

Linguistic Influences in Categorization

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There is an abundance of experimental evidence for how language affects similarity and categorization. But no account has been forthcoming as to how these results potentially affect formal models of categorization, that are typically insensitive to language information. In this paper we explore this issue via simple categorization tasks under different linguistic manipulation conditions. More specifically, we found that participants' expectations about category structure is indeed affected by the linguistic label given to the category exemplars presented, and that such effects appear to be beyond the scope of current formal models of categorization.

Are Phonological Priming Effects Fragile? The Interaction of Phonological and Orthographic Forms in Masked Priming

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Most demonstrations of prelexical coding of phonology involve the backward masking paradigm. In contrast, forward masking is considered to be sensitive to orthographic form rather than to phonological structure. Using forward masked priming, we examined how phonological and orthographic similarity interact in the recognition of target Hebrew words or nonwords. The deep Hebrew orthography allows simple manipulations in which the orthographic structure is kept constant while phonological dissimilarity gradually increases, and vice-versa. We measured the impact of phonological and orthographic similarity in various contrast/luminance conditions. Our results showed an identical linear effect of letter or phoneme alterations. Thus, we obtained clear evidence for both orthographic and phonological priming. Moreover, the effects for words and nonwords were identical. These results demonstrate that even subtle phonological manipulation affects masked priming, and that this effect reflects prelexical coding rather than post-lexical search.

Examining the Contact Account of Own-Race Bias in Face Processing Using a Flicker Paradigm: Support for the Development of Differential Perceptual Skills

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Using Asian and Caucasian face images presented within a flicker paradigm (Rensink, O'Regan and Clark, 1997), a statistically significant own-race bias in face-change detection rates is demon-

strated for both Asian ($N = 32$) and Caucasian ($N = 32$) participants. The adoption of the flicker paradigm allows the role of low-level perceptual skills to be disambiguated from higher-level, semantic-driven processes as change detection represents a perceptual discrimination task employing sub-optimal (i.e., very brief) stimulus presentation. The observed own-race bias in change detection rates can thus be attributed to the development of differential (i.e., race specific) low-level perceptual skills and is consistent with the contact account of own-race bias in face processing (in which differential contact with own- and other-race face exemplars generates the development of differential perceptual skills—Valentine and Endo, 1992).

The Representation and Processing of Integers

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Subjects were presented with pairs of numbers for magnitude comparison. The set of numbers contained both positive and negative integers. Performance in three tasks were evaluated: (a) numerical comparisons of numbers differing only in their numerical size, (b) numerical comparisons of the absolute magnitude of numbers differing only in their numerical size, and (c) physical comparisons of numbers differing in physical and numerical size. The results obtained were consistent with the assumption that integers are represented in terms of two dimensions, magnitude and polarity, and only the processing of magnitude is automatic.

Individual Differences in Strategies to Deal with Working Memory Tasks

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In spite of Saul Sternberg's conviction, STM scanning is not always serial and exhaustive. Whether it is serial or parallel, and exhaustive or self-terminating, depends on task's conditions and individual preferences. In a series of five experiments it has been found that slow presentation of stimuli (1000 ms. per item) usually produces serial and exhaustive effects, as first observed by Sternberg. However, quick presentation of stimuli (300 ms. per item) often makes scanning processes more parallel and self-terminating. Moderate speed of presentation (750 ms. per item) is the one which allows individual preferences and strategies to appear. Some people behave in the way which suggests parallel and self-terminating scanning, others stick to serial and exhaustive strategy of search. These differences partly depend on individual storage capacity of one's WM. People with capacious WM are more often inclined to adopt serial strategy, whereas those with less capacious WM prefer parallel search.

Focusing in Complex Sentences

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According to centring theory (Grosz et al, 1995), the utterance subject is the highest ranked entity and hence the most accessible to a subsequent pronoun. However, “utterance” (the focusing unit) is not defined. If the unit is the sentence, then ranking is difficult to determine in complex sentences in which each clause has a separate subject (Kameyama, 1998; Suri & McCoy, 1994). Alternatively, the unit may be the clause, with the ranking in the final clause determining accessibility for a subsequent pronoun.

Two self-paced reading-time experiments investigated this issue, using complex sentences containing that-complements. Target sentences contained a subject pronoun referring either to the main clause subject of the preceding (complex) sentence or to the complement clause subject. Reading times were faster when the pronoun referred to the main clause subject, suggesting that the complement clause is embedded and does not update the focus. We conclude that the focusing unit is the sentence.

Modelling Language Processing Asymmetries in the Cerebral Hemispheres

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Speculations concerning language processing in the cerebral hemispheres have recently benefited from connectionist models that instantiate the separate processors of the two hemispheres (e.g., Reggia et al., 1998). We present a connectionist model of lexical decision that implements the anatomy of the visual pathways such that the right visual field (RVF) projects initially to the left hemisphere (LH), and the LVF to the RH (Shillcock, Ellison & Monaghan, 2000). Lavidor and Ellis (submitted) reported that orthographic neighbourhood size influences lexical decision when words are presented to the RH but not to the LH. After training on a realistic corpus of words, the model closely reflects the asymmetric neighbourhood effect. We discuss the implications of this asymmetry as an emergent effect of the anatomical structure of the model interacting with the characteristics of the lexicon.

Verbalisation may Interfere With or Facilitate Multiple Face Recognition

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A substantial line of research shows that participants describing a previously seen face (compared to those providing no description) are less accurate in later identifying that face from a line-up of faces (e.g., Schooler & Engstler-Schooler, 1990). However, two experiments reported here reveal both interference and facilitative effects of verbalisation upon the speed and accuracy with which multiple to-be-remembered unfamiliar faces are later recognised. Compared with providing no description, describing a single face following the presentation of multiple non-verbalised faces elicited longer response latencies for later recognition of those faces (Experiment 1). In contrast, describing each face presented at study benefited later recognition accuracy (Experiment 2).

Although verbalising a single face after presentation of multiple faces may ‘overshadow’ the application of perceptual processes suited to face recognition, verbalising each individual face after presentation provides protection from verbal overshadowing.

Number Processing Modulates the Speed and Accuracy of Spatial Behaviour

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Parity judgments for small numbers (1, 2) are faster with the left hand, while parity judgments for larger numbers (8, 9) are faster with the right hand. This response speed effect suggests a Spatial Numerical Association of Response Codes (SNARC effect; Dehaene et al. [1993], *JEP-General*, 122, 371–396). Bisecting long digit strings with a pencil showed a similar effect in spatial accuracy (Fischer, under review). The present study measured the combined spatial and temporal performance of pointing responses on a touch screen. Participants pointed to lateralised target areas in response to centrally presented digits. Both reaction times and movement times showed the SNARC effect while movement amplitudes were not affected. A control experiment (consonant/vowel discrimination) did not show the SNARC effect. These results support the notion of automatic access to a spatially oriented mental number line.

Repetition Priming in Implicit Memory Tasks: Prior Study Causes Enhanced Discriminability, Not Only Bias

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Ratcliff and McKoon (1996, 1997) argued that repetition priming effects in implicit memory tasks are solely due to bias. They showed that prior study of the target stimulus resulted in a benefit for that stimulus in a later implicit memory task. However, study of a stimulus similar to the target resulted in a cost. These bias effects were obtained in a several tasks, including visual word identification, auditory word identification and picture identification. In the present study, using a forced-choice procedure, we investigated the effect of prior study in an unbiased condition: Both alternatives were studied prior to their presentation in an implicit memory task. Contrary to a pure bias account of priming, we obtained evidence in three implicit memory tasks that performance was better when both alternatives were studied than when neither alternative was studied. These results show that prior study results in enhanced discriminability, not only bias.

Gender and Number Agreement in Sentence Comprehension and Production in Spanish

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Two experiments examined the processing of subject-verb agreement in sentence comprehension and production in Spanish. In experiment 1 eye movements were recorded while participants read sentences which contained a complex noun phrase, composed of two NPs, followed by a copular verb and a predicate (e.g., The name of the child was German. . .). The verb and the adjective always agreed with the first NP. The gender and/or the number of the second NP could match or mismatch that of the first NP. In experiment 2, subjects were presented the same preambles (e.g., the name of the child) and they were asked to continue them by using a limited number of verbal forms. The results showed that a mismatch of gender and/or number of the second NP increased the reading time of the verb and following regions, as well as the number of errors in the production experiment. The effects of gender and number mismatch did not interact. The results suggest that readers compute immediately and separately number and gender agreement relations.

The Articulatory Origin of the Masked Onset Priming Effect

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Words preceded by a briefly presented and backward-masked prime are named faster when the word shares just the onset with the prime (e.g., save-SINK). This masked onset priming effect has been taken by the proponents of the dual-route framework as providing support for the serial nature of the nonlexical route for generating pronunciation (Forster & Davis, 1991; Coltheart, Woollams, Kinoshita & Perry, 1999), however, an alternative, articulatory account of the effect has also been suggested. In the current study, we examined two observations that are problematic for the articulatory account, namely, the absence of the masked onset priming effect in the conditional (go-nogo) naming task, and its absence for irregular words (e.g., PINT). We suggest that when combined with the assumption that subjects do not always initiate articulation at the earliest opportunity, these findings may be explained within the articulatory account.

Associative and Semantic Priming in Face and Object Processing

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In a single-decision priming task, Barry, Johnston & Scanlan (1998) noted an asymmetry in patterns of associative and semantic priming for faces and objects. While both associative and semantic (category) priming was observed between objects (serving as primes and targets), only associative but no semantic priming was observed between faces. The authors proposed that these effects arise because of qualitative differences in the ways in which semantic representations of objects are organised, compared to semantic representations of people. We report an experiment that employed a “double-decision” priming task (see Brennen & Bruce, 1991) that produced a pattern of results where both associative and semantic priming was reliably observed both for objects and faces. The results are interpreted in terms of a model that proposes that semantic representations of both faces and objects are organised in similar ways. Reasons behind the differing findings of these two studies will also be discussed.

The Time Course of Semantic Priming in a Number Naming Task

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The issue of semantic and non-semantic conversion routes for numerals is still debated in numerical cognition. We report a series of number naming experiments in which the numerals were preceded by another numeral. The primes and targets could either be in an Arabic or in a verbal (alphabetical) notation. The time course of priming was analysed by a systematically varied stimulus onset asynchrony (SOA) of prime and target. Results reveal a semantically related distance effect: Latencies were fastest when the prime had the same value as the target and increased when the distance between prime and target increased. We argue that the present results are congruent with the idea that the numerals make access to an ordered semantic number line common to all modalities.

The results will be discussed in the light of number processing models including a semantic and a non-semantic pathway for each modality.

Sex Differences in Spatial Cognition: A Critical Test of the “Hunter-Gatherer” Theory

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The present study tested two predictions of the “hunter-gatherer” theory of sex differences in spatial cognition. According to this theory, men and women have faced different evolutionary pressures on their spatial capacities (Ridley 1994). On average, males are hence expected to exhibit better navigational capacities than females (Martin 1998), while females can be assumed to exhibit better incidental object location memory capacities than males (Silverman & Eals 1992, Eals & Silverman 1994). Our study directly addressed this alleged pattern of sexual dimorphism in spatial abilities using (1) a spatial navigation task involving the exploration of a computer-based 3D virtual environment developed by Martin (1998); and (2) an exact replication of the object location memory task developed by Eals et al. (1994), involving pseudo-objects in order to reduce contamination by verbal encoding strategies. Results replicated the well-established male advantage in spatial navigation, while showing an unexpected female disadvantage in incidental object location memory. Further research is thus needed to explore the assumed female advantage in object location memory.

Brain Potentials Investigation of Semantic And Prosodic Processing During Spoken Language Comprehension.

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Few neurophysiological experiments have been aimed at understanding the role of prosodic cues in spoken language comprehension. Here, we used Event-Related brain Potentials (ERPs) to study the relationship between semantic and prosodic processing. Results showed that an N400 was associated with semantic mismatch (right centro-parietal scalp distribution) and that a P800 was elicited by prosodic mismatch (left parietal scalp distribution). These topographic differences may indicate that different underlying generators are responsible for the semantic and prosodic effects observed at the scalp. Moreover, we were able to demonstrate that semantic information is processed predominantly with respect to prosodic information even under different task demands. The temporal alignment and the magnitude of the ERP components suggest that semantic processing is allocated more processing resources and that, at least under the specific experimental conditions of our experiment, prosodic information is underspecified during sentence comprehension.

How Much Tyme Does Phonology Take? The Role of Sublexical Phonology in Visual Lexical Decision

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In two Dutch lexical decision experiments, we manipulated the encouragement to rely on phonological information by varying presence and instruction concerning pseudohomophones. In Experiment 1, participants had to reject pseudohomophones as distractors, in Experiment 2 they had to accept them. Rejecting a pseudohomophone took slightly longer than rejecting a normal nonword. However, the costs to accept pseudohomophones were ten times larger than to reject them. This asymmetry supports a primary role of orthography in lexical decision. In the experiments, we also presented words with inconsistent letter-to-sound mappings. There were no effects of phonological consistency in either lexical decision experiment, although Experiment 3 demonstrated that inconsistency had strong effects on naming latencies and errors. The results of this study failed to support a primary role of phonological assembly in lexical decision. Rather, they indicated that phonology becomes active automatically but late and has a marginal effect on lexical decisions.

When Context Hinders: Learning-Test Compatibilities in Face Recognition

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Various competing models exist in regard to the representation involved in face recognition. The holistic approach proposes that faces are represented holistically, and cite empirical evidence found in studies in which recognition of facial parts was superior from facial context (Tanaka & Farah, 1993, QJEP). Alternative approaches emphasize the special role of relational features in face processing (Leder & Bruce, 2000, QJEP). To test whether the context generally provides a superior condition for face recognition, we present two experiments in which complete faces as well as isolated facial parts are employed as conditions in test and (between subjects) in the

learning phase. When context was identical in all faces recognition rates were higher in the conditions that corresponded to the learning condition. Using real faces in experiment 2 likewise did not reveal an advantage of the “full face” conditions. The results are not in accordance with the holistic approach but point to the importance of learning-test compatibilities.

Context Effects on the Processing of Environmental Sounds

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Three experiments investigate the contribution of top down and bottom up processes on the processing of environmental sounds. Participants were required to quickly decide whether target sounds was produced by an animate or inanimate source. Repetition priming effect was observed in Exp. 1. Semantic priming effects were reported when linguistic labels of the sounds were presented (Exp. 2) but not when the sounds were played. These findings suggest that context effects on the processing of environmental sounds mostly occur at a presemantic level of processing. These data are discussed in light of Tulving and Schacter (1990) and comparisons with context effects reported in other domains (music and language) are drawn.

Attentional Capture and Spatial Pre-Cueing

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It has been amply demonstrated that the sudden appearance of a new object in the visual field captures involuntary visual attention. For example, if in a visual search task an already present (old) object transforms into a target, observers are less readily able to detect it than they are to detect a target that onsets as a new object. However, there is some uncertainty as to whether the attention captured by a new visual object should be thought of as space-based attention or as object-based attention. We addressed this issue in a series of experiments in which a new objects/old objects task was combined with various spatial cueing manipulations. We hypothesised that pre-cueing spatial attention to the target location should reduce or eliminate a space-based attentional advantage but should be independent of, or additive with, an object-based advantage. However, our results show that spatial pre-cueing actually magnifies the new object advantage. This finding will be discussed in relation to inhibition of return.

