type of mental operation on numbers (Kolers, 1968). Subjective reports are not always indicative of performance, however, and in fact no firm conclusion can be drawn from the few bilingual studies that have examined whether the language used during mental manipulation of numbers actually has an impact upon performance (Frenck-Mestre & Vaid, 1991; Mägiste, 1982; Marsh & Maki, 1976; McClain & Huang, 1982). This question was addressed herein by comparing novice versus proficient bilinguals' verification latencies of simple multiplication problems, presented in the first-learned language, and in the second language. Problem type was manipulated such that half were taken from the times-table (in the range from 2x3 to 9x8, excluding ties, eg. 2x2) and half were not (these involved a "teen" number multiplied by a single digit, eg. 14x5). We thus examined whether the language preference reported by bilinguals repercuted onto processing time, whether this was more apparent for novice bilinguals, and whether or not it was restricted to "tabled problems". The results are discussed in conjunction with previous results, obtained with bilinguals for mental addition (Frenck-Mestre & Vaid, op.cit.), which lend some support to the idea that the activation of number facts is in fact language-sensitive.

E. Gamez, H. Marrero, O. Espino, D. Castillo & I. Leon, Universidad de La Laguna, Tenerife, Spain

The role of interpersonal schemata in the comprehension of movies.

An experiment will be described wich examines the expectations about the relationships that people have when they watch visual stories. Subjects watched short movies that had or did not have referents about relationship wich elicited strong expectations about upcoming events. Two types of movies were possible: movies with referents where relations between characters were positive and movies where relations between characters were debilitated.

E. Gamez, H. Marrero, O. Espino, D. Castillo & I. Leon (contd)

Two types of ends were possible: movies where the resolution of interaction were positive (the event fit with the previous expectation) and movies where the resolution of interaction were negative (the event didn't fit with the previous expectation but it was coherent with the story).

We had two different measures: one, a cualitative measure used the Thinking-out-loud method, where the subjects expressed they were expected to occur in the end sequence; the second measure was the time that subjects spent watching the last sequence of the movie (positive the end vs negative the end).

The results support a model in wich expectations about relationships between the characters of the movie are generated from a mental representation where the subjects recognizes the relationship's referents and the specific cause of interaction. As a consequence of that, the subjects expect specific event must be ocurr. They spent less time watching these events vs others that were coherent with the stories but they didn't expect.

C. Garitte, Université de Haute-Bretagne, Rennes, France
The conversation of children from 6 to 11: Analysis method and developmental study of conversational behavior.

This study sets out the analysis of 12 conversations between children in groups of two of the same age: 6, 8 and 10-11 years old. who were unaware that they were being taped and filmed by a video camera. while they were having lunch at the school canteen.

The unit of analysis is the conversation objet (C.O.). definited as a body of replies linked together by the same common reference. To this unit is linked the concept of Reply of Conversation Objet. that covers a whole reply if the whole of what is said when they take their turn to speak refers to a single C.O.. or part of a reply if the whole of what is said refers to several C.O.

The researche points out that children's conversation evolves according to their age. Two conversational levels can be defined: 6-8 and 10-11. The evolution concerns: 1°) the conversational interest (according to their age. children make abstraction of their physical environment when speaking and concentrate more C.O. related to their common and individual experience)- 2°) conversational stability (children of 6 and 8 spend less time on the same C.O. than children of 10-11)- 3°) play interaction (play activity decreases according to their age and becomes more verbal: jokes. puns....)- 4°) thematic links (theme breaks are clear: abrupt change of subject but at 10-11. children use more frequently the linguistic context to change the C.O.).

B. de Gelder & J.P. Teunisse, Tilburg University, The Netherlands
Aspects of face processing in autistics.

Research on face processing in autistic children has shown a deficit in the processing of emotional expressions (eg. Hobson et al., 1988) as well as in memory for unfamiliar faces (de Gelder et al., 1991). These findings raise the question of the interdependence between the various aspects of face processing distinguished in a model like that of Bruce and Young (1986). The paper reports studies examining face processing in young and adult autistics. The present evidence suggests the existence of a generalized processing deficit combined with more severe impairments to selected subcomponents.

B. de Gelder, M. van Zon & P. Bertelson
Tilburg University, The Netherlands & Université Libre de Bruxelles

The role of word onsets in the development of phonological segmentation ability.

The ability to segment speech in subsyllabic units seems to be the single most distinctive characteristic of alphabetic literates commonly called phonemic awareness (see Bertelson, 1989; Bertelson and de Gelder, 1990; Morais et al, 1987a for overviews). Recently linguists have argued in favour of a level of analysis in between the syllable and the phoneme, the onset and rime (Halle and Vergnaud, 1980). Taking up this suggestion students of reading acquisition started to investigate whether onset segmentation would be independent of the acquisition of alphabetic literacy, show up in pre-readers and facilitate reading acquisition (Treiman, 1985; Kirtley et al. 1989). The paper presents studies examining the relation between onset segmentation ability and reading skill in pre-readers, beginning readers and poor readers. The results will be discussed in the light of the claims about the critical importance of onset segmentation ability.

P. Gonzalvo, J.J. Canas & M.T. Bajo
Universidad de Granada, Spain

Assessing changes in mental representation with learning.

Empirically derived cognitive networks were employed to investigate changes in conceptual organization due to learning. A relatively new scaling technique (Pathfinder) was used to generate network representations (PFNETs) from proximity estimates of pairs of psychological concepts. A goal of this study was to explore the advantages and limits of the Pathfinder technique to identify structure in proximity data. Relatedness ratings on pairs of 32 concepts were collected from first year psychology students. Those concepts were taken from a History of Psychology textbook. Ratings were taken at the beginning of the academic year and two months later. During this interval, subjects received some history of psychology lectures and studied a handbook on this matter. After the rating task, subjects were asked to provide definitions for the presented concepts. Learning was assessed by comparing the students' PFNETs (pre- and post-learning) with the PFNETs extracted from 4 expert subjects.
The most important quantitative measure for assessing network similarity was based on the neighbourhood property of graphs: the cardinality of the intersection of the neighbours divided by the cardinality of the union of the neighbours. This measure reflected how student's conceptual representations became increasingly similar to the experts' ones, and therefore, how learning might change representation.

S. Jhean-Larose, Université de Paris 8, France

Evolution of categorization of mental representations in knowledge or in belief according to expertise levels.

The purpose of this experiment is to study the relevance of the categorization of mental representations in knowledge or belief. The experience leads with texts and hypertexts (texts and pictures) with novice and expert mechanics. Texts describe a functional system: the starting - system. According to logical tradition, truth values consort with representations allow to distinguish between knowledge and belief: a knowledge is a true belief. (Baudet, 1988).

We argue that expertise levels differ in the number of present elements in memory, in their system organization and in their categorization in knowledge and belief.