Processes in Written Word Production: A Spanish-English Comparison

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Most research on written word production has used off-line measures such as the analysis of errors, at least until very recently. The experiments reported here employed a new methodology using a computer, a graphic tablet and Spellwrite software (Cottrell, 1999), which allows us to record written times with great accuracy, for instance the time between the end of a letter and the beginning of the next one. Stimuli were presented using headphones. The present experiments were carried out both in English and Spanish and the roles of morphology and phonology (i.e., the syllable) were studied. Results showed a clear effect of syllabic transition in Spanish but not in English, and a morphological effect in English. We discuss the roles of levels of processing in written language production and of the differences between inflectional and derivational morphology, as well as the origin of the differences between English and Spanish.

Semantic Facilitation and Lexical Competition in Picture Naming

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Five experiments are reported for assessing lexical access in picture naming. Interference was found when semantically related word primes were presented, but no effect was obtained using picture primes (Experiment 1). In Experiments 2a, 2b and 3a, 3b, we introduced a new technique: Double-masked priming. The technique requires naming a picture target after presentation of two masked stimuli: A preprime stimulus and a picture prime. The results showed that the presentation of a semantically related preprime word slowed picture naming (Experiments 2a, 2b and 3a). The interference was not due to the single effect of the preprime or to the prime's lexical processing since related primes by itself (Experiment 1), and primes preceded by neutral (Experiment 2b) or unrelated word preprimes (Experiment 3b) did not produce the effect. This pattern of results suggests that lexical access in picture naming involve two types of processes. The first is excitatory and semantic in nature; the second involves competitive lexical selection.

Why Configural Information in Faces is Overestimated By 15–40 Percent

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Several previous studies have stressed the importance of configural information in face recognition. In this study the perception of configural information was investigated. Using the method of adjustment Experiment 1 revealed that the inter-eye distance is overestimated by 15 percent and the eye-mouth distance by 30 percent. In Experiment 2 this effect was replicated using a different set of stimuli, and the eye-mouth distance was now overestimated by 40 percent. In Experiment 3 several possible explanations were tested: Horizontal vertical illusion, Muller-Lyer illusion, Oppel-Kundt illusion, context effects, Pragnanz effect, and the role of surface information. Experiment 4 consisted of a replication in which a face and a line drawing was used in order to test for surface based face specific effects. The results of these four experiments suggest an important role of well-known perceptual illusions for the explanation of the large overestimation of configural information in faces.

Specific and Nonspecific Components of Inter-Trial Repetition Effects

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Memory for specific prior experiences appears to play an important role in determining both repetition priming (Jacoby & Brooks, 1984; Logan, 1988; Tenpenny, 1995) and negative priming (Neill, Valdes, Terry, & Gorfein, 1992). However, the link between episodic memory and repetition effects is more compelling under some experimental conditions than others. We report experiments from several empirical domains that converge on one possible explanation for such results. In particular, the interfering effect of a specific prior experience on performance is often obscured by nonspecific memory influences that produce the opposite effect on performance. The results are discussed with reference to putative activation and inhibition processes that contribute to repetition effects.

Spatial Attention Varies Between Global and Local Tasks

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The allocation of spatial attention in global and local tasks was measured with spatial probes (e.g., Cepeda, Cave, Bichot, & Kim, 1995). The primary stimulus, which was the same for both local and global conditions, comprised two columns (one red, one green) of 3 shapes. For half the participants, the target stimuli were red; for the other half, the target stimuli were green. The primary stimulus was embedded in a blue grid to equalise masking. Probes appeared after the primary stimulus on 50% of trials to measure attention at the location of each shape, and at the locations between them. In the local condition, probe responses were fast for target locations and the areas between targets and distractors, but slow for distractor locations. A distinctly different pattern was found in the global condition, suggesting that the allocation of spatial attention varies markedly between local and global tasks.

Long-Term Working Memory and Text Comprehension: Effect of Cue Sentence Reinsertion on Reading Times and Comprehension

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The goal of this study was to investigate the role of Long-term working memory during text comprehension (Ericsson & Kintsch, 1995). It was assumed that the comprehension process implies the building of retrieval structures consisting of encoded information associated with retrieval

semantic cues. We designed 2 experiments using an interruption procedure with cue sentence insertion and manipulated cue sentences characteristics. The reading times of the sentences presented after interruption and the number of correct answers to comprehension questions lead us to conclude that (a) reading interruption did not lead to comprehension impairment and (b) At the reading resumption retrieval cues are reinstated in Short Term Memory to access encoded information in episodic structure of the text in Long-Term Working Memory.

Beyond the Rime: Consistency in Monosyllabic and Polysyllabic Words

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Research on phonological consistency has traditionally focused on the rimes of monosyllabic words.

We developed a methodology for determining the degree of bidirectional (spelling-to-sound and sound-to-spelling) consistency that is applicable for monosyllabic and polysyllabic data alike. By taking not only the consistency mappings between rimes into account, but also those between other (overlapping) subsyllabic units, we can expand the range and increase the accuracy of the description of consistency considerably. This will be shown in comparisons with the traditional (monosyllabic) rime analyses.

We present computational analyses of the overall spelling-to-sound (in)consistency of English, Dutch and German and explore the psychological validity of these measures cross-linguistically in empirical studies.

Implications for current models of visual word recognition will be discussed.

The Use of Non-Featural Strategies in the Recognition of Inverted Faces

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Familiarity enhances the processing of inverted faces. In Experiment 1, participants performed a series of 2AFC trials where they were shown normal and grotesque ('Thatcherized') versions of the same faces. On each trial, the task was to detect the grotesque face. Orthogonal combinations of familiar and distinctive faces were presented in upright and inverted orientations. Responses to familiar faces were faster and more accurate than to unfamiliar faces; distinctiveness did not affect performance. This suggests the 2AFC comparison was aided by familiarity. In Experiment 2, participants performed a related task with a single stimulus face presented on each trial. Participants decided whether a normal or grotesque face had been presented. There were no significant effects when stimuli were upright. When inverted, however, grotesque faces were responded to more accurately if derived from familiar than unfamiliar faces. The results suggest familiarity allows the operation of non-featural strategies with inverted faces.

Chord Repetition versus Harmonic Priming Effects

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This study investigated the effect of harmonic priming and chord repetition in short and long context. According to several accounts, the processing of a target chord was supposed to be facilitated when preceded by an identical prime (chord repetition effect) rather than by a different but harmonically related chord (harmonic priming effects). The data did not support this prediction. Priming effects in music were shown to entirely depend upon the structural function of the target chord in the larger musical context. These data are discussed in light of current research on perceptual fluency, episodic memory, and music cognition. It is suggested that the structural relationship between events may be more influential for the processing of musical events than for the processing of meaningful events such as words, environmental sounds, or visual objects.

Target Frequency Modulates Spatial Cueing Effects

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In a spatial cueing procedure, facilitation is usually observed at short cue-target SOAs whereas IOR is observed at long SOAs. Those effects are generally explained by assuming that attention is first captured at the cued location and later inhibited to return to it. The underlying logic is that attentional capture and IOR both occurs before the target appears, being responses to the target just a mere way of measuring the effects that such attentional processes have on performance.

In the experiments we report, the frequency of the target was manipulated within participants, so that all trials were equivalent regarding the cue. Results showed that cueing effects depended on the frequency of the target, as they were more negative (IOR) for the trials with the most frequent target.

It is concluded that cueing effects depend on attentional set, as proposed by other authors. However, we argue that the attentional set must refer not only to the cue but to both cue and target.

Shape Recognition and Consciousness in Mind and Brain

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We have recently found that cells in the inferior temporal cortex (IT) of the macaque exhibit greater sensitivity to differences in nonaccidental shape properties (NAPs) than differences in

Metric Properties (MPs). NAPs are unaffected by changes in orientation in depth, such as whether a contour is straight or curved, whereas MPs, such as the aspect ratio of a part or its degree of curvature, vary continuously with such orientation changes. The pattern of correlation of the neural modulation with changes in orientation suggests a neural population code that enables both: a) object constancy—the classic phenomenon that the perception of an object’s shape does not change when it is rotating in depth despite dramatic changes in the retinal image projected by that object, and b) immediate recognition of novel objects at these new orientations. The locus in the ventral cortical pathway at which the representation shifts from an early spatial (metric) basis to one characterized by invariance to viewpoint appears, on the basis of priming and fMRI studies, to be coincident with the locus at which we first become aware of a stimulus.

How Face Recognition Becomes Special: Configural Recognition of Faces and Objects in Children and Adults

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We studied the development of configural processes in six experiments presenting both face stimuli and objects. Children were less efficient in judging only internal features (Experiment 1 and 2). However, this does not mean that their face recognition is only based on feature matching, as both age groups recognized fragmented faces better with divided face features than with face features kept intact (Experiment 3). Performance was better with inverted than upright presentation condition (Experiment 4 and 5), and even three- and four-year-olds showed that matching whole stimuli was performed better than whole-to-part matching (Experiment 6). Only adults showed that these latter two configural effects were larger for faces as compared with respectively objects (shoes) or non-objects (scrambled faces). We conclude that what develops with age is not configural processing itself but the interaction between manner of processing and stimulus class.

Categorical Perception of Facial Expressions: The Effect of Verbal Interference.

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Categorical perception of facial expressions has been documented in a number of paradigms including simultaneous perceptual matching (Young et al., 1997) and two-forced-choice alternative ABX discrimination tasks (Etcoff & Magee, 1992, Calder et al., 1996, de Gelder, Teunisse & Benson, 1997). In the ABX task stimuli, using morphed expressions, stimuli at the boundary between categories of expression are discriminated more easily than those at the centre of a category. We present evidence that this advantage persists in the neuropsychological case where a patient can no longer name or point to named examples of facial expressions (Roberson, Davidoff & Braisby, 1997), Nevertheless, the advantage disappears, for normal adults, when any kind of verbal interference is interposed between presentation of target and test items (Roberson & Davidoff, 2000). The extension of this finding to other paradigms will also be addressed.

First, Find a Face... Some Initial Experiments into the Initial Stage of Face Processing

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Cognitive models of face processing typically begin with the presentation of a face-centred image from which structure and identity can be extracted. The human face-processing system, however, must be able to first find a face within a complex scene in order to perform this processing. Face detection appears to be so trivially easy that it has been relatively neglected in modelling the processes from pixels to people. Methods designed for automatic face detection have demonstrated how difficult this task can be. Automatic face detection often employs movement or colour to find faces but humans can easily see faces in static greyscale images. By exploring the time that it takes to detect a face in a particular scene or image, the experiments reported identify factors that affect human face detection. A better understanding of how humans perform this task may offer strategies for effective automatic face detection as well as providing an insight into this preliminary stage of face processing.

Neurophysiological Correlates of the Categorical Perception of Facial Expressions and Identities

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Introduction: Behavioural studies have shown that two morphed faces showing an identical emotional expression or the same familiar identity are harder to discriminate than faces showing different ones. The temporal course of these categorical perception effects were explored through event-related potentials.

Method: Three kinds of pairs were presented in a same-different matching task: (1) two different morphed faces belonging to the same category (emotional expression for Experiment 1; identity for Experiment 2; WITHIN); (2) two morphed faces representing two different expressions or identities (BETWEEN); and (3) two identical faces (SAME).

Results and Discussion: The amplitude of the occipito-temporal negativity (N170) following onset of the second face was reduced for WITHIN and SAME pairs relative to BETWEEN pairs, bilaterally for emotional expressions and only in the right hemisphere for familiar identities.

Conclusions These results indicate that categorical perception of human faces has a perceptual origin, as early as 170 ms. in the occipito-temporal regions.

Naming Faces and Recognising Names: What Makes a Name Proper?

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A repetition priming technique has shown that a familiarity decision to an auditory presentation of a person's name facilitates a subsequent familiarity decision to the same person's written name. Further experiments are reported which show that cross-modality priming is observed for landmark names but not for names of countries or objects. It is shown that the effect cannot be explained in terms of the word frequency or specificity of the stimulus names.

Furthermore, production of a person's name in response to their face primes a subsequent familiarity to their written name. This effect is observed for landmark names but not for names of countries or objects. The effect is dependent on the type of the name produced but not on the specific stimulus seen. It is argued that these priming effects are only observed for expressions that have pure reference.

Age-Related Differences in Executive Functions: To What Extent Are They Related to a Frontal Dysfunction?

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The aim of this study was to explore the effect of aging on executive functions by using three tasks (Tower of London, Hayling and Brixton tests) designed to assess Supervisory Attentional System (SAS) functions (planning, inhibition, and abstraction of logical rules). The performance of elderly participants was significantly poorer than that of young participants. Processing speed, measured by means of a color-naming task, explained some but not all of the age-related differences. These results will be discussed in terms of general and specific factors in cognitive aging. Their implication for the 'frontal' hypothesis of cognitive aging will also be discussed in the light of further results from a similar study with patients with focal frontal damage (Andres & Van der Linden, in press).

Effects of Age on Tests of Dorsolateral and Ventromedial Frontal Lobe Function

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Although numerous studies have associated the frontal lobes with age-related cognitive decline, there do not appear to be any studies that have compared the effects of age on the distinct regions of the frontal lobes, i.e., the dorsolateral versus ventromedial prefrontal regions. The aim of this study is to outline and test the hypothesis that it is only the dorsolateral prefrontal functions that deteriorate with age, leaving the ventromedial prefrontal functions intact. Ninety healthy participants aged between 20 and 80 years performed 3 tasks sensitive to dorsolateral prefrontal dysfunction and 3 tasks sensitive to ventromedial prefrontal dysfunction. Age-associated declines in performance were found on all tasks sensitive to dorsolateral prefrontal dysfunction. However, they were not found on the majority of tasks sensitive to ventromedial prefrontal dysfunction. Therefore, the lack of an age effect on tasks sensitive to ventromedial prefrontal dysfunction speaks against the current "frontal lobe hypothesis of aging".

Cross-Sectional and Longitudinal Behavioral Studies of Pre-Frontal Brain Aging

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Both post-mortem and brain imaging studies show that age related declines in functional integrity occur earlier, and proceed faster in frontal, pre-frontal and temporal cortex than in other areas. Some methodological difficulties weaken interpretation of small-scale cross-sectional studies that have compared younger and older persons on particular “frontal” and “executive” tests such as “Stroop”, “Switching”, “Trails” or “Negative Priming”. Less ambiguous data from two longitudinal studies of age changes in performance on large batteries of “frontal” or “executive” and memory tests reveal “local” changes in memory and executive function independently of “global” changes in efficiency in fluid intelligence or information processing speed. Analyses show that these reflect an increasing incidence, with age, in a variety of different patterns of change in different individuals, rather than the progress of a common pattern of change, at different rates, in different members of an aging population.

Age Effects in Prospective Memory: The Involvement of Executive Functions

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The present paper examines differences in young and old adults’ prospective memory performance and the relationship between prospective memory performance and executive functions. It examines (a) which executive functions predict prospective memory performance, (b) to which degree age-related effects in prospective memory performance are due to individual differences in executive functions, and (c) if age-related differences in prospective memory exist that are not explained by individual differences in executive functions. In a sample of 40 young (22–31 years) and 40 old adults (60–80 years), we used well-established instruments to measure prospective memory and several executive functions. Results show several executive functions to differentially predict prospective memory performance, and that age-related differences in prospective memory are largely due to individual differences in executive functions. The discussion focuses on the explanatory power of executive functions for age differences in prospective memory performance.

Eye Movements During the Production of Complex Sentences

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This study investigated how eye movements precede and accompany the description of complex scenes. As in earlier syntactic priming experiments, subjects read prime sentences, which included either double object or a prepositional object construction. Target pictures that were best described using one of these constructions succeeded prime trials. There was only a small, insignificant effect of priming. The location of the agent influenced the choice of structure with more prepositional phrases occurring when the agent was located on the left. Subjects fixated the inanimate object first and then the agent before they started describing the scene. Subjects probably looked at the inanimate object in order to select the verb. During the description, speakers tended to fixate upon the pictorial elements before naming them, which corroborates earlier findings. Thus, the order of mention was reflected in the order of fixation.