Tasks that require different levels of activity of retrieval in memory are used to evaluate mental representations before and after reading (Causal and teleological production, causal and teleological multiple choices questions, "triades lacunaires" and "triades de remise en ordre").

The main results are:

1 - Expert mechanics give more correct answers and categorize more often their answers in knowledge than novice mechanics do.

2 - The more the tasks require of activity in retrieval in memory, the less novice mechanics categorize their answers in knowledge while expert mechanics' categorization evolve hardly.

3 - Pictures facilitate the categorization of mental representations in knowledge.

Categorization of mental representations in knowledge or in belief appears to be related to requirement of activity of retrieval in memory.

L. Lenoble, Université P. Sabatier, Toulouse. France

A contribution of cognitive psychology to the study of the meaning of a peculiar behaviour in the mouse.

SUMMARY: The search for cognitive mechanisms in an animal may include the study of the meaning of the animal's behaviour as the animal experiences it. This psycho-ethological approach (insofar as it takes both psychological and ethological dimensions into account) is particularly indicated in the case where the behaviour under study has no obvious cause or purpose. This is the case of tail-carrying in the mouse, which is a common behaviour; nevertheless, it has not yet been studied until today. In this behaviour, the mouse catches its tail in its mouth, carries it to the nest, and lays it down, then immediately repeats the same behavioural sequence. This paper examines the temporal context in which the tail-carrying behaviour appears in 18 pregnant and lactating females, particularly by defining the types of activity which precede and which follow bouts of tail-carrying.

The set-up used to observe and record the mouse activities in real time on a computer key-board was composed of a food cage and a small box for the nest, linked to each other by a corridor. Of the 33 observational periods, each lasting 30 minutes, 21 of them included tail-carrying behaviour. We were able to define 19 series of tail-carrying behaviour within the 21 observational periods.
The analysis concerns, on the one hand, the 5 items immediately preceding and the 5 following a series of tail-carrying, and on the other hand, the 5 items occurring during the 2 min preceding and following a bout of tail-carrying.

The results showed the following :
- Before a series of tail-carrying, the mouse spent more time in the cage ($p < 0.05$) than usual and less time in the nest ($p < 0.05$). Yet, the animal showed behaviours which indicated that the nest became increasingly attractive.
- After a series of tail-carrying, time spent in the cage returned to normal, but still less time was spent in the nest ($p < 0.05$). Although the mouse stopped tail-carrying activity, it appeared still more interested in its tail, and some behaviours indicate that the relationship the animal had with its nest was in the process of changing.

It is proposed, in reference to Piaget's work with the child (1967), that the mouse is considered to be an animal which is centered on its own action and which structures its space with respect to its behaviour. From the data collected, a psycho-ethological interpretative model is presented in terms of an imbalance in the psychological investment and temporal occupation with the food cage and the nest.

C. Loisy & J-L. Roulin
Université Pierre Mendes & Université de Chambery, France

Multiple short-term storage in working memory: a new experimental approach.

Baddeley (1980) proposed a model of Working Memory in which a Central Executive (CE) is responsible for all the tasks that require attention. In its work it is helped by two slave systems : the Articulatory Loop (AL) for verbal material and the Visuo-Spatial Scratch Pad (VSSP) for spatial and visual material.
To date, experiments have reported only a dissociation between one slave system (AL) and the rest of working memory. Unfortunately, the span tasks and paradigms used (single dissociation with interference tasks) does not allow dissociations between three systems.

We propose a new task ('*double span task*') whereby all the systems of working memory must be activated. Words appeared on a grid at different locations and subjects were asked to recall either the words or the locations or to remember for each word the exact location at which it appeared. The choice of interference tasks allow us to predict classical effects and even a true double dissociation.

In the present experiment, the results are coherent with Baddeley's model. We find the classical effects of interference on recall of verbal and spatial material and the double dissociation between three sub-systems. However some questions can still be asked about the nature of these sub-systems. We propose to discuss the consequences of our results on Baddeley's conception and the general 'box model' approach to working memory tasks.

F. Lopez, P. Fernandez & P.L. Cobos, Universidad de Malaga, Spain
A task to examine the detection of non-contingent relations.

We describe a computer implemented task that allows us to examine the ability of the subjects to detect non contingent relations between two events. The task takes place in two phases. In the first phase, the subjects are given information about the occurrence of two events: the camouflage of a tank (an action) and the explosion of the tank (an outcome). The absence of relation between the two events can be derived according to the information given. During the first phase, the subjects must make judgments about the relation detected. In a second phase or behavioral task, the subjects have to minimize the number of explosions by means of the camouflage. To do this, the subjects are given a limited number of tanks that can be camouflaged or not camouflaged. If the subjects behave according to the relation established between the events, no difference between the number of camouflaged and not camouflaged tanks is expected. According to the results obtained, not only were the subjects able to detect the non-contingent relation but they also behaved in accordance with their detection.

D. Luna & M. Lasaga, UNED, Madrid, Spain
& University of Wyoming, U.S.A.
Processing dominance: effects of the size and number of the local elements.

The present research is related to the issue of the processing of global and local information of visual patterns. The aim of the study was to examine whether the size and the number of the local elements have differential effects of processing dominance.

In the first experiment we have varied the size of the local elements and the inter-element distance concomitantly. The size of the global pattern has been held constant. We have used stimuli whose global and local levels were at the same retinal eccentricity. In the second experiment, we have examined whether the results depend on using local and global patterns with the same eccentricity. We have used stimuli whose global and local levels were at different eccentricity (local elements occurring centrally).

The results showed differential effects of these variables on processing dominance depending on the same/different eccentricity of global and local information. These results are discussed in terms of the discriminability of global and local patterns.

B. Lyxell, Linköping University, Sweden

Tactile support in visual speechreading.

SUMMARY: In four studies, individual differences in the ability to utilize tactile information in visual speechreading were tested. The results demonstrate that component processes such as visual word-decoding, lexical access speed, and phonological recoding accounts for large proportions of the variation in performance. Further analysis of the data reveals that performance of the "Skilled" visual speechreaders deteriorates when tactile information is supplemented, whereas the opposite was true for the "Less skilled" visual speechreaders. It was also demonstrated that the nature of the tactile information influenced speech comprehension in different ways, such that the tactile signal has to provide frequency as well as time-intensity information about the speech signal to improve performance without any practice, whereas practice is necessary when the tactile signal only transmits time-intensity information. The results are discussed with respect to (a) how perceptual and cognitive components influence tactually supported visual speechreading, (b) implications of supplementary tactile information on different models of speech perception, and (c) how the tactile information should be presented to optimize speech perception.

S. Magnussen & S. Dyrnes, University of Oslo, Norway

Perfect visual long-term memory for periodic patterns.

The visual long-term memory for spatial frequency information was assessed by measuring the spatial frequency discrimination thresholds for test and reference gratings presented with different time intervals. Subjects were initially shown a grating of either 2.5, 5 or 10 c/deg for 10 sec, and tested after 30 min, 300 min or 3.000 min (50 hours). The delayed discrimination threshold was measured by a forced-choice procedure in combination with the method of constant stimuli; here the subjects were presented with a random series of 44 briefly (200 msec) exposed gratings whose spatial frequencies were 0, 2.5, 5, 10, 20 or 50% higher or lower than the reference spatial frequency, and the subject decided on each trial whether the test grating had a higher or lower spatial frequency than the previously viewed reference grating. A total of 12 subjects participated, each subject was tested with three different combinations of spatial frequency/retention interval in a balanced design. Two weeks after the experiment was completed the subjects were returned to the laboratory and tested for immediate recall using the same same procedure.

Discrimination thresholds derived from psychometric functions fitted to group data were in the region of 3-5% for all time intervals. This is comparable to delayed discrimination thresholds measured within short-term memory retention intervals, and thresholds measured with simultaneous presentation of test and reference gratings. It is concluded that spatial frequency information is maintained in long-term memory with the precision with which it is analyzed at the level of sensory processing.

F.S. Marrucci, E. Pessa, V. De Pascalis & V. Cinanni, Universita di Roma "La Sapienza", Italy.

Mental imagery and reality monitoring.

Summary:
Aim of this study is to examine the validity of the hypothesis, suggested by Finke, Johnson & Shyi (1988), that good imagers show a worse performance of reality monitoring compared to poor imagers, i.e. the formers with respect to the latters exhibit a smaller ability to distinguish correctly between recall of the visual stimulus really perceived and recall of the visual stimulus only imagined.

80 subjects (44 females and 36 males, mean age:19.5), with normal (or corrected to normal) vision, participated to the experiment. Poor imagers (below 25° percentile) and good imagers (above 75° percentile) were selected with Marks VVID (1973) out of a group of 160 subjects. 16 geometrical figures (8 representing a "whole" figure and 8 representing an "half" figure) were used. Whole figures were formed by two symmetric sides with respect to the vertical axis. Half figures were single sided. To half subjects of each group were shown right side incomplete figures, and to the other half left side incomplete figures. Subjects were asked to evaluate figure complexity, using a rating scale from 1 to 5 points, when the whole figure was presented. For incomplete figures subject's task was: 1) to complete these figures with a mental image of the missing side; 2)to express a judgment relative to its complexity. After presentation of 16 stimuli subjects had to recognize them mixed with 32 new whole geometrical figures.

Results showed that good imagers had a smaller ability to reality monitoring with respect to poor imagers (F (1,79) = 11,38, p < .001), thus giving support to Finke, Johnson & Shyi's suggestion. Good imagers showed furthermore a significantly higher amount of errors when they had to discriminate between recall of the stimulus really perceived and recall of the figure only imagined. On the other hand differences were not found between the two groups with respect to the recognition task.

C. Masduraud, Université de Poitiers, France.

Effect of asserted vs presupposed status of information on the processing of anaphora.

This paper reports a test of a model of presupposition wich results from an attempt to integrate the linguistic and psychological approaches of presupposition. According to this model an essential function of presupposition in discourse is to mark the information it conveys as secondary, while asserted information is focused. So, it can be assumed that presupposed information is less available in memory than asserted information.

In order to test that hypothesis, an experiment investigated the effect of the asserted vs presupposed status of the antecedent on the processing of anaphora. For understanding an anaphoric expression, one has to retrieve its antecedent in memory: so, it can be expected that the processing of a sentence containing an anaphor will require more time if the antecedent is presupposed than when it is asserted.

54 adult subjects had to read five texts presented on a computer screen. Each text included an anaphoric expression, the antecedent of wich was either presupposed (condition P), asserted (condition A) or neutral (condition N). Reading times were measured for the sentence containing the anaphor.

The results support our hypothesis: reading times were consistently longer, for a given anaphor, in condition P than in condition A. The differences were significant for four texts out of five.

Further tests and developments of the model are discussed in conclusion.

E. Meseguer & M. Carreiras, Universidad de La Laguna, Spain.
The use of minimal attachment strategy: Evidence from Spanish

An experiment was carried out in order to explore the use of the
minimal attachment strategy during reading syntactic ambiguous
sentences in Spanish Sixteen pairs of sentences were submitted to
be read Each pair had a initial clause, where the word "se" was
used ambiguously, that is, it could either be considered just a
pronoun or a mark of impersonality and voice (the Spanish
reflexive-passive) In the first case -when used as a pronoun-
sentences like "Se podria comer todo lo que produce su huerta el
campesino" ("The peasant would be able to eat everything that his
farm produces") were presented; in the second case sentences were
of the type "Se podria comer todo lo que produce la huerta del
campesino" ("Everything that the peasant's farm produces would be
able to be eaten . In short, the difference between both
sentences of the pair was the presence or absence of a clear-cut
third person elliptic, or not, subject -when "se" is used as a
pronoun a third person subject is needed, and therefore an extra
node is postulated- The ambiguity in both cases was destroyed to
one of the two possible interpretations by the immediately coming
clause The total reading times, as well as the reading times per
character, showed faster reading times sentences in which se was
a mark of impersonality and voice than for sentences in which se
acted as a pronoun The results are discussed according to the
Garden Path theory

J-P. Mialet, N. Feuche & A.M. Jacobs, France.
Implicit and explicit memory in anxious and normal subjects.

Recent experimental work by Eysenck and collegues (e. g. Eysenck,
Mogg, May, Richards & Mathews, 1991) suggests that internal
representations for threatening word stimuli are constantly more
activated in anxious subjects than in a control group. In the present
study we test this hypothesis by comparing performance in an
implicit memory task (lexical decision) and an explicit one (free
recall) using threatening and neutral words for anxious patients,
and normals with high and low trait anxiety. The results have
implications for the recent debate about the
dependence/independence of cognitive and affective functions and
for models of word recognition and memory.

V. Mullet, Université de Paris 8, France.
Activation and updating of situational models in text comprehension.

The purpose of this experiment is to study the effect of the activation of a
situation model on reading, understanding and memorization of a text. Subjects
read an identical second text describing an hijacking. This text is preceded by a first
one. The second text either describes a different situation model from the first text
(control group) or takes again the same model but gives some new informations
that are consistent or not with the informations of the first text (experimental
groups). Recognition and recall tasks are used to evaluate memorization.
The main results are:
1 - The control group reads the second text slower than the both others groups.
2 - The experimental group confronted with inconsistences between texts reads
slower than the group with no inconsistences.
3 - The instructions of recall produce slower reading times than the instructions of
recognition do.
4 - We can explain the results of the recognition task with Kintsch 's symbolic and
connectionnist model (1988, 1990) that integrates Murdock's (1982), Gillund et
Shiffrin 's (1984), Hintzman 's (1988) recognition models. Content of text is
represented at different levels in memory (surface structure, local and global
semantic structures and situation model). The traces in memory of these
structures decay with different rates.
Simulations of our results with Kinstch 's construction-integration model are in
progress.