Naming Bisyllabic Words: A Large Scale Study

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Recent studies have reported item level performance by asking a group of participants to read aloud a large number of words (e.g., Spieler & Balota, 1997). These item databases have been used to evaluate computational models of reading and to determine which psycholinguistic factors are the best predictors of performance. These studies were restricted to English monosyllabic words. The present work addresses the issue of bisyllabic word naming by relying on the large scale study approach, in both French and English. Naming latencies of 600 disyllabic words were collected from 100 participants for each language. Various psycholinguistic factors were used to predict item level performance. These data are exactly those that are needed by models of word recognition extended to multisyllabic words. Therefore, these results provide strong empirical constraints for computational models of polysyllabic word processing.

When Preference Reversal Disappears

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Preference reversal (PR) between alternatives (lottery gambles) are systematically observed when different procedures (choosing vs. pricing) are used to elicit such preferences. PR is usually explained without taking into account the specific response method of each procedure: when choosing, subjects compare gambles pair by pair (using a binary scale), while they assign a value to one gamble after the other (using a numerical scale) when they price.

In our experiment, subjects were asked to evaluate attractiveness and minimum selling price using the same response method: either they compared gambles by pair with a binary scale (A), or assigned a value to gambles presented one by one with a numerical scale (B). A control group was tested in the usual mixed-method conditions (C).

No PR occurred in conditions A & B, while PR did occur in condition C, suggesting that PR is no longer observed when identical response methods are used to elicit preferences.

Similarity-Driven Language Production: The Case of Linking Elements in Dutch

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When producing novel compounds, speakers of Dutch have to insert a linking element (-en-, -s-, or -0-) between the two constituents (e.g., auteur+s+naam 'author+s+name'). The selection of the linking element is not a trivial task, as there are no clear-cut rules guiding this choice. Previous research (Krott, Baayen, & Schreuder, 2001) has shown that speakers base their choice on the distributions of the linking elements in morphologically defined similarity sets of existing compounds. In this paper, we present a series of experiments addressing the time course of this selection process. The results show that the strength of analogical support from the similarity sets determines the choice of the linking element both in decision tasks and in naming. In decision tasks, analogical strength straightforwardly predicts response latencies. However, the naming results show that actual production times are strongly affected by sequencing for articulation.

Reference:

Krott, A., Baayen, R. H. and Schreuder, R. (2001). Analogy in morphology: modeling the choice of linking morphemes in Dutch. *Linguistics* 39 (1), 51–93.

Graded Phonological Effects in Language Production

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When Dutch speakers produce past tense forms, they have to select one of two possible past tense suffixes: -TE or -DE. The suffix -TE follows stems ending in a voiceless obstruent, -DE is found elsewhere. This rule presupposes that speakers know the voice specification of the final obstruent. We present two experiments that show that the behavior of Dutch speakers is more complex than this rule suggests. First, speakers reveal considerable convergence for pseudowords presented in a context from which the voice specification of the final obstruent cannot be deduced. Second, speakers produce past tense forms for existing words violating the rule. Interestingly, the behaviour of the participants in our experiments can be understood as resulting from the analogical force exerted by gangs of phonologically similar words. These results challenge the standard strict symbolic models of morphophonological processing (e.g., Levelt, 1989), and provide evidence for similarity-driven processes.

W. J. M. Levelt (1989). *Speaking: from intention to articulation*, Cambridge: MIT Press.

Cross-Domain Repetition Priming for Gender Decisions in Person Recognition

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Repetition priming of person recognition is found for familiarity decisions at test, irrespective of the decision taken at an earlier prime stage (i.e., gender, expression, familiarity or semantic). Also, it has been shown to cross domains (face prime/name target) for semantic decisions at test. However, priming has not yet been shown onto a gender decision. We present three experiments which examined priming for gender decisions. Each required a semantic decision (British/American) to a face at prime and a gender decision at test. Repetition priming was found for personal surnames (i.e., Geldof), but was not evident when the test items were full personal names (i.e., Bob Geldof) or faces. The data showed priming when the gender decision was based on semantic knowledge, but not when it was based on superficial characteristics of the stimuli. These results are consistent with structural models of face processing, but problematic for theories based on episodic processing.

Why Reading Dickens is Easy (And Reading Needham is Hard): Contrasting Familiarity and Figurativeness in On-Line Processing

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An eye-tracking experiment investigates the role of context in the interpretation of metonymies like: My great-grandmother has all the novels written by Needham in her library. I heard that she often read Needham when she had the time. Name familiarity had an immediate effect: Less familiar names like Needham required more processing than more familiar names like Dickens. Use familiarity had a delayed effect: Reading times for Needham, but not Dickens, were affected by whether the use was figurative or literal. Moreover, the difficulty with the figurative use of Needham was greatly reduced when Needham was previously introduced as a writer. Hence mentioning the product is enough to license a producer-for-product interpretation, which appears to be learned by rule. We argue that the name familiarity effect occurs over an under-specified representation (Frisson & Pickering, JEP: LMC, 1999) and question the relevance of the literal-figurative distinction to language comprehension.

Acoustic-Phonetic Cues and Lexical Competition in the Segmentation of Continuous Speech: Word-Spotting Experiments

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The present research examined the interplay between lexical competition and acoustic-phonetic cues in word segmentation and recognition. Lexically ambiguous bisyllabic carriers were used in word-spotting experiments that required the participants to detect CVC or CV initially embedded words. The lexical assignment of the pivotal consonant in the medial cluster (C#C vs #CC) and the lexical status of the post-boundary final chunk were manipulated. The word-spotting responses to CVC words were clearly inhibited by the overlapping word, leading to a target-offset misalignment effect. The CV word-spotting latencies also showed a misalignment effect, which

tended to be reduced when the target was followed by a word. These results are interpreted in terms of a framework which combines the Possible Word Constraint (Norris et al. 1997) and a prelexical segmentation heuristic based upon the onsets of syllables (Content et al. in press).

Interaction Between Emotional Facial Expression and Face/Gaze Direction: Evidence from Match-to-Sample and Gaze-Cueing Paradigms

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Using match-to-sample and gaze-cueing paradigms, we obtained evidence showing interaction between emotional facial expression and face/gaze direction in early perceptual processes. In the former task, a face with a positive, negative or neutral emotional expression was presented momentarily in peripheral vision and subjects matched it with a face on a response panel. In the latter, subjects responded for a laterally presented target regardless of the direction of a preceded facial cue with or without an emotional expression. The results showed that: (1) in the match-to-sample task, the perception of negative faces is more accurate overall than of other faces but even more accurate when the face/gazes is directed towards the observer. (2) In the gaze-cueing task, the response is better facilitated by a congruent schematic face (gaze) cue when the facial cue has an emotional expression. Based on this and neuroimaging data, we propose a neuro-cognitive model of social information processing.

How Plastic is the Brain When It Comes To Perceiving Language? Evidence from Behavioural Data and ERPs.

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Despite recent claims based on behavioural data (Palier, Bosch & Sebastien- Galles, 1997), the phenomenon of categorical perception does not entail that the listener is incapable of discriminating foreign contrasts. Werker and Polka (1993) found that adults can perceive vowels that are absent from their system, even though these same listeners assimilated the foreign vowels to native-language categories in a categorical perception task. Winkler et al. (1999) reached the same conclusion based on ERP data. While foreign vowels are assimilated to the categories available in the listener's system in a behavioural task, the recording of ERPs revealed that the foreign vowels are actually perceived as different from native vowels by the auditory system. The present study takes another look at foreign vowel perception in monolingual adults. Behavioural and electrophysiological evidence is examined. Results from a behavioural experiment show that listeners assimilate foreign vowels to native-language categories. However, to examine perception in the absence of higher-order cognitive influences, we recorded Event Related Potentials while listeners were presented with native and foreign vowels. Complete results will be reported at the conference. Perception of the foreign vowels would suggest that the brain remains sufficiently "plastic" to learn new contrasts, even in adults.

The Role of Allographic Information in Reading

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The main objective of this study was to investigate the involvement of allographic information in the reading process. This is a single case study of an allographic dysgraphic individual, BC, who shows an insensitivity to mixed case lettering, despite her intact ability to read accurately. BC was examined on a reading task that comprised 3 word lists, each of which was written in a specific case (UPPER, lower or MiXeD CaSe). Results indicated that there was no significant difference between her mean reading time for words written in mixed case and those written in the homogenous case. In contrast, a sample of 20 age and education matched healthy controls took significantly longer to read words written in mixed case. Evidence from this case, strengthens previous arguments that the mechanism responsible for selecting and maintaining case in writing, may also be employed to assign or identify case whilst reading.

Manipulations of Concrete Micro-Worlds and Cerebral Reorganization: A Working Hypothesis

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Saïd had a meningitis at the age of 1. As a consequence he suffered bilateral cerebral lesions in the temporal and parietal lobes and lost the possibility to speak or understand spoken language. At the age of 5,6 we started a therapy based on manipulations of sets of objects provided with technical constraints. These constraints make certain actions possible and others impossible. This in turns suggests a logic. After 3 years this boy was again able to communicate in a structured way. He even learned to read, write and compute.

Similar observations were made with other children with localized cerebral lesions. This suggests that such manipulations favor some kind of cerebral reorganization enabling the subject's brain to create new networks serving as a basis for the re-acquisition or the acquisition of superior cognitive functions which seemed to be lost or unattainable.

We intend to discuss this working hypothesis.

Positive and Negative Online Syntactic Priming Effects

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Facilitatory Syntactic Priming is traditionally measured in terms of response bias. The effects are assumed to originate from heightened levels of activation in previously used structure representations, and serve to reduce processing load by reusing recently encountered sentence structures, thereby allowing more processing capacity for other—non-syntactic—tasks involved in conversation maintenance. Assuming this process saves time, we conducted a series of online cued picture

description experiments, measuring response speed in syntactically compatible and incompatible and semantically (i.e., with respect to word choice) identical and non-identical prime-target pairs. We found positive priming effects for compatible pairs if no word identical prime-target pairs were employed. However in case of overlapping word identity, priming effects on syntactically compatible pairs turned out to become negative (reversed priming effect). The results are explained in terms of the Theory of Event Coding (TEC) (Hommel, Musseler, Aschersleben & Prinz, 2001 BBS).

The Frequency Effect in Noun Phrase Production and Its Implications for Models of Lexical Access

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We investigated the processes of lexical retrieval during the production of adjectival noun phrases (NPs) such as “the blue kite”. We used various current assumptions about the scope of grammatical and phonological encoding and about the locus of the classic frequency effect to derive predictions about possible frequency effects in the NP naming task. The predictions were tested in two picture-naming experiments where we manipulated orthogonally the frequencies of the adjective and of the noun that composed the NPs. We consistently found frequency effects for both adjectives and nouns. Moreover the effects were additive. We argue that the existence of a frequency effect of the noun during noun phrase production restricts the various combinations of assumptions that speech production models can hold together. Possible implications of the additivity of the effects for the time course of lexical access are also discussed.

Obvious S-R Covariations that are not Learned

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Experiments are reported, in which salient but task irrelevant stimuli predict either the location of a to-be-identified target or the required response. Interviews as well as performance data reveal that only a few participants become aware of the covariations. The data from the other participants provided no evidence for an implicit (inevitably) learning of S-R covariations. The results are discussed in terms of “inattentional blindness”: If attention is focused on definite task relevant stimuli, other (even salient) stimuli are hardly individually encoded (identified), so that any covariation of them with other aspects of the situation only accidentally become effective. Further experiments, in which the predictor was again not related to the imperative stimuli but task-relevant, showed covariation learning independently of whether the covariation was detected or not. This finding suggests that S-R covariation learning requires the individual coding of the predictor but not conscious detection of its predictiveness.

Using Functional MRI To Explore the Functional Anatomy of Frontal Cortex

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Functional neuroimaging techniques have provided clues about localisation of function within frontal cortex (FC) but they are hampered by our incomplete understanding of frontally-mediated processes. Studies identifying activation foci within FC are useful and meaningful only in as far as we can characterise, in detailed cognitive terms, the tasks that engender them.

We present evidence for the usefulness of functional neuroimaging in differentiating between subtle cognitive processes and suggest that this neurophysiological differentiation may serve to inform our cognitive models. In a study of FC involvement in associative learning, subjects were exposed to cue-outcome contingency relationships following which the neuronal consequences of violated expectation were characterised using fMRI. As predicted, this violated expectation was associated with dorsolateral FC activation. This activation was greater when such events were followed by subsequent alterations in behavioural responses, suggesting that dorsolateral FC may have a role in modifying behaviour in response to unexpected events.

Investigating the Neural Basis of Episodic Memory Using fMRI

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fMRI (functional Magnetic Resonance Imaging) has become a standard tool for investigating cognitive abilities such as memory, language and attention. By using innovative methods (e.g., event-related procedures) and rigorous experimental procedures (e.g., effective paradigm design) it is possible to investigate the neural basis of such abilities. Imaging has been particularly usefully applied to episodic memory—the ability to remember specific events from the past. Recent studies reveal a network of regions in parietal and frontal cortex that are modulated by successful retrieval from episodic memory. Specifically, there is greater activity within these regions to test items that are successfully remembered as having been studied, than to items correct rejected as being new. Greater understanding of the neural basis of episodic memory can be gained by delineating the functional properties of this network of regions (e.g., investigating whether these regions support core retrieval processes or wider support processes, and whether they are associated with explicit and/or implicit memory).

Mapping in Time the Human Brain Regions Involved in Perceptual Set, Search, and Decision

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Recent methodological advancements in functional magnetic resonance imaging allow us to map not only the sites of brain activation during a task, but also the temporal sequence of their recruitment. Although temporal resolution is still coarse (about 2 seconds), we have applied these methods to resolve between areas that are involved in encoding and maintaining an attentional set, from areas involved in the analysis of a subsequently presented test display. In a separate

set of experiments, we distinguish between areas involved in searching and cumulating sensory information, from areas involved in decision and post-decision processes. These studies provide a view of how everyday visual perception is mediated by the interaction of large neuronal ensembles.

Ventral Extrastriate Visual Cortex is Activated During Tactile Discrimination of Faces and Objects: A fMRI Study in Congenitally Blind and Sighted Subjects

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Visual recognition of faces and other object categories is associated with activation of distinct areas in the ventral extra-striate visual cortex. We hypothesized that these cortical areas may be involved in the processing of information on object form regardless of the sensory modality in which the information is acquired. Using functional magnetic resonance imaging (Gradient echo EPI, GE 3T scanner) we examined neural activity elicited in congenitally blind adults and blind-folded sighted subjects while they performed a one-back repetition detection task that involved tactile recognition of life masks of human faces, plastic bottles, and shoes. Bilateral activations of regions in ventral temporal and occipital extrastriate cortex, including the inferior temporal and the fusiform gyri, were observed in all blind and sighted subjects. Additional regions of activation were observed, including the cerebellum and the hand representation in sensorimotor cortex. These findings demonstrate that the ventral temporal extrastriate cortex can be activated by non-visual sensory modalities even in subjects who have had no visual experience, indicating that these cortical regions may be involved in the supramodal representation of attributes of object form.