T. Nazir & A.M. Jacobs, Groupe Regard, Laboratoire de Psychologie
Expérimentale, France.
Testing the revised feature-integration theory of attention.

Treisman's feature-integration theory, one of the most popular
theories of attention, has been revised many times to remain
compatible with new data. In one of the latest revisions, the
postulate of a continuum of attentive processing replaces the old
dichotomy of a strict parallel vs. serial stage (Treisman & Gormican,
1988). To make this revised theory more rigorously testable and
falsifiable - both by experimental and by simulation studies - , a
simple formalization of the main postulates of the theory is
proposed here. The formal model permits exact predictions about
the display size functions in a variety of experimental conditions. It
can thus be tested against alternative formal models, like
Bundesen's (1990) "one view search" model for the Treisman task.
In addition, important aspects of visual search behavior which are
totally neglected by feature-integration theory (e. g. eye
movements and the Search Operating Characteristic; Jacobs, 1991)
will be discussed in the light of this modified model.

L. Nyberg, University of Umeå, Sweden.
LISREL-analyses of models of memory.

SUMMARY: LISREL-type structural equation modelling (Jöreskog & Sörbom, 1982, 1984) was used for testing the episodic-semantic memory-systems model proposed by Tulving (e.g., 1983) against a one-system model of memory. The data used for testing these models were the performance of 400 subjects on ten cognitive tests classified as episodic or semantic memory tests. The results were in favour of the episodic-semantic model. The idea of separating episodic memory into subsystems mediating recall and recognition was then tested. The result of this analysis favoured such a division and is in line with previous experimental and clinical studies which have found support for a similar division of episodic memory (e.g., Anderson & Bower, 1972; Hirst, Johnson, Kim, Phelps, Risse, & Volpe, 1986).

A. Oliva & S. Carbonell, Grenoble & Université de Savoie, France:
Evidence for two associative networks in permanent memory.

This research deals with the issue of knowledge organization in long term memory. In agreement with the Paivio's (1991) DCT, the existence of two associative systems, one verbal and one image-based, is postulated. The hypothesis was that stimuli learnt in a visual context -ie. when presented in a pictorial form- generate associative connections amongst themselves, and similarly for stimuli learnt in a linguistic context. For example, an ashtray and a table are often visually encoded together, while they are rarely encoded together verbally. In the present study, the effects of automatic priming in different situations of stimulus presentation and stimulus association were investigated. Preliminary experiments were designed in order to distinguish associations that are purely verbal from those that are primarily image-based. In the main experiment, the same pairs of prime-target were presented either as words or as pictures and the type of association, verbal/visual, was contrasted within both presentation conditions. In a target categorization task, priming effects, which are assumed to result from an automatic spreading activation with an SOA of 200 ms, support the hypothesis that two associative networks do exist. Indeed, significant priming effects are only obtained in word presentation when the association is verbal and in picture presentation when the association is visual. No priming effects were found for the two inconsistent conditions. These results are compatible with the hypothesis that two functionally independent verbal and visual associative networks exist in long term memory.

M. Olivetti Belardinelli & P. Rizzo, Universita di Roma "La Sapienza", Italy.
A connectionist model for physics problem solving: comparison with human performances.

Recent researches showed the pssibility of realizing hybrid Intelligent Tutoring Systems, namely composed by traditional symbolic modules and connectionist ones.

In a previous research (Olivetti Belardinelli, Rizzo, Battiti & Serra, 1991) we implemented a multilayer neural network with backpropagation for modeling the problem solving process in physics. The network showed good capacities for learning and generalizing the "data-driven" and "goal-driven" strategies used by experts and novices respectively.

The present research is concerned with the comparison between the network performances and those of human subjects confronted with the same kind of problems.

The comparison between simulation processes and psychic ones is performed in order to improve the connectionist model for the final construction of an Intelligent Tutoring System for physics teaching.

M. Perea & S. Algarabel, Universidad de Valencia, Spain.
Effects of neighbourhood in masked repetition priming at short SOAs.

Three lexical decision experiments were conducted to examine the effects of neighborhood (density and frequency) in masked repetition priming at short SOAs (33, 50, and 66 ms), and to check whether the unrelated priming condition is a suitable baseline.

There were three prime conditions: identical prime-target, unrelated prime-target, and unprimed target (i.e., a blank prime). This latter condition was used according to Humphreys et al. (1988), who pointed out that using the unrelated condition as a baseline can overestimate the repetition effect. However, in lexical decision tasks, neither Seguí & Grainger (1990) nor Sereno (1991), using a row of x's and a row of asterisks as neutral primes, respectively, found such a overestimation relative to an unrelated condition.

The results indicated that at 33 and 50 ms SOA there was only a small, nonsignificant, repetition effect relative to the unprimed condition (about 7 ms). Furthermore, latencies to unprimed targets were lower than unrelated ones. These effects were independent of neighborhood.

At 66 ms SOA, the repetition effect relative to the unprimed condition was significant and also independent of neighborhood, but its size was small (about 24 ms). In this case, only latencies to unprimed targets in high-density neighborhoods with no higher frequency neighbors were statistically lower than latencies to unrelated targets.

Consequently, in lexical decision tasks, using the unrelated condition as a baseline seems to overestimate masked priming effects at short SOAs. On the other hand, significant effects of neighborhood density and neighborhood frequency were observed. Implications for models of word recognition are analyzed.

F. Peressotti, R. Rumiati, R. Nicoletti & R. Job, Universita di Padova, Italy.
Visual analysis in word recognition.

Recently, Caramazza & Hillis (1990) have proposed a three level representation model for word recognition. As for object recognition in Marr's model, linguistic stimuli would be identified through processing and computation at three different stages. First, a retinotopic feature-map is constructed starting from the light intensities and relevant discontinuities of the image. At a second stage, spatial relationships between features are computed, resulting in an object-centered representation of the letter shapes. At a third stage, abstract letter identities are recovered and a graphemic word-centered map can be constructed. This third representation would be the input for lexical access.

In this research, we try to test this model by studying the selective effects of different variables on visual word processing. Subjects were presented with strings of letters that were either high and low-frequency words, legal, and illegal non-words. The strings were 5 or 7 letters long. Two conditions were created by manipulating the space between the letters of the same string yelding high letter density string and low letter density string. Two experiments were run. In the first one subjects had to detect a bold segment present in one of the letters of the string; in the second one, they had to detect the presence of a uplifted letter in the string. Lexical category, length, and letter density were supposed to differently affect these different tasks. The results are discussed with reference to the previously described model.

P. Peruch & E.A. Lapin, Université d'Aix-Marseille, France.
Memory of routes in different spatial frames of reference.

Orienting oneself in space requires establishing a correspondence between various spatial frames of reference (SFR) in which the same information about the environment can be encoded in different ways and formats. During this encoding process, one key point is the alignment of the SFRs, which may require additional operations such as a mental or real rotation.

Two experiments were conducted in order to investigate the process of spatial orientation under misaligned conditions. Subjects were presented either animated sequences of decision points perceived along a route (experiment 1) or verbal route instructions (experiment 2) to which they had to attribute a path on a map. The subjects could be given the starting point and had to find the ending point of a sequence (direct response condition), or vice versa (reverse response condition).

The results showed that when the orientations of the map and the route were different (misalignment) both total time and errors increased; the need to reverse the direction of the path (reverse response condition) also led to a decline in performance. In experiment 2, the map-rotation procedure was found to be pertinent for solving misaligned spatial problems. Two strategies were observed in each experiment: "computational" subjects translated the sequence of decision points into verbal instructions, while "visual" subjects built a mental image of the route they had followed. These results are discussed in terms of route/survey characteristics of the memory of routes.

E. Pessa, F.S. Marucci, V. De Pascalis & V. Cinanni, Universita di Roma "La Sapienza", Italy.
On simulations of mental image rotations through neural networks.

Summary:

When mental images are viewed as equivalent to configurations of activity of a suitable neural network, we can build neural models of mental image transformations. We build such models relative to mental image rotations, based on multi-layered networks with learning laws of self-organizing type. By using a global quantity which characterizes network's behaviour, the so-called "neural population vector", introduced by Georgopoulos et al., we have been able to evidence mental image rotations from data coming from computer simulations of network activity. A comparison has been made between these results and those obtained in experiments with human subjects, where visual input stimuli were the same used (in a digitalized version) in computer simulations. It emerged that only one model (generalizing Kohonen's one) can agree with experimental data and that the input pattern complexity (suitably quantified) is crucial in determining the amount of mental image rotation, both in human beings and in neural networks models. A discussion has been given on the possibility of simulating mental image transformations through models of the latter type.

S. Poitrenaud, C.A. Tijus & J. Barcenilla, Université de Paris 8, France.
A theory of skills based on semantic networks.

The current theory of skills is based on production systems (Anderson, 1983, 1982). This formulates the differences between the knowledge of facts (i.e. declarative knowledge) represented as a set of propositions organized as a semantic network and the knowledge of how to perform tasks (i.e. procedural knowledge) represented as production systems.

We report an unified model of "How to do it" and "How it works" for describing the subject's conceptual understanding about objects. The notation consists of a hierarchical classification of object types with procedures for acting on objects attached at different levels in Semantic of Action Networks.

Two experiments examined the relevance of representing and simulating the behavior of subjects within Semantic Of Action Networks (S.O.A.N.s). Starting with data of achieved tasks done by subjects that where using (exp.1) or learning (exp.2) elementary devices functions, individual S.O.A.N.s were constructed with the observed procedures that have been applied to the objects of the device, given that applied procedures, being justified by objects properties, might be similarily processed. Findings are prediction of errors and the modeling of Learning by accretion and by restructuring as proposed by Norman and Rumelhart.

V. Pouthas, F. Jarreaud & S. Vanneste, C.N.R.S., France.

Estimation of duration in the elderly: comparison with young adults.

Although subjective duration is known to decrease with age -- the older we get, the faster time seems to go by -- (Doob, 1971; Fraisse, 1967, 1984), there has been little empirical work on changes in estimation of duration over the course of aging. The two experiments presented below were designed to shed some light on this area.

1. Three groups of subjects (20-25, 65-69 and 70-80) were administered a response duration differentiation task (pressing on a key for a target time of 4 - 6 sec) with differential feedback (good, average or poor, as a function of the length of the press). When subjects had met the criterion of three consecutive correct responses, the target time was diminished without their knowledge to 1.6 - 2.4 sec.

2. Two groups of subjects (20-25 and 60-70) were asked to estimate the duration of 1, 2, or 3 stimuli out of the three stimuli displayed on the computer monitor. The durations were 6, 8, and 10 sec and partially overlapped. Estimation was obtained through motor reproduction.

Overall, the findings for both these experiments show that the elderly are as capable as young adults of regulating their actions in time accurately (Experiment 1) and making correct estimates of duration (Experiment 2). However, the elderly exhibit less flexibility when action duration parameters change (Experiment 1) and when the task requires them to estimate several durations simultaneously (Experiment 2).

Further research should help clarify to what extent these differences in performance are related to a specific impediment of the ability to process temporal information, and to what extent they are related to a more general cognitive decline which can be characterized by difficulties in changing strategies or by difficulties in processing of information from multiple sources rapidly.

E.D. Revill & J.B. Davidoff, University College London, U.K.

Does object familiarity affect colour and shape matching?

A series of experiments investigated whether object familiarity may influence colour and shape matching. It has been reported (Ménard-Buteau & Cavanagh, 1984) that interference occurs when subjects are required to name or match the colours of incongruently coloured objects in a variation of the Stroop Test. We replicated these studies using frame-grabbed drawings that could be made either incongruently coloured (eg, blue carrots) or neutral with respect to colour (eg, blue cups). Our replications (experiments 1 to 3) showed only limited interference in colour naming and same-different matching tasks. For colour naming, interference disappeared on second presentation; for colour matching, it consistently occurred only on 'different' trials. When a congruent condition (eg, red and green apples) was introduced (experiment 4), facilitation occurred, but again only on the 'different' trials. We interpret these asymmetric effects as due to post-recognition decision processes on 'different' trials. Hence, the asymmetry was affected by manipulating the difficulty of colour discrimination (experiment 5).
In a shape-matching task (experiment 6) with congruent (eg, red apple and red pepper) or incongruent colour (eg, blue apple and blue pepper), neither facilitation nor interference effects were found on 'same' or 'different' stimuli. So, again we find no evidence for 'top-down' effects in the extraction of sensory information.

F. Robin, Université Paris-Sud, Orsay, France.

Strategies for the description of spatial networks: a developmental approach.

The aim of this research was firstly to explore the development of cognitive processes in the description of spatial configurations by children. The second aim consisted in comparing descriptive strategies for either perceptual or mental representations. The materials were adapted from those used by Levelt (1982) to explore regularities in descriptive strategies. They consisted of networks in which coloured circles were connected to each other by horizontal and vertical lines.

Subjects aged 6 to 10 participated in this experiment. Each was first involved in a perceptual condition, where they had to describe visually presented networks, and then in an imaginal condition. In the imaginal condition, a given trial consisted for the subjects firstly to memorize a network without time limitation. When subjects stated they had formed a clear visual image the network was withdrawn. They were then asked to describe the network. In both perceptual and imaginal conditions, subjects had only one constraint : to start their description from a specific circle which was mentioned just before they started their description. From this circle, two branches went in opposite directions and subjects had to make a choice of which branch would be described first.

The findings attest for an age-linked progression in cognitive capacities to use consistent descriptive strategies. Analysis shows that the regularities evidenced in the perceptual condition develop in a similar way when children are asked to describe images of spatial configurations.