The Segregation of Case and Style in Visual Processing of Written Stimuli Using fMRI

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There are several reports of patients with peripheral dysgraphia who have specific problems generating the appropriate case or style of letters. Impairments specific to one case or one style have been reported. This evidence led authors to suggest that case and style may be independently represented within the cognitive architecture. The aim of this study was to verify whether case and style map onto different anatomical brain regions. An fMRI study was run in which participants were required to perform case and style judgements of pronounceable pseudowords presented visually. Results showed significant left sided activation in case processing centred in the inferior parietal lobe, middle occipital gyrus and left cerebellum. Style processing generated

significant activation in a more restricted area of the right parietal lobe centred in the postcentral gyrus. These results indicate that case and style segregate anatomically as well as cognitively and justify the dissociations observed in patients.

Acquisition and Generalization of Action Effects

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We investigated the acquisition of action-contingent events (action effects). In a first, acquisition phase subjects performed free-choice reactions with each keypress leading to the presentation of either a particular category word (animal or furniture) or an exemplar word (dog or chair). In the test phase, responses were made to category words (animal and furniture) by using a word-key mapping that was either compatible or incompatible with the key-word mapping during acquisition. Compatible mapping produced better performance than incompatible mapping after both category and exemplar practice—suggesting generalization of action effects. Explicit knowledge about the practised key-word mapping facilitated performance in the test phase but did not affect the compatibility effect—suggesting different roles of explicit knowledge and the implicit, automatic integration of actions and their consequences.

Action-Effect Learning

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To accomplish intended goals, we have to know in advance the environmental effects of our actions. The present experiments investigate the processes underlying the learning of action effects. Participants had to respond to two succeeding stimuli. As the second stimulus was contingent on the first one, it could be considered as an effect of the first response. Action-effect learning should accelerate the response to the second stimulus. The first response was required only in half of all trials. In the other half of trials, a late or an early NOGO signal stopped response planning. The results show that action-effect learning depended on the time of presenting the NOGO signal; there were clear learning effects with late NOGO signals and rather small effects with the early signals. Obviously, action-effect learning is integrated in action planning. Action execution is not required for learning. The learned effects become part of the action plan.

Linkage of Action and Effect Representations: Learning and Performance Dissociated

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We will describe empirical work aimed at demonstrating a dissociation between learning and performance in cognitive action effect integration. The automatic integration of action effect codes in the cognitive representation of actions can be reflected in a Simon-like S-R compatibility effect. This compatibility effect can be shown to be insensitive to a manipulation that destroys the initial contingency between actions and effects. The present research tries to provide direct evidence that such manipulation, though leaving action-effect integration intact, does away with attentional interference caused by this action-effect integration. This would mean that removing the original response-outcome contingency does not result in unlearning, while it can affect performance. A framework for this seemingly paradoxical hypothesis will be provided, derived from associative learning theory.

Anticipated Action Effects in Action Generation

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The classical ideo-motor principle assumes that motor actions are perceptually represented, that is by representations of the action's reafferences. From this point of view, actions cannot be accessed directly (e.g., via motor parameters), but only indirectly by means of an anticipation of the action's sensorial effects. Support for this assumption could be provided by showing that forthcoming action effects influence action generation. I will report experiments which show that contingent action effects indeed have an impact on, and are thus likely to contribute to, the selection, initiation, and execution of voluntary movements. The results will be discussed with respect to historical (e.g., James, 1890) as well as more recent (e.g., Greenwald, 1970, Hommel, 1997) formulations of the IM principle.

Brain Structures Representing Learned Associations Between Actions and their Sensory Consequences Revealed by H₂¹⁵O-PET

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Behavioural evidence suggests that the perception of a learned action effect leads to an activation of the motor representation related to action performance (Elsner & Hommel, JEP: HPP, in press). The neuronal basis of this behavioural effect was investigated with H₂¹⁵O positron emission tomography (PET). Prior to PET scanning, healthy human subjects performed left or right key-presses (i.e., actions) and learned that each key-press was consistently followed by certain tone (i.e., action effect). During PET scanning, subjects did not perform any movement, but only listened to tone sequences consisting of varied ratios of one learned action-effect tone and one neutral tone. The caudal SMA and the right hippocampus showed graded increase in functional activation with the amount of action-effect tones presented in the sequence. Thus, these brain regions seem to mediate learning and control of goal-directed actions by linking representations of action consequences to the motor representation related to action performance.

Shifts in Voluntary Actions: The Functionality of a Binding Mechanism in Action-Planning

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From a feature-based approach to action coding it can be argued that action representation is subject to a binding problem, similar to the one formulated for perception. Consequently, an integration mechanism for action features was proposed to solve this binding problem. In this study we will present data of a series of experiments in which subjects were required to either switch from a prepared response to a novel response or not. The novel response could be compatible or incompatible with the previously to-be executed response. Our main question was whether or not action preparation entails feature-integration. Secondly, we investigated the role of temporal constraints on action-execution by manipulating the temporal requirements for the prepared action. The latter was intended to shed some light on the role of the response-delay period in previous studies. The results will be discussed in terms of the functionality and characteristics of a feature-integration mechanism.

Grammatical Feature Selection in Noun Phrase Production

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Grammatical feature selection is necessary to compute agreement in noun phrase production. In the last two years, extensive work in a variety of languages has focused on the selection of a specific grammatical feature, namely gender (e.g., Alario & Caramazza, submitted; Costa et al., 1999; Miozzo & Caramazza, 1999; Miozzo et al., submitted; Schiller & Caramazza, submitted; Schriefers & Teruel, 2000). We show that gender-incongruent distractor words can slow down naming latencies of pictures relative to gender-congruent distractors in German and Dutch. But this is only the case when a choice between different determiners is required at the same time, e.g., in the singular. In the plural, however, both these languages only have one determiner for all genders. Hence, no gender congruency effects were found in the plural. This suggests that grammatical feature selection is a non-competitive process. However, competition occurs during the selection of the appropriate determiner.

Processing Resyllabified Words in French

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In French, the final [r] of *dernier* is not pronounced before a consonant (*dernier train*, last train), but is pronounced and resyllabified into the following syllable in liaison environments (*dernier oignon*, last onion where *oignon* begins with a vowel). We explored how listeners retrieve the correct segmentation in a priori ambiguous sentences like *le dernier oignon/rognon* (the

last onion/kidney)? In four cross-modal priming experiments, subjects made visual lexical decisions to either vowel-initial (OIGNON) or consonant-initial targets (ROGNON). Facilitation was found for vowel-initial targets when the speaker's intended segmentation matched the target (...dernier oignon) but not when it matched the consonant-initial counterpart (...dernier rognon). Similarly, facilitation was found for consonant-initial targets when the speaker's intended segmentation matched the target (...dernier rognon) but this effect was reduced when it matched the vowel-initial counterpart (...dernier oignon). We suggest that listeners exploit durational acoustic cues to retrieve the correct segmentation when liaison-resyllabification occurs.

Auditory, Visual, and Cross-Modal Negative Priming

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Auditory, visual, and cross-modal negative priming was investigated using a task in which participants (N = 284) judged whether stimuli were animals or musical instruments. Negative priming was observed, but only if the attended and the ignored prime evoked different responses. This pattern—% negative priming after conflict but not after nonconflict primes—was demonstrated with visual stimuli and replicated with auditory stimuli as well as across modalities (both auditory-to-visual and the visual-to-auditory). The results help to broaden the scope of negative priming research, and they aid in distinguishing between various accounts of the negative priming phenomenon: Neither temporal discrimination nor feature mismatch can explain the observed data pattern. In contrast, both the distractor inhibition account and a particular variant of the episodic retrieval account provide plausible explanations.

On the Interaction of Age of Acquisition and Repetition

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The effects of Age of acquisition (AoA), word repetition, and their interaction were investigated in four experiments with different tasks: Word naming, picture naming, lexical decision, and semantic decision. We found effects of both AoA and repetition in all four paradigms. However, the interaction of AoA and repetition was significant in word and picture naming only: The advantage of early acquired words decreased substantially on the second presentation of the stimuli. The pattern of data is explained in terms of the different levels of the computation of the phonological representation and output.

Lexical Overlap and Syntactic Priming in Dialogue

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Five experiments investigated syntactic priming in dialogue using a confederate-scripted dialogue method (Branigan, Pickering, & Cleland, 2000). We considered the extent to which lexical overlap and the precise syntactic relationship between prime and target affected priming of dative verbs. Experiment 1 investigated whether priming was enhanced by lexical overlap of all three NPs. Two experiments explored the hierarchical structure of the prepositional phrase by including the prime conditions High-Attached and Low-Attached (Experiment 2) and for-PO structure (Experiment 3). Two experiments explored priming when the for-PO structure (Experiment 4) and the Low-Attached (with a to preposition) (Experiment 5) was combined with an overlap of the entities. Overall, the results contrast with Bock (1989) who found syntactic priming was unaffected by differences in preposition. Hence, lexical overlap is a significant factor in priming, and strong priming requires fairly exact repetition of constituent structure rather than just linear order of constituents.

Inappropriate Binding of Semantics and Context to Novel Stimuli can Give Rise to False Memories of People

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Further experiments are reported on a frontal lobe patient, MR, who falsely recognises unfamiliar people (Ward et al., 1999). MR is able to identify famous faces and names well, but he tends to claim that novel faces and names are familiar. This is unlikely to be due solely to incidental physical resemblances between the novel stimuli and known people because MR still falsely recognises atypical looking faces. An experiment, morphing together unfamiliar and famous faces, suggests that his false recognition is tied to the availability of semantic information. This false semantic information may derive from recent and current context (e.g., previous conversations) which becomes inappropriately bound with the novel stimulus giving it an illusion of familiarity. This study underscores the importance of viewing memory as an attributional process in which our sense of 'pastness' derives from aspects of current and ongoing mental processing.

Semantic Facilitation and Semantic Interference in Word Translation: Implications for Models of Lexical Access

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In language production tasks a semantically related context stimulus induces facilitation or interference (in comparison with an unrelated context) dependent on the task characteristics. In a series of English to Dutch word-translation tasks, we show that semantic interference obtained with Dutch context words reverses into semantic facilitation when instead of context words the corresponding context pictures are used. Present models of language production (e.g., Levelt et al., 1999; Starreveld & La Heij, 1996) cannot account for the semantic facilitation effect observed. We argue that in order to account for semantic facilitation, the models have to abandon the assumption that the names of all activated concepts compete for selection at the lexical level.

Computer simulations of two modified models confirm that they are capable to produce the observed semantic interference and facilitation effects. A prediction derived from the two modified models is tested and confirmed.

Masked Partial Priming of Letter Perception

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In three experiments, letter targets were preceded by briefly presented masked primes formed by deleting pixels in a larger or smaller version of the target stimulus. In Experiment 1 (alphabetic decision & letter naming) a slight advantage was observed for global primes (alternate pixels deleted) compared with junction primes (midsegment information removed). This advantage was stronger at 50 ms. prime exposures than at 30 ms exposures in the naming task. In Experiment 2 (letter naming), midsegment primes (with junction information removed) produced faster latencies than did junction primes. This result was replicated in a third experiment and was shown to be independent of target letter case and the relative size of prime and target stimuli. The same midsegment and junction primes did not facilitate performance compared to neutral primes in the alphabetic decision task. These results suggest that masked partial priming of letter naming can be usefully applied to the study of basic processes in letter perception.

Does False Memory Mimic Veridical Memory? Common Factors Influencing Both Phenomena

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A common paradigm in investigating false memory is presenting a list of words related to a non-presented lure and investigating the incorrect memory for that lure. In the current experiment we examined the effects of (a) lure familiarity and (b) backward association strength between the presented words and the lure, on false and veridical memory.

The results revealed higher false memory of low familiar lures than high familiar lures and greater intrusion of lures with strong backward association than weak backward association. The variables also interacted with more intrusion of lures in the high backward association and low familiarity conditions.

These results indicate that unrepresented lures develop episodic memory traces and act like presented list words. This claim is supported by the greater intrusion of low familiar lures, which mimics the classic mirror effect in memory research and is compatible with prevalent theories of recall and recognition.

The Division of Labour Between Internal and External Speech Monitoring

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Speech monitoring refers to the processes that control the quality of speech (error detection, self-correcting). Many theories of monitoring assume that speakers detect errors through two channels: overt speech (the external channel), and pre-articulatory speech (the internal channel). The postulation of two channels raises questions about their division of labour: Which proportion of errors does each channel intercept? Hartsuiker and Kolk (in press) proposed a procedure for decomposition of self-corrections into proportions of internal and external interceptions, using empirically observable quantities. However, this procedure assumed that both channels are equally accurate. I tested this assumption using data from an experiment in which the external channel was sometimes masked, and estimated the accuracy of each channel in the condition without masking. This disconfirmed the assumption of equal accuracy. Furthermore, it suggested flexibility in the division of labour between the channels, consistent with a proposal by Oomen and Postma (in press).

The Processing of ‘Unattended’ Words: A Priming Study

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The semantic categorization of words has been related to word presentation in the focus of attention (e.g., McCarthy & Nobre, 1993). Some studies, however, have also shown semantic priming by unattended words (e.g., Fuentes, Carmona, Agis, & Catena, 1994). Previous ERP studies reported semantic categorization of parafoveal and ‘unattended’ words (De Filippis, Kotz, & Gunter, 2000), but argued for the involvement of pre- and post-lexical attention mechanisms. The present study attempted to find similar evidence for semantic priming by directing selective attention to one side of the screen. A categorical decision (‘animate’ vs. ‘inanimate’) was performed for attended words only. ERPs from 32 subjects on 32 electrode-sites show significant priming for both categories on the attended but only priming for the target category (‘animate’) on the unattended side. The data suggest capacity limited post-lexical selection mechanisms responsible for semantic priming of unattended words.

Inhibition, Naming and Aging

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In order to examine the different accounts of cognitive aging, normal, healthy, aging individuals (ages 64–80) were compared to young adults (ages 18–26) on three confrontation naming tasks—word naming, picture naming, and naming from a definition. These tasks were chosen as, collectively, they help isolate different levels of lexical processing. Participants were presented with single words, photographs or definitions (short sentences) and were instructed to name the object represented as quickly and accurately as possible. The young adults were faster and more accurate than the old adults at picture naming. They were also faster at word naming. There was no difference in accuracy between young and old in word naming or definition naming and there

was no difference between young and old in reaction time on definition naming. We suggest that these results best support inhibitory deficit accounts of cognitive aging, and the implications of the results are discussed.

Processing of Peripheral Information During Multiple Object Naming

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When speakers name several objects, they usually fixate upon each object until they are about to initiate the object's name. We examined whether processing was confined to the fixated object, or whether objects in the periphery began to be processed before the eyes turned towards them. In the experiments, the object first seen peripherally (the interloper) changed into a new object (the target) as soon as the speaker's eyes moved towards it. Target and interloper were identical, or objects with phonologically related or unrelated names. The interloper appeared at trial onset or after 350 or 450 ms. Irrespective of interloper timing, the viewing times for the targets revealed a large identity preview benefit, but phonologically related and unrelated interlopers did not differ in their effects. Thus, when several objects are named, peripheral objects may undergo some visual and conceptual processing, but lexical access to their names only begins after fixation.

Perceptual Assimilation and Word Recognition

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Our previous work has shown that /dl/ and /tl/, illegal word-initially, are perceptually assimilated to /gl/ and /kl/, respectively. We investigated the effect of this phenomenon on word recognition. Nonwords derived from /gl, kl/ base words by a velar-to-dental change (e.g., dlaïeul derived from "glaïeul") were generally perceived as words. These nonwords, used as primes in a cross-modal form-priming task, produced almost as much priming as did the base words. Legal nonwords such as droseille, derived from words by this same change produced much less priming. Such differential effects on word recognition suggest that the goodness of fit determining lexical activation depends not solely upon the phonetic features shared by the input and lexical forms, but also upon possible perceptual assimilation. The findings are a challenge for models proposing direct lexical access from phonetic features and support the existence of intermediary stages of perceptual integration into sublexical units.

Interactional Constraints on Representational Form

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This experiment investigates how two parameters of interaction, specificity and alignment, contribute to representational form in graphical interaction. Pairs of subjects are seated in separate rooms and communicate, solely by drawing, on a virtual shared whiteboard. They listen to one piece of music each and draw pictures in order to determine whether their pieces of music are the same or different. The drawings produced can be reliably coded into two main categories: Figurative or Abstract. Using the whiteboard two factors were manipulated: a) the ability to locate problems (specificity) e.g., by circling or underlining each others drawing, b) the ability to align drawings e.g., using bracketing or arrows. The results demonstrate that these factors have a marked effect on the use of Figurative and Abstract representation types. This provides evidence for the claim that representational form is conditioned primarily by communicative use and only contingently by domain structure.

Dual Task Co-ordination as an Executive Function: Evidence from Manipulation of Task Load in Healthy Aging and in Alzheimer's Disease

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Dual task co-ordination has been assumed to be one of the executive functions of working memory, and evidence from both healthy volunteers and Alzheimer's Disease (AD) patients has pointed to a specific co-ordination function that is largely independent of overall cognitive load. Dual-task experiments will be reported in which the demands (titrated for the ability of each individual) were manipulated for each task while demands of the other task were held constant. AD patients, healthy elderly and young showed very similar patterns of performance when the demand of a single task was varied. However AD patients were differentially impaired by performing two tasks concurrently regardless of the manipulation of the demands of each task. There was no evidence of an effect of normal aging on dual task performance. Results are consistent with the concept of a specific cognitive co-ordination function and with a multiple component working memory system.

Exploring Executive Processing Components in Dual-Task Variations

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Although a specific theory of executive functioning is lacking, it is commonly assumed that a number of functions, such as decision making, error correction, and others are involved in executive control. This paper explores the utility of a strategy which is aimed at finding related but independent components of executive control, by varying the complexity of secondary executive tasks.

Based on previous findings it can be argued that input monitoring is one of the basis executive processes. Extending a simple executive task (random/fixed interval repetition) by adding decision and memory components results in the involvement of additional processing components that may call on additional executive processes.

This makes it possible to test whether the additional components disrupt short-term memory performance and whether their effects are additive. Data obtained within this research program will be presented and the utility of the research strategy will be discussed.

Working Memory in Reasoning and Planning

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Until recently it was frequently asserted, without direct evidence, that working memory limitations shaped problem solving and reasoning processes, and contributed to problem difficulty. This paper reviews experiments with colleagues addressing the role of working memory components in reasoning and planning. Dual task methodology revealed clear involvement of central executive resources in syllogistic reasoning and in planning in the Tower of London task. More complex strategies (arising from individual differences or training) loaded the phonological and visuo-spatial systems in syllogistic reasoning. In the Tower of London task evidence was obtained for a clear role for the visuo-spatial system. Loading the articulatory system somewhat facilitated Tower of London performance, indicating that verbal strategies were sub-optimal in this task. This conclusion was further supported by factor analysis of individual difference measures together with Tower of London performance scores. The results will be discussed with reference to the interaction between strategies and working memory.

The Role of the Phonological Loop in Executive Control

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Three dual-task experiments examined the role of the phonological loop in executive control. Participants performed a continuous task in which they first responded to certain targets (e.g., green Xs and red Ys), but later responded instead to stimuli they had learned to ignore (e.g., red Xs and green Ys). Participants' performance after target switch was more severely impaired by articulatory suppression than by concurrent foot tapping, an effect that also appeared for visuo-spatial stimuli (e.g., complex polygons) devoid of verbal labels. Together with recent reports of disruption by articulatory suppression in performance of other executive tasks (e.g., Wisconsin Card Sorting, task switching), these results challenge the prevalent view that the phonological loop is a passive 'slave' system with a limited role in complex cognition. Instead, the data suggest that, by keeping crucial task-related information active and highly accessible to consciousness, the phonological loop can play a pivotal supporting role.

The Role of Executive Functions in Memory Encoding and Retrieval

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Encoding and retrieval processes appear to occur spontaneously and automatically. Yet effortful processing for both can boost memory performance, so how should we characterize these conscious strategic functions? I will describe recent experiments that attempt to answer this question using the dual-task paradigm, with encoding or retrieval constituting one task and demanding, concurrent, secondary perceptual-motor tasks. One intriguing result is that retrieval is affected only minimally by a secondary task, yet secondary task performance itself suffers more when combined with a retrieval task than with an encoding task. A second puzzling result is that whereas encoding is sensitive to instructions to emphasize either memory or secondary task performance and demonstrates trade-offs between the tasks, retrieval is not. A third question concerns the qualitative type of encoding achieved when resources are withdrawn. Some general conclusions are drawn about the role of strategic executive functions in the processes of encoding and retrieval.

Decomposability in Idiom Comprehension

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Traditionally, idiomatic expressions have been characterized as strings whose semantic interpretation is not a direct function of the meanings of their components. More recently, however, it has been suggested that idioms do not form a homogeneous class: while the components of some idioms do not seem to contribute to the overall meaning of the string, the individual components of other idioms do contribute to the overall meaning. Several lines of research suggest that these differences are relevant in determining the syntactic behaviour of idioms. However, the empirical evidence in support of the role of decomposability in idiom processing is neither very strong nor unequivocal. In this study, we present new evidence on the relevance of decomposability in the comprehension of idiomatic expressions. The relevance of these findings for theories of idiom comprehension are discussed.

Idiom Processing in Schizophrenia: Literal Implausibility Saves the Day

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Schizophrenia patients are reported to have difficulty comprehending nonliteral forms of discourse such as idiomatic expressions, and this has been considered as indicative of a global schizophrenia-related deficit in nonliteral processing. In contrast with the standard view, we

hypothesize that schizophrenia patients will only show impairments when nonliteral sequences are ambiguous and have equally plausible nonliteral and literal interpretations. Consistent with this prediction, schizophrenia patients showed reduced idiom priming compared with controls for literally plausible idioms (“kick the bucket”) but intact idiom priming for literally implausible idioms (“pay through the nose”). They were also less likely than controls to simultaneously activate idiom and literal meanings for literally plausible idioms. These results are consistent with the notion that schizophrenia patients have language impairments that arise specifically in the presence of ambiguity. The results also highlight how the study of language disordered populations may capitalize on the heterogeneous nature of idiomatic expressions.

What is Inhibited During Idiom Processing?

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Most theories of idioms assume that the literal meaning of an idiomatic phrase is inhibited at some point during its processing. This idea makes good sense because the figurative interpretation of idioms appear quite different from what they literally mean. But there remain important questions as to what constitutes the “literal meaning” of any idiomatic phrase. I will argue in my talk that important aspects of the surface forms of idioms are not inhibited during idiom processing, particularly for idioms that refer to embodied experience (e.g., “sweat it out”, “left a bad taste in his mouth”). The implications of this idea for theories of idiom processing will be discussed.

Comprehending Idioms and Metaphors: A Same or a Different Story?

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Traditionally, idioms and metaphors were considered as different phenomena: the first behaving like words, with their global meanings retrieved from the lexicon; metaphors computed via lexical processing plus some pragmatic mechanism accounting for and correcting the defectiveness of their literal meaning. These views have been overtly questioned: evidence exists suggesting that idioms are accessed as configurations formed by the same words that might occur literally in a sentence, and that familiar metaphors do not require any extra effort for being comprehended.

In this presentation, I argue that metaphors and idioms should form a unique story, at least for processing models discussing the role played by the meaning of the words forming idiomatic strings and the problem of polysemy.

Minding the Clock

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Abstract conceptions of time are often conveyed linguistically via concrete idioms. Some of the most frequent and familiar of these idioms are used for telling the time. To tell the time, literally by producing time expressions, speakers rely on a set of phrasal formulas that, befitting their idiomatity, vary in surprising ways across languages. In English, for example, the hour serves as a linguistic reference point regardless of the time expression. In Dutch, by contrast, the hour and half-hour both serve as reference points, depending on the time and type of expression (e.g., 1:35 is typically *vijf over half twee* [five after half two]). These formulas are combined with number information derived perceptually, usually from clocks. Coupled with variations in clock formats, the creation of time-telling idioms within and across languages offers a means for tracing how variable components of idioms are integrated with formulaic components in normal language production.

Psychological Reality of Formants in Speech Perception

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This study addresses the question of what representation of sounds mediate between the raw acoustic signal and the abstract categories of speech such as vowels. Formant frequencies (i.e., resonances at certain frequencies due to vocal tract filtering) are commonly used for describing a wide range of speech sounds, but their perceptual reality is still debated, since they may not be explicitly represented in the auditory excitation pattern because of the harmonic structure of the sound. In six formant matching experiments, subjects were asked to adjust the frequency of one- or two-formant complex sounds to match the timbre of a target sound). Data show that formant frequencies can be extracted. Nevertheless, variability of matches is greater for sounds played on high fundamental frequency (individual harmonic components are resolved by the cochlea) than for low fundamental (unresolved harmonics). This result reflects the perceptual cost of interpolating a formant from resolved harmonics.

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Attentional Modulations on Semantic Priming and Recognition Measures

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Two experiments were conducted in order to explore the role of attention on automatic and controlled semantic memory processes. Both experiments comprised two stages. In the first phase, participants performed a lexical decision on probe words or pseudowords preceded by masked prime words either semantically related or unrelated to them. Prime words' duration was varied from trial to trial. During the second phase, participants performed a recognition test on the earlier prime words. Whereas in Experiment 1 words appeared only once, in Experiment 2 they were presented nine times each. Instructions either to attend or to ignore the prime were manipulated between subjects. A positive semantic priming effect was obtained in Experiment 1 regardless of

attentional instructions, whereas in Experiment 2 it only appeared when participants paid attention to the masked primes. On the other hand, the attentional manipulation affected recognition in Experiment 1 but not in Experiment 2. These results shed some light into the role of attention at linking specific episodes to their contextual characteristics.

Neural Correlates of Increasing Intelligibility of Speech: Evidence from Functional Neuroimaging

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In this study PET was used to interrogate the cortical regions associated with increasing speech intelligibility. Regional cerebral activity was measured while pre-trained subjects listened to noise with embedded speech. The number of channels was varied between 1 and 16 across different scans. Each subject was later tested to identify how intelligible he or she found each condition. The results showed activation associated with intelligibility greater on the left, extending to the posterior temporal sulcus, and to the temporal pole. The profile of responses showed functional subsystems within this activation. These results are interpreted in the context of different functional streams of activation in the human auditory cortex, with a left lateralised anterior stream being associated with the identification of intelligible speech (an auditory ‘what’ pathway), and a posterior stream associated with sensory-motor representations of speech sounds (a ‘how’ pathway).

Time in Psycho(patho)logy and its Underlying Geometrical Structure

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Distortions in the perception of time represent one of the most intriguing and fascinating aspects of a variety of mental psychoses and/or altered states of consciousness. A simple geometrical model, accommodating most of such aberrations of subjective time, is presented. The model is based on a specific single-parametrical aggregate of conics in a projective plane. The set of conics is found to nicely reproduce the subtle structure of time when the projective plane is affinized. It simply suffices to postulate that each proper conic of the pencil stands for a single temporal event, and relate three distinct kinds of (proper) affine conics, viz. a hyperbola, a parabola and an ellipse, with the three different kinds of temporal event, viz. the past, present and future, respectively. To illustrate the predictive power of the model proposed, a rich representative sample of first-hand accounts of disturbed perception of time is given.

Emotional Modulation of the Attentional Blink

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When two targets are presented in rapid succession, processing of the first target produces a deficit in the processing of the second target as a function of the temporal lag between them (attentional blink: AB). The interference typically lasts up to 500ms. In our experiment we used this paradigm to investigate if the emotional valence of the first target could affect this deficit. Participants were shown a rapid serial visual presentation (RSVP) of words. Their first task was to judge the emotional valence of a word presented in a different color (T1). This word was either neutral, positive or threat related. Their second task was to detect another specific word. Our results reveal a larger deficit for the detection of T2, when T1 was a threat related word. This result is consistent with theories that propose the existence of an attentional mechanism for threat evaluation and indicates that the AB represents a promising paradigm in order to study its underlying processes.

Retrieving Structural and Functional Attributes About Living Things At Different Levels of Hierarchy: A fMRI Investigation

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Functional MRI was used to investigate whether knowledge about structural attributes (e.g., external or internal parts of objects) and functional attributes involved distinct cortical networks, when accessed by categorical inferences. Subjects verified associations between pictures of living things and written attributes, which could be retrieved at the entry level (accurate for the object only) or at the supra-ordinate level (accurate for the whole supra-ordinate category).

Compared to entry level, supra-ordinate level involved areas that may subserve top-down processes requiring additional stored memories (BA 40, BA 19) and attention resources (BA 24, BA 10).

Moreover, supra-ordinate structural attributes involved areas that are crucial in mental imagery (BA 19) and in spatial information retrieval (precuneus), whereas supra-ordinate functional attributes involved areas critical in motion processing (BA 6, BA 10, the right caudatus). Taken together, our results suggest that knowledge about living things may be organised according to both hierarchical and modality-specific principles.

Remapping of Auditory Space By Visual Distractors

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Subjects judged the location of a sound after they had been adapted to a sound that was synchronized with a light coming from a slightly different location (i.e., a ventriloquised sound). The ventriloquised adapter sound was presented from one specific location only. We tested its effect on sounds presented from trained and untrained locations. Results will be discussed in the light of the kind of re-mappings that can be acquired and the extent to which our audio-visual results can be compared with other perceptual learning experiments involving visual and proprioceptive dimensions.

Conceptual Representations: Evidence for Perceptual Symbols

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According to Barsalou (1999), conceptual representations consist of perceptual symbols. Perceptual symbols are records of the neural states that underlie perception. The neural systems that are used in perception are also used for conceptual knowledge. Perceptual symbols can have any aspect of perceived experience, such as vision, audition, touch, smell, taste, and proprioception. In perception there is a cost associated to modality shifts. We investigated whether this also holds for conceptual representations. In a verbal property verification task a critical trial (e.g., eggplant-purple) was preceded by a trial in the same modality (gemstone-glittering) or a different modality (marble-cool). The results showed that responses were slower after a modality shift. These results provide evidence for embodied theories of cognition.

Maintaining Response Balance Over the Life Span: Activation, Inhibition and Error-Processing

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Fast and accurate responding requires mutual adjustment of motor activation and inhibition and additional tuning after errors. Behavioral and electrocortical indices of these executive functions in subjects aged 7, 10 or 64 were compared with those of young adults. A cue (S1) indicated which response might be required later, and evoked activation of the associated response. The imperative stimulus (S2) 1500 ms. later confirmed or contradicted the cue, indicating whether the prepared response should be executed (80%), suppressed (stop) or adjusted (change) (20% of the trials). Young children's activation pattern was characterized by coarse control of timing and poor task engagement. Error monitoring worked fine, but strategic adjustments were not effective. Ten-year-olds were more eager to respond and performed uninhibited. Errors had little effect on their subsequent performance. Older adults performed efficiently but cautious and therefore slow. Their inhibition was good and they changed their response strategy drastically after errors.

Functional Speech Hemispheric Asymmetry in Tinnitus Patients

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Tinnitus is the perception of sound in the absence of a corresponding external acoustic stimulus. Functional hemispheric asymmetry associated with speech auditory and verbal stimuli was investigated. The tinnitus signal might impair or slow down the auditory processes. We hypothesized that this aberrant stimulation may lead to an abnormal asymmetric speech pattern in right-tinnitus sufferers.