C. Saiz & F.C. Gonzalez, Universidad de Salamanca, Spain.

Attention, mental models and comprehension of social information.

Comprehension of personal information depends on the construction of mental models that represent relevant information, such as traits in the case of person descriptions. The mechanisms through which trait information is incorporated into mental models were studied in one experiment. Subjects read person descriptions and performed an on-line trait recognition task while engaged in a concurrent auditory word detection task. The extent to which that secondary task affected the incorporation of traits to the mental model was evaluated. Results are discussed in terms of automaticity and memory operations involved in social information processing.

P. Salame, P. Tassi, G. Dewasmes, J. Ehrhart & J.P. Libert, C.N.R.S / L.P.P.E. Strasbourg, France.
Sleep inertia and cognitive performance.

This study aimed at assessing and evaluating the existence and the duration of a state of sleep inertia on consecutive performance, following one hour of sleep located at 01:00H or at 04:00H. Spatial Memory and Logical Reasoning tasks were studied. Two separate groups of 12 subjects were tested, and each group performed each task in two conditions: a) Experimental: the subjects slept one hour before being tested, and b.) Reference: the subjects remained awakened before the time of testing. Each testing session lasted 30 min and speed and accuracy of responses were recorded. In each task, the data were analyzed in blocks of 3 min as a within factor.
On errors, no noticeable effects were found. On Correct Response Time, the resluts showed: 1) significant impairments following sleep as compared with the non-sleep condition, hence reflecting a state of sleep inertia, 2) sleep inertia effects would last 6 to 18 min after awakening, and 3) both tasks used would be sensitive to sleep inertia effects.

S. Samuelsson & J. Rönnberg, Linköping University, Sweden.
The role of implicit and explicit script processing in lipreading.

The interaction between organizational dimensions within scripts and different contextual conditions were specified in a lipreading model of predictive sentence comprehension. The model generates three main predictions. First, the degree of contextual specification sets the level of expectancy. Given a low degree of contextual specification, expected typical and basic level information should be available for scripted inferences. Second, typical and basic level representations are assumed to dominate automatic (implicit) scriptual activation, whereas conscious (explicit) activation is mediated by temporal constraints. Third, the model postulates a predictive script mechanism. In each of four experiments, subjects lipread 48 sentences from three scripts. Different levels of abstraction (basic vs. low-level), typicality (typical vs. atypical), and temporal order (early vs. late) were always embedded in each sentence. To assess a base-line, Experiment 1 measured "pure" lipreading in the absence of scripted context. In Experiment 2, the script header was present. Experiment 3 correctly or falsely cued the script activation along each organizational dimension. In Experiment 4, the subjects received correct or false script-scene information, either before or after sentence presentation. The results confirmed the predictions in that (a) there were no dimensional effects when the script heading was absent, (b) typicality and abstraction constituted the main organizers within scripts, and typical, basic level information occurring late was always implicitly activated, (c) the temporal structure at atypical, low levels of abstraction was the only dimension that was explicitly activated (i.e., sensitive to false cuing), and (d) pre-exposed correct script-scene information enhanced lipreading relative to the other conditions. It was concluded that the predictive script model of lipreading received strong support, and that, a "weak" hierarchical view of scripts is compatible with implicit processing, whereas a "strong" temporal view is compatible with explicit script processing.

P.Ch. Shih & M. Belinchon, Universidad Autonoma de Madrid, Spain.
Pauses as indicators of failures in grammatical encoding.

This paper presents the results and conclusions of a comparative study of pause patterns in the speech of a group of schizophrenic patients and a normal control group in a descriptive and a narrative task. The differential effect of the change of task on the planning of clauses in both groups, and the greater time required by schizophrenics to codify clauses with lower syntactic dependence confirmed deviations in so-called "processes of functional level" in these patients, as well as the usefulness of temporal measures in psycholinguistic research of both normal as well as abnormal grammatical encoding.

J.C. Sontag & D. Dubois, INETOP, Université Paris V & CNRS/EPHE, France.
Taxonomies and schemas: developmental changes and differential analysis of categories.

The purpose of our research was to investigate knowledge organization from a differential and genetic point of view. The argument deals with the hypothesis that two types of knowledge structures co-occur at least along the ontogenesis : the first one refering to the "classical view" on concepts and categories can be considered as the inheritance of Piaget's tradition whereas the second one stresses on ecological rather than intellectual factors in development (Rosch,1983; Nelson, among others).

The variability of the data already reported in the litterature, associated to the limited range experimental procedures used, led us to conduct a free sorting experiment on subjects (n=60), ranging from 6 to 12 years old (plus a group of 10 adults).The 40 pictures of the selected material could be classified either along a taxonomic criteria (such as shoes, furniture, persons ..) or along schemas (seaside, school, restaurant ...). Two successive sorting were asked by the same set of subjects. Two data analysis were processes , classical analysis of variance and tree representation of similarities within and across subjects' classifications.

The results showed the dominance of the schematic organization within all groups. If an evolution from a highly schematic to a more taxonomic organisation can be observed with children, the adults massively sort according to schemas. The ability to shift in the mode of classification from the first sorting to the second one (vicariance of the processes) increased with age without a strong effect on the pattern of the results. A semantic analysis among categories showed that basic level categories refering to objects tend to lead to taxonomic structures whereas persons and social objects were preferentially structured along schemas.

A. Streri, R. Lecuyer & J. Ruel, Université René Descartes, Paris V, France.
Causal and non causal events as categories in infancy.

Michotte's experiments (1946) had shown that causality perception depends on highly automatized mechanisms in human adults. He concluded that causality perception is an innate gestalt. A series of studies by Leslie (1982,87) seem to show that 6-month-old infants differentiate causal and non-causal events. However, in these experiments infants were presented with the same stimuli and the same movements all along the habituation phase. So, these findings do not provide evidence that infants perceive the causality because they may have simply differenciated two types of movement.

The purpose of the present study was to confront two categories of events: a causal category and a non-causal one. Thirty-six 3-month-old infants participated in the experiment. Half were habituated with a causal event and the other half with a non causal event. In the causal situation, a ball strikes another one which immediatly moves. In the non-causal event, a delay is introduced between the impact and the departure of the second ball. For each category of event and in every trial, the color and size of the two balls were randomly determined. Half of the subjects were habituated with a left to right movement and the other half with a right to left one. After habituation with an infant control procedure, infants were presented with two test events (causal and non-causal) on six alternating trials. A trial began when the infant looked at the event and ended when he looked away. The results showed no difference between habituation durations in the two conditions. In the test phase, whatever the habituation condition, the infants looked longer at the causal than at the non-causal event. These findings provide evidence that three-month-old infants discriminate causal and non-causal events despite of variations in each category of events. Such results lead to the conclusion that infants perceive causal events like adults, and thus support Michotte's hypothesis.