Tinnitus patients, tinnitus-simulated and healthy participants were tested. A dichotic word listening and a lexical decision tasks were proposed. Analysis of indexes of asymmetry revealed a symmetric pattern for speech auditory processes in right-tinnitus patients, but no difference between groups was shown in the visual task.

This suggests that the presence of tinnitus signal can impair central speech processing. Moreover, the right-tinnitus-simulated participants didn’t show the same perturbations. This leads us to consider the disabling tinnitus signal as a very particular stimulation to which the central nervous system can’t adapt.

Semantic Influences on Feature-Based Attention due to Overlap of Neural Circuits

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Feature-based attention was investigated by examining the effect of irrelevant information (digits) on the processing of relevant information. Numerical semantic processing is known to be based on parietal areas. Between experiments we varied parietal involvement in the processing of the relevant feature. The irrelevant digit’s influence on the for the relevant feature used binary manual response task was measured by the SNARC-effect, demonstrating faster left than right hand responses for small numbers and vice versa for large numbers. When processing of the relevant feature depended on parietal cortex (like orientation processing) the digit’s semantic value effected response times. Conversely, the irrelevant digit had no effect on the processing of color or shape, which rely minimally on parietal resources. We conclude that efficiency of feature-based attention is determined by the degree of neural overlap of structures dedicated to process relevant and irrelevant information. Underlying neural substrates constrain cognitive models on attention and information processing.

Implicit and Explicit Memory for Action Events in Younger and Older Adults

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Age-related differences in explicit and implicit memory for subject-performed tasks (SPTs) and verbal memory tasks (VTs) were examined in several experiments. In explicit memory tests (e.g., free recall), younger subjects surpassed the elderly regardless of type of encoding (SPTs, VTs). In contrast, no age effect was observed on implicit memory tests (e.g., word-stem completion, word-fragment completion). In addition to the developmental dissociation of memory performance, a functional dissociation showed up in that a higher memory performance level for SPTs (an enactment effect) was found only in the explicit memory test but not in the implicit memory test. The performance-enhancing effect of encoding by acting in the explicit memory test was highly similar regardless of age. These findings provide further evidence for the similarity of information processing in SPT and VT memory as well as for differences in age sensitivity between explicit and implicit memory.

Why Does My Watch Go “Tick-Tock” and Not “Tick-Tick”? An Objective Measure of Subjective Accents in Sound Sequences

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It has long been observed that sequences of identical sounds are not perceived as such, but that some events seem louder than others, leading to the sensation of strong and weak beats. We used EEG measurements to provide objective evidence for such subjective accenting. According to time-based attention theory (Drake, Jones & Baruch, 2000), we hypothesised that changes would be better processed if they occur on strong, more expected events rather than on weak ones.

Our results showed that late evoked potentials (P300-like) elicited by infrequent softer sounds had greater amplitudes and earlier latencies when such changes fell on presumably strong positions compared to weak ones. The same results were observed when a binary metric structure was induced by cueing subjects with physically louder sounds every two events. However, no differences between positions were found in earlier waves related to more “automatic” processing of deviance (Mismatch Negativity), suggesting that subjective accenting might be based on cognitive, attention-dependent rather than perceptual, preattentive processes.

Voluntary Expectancy Affects Postperceptual but Premotoric Stages: A Study Using Event-Related Brain Potentials

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It is commonly believed that sequential effects in reaction times (RTs) but not in components of the event-related brain potential (P300) are influenced by voluntary expectancies. Such active expectancies are assumed to affect late postperceptual processing stages. The present study examined whether the expectancy effect is localized in premotoric (response-selection) or in motoric stages. In two RSI conditions (700 and 1200 ms.) participants (N = 12) performed spatial compatible responses to two equiprobable visual stimuli. In separate blocks, participants were instructed to expect either stimulus repetitions or alternations. RT results showed that subjects were able

to “voluntarily” produce either first-order repetition or alternation effects. The onset-results of the lateralised readiness potential (LRP) revealed a clear premotoric locus of the expectancy instructions. In contrast, P300 latency as an index of perceptual processing time was not affected by expectancy instructions. In conclusion, the results support a postperceptual but premotoric locus of voluntary expectancy effects.

Working Memory for Duration: An ERP Study in Humans

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The aim of this study was to characterize the electrophysiological correlates of retention and manipulation of temporal information in working memory. Event-related potentials were recorded during a 3500 ms. retention period in a simple and a complex tasks in which the amount of durations to be retained and the degree of manipulation of these durations was varied. A frontally distributed slow negative wave developed during the retention period for both tasks. The amplitude of this slow wave was greater during the complex task, in which working memory demands were more important in comparison with the simple task. These data showing a modulation of slow brain potentials in function of memory load and of degree of manipulation of temporal information suggest that these potentials underlie retention and manipulation of temporal information in working memory and that frontal lobes play a crucial role in these memory processes.

Memory and Reexperience

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Two memory systems are postulated. The reexperience memory (RM) system supports the detailed remembering of very recent experiences, i.e., over retention intervals of seconds, minutes, and hours. In contrast, the autobiographical memory (AM) system mediates remembering over periods of days, weeks, years, decades, and lifetimes. These two different systems have different retrieval processes and are supported by networks in different brain regions. The RM does not use constructive processes but rather is reconstructive, i.e., reconstructs in sensory detail a representation of a recent experience. AM, on the other hand, uses constructive processes and does not, in general, support extensive reexperience although all detailed AMs contain some sensory detail. This two-system memory model is used to explore various aspects of memory malfunction following brain damage and in old age.

Gains and Losses in Memory for Action

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According to the enactment effect the recall performance in subject performed tasks (SPTs) is better than in verbal tasks (VTs). Performance in experimenter performed tasks (EPTs) lies in between. Presumably the encoding conditions vary in their degree of item specific information. The role of relational information is unclear. To explore the role of item and relational processing in memory for actions we analyzed gains and losses in multiple free recall testing. Within this paradigm it is usually assumed that gains indicate rich item information and losses poor relational information. In a series of experiments we replicated the usual pattern of free recall performance (SPT > EPT > VT). Moreover we observed the same pattern for gains which supports the assumption that the recall pattern is due to better item information in SPT than in EPT and VT. The findings for losses were less clear.

Generation and Hypermnnesia

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Generation effects often occur in within-subjects but not between-subjects designs, a pattern attributed to enhanced item-specific processing and disrupted order/relational processing in the generate condition. We investigate this hypothesis by examining the effects of generation over multiple recall tests, conditions that sometimes foster hypermnnesia (increased recall over multiple tests). The components of hypermnnesia, item gains and losses across tests, are hypothesized to index item-specific and relational encoding. In a series of experiments, the generate but not the read condition produced hypermnnesia. In addition, generation lead to both more gains (indexing greater item-specific processing) and losses (indicating disrupted relational encoding). In a between-subjects design, the generation effect was not present on the first recall test but emerged in later tests. Additional experiments examine the basis of this latent generation effect.

Part-List Cueing in Healthy and Amnesic People

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A number of recent studies indicate that retroactive interference and output interference are mediated by different forgetting mechanisms. Among the factors suggesting this difference is item strength which does not influence retroactive interference but has systematic effects on output interference. Indeed, whereas items strongly associated to a common cue show output interference, items weakly associated to the cue do not show interference. Experiments are reported which indicate that, in healthy subjects, item strength plays the same role in part-list cueing as it does in output interference, suggesting that the two forms of forgetting are mediated by similar mechanisms. Amnesic subjects were found to show a different pattern, however. Here item strength seems to play the same role in part-list cueing as it does in retroactive interference. Implications of these results concerning retrieval processes in healthy and amnesic people are provided.

Stopping Episodic Retrieval: Inhibitory Control and the Cognitive Foundations of Repression

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Behavioral and neurobiological research on memory and attention shows that people have executive control processes that are directed at minimizing perceptual distraction, interference during short and long-term memory tasks, and stopping strong habitual responses to stimuli when they are inappropriate. Here we demonstrate that these control mechanisms can be strategically recruited to prevent unwanted episodic memories from entering awareness, and that this cognitive act has enduring consequences for the rejected memory. When people encounter retrieval cues that remind them of an unwanted memory and they consistently try to prevent awareness of it, the later ability to recall the rejected memory is impaired. We show that this forgetting increases with the number of times the memory is avoided, resists incentives for accurate recall, and is caused by processes that suppress the memory itself. These findings suggest that inhibitory control processes not uniquely tied to trauma may provide a viable model for repression.

Dynamic Objects & Events: An Overview

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Our knowledge of object and scene recognition is largely based on studies that have used static stimuli. However, in reality, motion and change are fundamental aspects of our world. Do our perceptual/cognitive systems make use of these real world dynamics? The purpose of this symposium is to showcase a number of research projects that have begun to explore the impact that characteristic motion might have on our internal representations of the world. After a brief review of related psychological and physiological studies, this talk will highlight some of the general themes which link the current presentations and will conclude with suggestions for future research directions in the area of dynamic objects and events.

Recognising the Style of Human Movement

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Studies of biological motion clearly demonstrate that even impoverished displays can be spontaneously organised into the percept of a moving figure. Although it appears that these displays provide sufficient information to appreciate detailed properties of the actor and action being performed, little is known about which properties of human motion are essential for its categorisation. I will present research from a variety of approaches including prototypes, movement primitives and statistical pattern matching that has examined the ability of humans to recognise identity, affect, and style from displays of human movement. Results of these studies indicate that recognition of style can be achieved via representations based on either the spatiotemporal signature of the movement or specific movement properties such as velocity. Finally, I will discuss extensions of this research into the field of designing interactions with humanoid robots.

The Role of Dynamic Object Properties in Categorisation

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We investigated whether dynamic properties of an object can be used to the same extent as spatial properties in a categorisation task. 16 participants were instructed to categorise computer-generated objects varying systematically in four dimensions: two spatial dimensions (3D-shape and colour) and two dynamic dimensions (route taken and object's action). The task consisted of a learning phase and a test phase. In the learning phase, participants were presented with two prototype objects and learned, via feedback, to correctly categorise these prototypes. In the test phase participants had to categorise a new sample of objects into the previously learned categories. These new objects differed from the prototype objects in either 1, 2, 3, or all of the stimulus dimensions. We found that participants showed no bias towards either the spatial or dynamic cues when both cues were useful for categorisation. For the dynamic information, however, we found a significant bias towards action. Our findings suggest that both spatial and dynamic information is equally relevant for categorisation purposes, although for dynamic information more attention is paid to how an object moves rather than where the object is going.

Characteristic Motion & Facial Identity

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Faces often move in complex, non-rigid ways (talking or laughing). Do such motion patterns influence our perception of facial identity? To explore this issue we animated 3D head models using motion sequences captured from different human actors. During an incidental learning phase, observers were exposed to FACE A moving with MOTION A and FACE B moving with MOTION B. Test stimuli consisted of spatially morphed heads (no texture) ranging in 10% steps from FACE A to FACE B. The morphs were animated using either MOTION A or MOTION B. Observers were instructed to categorize each test stimuli as either FACE A or FACE B. Motion biased the perception of identity across most levels of the morph sequence, with the strongest bias occurring around the perceptual midpoint. These results suggest that facial motion can play an important role in determining facial identity, particularly when structural information is ambiguous

Representing Dynamic Faces

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Seeing a familiar face move adds additional ‘dynamic’ information for the viewer, useful in the recognition of identity. Famous faces are recognised more accurately when the original characteristics of the motion are maintained, compared to when either the tempo or the direction of motion are altered. This finding is consistent with the idea that familiar movement patterns—either of faces generally, or of specific faces, are stored in memory. We describe a number of experiments which explore how dynamic information is represented in memory, using a repetition priming technique. Repetition priming is the advantage demonstrated at test when a to-be-recognised item is encountered earlier, at some time prior to test. Results suggest that a moving image primes more effectively than a static image, even when the same static image is shown in the prime and test phases. Results are discussed within the framework of current models of face recognition.

The Use of Verb Subcategorisation Information in Sentence Processing

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In an eye-tracking study, we investigated whether readers use verb subcategorisation information immediately, or whether it is delayed relative to purely syntactic parsing strategies. Using sentences such as (1), we observed that readers experience more difficulty reading a noun phrase (“the vet”) when it followed an intransitive verb (“struggled”) than when it followed a transitive verb (“scratched”).

1. After the dog struggled/scratched the vet and his assistant took off the muzzle.

We conclude that readers initially process the noun phrase as a direct object of the preceding verb, regardless of whether verb subcategorisation information rules out this analysis. Our results challenge Adams, Clifton, & Mitchell (1998). We argue that they failed to find an effect because they did not report regression-based eye-tracking measures, nor did they include a spill-over region. The results also challenge constraint-based theories, but are consistent with Mitchell (1987) and two-stage theories of sentence processing.

Strategic Effects in Naming: Another Examination of the Route-Emphasis versus Time-Criterion Accounts

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Rastle and Coltheart (1999) demonstrated that both nonwords and low-frequency regular words are named more slowly when mixed with exception word fillers that are irregular in their first phoneme (e.g., chef) than when mixed with exception word fillers that are irregular in their third phoneme (e.g., glow). Those authors explained these effects in terms of Coltheart et al.’s (1993) DRC model by claiming that there was a strategic de-emphasis of the nonlexical route in the first-phoneme irregular filler condition. An alternative explanation is that because first-phoneme irregular fillers are slower to name than third-phoneme irregular fillers, the slowing down of

nonword and low-frequency regular word targets simply reflects a higher position of a time criterion (Lupker et al., 1997) in the first-phoneme irregular filler condition. We contrasted these two accounts in a series of experiments. Results strongly favour a time-criterion account of Rastle and Coltheart's effects.

Sound Memories: Evidence for Traces of Recent Auditory Events

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It is assumed that brief tones provide frequency-specific sensory traces which may be equivalent to enhancement of sensory information. The task is to listen on each trial to two complex sounds in succession; each consists of a series of tones of increasing frequency. But one complex has a single tone decreased in intensity: the task is to report which of the two contains it. Now, prior to each trial a pure tone is presented: this matches the frequency of the decreased component or not. The reasoning is that if the pure tone causes sensory enhancement at that particular frequency, then it should effectively remove the decrement when tone and decrement match in frequency, so making the task very difficult on these trials. This was the result obtained. Further experiments used detection tasks. Results are discussed in terms of sensory traces which maintain a precise record of recent auditory events.

Lexical Frequency and Anaphor Resolution

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An eye-tracking study investigated whether anaphora reactivate the lexical frequency information associated with their antecedent. The results showed that reading times for "she" in sentences such as (1) were the same when the antecedent was frequent ("secretary") as when it was infrequent ("ballerina"). However, when the pronoun was replaced by a repeated noun phrase anaphor (e.g., a second occurrence of "secretary"), anaphora with infrequent antecedents were read slower than anaphora with frequent antecedents.

1. The secretary/ballerina was not very popular, because she hardly ever spoke to anyone.

We conclude that repeated noun phrases reactivate lexical frequency information, whereas pronouns do not. The results indicate that accessing antecedents through pronouns is different from non-anaphoric lexical access. To account for earlier findings that other lexical properties of antecedents (semantics and grammatical gender) do become reactivated, we propose that pronouns reaccess the lemma representation of their antecedent, but not the lexeme representation (Simner & Smyth, 1999).