I. Tapiero, Université de Paris 8, France.
Simulation and Text Recognition: Evidence for Levels of Representation.

The main purpose of this paper is to compare the performances of adults' subjects reading an expository text in a recognition task with the results of different simulations derived from the cognitive architecture proposed by Kintsch (1988, 1990) through his construction-integration model. If we assume that while reading a text, different levels of representation of this text are "constructed": surface structure, syntactic structure, local semantic structure (microstructure), global semantic structure (macrostructure) and situational model, we can construct different types of recognition statements referring, in a direct or undirect way, to these different levels: verbatim, surface syntactic variation, close semantic variation (paraphrase), inference, distant distractor dealing with the same situational model, and distant distractor dealing with an other situational model.

I. Tapiero, Université de Paris 8, France.
Simulation and Text Recognition: Evidence for Levels of Representation (cont'd).

Two main hypotheses are tested. The first one contrasts the classic recognition models, in which the sentence to be recognized is compared with the corresponding sentence of the text (see Lecocq & Tiberghien, 1981) with the more recent models, which postulate a comparison of the sentence to be recognized with the resulting trace of the processing of the whole text (Murdock, 1982 ; Hintzman, 1988 ; Gillund & Shiffrin, 1984). The second hypothesis postulates that the memory traces strength of the different representation levels regularly decreases from the surface structure to the situational model. In the simulations carried out, these differences are represented by weights differences: the more the memory traces strength is high and the more the weight is important.

The results obtained to the simulations correctly fit the hierarchy of the experimental data. Considered with those obtained in the recall task (see Tapiero & Denhière, 1992), these results lead us to develop this type of model influenced by the connectionnist principles.

I. Tapiero, G. Denhiere, Université de Paris 8, France.
Simulation of narratives recall: Evidence for micro- and macroprocessing.

The main purpose of this paper is to compare different types of simulations with the performances of young children in a narratives' recall task. The simulations carried out are issued from the construction-integration model proposed by Kintsch (1988, 1990), which, in contrast with the other models of comprehension, is strictly bottom-up and reject the use of pre-stored schemata and "smart" rules controlling the process of comprehension. According to this model, reading a text leads, in addition to the activation of "correct" representations to the activation of non relevant, redundant, and even contradictory information, which will be, during a second phase, desactivated by a relaxation connectionnist process.

A first set of simulations has consisted in testing different hypotheses about the construction of the microstructure. A first dichotomy contrasts the processing sentence by sentence with the processing of the whole text ; then, for the processing sentence by sentence, we tested the effects of different buffer memory sizes ; we also try different weights in the connections between propositions. Finally, we contrasted coreferential (Kintsch, 1974) with causal (Trabasso, 1991 ; Fletcher & Bloom, 1988) local semantic coherence. In addition to the original model (Kintsch, 1988), we added for each one of these simulations, the simulation of the relevant macrostructure (Baudet & Denhière, 1991 ; van Dijk & Kintsch, 1983)

The correlations between the simulations and the recall vary from .04 to .60 according to the types of postulated microstructure and from .14 to .67 when the corresponding macrostructure is added. These results lead us to develop this type of model in introducing in priority prior knowledge of the learners.

V.L. Tatko, Independent Union for Brain and Behavior Research, Russia.
The linguistic approach to preferable tactics choice analysis

The linguistic principles of information decoding were applied for precise description of the human behavior under the information environment uncertainty. The reaction time (RT) paradigm in the letters recognition task was used. In addition to the traditional measure of the 1-st decision RT, the latencies of the doubts arising just after it was registered too. The analysis program was carried out on the IBM PC base.

The upper limit of possible RT single probes combination was restricted by 4: high RT for the 1-st solution and high RT for the 2-nd (A), high-low (B), low-high (C) and low-low (D) latency of answers. The A − D defined as elementary units of behavioral information and were named words. The 2-nd order combinations which were named sentences consisted from words AB, AC, AD and so on.

The principal issues of the study was if there exist the steadiness successions at any level of RT combinations. The next question − what is the upper limit of the circles for analysis.

The steadiness successions were founded for all subjects. The features of them are looking like the highest degree individual person characteristic. The principal component analysis separated roughly 4 groups of subjects. For the fast ones, units A appeared with probability P = 0.5-0.6, as well as B and D with P = 0.1-0.2, C with P less than 0.1. The P of sentences AA are 0.30.-0.45, the probability of every other two words combinations varied under 0.1. For the next order combinations P(AAA)=0.22- 0.36, the remained 3-words combination appeared with P=0.01 with except of 5 − 8 pairs, which consisted the individual behavioral pattern specificity of subject. Both the 3-words combinations included B or D at the beginning and the 4-words combinations were not observed at the group of fast subjects.

The upper limit for RT data analysis was 3 at data presented. For other types of the signal it is clear the existence of the limit value dependency from the number of well defined elementary units in according to described method, for example 3-4 for electrooculogram, 5-7 for electrocardiogram e.t.c.

J. Thomas & M. Martin, Universität Mainz, Germany.
The Articulatory Loop in word detection.

Information processing theories of reading are equivocal in judging the importance of phonological information in word detection tasks. According to the dual route model there are two ways of accessing the mental lexicon. One leads from the visual encoding of the word directly to its meaning. On a second path, the visual encoding is followed by the assembly of a phonological representation according to language specific grapheme-to-phoneme translation rules. The phonological representation then is the basis for accessing the mental lexicon. However, the phonological route is efficient only for languages with consistent transformation rules. This is probably why studies using English speaking subjects find the phonological route to be of lesser importance compared to the direct access route.

J. Thomas & M. Martin, Universität Mainz, Germany.
The Articulatory Loop in word detection. (cont'd)

However, if languages like the Serbocroatian are used grapheme-to-phoneme correspondences are more simple. As might have been expected, in these cases the phonological detour can be very fast. In addition, it might be assumed that when using simple grapheme-to-phoneme translation rules the phonological route is also more important in word detection tasks than is usually found with native English speakers.

According to Baddeley's working memory model one function of the articulatory loop is to translate visually encoded information into phonological representations. As a consequence, we assumed that obstructing our subjects' articulatory loop while they were working on a reading task should lead to respective results, i.e., longer reaction times in trials that primed the use of the phonological route. In our study, 32 subjects participated in a lexical decision experiment. The task had to be solved with or without obstruction of the articulatory loop. We were mainly interested in differential effects of word frequency and word length.

The results are discussed in the framework of the dual route model. We will focus on the question in how far recent interpretations assuming an influence of unspecific resources must be reinterpreted in the light of Baddeley's working memory model.

M.-F. Valax, Université Toulouse-le Mirail, France.
Time orientation in planning: role of temporal and nontemporal information.

One of the functions of plans is action driving. However the indetermination of the future prevent constructing complete plans directly feasible, and then an automatic action driving. The schematic nature of plan allowing to adjust it to a set of possible future situations, suppose to control plan validity during its execution.

To perform that, subject must be able to match the plan progress and the evolution of actions and events. So, it must be able to know its place in time, "...to identify the present time... (and)... to know where that time falls relative to other time markers and important events..."(Friedman, 1990).