Lexical and Conceptual Connections in Second Language Beginners: Data from Spanish and German

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The aim of the present study was to test several predictions derived from the revised hierarchical model, proposed by Kroll and coworkers (Kroll, 1993; Kroll and Sholl, 1992; Kroll and Stewart, 1994), to explain the bilingual memory organization in very early stages of L2 acquisition. Native Spanish speakers were taught a restricted set of German words. They performed a bilingual (Spanish-German) version of the Stroop task. Results showed that these novice subjects showed an interference effect both within and between languages. That result did not confirm the prediction derived from the revised hierarchical model, concerning the lexical and conceptual representation in bilingual memory in novice subjects. In order to extend that result, more experiments were designed including a translation recognition task and a picture-word interference task. Formal and semantic variables, such as word frequency and concreteness, were manipulated.

Functional and Perceptual Attributes in the Living/Nonliving Things Dissociation and in the Organization of Semantic Memory

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The living/nonliving things double dissociation is a well-established phenomenon in neuropsychology for which different categorical and featural explanations have been proposed in terms of the organization of semantic memory. In the experiments reported a suppression task was used, where subjects viewed lists of words (living and nonliving) presented one by one, and had to name all items with a particular functional attribute and to recall all items with a particular perceptual attribute or vice-versa. Recall results, that imply a stronger suppression of information, are more in accordance with a featural perspective of semantic memory organization. However, not all featural models receive the same support. Implications for these different models, including possible alternative accounts of the results, are also presented.

Grammatical Gender in Williams Syndrome: Evidence for a Linguistic Dissociation

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Williams syndrome (WS) is a neuro-developmental disorder characterised by a relatively spared language in the face of serious deficits in nonlinguistic cognitive abilities. Several linguistic abnormalities have been however reported, in particular regarding morphosyntactic abilities (Karmiloff-Smith et al., 1997).

We conducted a study on ten French WS subjects to assess two components of grammatical gender: gender assignment (ability to make use of word endings to access grammatical gender) and gender agreement (ability to make adjectives agree with nouns). Two tasks were used: gender categorisation and gender concord.

Performance on the categorisation task revealed that WS relied on gender-ending regularities in quantitatively and qualitatively different ways from the controls.

Performance on the concord task revealed that WS subjects achieved good correctness score though lower than the controls. The results are interpreted following the theoretical distinction proposed by Clahsen and Almazan (1998) between computational operations (spared in WS) and retrieval of specific information from lexical entries (impaired in WS).

The Sad Story of the Syllable Effect

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One highly influential demonstration that syllable units are instrumental in speech perception in some languages is the observation of a crossover interaction between target type and word type in the sequence detection task. In two experiments, French speakers detected CV or CVC targets at the beginning of disyllabic pseudowords varying in syllable structure and pivotal consonant. Overall, both studies failed to replicate the expected syllable effect, excepted in rather circumscribed conditions. A third experiment collected phoneme-gating data on the same pseudowords to obtain estimates of the duration of the initial phonemes. Regression analyses showed that phoneme duration accounted for a large proportion of the variance for CVC target detection, suggesting that participants were reacting directly to phonemic throughput. These findings argue against the hypothesis of an early syllabic classification mechanism in the perception of speech.

Visual Advantages in Serial Recall

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Differences in recall ability between immediate serial recall of auditorily- and visually-presented verbal material have frequently found an advantage for recall of material presented in the auditory modality. Theories of “the modality effect” have therefore addressed the origin of this auditory advantage and largely ignored the possibility of other modality differences. This study shows that a recall advantage can be obtained for visual presentation if participants are required to serially recall the list in two distinct sections. Judged on a list-wide basis the visual advantage is of equivalent size to the auditory advantage of the classical modality effect. These results demonstrate that differences in representation of auditory and visual verbal material in short-term memory persist beyond phonological and lexical categorisation and that response requirements influence the amount and the type of information recalled.

The Meaning of a Word is ‘All’ in the Family

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The number of complex words in which a given simplex word occurs co-determines response latencies in lexical decision (Schreuder & Baayen 1997). This morphological family size effect arises at central, semantic levels of processing (De Jong, Schreuder & Baayen 2000). The present study makes use of a semantic decision task in which participants decided whether a Dutch simplex word was a man-made object (e.g., TAFEL, 'table') or a nature-made object (e.g., APPEL, 'apple'). Interestingly, participants respond faster when the morphological family contains many relevant family members (objects rather than actions or qualities). Moreover, the congruency within these relevant family members co-determines the participant's response accuracy. APPELBOOM, 'apple tree', is congruent with the 'nature-made' response for APPEL but APPELTAART, 'apple pie' is incongruent. Apparently, the activated family members affect the percept of the semantic domain of the target word, supporting highly interactive models of semantic processing.

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Schreuder, R. & Baayen, R. H. (1997): How complex simplex words can be. *Journal of Memory and Language*, 37, 118–139.

Do Incidental Relatedness Judgements Influence Semantic Priming Effects?

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At least a part of semantic priming effects observed in binary decision tasks are supposed to be caused by congruity effects stemming from incidental relatedness judgements: A semantic relationship between prime and target could positively bias a "yes" response, whereas the absence of relationship would rather favour a "no" response to the same target.

We tested this assumption in a semantic categorisation experiment in which participants were induced to associate different values—positive, negative, or neutral—to each of the responses. If the congruence between the value of the relatedness judgement and the value of the target response matters at all, faster reaction times should be observed when the value of the response matches that of the relatedness judgement.

Although semantic priming effects were obtained even with negatively valued responses, they were substantially enhanced with positively valued responses, confirming the influence of an incidental, postlexical relatedness judgement.

Working Memory Capacity and Updating in Text Comprehension

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According to O'Brien (1999), text comprehension and situation model updating are based on a resonance process: Traces currently active in Working Memory resonate with relevant inactive traces in the discourse model and from general world knowledge.

Using O'Brien's method based on inconsistent texts, we hypothesised that individual Working Memory capacity should affect this process.

A first experiment was run to provide reliable indicators of WM capacity. As Engle et al. (1999), we found strong correlations (.38, .46, .47) between three span tasks (Operation, Counting and Running Spans).

In a second experiment, high and low span groups were created according to span scores. Readers were instructed to read carefully nine narratives. Three versions of each text (consistent, inconsistent and qualified) were designed.

We observed that high and low span readers significantly differed in the way they processed on-line inconsistencies. Those results will be discussed further in terms of updating capacity.

The Emotional Content of Illustrations Intervenes During Text Comprehension: Evidence for the Existence of an Inhibitory Mechanism

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The purpose of this study was to investigate the role of illustrations and of the connotation of textual information on the construction of a mental representation. Participants had to read a text, composed of negative and positive information, that described a current event, through two topics. This text was preceded by a set of pictures, linked to the described event which was either positive or negative. The two sets also differed in the number of pictures devoted to each topic. After reading the text, participants judged positive as well as negative information related to the event described. Illustrations were expected to promote the representation of textual information that was consistent with their connotation and their informational content, and an inhibitory mechanism was expected to occur for the negative information processing and retrieval. Results confirm the validity of these assumptions and are discussed within an approach of the comprehension process.

Irregular Pronunciations and Serial Order Effects in Reading Aloud

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Coltheart & Rastle (1994) and Rastle & Coltheart (1999) show that, in reading aloud, the cost of a spelling-to-sound irregularity declines monotonically and linearly across the word, from left to right, as predicted by their Dual Route Cascaded (DRC) model. They argue that this position of irregularity (PoI) effect is evidence against solely parallel connectionist models of reading aloud. We show that a neuro-anatomically grounded, parallel connectionist model of reading—the split fovea model—naturally produces the PoI effect, using the subset of four-letter words from the stimuli used by Rastle and Coltheart (1999). We show that parallel connectionist models in general exhibit the PoI effect when fixation position is taken into account, but that the split fovea model provides the most parsimonious explanation. The PoI effect does not discriminate between models of reading aloud which do and do not contain a serial process in the generation of the pronunciation of a word.

Localisation of Executive Processes in Dual-Tasks Using fMRI

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We investigated the neural substrate of the scheduling of interfering processing stages in dual-tasks using the paradigm of the psychological refractory period and fMRI. Subjects performed an auditory and a visual choice-reaction task either separately or concurrently. Task scheduling requirements in dual-tasking were manipulated by presenting both tasks in a fixed or random order. Results indicated dual-task related activation in the dorsolateral-prefrontal cortex and the superior-parietal lobe. Activation in these areas was higher in the random compared to the fixed order condition, suggesting the location of task-scheduling processes, which are governed by exogenous task components, i.e., order of presented stimuli. On the contrary, motor areas and the anterior cingulate cortex were higher activated in the fixed compared to the random order condition. This suggests the latter areas to be related to task scheduling processes, which are based on the endogenous preparation of a certain processing order prior to task presentation.

Age of Acquisition and Speech Production in Bilingual Picture Naming

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This study explored the role of age of acquisition on second language (L2) picture naming speed in a group of Spanish-English bilinguals. We hypothesised that we would find effects of L2 age of acquisition on performance if the age of acquisition effects reported in first language (L1) picture naming are due to acquisition order rather than acquisition age. Participants named a large set of pictures in their L2 (English). The most important predictor of naming speed was L2 age of acquisition. Error analyses indicated that L1 (Spanish) age of acquisition was an important predictor of both naming errors and omissions. We conclude that age of acquisition effects are more likely to be due to order of acquisition rather than to age of acquisition per se.

A Critical Test of the Cumulative-Frequency Hypothesis Using Dutch-Language Tasks

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One possible explanation for age-of-acquisition (AoA) effect is that early-acquired words have been encountered more often. Lewis, Gerhand & Ellis (2001) demonstrated that existing English-language data are consistent with such a cumulative-frequency account of AoA effects when a power-law of learning is applied. This account predicts that AoA and word frequency should exert equivalent effects on reaction times for any task. Testing this equivalence with English-word norms is difficult for a number of reasons. Data collected using Dutch speakers performing Dutch-word tasks allowed the equivalence of the two factors to be tested. Results indicate that the AoA effect was consistently larger than would be predicted by the cumulative-frequency hypothesis alone. These data, therefore, represent real evidence that there is an effect of AoA beyond cumulative frequency. They also indicate the level of difference in size of effects that any account of word AoA and frequency effects will need to model.

Early-Acquired Word Neighbours Keep Up with the Frequent Ones: Further Effects of AoA and Frequency When Neighbour Words Are Used

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A series of experiments is reported in which the effects of age-of-acquisition and frequency were examined. Using masked priming with orthographic neighbours in combination with a lexical decision task, we obtained significant inhibition effects of earlier acquired neighbour words on late acquired targets matched on frequency. Although the effects of higher frequency neighbours did not reach significance, a trend towards inhibition was observed. On the basis of these results, we conclude that AoA-effects do not solely originate from the speech output system, but also reside in the lexical input system.

Age of Acquisition and Word Frequency in Spoken and Written Production

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In Bonin, Fayol and Chalard (in press), age of acquisition (AoA) and objective word frequency were investigated in both spoken and written picture naming. Reliable AoA effects on naming latencies, with word frequency controlled for, were found in both production modes. In contrast, no reliable word frequency effects were observed on naming speed, with AoA controlled for, in either spoken or written production. Recently, a large scale regression study was conducted to investigate the influence of nine variables on the latencies to write down or to speak aloud the names of pictures. In both production modes, the major determinants were image variability, image agreement and AoA and, to a lesser extent, name agreement. Again, neither word frequency nor the interaction between word frequency and AoA were found to contribute to the naming latencies. The implications of the findings for theoretical views of both spoken and written production are discussed.

Age of Acquisition Does Not Affect Semantic Classifications of Celebrities

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Words, objects and faces acquired early in life are processed faster than later acquired items in recognition and naming tasks (e.g., Moore & Valentine, 1998; 1999). No such effects occur for semantic classification of objects (Morrison & Ellis, 1995). A re-analysis of data reporting semantic effects of age of acquisition (AoA) to faces, reveal the stimuli to be contaminated. Four experiments explore semantic classification of celebrities' according to membership of a specific occupation category, semantic association and individual occupation categorisation. No advantage for early acquired items occurred. These findings support the Set up of a Specialised Processing System Hypothesis (Moore 2000).

Discussion: Age of Acquisition and The Nature of Mappings Between Representations

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If a network learns cumulatively, then there are circumstances when knowledge built up in response to early items, and embodied in changes to connection strengths, will be conducive to assimilating and processing items entered later into training. This will happen when the mappings between inputs and outputs are regular and predictable. In other circumstances the knowledge built up in response to early items will not assist assimilation and processing of later items. This will be seen when mappings are arbitrary. Evidence will be presented to support the proposal that age of acquisition effects will vary according to the nature of input-output mappings. The results presented in symposium papers will be considered in this light.

Gaze Cues Attenuate Change Blindness in a Flicker Paradigm

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When alternating versions of a scene and a modified version of that scene are separated by a brief blank field, observers take a surprising long time to spot even large changes between the two scenes. One theory of this change blindness effect holds that attention is necessary to perceive such changes (Rensink, O'Regan and Clark, 1997). In line with this, we showed that manipulating participants' attention using gaze cues reduced the change blindness effect. More specifically, when the gaze of an individual appearing in a scene cued the change made to the display, participants spotted the change sooner than in scenes where no cue was present or when a neutral cue was provided. This finding represents further evidence that observers automatically process another individual's social attention signals, and use these cues to direct their own attention within a scene.

Less Than Meets the Eye: Perceiving the World in Cognitive Categories

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It is commonly acknowledged that the human perceiver can interact with the objects of his or her world at different, hierarchically organized levels of categorization. People who have learned to categorize an object as general or specific may therefore perceive different features in this object. I will report experiments that examined the hypothesis that the nature of categorization (general and specific) can influence the perceived properties of an identical distal object.

Change Blindness: Implications for the Study of Attentional and Nonattentional Processes in Vision

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A striking blindness to change can be induced when attention is diverted away from the location of the change. To account for this “change blindness”, it is proposed that focused attention is needed to see change. It is shown that change blindness on controlled displays can provide an effective way of mapping out various characteristics of attention, leading not only to confirmation of known properties, but to the discovery of new ones. It is also shown how change blindness can lead to a new phenomenon, *mindsight*, in which observers have a strong feeling of change without an accompanying visual experience.

Implications of Change Blindness for Understanding the Phenomenology of Sensation

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It is usually thought that in order to have the impression of seeing a rich visual world outside of us, it is necessary for the brain to create a rich internal representation of the world. Evidence from “change blindness” experiments will be summoned in favor of another way of thinking about vision in which no picture-like internal representation is created. Instead the outside world is used as a form of external memory which, through its instantaneous accessibility via flicks of the eye or attention, provides us with the illusion of seeing. This idea can be further developed to understand how a mechanistic device like the brain can provide us with the subjective raw feel of visual sensation, and how these can be different from the sensations in other sensory modalities, such as touch and hearing.

Perceptual Coupling in Limb and Tool Movements

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We hypothesized, that the well-known symmetry tendency in bimanual circle drawing originates in a common representational medium for perception and action, and not in a motoric functional medium which is separated from perception. Eight subjects produced circling movements of two visible flags, either in symmetry (in-phase) or in anti-phase, by means of two hidden cranks. Whereas the movement of the left crank and flag were equivalent, the right flag's circling frequency was set at a 4:3 frequency ratio to the right crank and hand. The participants were generally able to perform symmetric movements of the visible flags up to rather high frequencies. Anti-phase movement patterns were less stable than in-phase patterns. With higher frequencies switches from anti-phase into in-phase occurred. These coordinative phenomena are obviously organized with regard to the visible flags, and thus in a perceptual functional medium, without regard to bodily constraints. In addition, the experiment reveals that movements of an extreme formal complexity can easily be executed in favor of a simple effect. Tool movements are organized in the same way as body movements.