The existing works that dealing with time orientation have studied reaction time from questions like "What day is today ?", "What day was yesterday ?" "What day will be to morrow ?". These questions were telling over the day of the week. The observed variations were explained by the authors (Koriat & Fischhoff, 1974; Shanon, 1979) as a construction of a time representation based on time markers, here the weekend, and on non temporal informations. This representation changes over time.

Our study extends the works above mentioned. Its purpose is to define :

— the nature of landmarks used in time orientation : apart from the cultural landmarks, as weekend, it seems that exist social and personal landmarks;

— the part of temporal and non temporal informations used in the construction of the answer.

In this view, we will use the experimental paradigm of Shanon (1979) but on mensual cycle. Concerning the data, we shall collect reaction time plus consecutive verbalizations about the way in which subject constructs its answer.

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Conditional reasoning: Scenario or context effects?

This paper study the importance of contextual factors in
reasoning with conditional inference tasks.

In this experiment subjects were given conditional
sentences in the context of narrative text. Short stories
about scenarios of the daily life were described in this
texts.

The experiment manipulated: a) context (causal or
promises/threats), b) degree of factual relation between
antecedent and consequent of conditional (deterministic,
probabilistic or without relation, c) congruence between the
factual consequence explicit in the story and the logic
conclusion and d) conditional rules.

The results were related to previous investigations about
syllogistic inference (Valiña y de Vega, 1988) and were
discussed within the framework of theoretical models about
pragmatic reasoning.

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The role of content and context in pragmatic reasoning.

The purpose of this paper is to study pragmatic
reasoning in conditional inference tasks. Two experiments were
performed, in which the subjects ought to choose among
alternative responses, rating their confidence in their choice.

The linguistic form of sentences ("if...then" or
"whenever...") and the negativity of antecedent vs consequent was
manipulated in the first experiment, with formal content. The
second experiment with thematic content, manipulated the context
or scenario of problem (causal, temporal or promises/threats) and
the probability of factual relation between antecedent and
consequent of conditional (deterministics, probabilistics and
without relation).

The results were discussed within the framework of the
theoretical approaches for human reasoning based upon mental
scenarios.

G. de Vooght, A. Vandierendonck, University of Ghent, Belgium.

Narrative induced expectations and time estimation.

The overwhelming majority of time perception studies has focused on
experiments which make use of nontemporal events (e.g. word lists, light
flashes, ...). In order to account for the findings of these experiments sev-
eral theories have been proposed. None of these accounts can incorporate
all evidence. Moreover, in trying to achieve explanatory completeness,
theoretical concepts tend to become less precise. A new framework for
time perception studies was presented by Jones and Boltz (1989). It is
based on the idea that events are temporal by definition and that their
structure in time is critical in determining how one attends to the event
itself. This proposal claims that people attend differently to events with
high and low structural coherence and predictability, and that this in
turn, differentially affects time estimates. They showed that time es-
timates under conditions of high temporal coherence (subjects had to
estimate the duration of tunes) are determined by the confirmation or
violation of expected endings. The present study explores their hypoth-
esis in the domain of story grammar. The results of an experiment in
which subjects estimated the duration of narratives are presented along
with their theoretical implications.

S.M. Watt & W.S. Murray, University of Dundee, U.K.

Constituent based parsing in the auditory modality.

The studies reported in this paper examine the processing of English sentences
containing Complement verbs in the auditory modality. The results show interesting
differences from those found with these sentences in the visual modality. Eyemovement
studies have generally found increased processing difficulty in the structurally more
complex 'Reduced Complement' and 'That Complement' versions of these sentences
than in the simpler 'Direct Object' form. Additionally, it has been concluded that the
parser operates by pursuing a single preferred analysis, since there is no apparent load
incurred in the locally ambiguous regions of the Reduced Complement and Direct Object
structures. In previous papers, however, we (Murray and Kennedy, 1987; Watt and
Murray, 1992) have shown that when using the mispronunciation detection task as an
on-line measure of auditory sentence processing difficulty, the pattern of effects near the
end of the sentence is very different. In auditory processing, Direct Object structures
are found to be more difficult to process than the two Complement types. We have
argued that this is a result of the continuing ambiguity in the Direct Object structures at
a point where the Complement structures have become unambiguous and the result
suggests that auditory parsing involves the computation of structural options in parallel.
This suggestion is in line with result found by Hakes (1971) using the phoneme
monitoring task on the second word into the ambiguous noun phrase of these itmes.
The experiments reported in this paper, however, fail to replicate these findings, and in
fact show an opposing pattern of results. Using mispronunciation detection, processing
load is found to be heavier on the second word into the unambiguous noun phrase of the
That Complement structures than it is at the same point in the equivalent locally
ambiguous structures. Furthermore, this load disappears by the third word of the noun
phrase, even when its structural role is equivalent. These findings lead us to suggest
that although, in the auditory modality, local ambiguity results in the computation of
parallel structural options, there are additional loads attributable to constituent building
and attachment at critical points in the parsing process.

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Cognitive expectancies and hemispheric lateralization for neural motor control as indexed by brain potentials.

Motor and cognitive processes are strictly bound: voluntary motor acts are programmed, executed, and controlled on the bases of continuously maintained and updated models of the internal and external world. From a neurocognitive standpoint, these voluntary acts are represented in a central motor behavioural system. One of the most thoroughly studied feature of this system is the lateral asymmetry of the contralateral rolandic cortex for the control of the distal musculature. Electrophysiologically, for instance, it is now generally agreed that the small negative shift preceding spontaneous limb movements, the readiness potential (RP), is contralaterally asymmetrical for the central scalp, depending on which hand is making the response. In order to investigate the lateralization of motor response programming and execution as a function of sequential subjective expectancies, and to disentangle the motor preparation processes from the execution processes, an electrophysiological study was carried out. Two go/no-go tasks were used in which a motor response with the right or left hand had to be given to rare targets interspersed within mainly frequent stimuli. Pre- and post-stimulus brain potentials related to both the rare targets and the frequent stimuli immediately preceding and following the latter were recorded from the central scalp, together with the reaction times. The results suggest that (1) the lateralization of neural preparation and control of motor response is under strict cognitive control, (2) cognitive expectancies and motor intentional execution of movement affect the lateralization of motor cortex activity in a way relatively independent of each other, and (3) cognitive expectancies mainly affect the lateralization of preparation for motor activity.

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Specific and not specific aspects of interference in olfactory verbal and visual tasks.

The aim of the present work is to investigate the effects of both inter and intra modal interference on visual verbal and olfactory tasks. Despite there are several studies on this topic in the visual and verbal domains few researches were carried out on the olfactory system. Preliminary data seems to support the hypothesis that the olfactory channel is not affected significantly by interference as well as visual and verbal systems. This is discussed on considering odours as stimuli whose internal representation is not aware and whose access to the information system is automatic.