Conflict-Monitoring and Cognitive Control: Response Competition and Dimensional Inhibition in Task-Set Switching

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Two remarkable features of voluntary action are flexibility and persistence: on one hand, response dispositions are flexibly reconfigured to meet changing task demands; on the other, task-sets are maintained in the face of distractions. A central but neglected question is how the cognitive system achieves a context-sensitive balance between these antagonistic constraints. We tested the hypothesis that inhibitory control processes, that serve to maintain task-sets by suppressing distracting stimulus dimensions, are adjusted online depending on the presence of a response conflict ("conflict-triggered control"). Participants responded either to the color, identity, or location of visual stimuli. Response times were reliably increased when participants switched to a task that required responding to a stimulus dimension that on the preceding trial activated conflicting responses, compared to task-switches preceded by conflict-free trials. Results indicate that part of the reaction time cost incurred by task switches results from a tendency to shield task-sets against distraction.

Carrying Out Intended Actions: Categorization Processes in Prospective Memory Tasks

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Whether people perform pre-planned actions depends on how these are encoded and on retrieval conditions. In Experiment I we used an identification task measuring response latencies where we found that encoding the specific retrieval conditions leads to better performance compared to categorically encoded retrieval conditions, but only for less typical exemplars. We set out to replicate these findings in a prospective memory task developed by Marsh and Hicks (1998). In Experiment II we manipulated both specificity and cognitive load, using a typical exemplar. Specificity now affected performance. Furthermore, we found no evidence for the claim that thoroughly specifying retrieval conditions leads to automaticity (Gollwitzer, 1993). In Experiment III, using categorical instructions, we manipulated exemplar typicality and cognitive load. The data suggest that typicality is less important in prospective memory tasks than in simple tasks measuring response latencies. We discuss the use of the paradigm and attempt to model prospective memory tasks in how they differ from other tasks.

Consciousness and Abstraction in Sequence Learning

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Whether people are sensitive to abstract structure constitutes a fundamental issue in domains such as language acquisition, categorization, implicit learning, or memory. Several authors have suggested that abstraction necessarily requires awareness of the relevant regularities. We explored the extent to which people become sensitive to abstract relationships between components of sequences of stimuli in the context of a 6-choice reaction time task.

Participants were trained to react as fast and as accurately as possible to continuously changing sequences of 12 elements, among which the first 6 were random, with the constraint that each element appears once and only once. The next 6 elements obeyed the same constraints, but were entirely predictable based on their relationships with the corresponding initial elements. These relationships were changed during a transfer block. Participants were neither informed nor aware that the material contained structure. The results indicate impaired RTs during transfer, thus suggesting sensitivity to abstract structure in the absence of awareness.

Switching Between Tasks: What Constitutes a Task Unit

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Task switching is a popular paradigm in contemporary research of control processes in task performance, and the evaluation of task demands. The costs of switching from one task to another are taken to reflect the control efforts associated with the requirement to stop the previous task activities and the reconfiguration called upon by the new task. In a sequence of experiments, we investigated the question of what constitutes a task unit. That is, in a long sequence of trials, what makes one segment distinguishable from another segment, such that task switching costs can be observed between the two. In particular, we were interested in the influence of internal events, such as subjective significance, on switching costs. The talk will describe the main results of these experiments, and the relationship between bottom up, top down, external and internal changes.

The Enactment of Action Phrases Induces a Different Memory Organization than the Verbal Encoding of These Phrases

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We examined the idea that the motor enactment of action phrases induces a different memory organization than the verbal encoding of these phrases. In Experiment 1, 33 action phrases were presented, which could be grouped into 11 conceptual categories or, alternatively, into 11 movement categories of 3 action phrases each. Participants either enacted or read aloud each phrase during study and test. Enactment enhanced both memory quantity and memory accuracy. Clustering during immediate or delayed recall revealed a stronger organization by movement following enactment and a stronger organization by taxonomic membership following verbal instructions. Furthermore, recall performance correlated more strongly with clustering by movement under enactment instructions and with clustering by taxonomic membership under verbal instructions. In Experiment 2 imagined enactment also induced stronger organization along movement similarity compared to verbal encoding. The results suggest that different memory organizations become salient under different encoding and testing conditions.

A Role for Tactile Reafferences in Bimanual Finger Tapping

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When tapping sequences of isochronous intervals with two hands simultaneously, the variability of the intervals is reduced in contrast to single-handed tapping. As this bimanual advantage can be attributed to timer variance (according to an analysis with the Wing-Kristofferson model; 1973), limb-specific timers have been proposed, the outputs of which are averaged (Helmuth & Ivry, 1996). Alternatively, timing might be based on sensory reafferences and the bimanual advantage could result from additional reafferences provided by the extra hand during bimanual tapping. Experiments in which tactile reafferences were varied support the alternative explanation: Analogous to the bimanual advantage we observed a timing advantage when participants tapped with two fingers of a single hand. This bidigital advantage cannot be explained by limb-specific timers. In addition, we were able to demonstrate that the bimanual advantage decreases, when tactile reafferences of the extra hand are omitted, e.g., by contact-free tapping.

Coordination of Multiple Actions: How One Hand Wins Against the Other in Paper, Scissors, Rock

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Many people believe that a set of cognitive functions is devoted to scheduling multiple actions. Recent research has focused on reconfiguration using mainly task switching as the experimental

paradigm. We were interested in the processes that allow one to simultaneously execute two actions under the constraints of a higher level goal. In three experiments, participants played paper, scissors, and rock against themselves by simultaneously forming gestures with their left and right hands. In Experiment 1, a cue indicated which of the two hands should win, or whether any combination of different gestures was valid. In Experiment 2 and 3 one or two of the target gestures were pre-specified by further cues and the SOA between gesture cue and winner cue was varied. Coordination costs arose under all conditions. In our view, these costs are due to a central coordination process because other sources (e.g., rule application) were controlled.

Unintentional Executive Processing: Implicit Sequence Learning in the Task-Switching Paradigm

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Current theory suggests that executive processes are performed consciously and intentionally. We used the task-switching paradigm and embedded a hidden task sequence, while randomising all other aspects including perceptual and motor elements. We found that a sequence of tasks was learned implicitly, leading participants to commit themselves more quickly and fully to the upcoming task, without being able to report any explicit knowledge of the sequence. The findings suggest that “executive processes” are controlled, at least to some extent, by non-conscious processes and result in unintentional changes in strategy of which the individual is unaware. This raises considerable doubts regarding the view of executive processes as only conscious and intentional. Additionally, the results imply that implicit sequence learning may be based exclusively on abstract elements such as tasks.

Imitative Action Priming

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We report two experiments that examined imitative behaviour in simple reaching and grasping tasks. Observers first saw a ‘stooge’ reach and grasp an object before they made a reach and grasp action. On valid prime trials, the observed and the actual reach and grasp were to objects of the same size. We found that the actions of normal observers are primed, being faster when they observed an action that they subsequently made. This occurred even when it was likely that consecutive actions were to objects of different size. In a second experiment, we report data from a single case participant (M. H.) with left parietal damage causing optic ataxia. The patient, M. H., showed no effect of valid prime, but was sensitive to the validity of the preceding trial. These data indicate a dissociation between imitative behaviours and actions controlled by our conscious expectations, with imitative behaviours being disrupted by damage to the dorsal visual stream.

Order Switching in Multi-Step Tasks

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The authors studied switching sub-task order in a multi-step task composed of two sub-tasks. In each trial two stimuli were presented, separated by a variable Stimulus-Onset-Asynchrony (SOA)—the PRP paradigm. Experiment 1 indicated that order-switching cost was not reduced while participants waited passively for the instructional cue signaling the upcoming sub-task order. In Experiment 2, order-switching cost was reduced but not abolished when participants actively prepared for the order switch instructed by the cue (during the Cue-Target Interval, CTI). We used Pashler's (1994a) bottleneck model to interpret the results as indicating that preparing sub-task order affected pre R1-selection stages, and order switching affected post R1-selection, and post or R2-selection stages. A revised bottleneck model is suggested in order to account for overadditive interaction between SOA and Order switching, and for CTI effects. The major assumptions are that sub-task order is controlled by an order task set and that participants use the cue as well as the order of stimuli in order to activate the order set.

A Prospective Study of Prospective Memory: Challenges of Procedural Changes for an fMRI Study?

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Prospective memory (PM) is memory for activities to be performed in the future. In order to carry out an fMRI study on PM, the standard PM task is to be modified in two important ways: The PM task is to be divided into separate blocks of 1 min. duration, alternated with blocks with background task only; and the time interval between consecutive PM cues/critical moments is to be shortened to 30 s. Two experiments explored the importance of these procedural changes. In Experiment 1, performance in time-based and event-based PM blocks of different durations (1 vs. 4 min.) was compared. Typicality and perceptual distinctiveness of the cues in event-based PM blocks were also manipulated. Experiment 2 manipulated the time interval between consecutive cues in an event-based PM task (30, 60, or 120 s.). Discussion will focus on whether the procedural changes reduce PM tasks to simple vigilance and time-monitoring tasks.

Action-Planning of Saccadic Eye Movements: The Effect of Stimuli Characteristics and Modality Specificity

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According to the Action-concept Model of Hommel, the planning of an action implies the formation of an integrated representation of stimulus, response and effect features (codes). These hypothesized action-concepts are an attempt to solve the binding problem in action representation, similar to the object files in perception. If the planning of an action requires a code which is at that moment integrated in the action-plan of another planned but postponed action, the theory predicts a hampering of compatible trials. In previous research we showed that planning, but

postponing, a manual binary choice task, increases compatible endogenous saccade latencies, but not the exogenous ones. However, the results depended on specific characteristics of the stimuli used for the saccade tasks (central versus peripheral, inherently spatial nature or not). The present paper reports further experiments which investigate these effects and discusses whether the origin of these effects is specific for saccade planning or modality independent.

Factors Underlying the Costs of Task Shifting: Task-Set Activation, Task-Set Suppression, and Task-Set Execution

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When one can perform the same task repeatedly, the 'task set' (the sets of task instructions, of possible stimuli and responses, and of stimulus-response mapping rules) can be kept active in working memory. When shifting from one task to another, the old task set must be de-activated and a new one must be implemented. This takes time: the so-called shift costs.

In the literature it is often assumed implicitly that shift costs pertain to task preparation: activating the proper task set takes longer after a task shift compared to a task repetition, due to interference/priming processes or to additional time-consuming control processes. In the present study we demonstrate in a series of experiments that not only task-set activation (the factor typically held responsible for shift costs), but also task-set suppression and execution contribute independently to shift costs. A fourth experiment, examining an alternative explanation in terms of exogenously triggered preparation, is currently underway.

Converging Evidence for Parallel Processing of Complex Visual Stimuli

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The issue of parallel versus serial processing of complex visual stimuli has been intensely debated in cognitive psychology over 3–4 decades. Lately the dominant view has been that only simple visual features such as color, line orientation, or certain types of motion are processed in parallel, whereas complex visual objects must be processed one after another (early selection). In this paper we present converging evidence for parallel processing of simultaneously presented complex visual stimuli. The evidence comes from studies of automatic attention attraction in visual search, measurements of effects of spatial separation in whole report, and demonstrations of mutually independent encoding of multiple features from multiple objects into visual short-term memory.

Individual Differences in Working Memory Inhibitory Control: Exclusion from Working Memory does not mean Exclusion from Long Term Memory

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A large series of studies has examined individual differences in working memory and their relationships with differences in reading comprehension. Studies have considered children, adults, elderly or other more specific populations, showing that the relationship is far from perfect and its nature is still unclear.

The present paper will review research of our laboratory showing that a mechanism responsible for these individual differences is related to modality specific verbal inhibitory control. This control requires that working memory inhibits information that has been processed but is no longer relevant to the task in hand. We will then show that inhibition does not mean elimination of irrelevant information from memory, but the reduction of its activation in working memory. Three studies will show that individuals with low comprehension and low span present higher working memory activation but not better long term memory for irrelevant information.

Processing and Complexity Factors in The Evaluation of Age Differences In Working Memory

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We explored the existence of different age-related effects in working memory while controlling the confounding role of task complexity. It has been showed that aging produces a selective impairment in the ability to manipulate and transform information within the working memory system, while more passive, maintenance functions are spared. The development of passive and active memory processes across the life-span is evaluated by testing three groups of participants representing different age ranges. We adopted a dual-task paradigm in which the same stimuli are used both as a measure of passive recall and of active processing, thus allowing a direct comparison between these two measures and the evaluation of the complexity of both tasks. The results demonstrated that the specific characteristics of the task in terms of active processing requirements cannot be confused with the complexity level. Age effects were more evident in active processes and this is a reliable index to interpret and assess memory modifications in normal aging.

Exploring the Mysteries Of Working Memory Span

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We report data that address some of the apparently mysterious properties of working memory span, drawing on analyses from individual-differences and from experimental manipulations among children. Among other issues, we evaluate theoretical accounts that purport to describe working memory, ask whether working memory is inherently different from short-term memory, and question the reliance on using span measures and particular scoring procedures. The regularities to be found in a complex set of phenomena will be emphasised.

Individual Differences in Spatial Working Memory Scores Between Neuropsychological Patients

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Spatial memory is one of the most important cognitive functions in daily life, enabling us to locate objects in our environment or to learn a route. In the present study, we elaborated on the notion that human spatial memory entails multiple sub-processes, relying on different brain structures. Fifty stroke patients and 40 healthy participants performed various spatial memory tasks. We will focus on two working memory tasks here: spatial span and immediate object location memory. The latter task comprised three different aspects: (1) object-location binding, (2) positional memory, and (3) a combination of these two aspects. Most interestingly, there was a clear dissociation between these different aspects of object-location memory. Some individual patients were impaired on object-location binding but not on the other two aspects, whereas other patients suffered selective deficits in one of the latter two aspects. In addition, some but not all patients performed poorly on the spatial span task. Some further thought will be given to the precise neurocognitive implications of these individual differences. In short, the findings support the notion that spatial memory can be fractionated in a number of functionally independent processing components, which in turn might engage their own specific neural substrate.

Pure Representational Neglect: A Visuo-Spatial Working Memory Deficit?

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We report on a new case, LL, of pure representational neglect. The hypothesis that aspects of the representational form of neglect can be interpreted within the framework of working memory is taken to task. The suggestion that representational neglect may be limited to impaired access to long-term memory was also investigated with a new test assessing recent mental representations formed from verbal descriptions. The early dissociation between perceptual and representational

neglect observed in LL cannot be interpreted as resulting from differential recovery slopes between the two functions. Therefore the case supports the notion of the independence between perception and mental representation. Representational neglect appeared for both long-term and recent information and also impaired the making of images from auditory verbal description. We argue that the concept of visuo-spatial working memory (Logie, 1995; Beschin et al. 1997) can provide a framework within which to interpret aspects of the representational form of neglect.

On the Process of Lexical Ambiguity Resolution in Reading

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How do readers arrive at the appropriate meaning of words that are lexically ambiguous and have two or more meanings? A number of experiments in our lab have addressed this issue. In this talk, I will provide an overview of the results we have obtained and discuss unresolved issues. I will also discuss some computational work that we have carried out in attempts to simulate the basic pattern of results.

Sentence Comprehension: Insight from Time-Course Measures

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Recent sentence processing models often propose non-modular, interactive architectures in which lexical frequency and plausibility directly affect parsing operations. We used the speed-accuracy trade-off procedure to examine how these constraints affect the time-course of sentence comprehension. Time-course measures indicate that parsing is more modular than many recent models suggest.

Unconventional Structures and Processes in Language Comprehension

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A fundamental assumption in psycholinguistics is that the interpretation that is obtained for a sentence reflects its syntactic structure. I will discuss results that challenge this assumption because they reveal that people often obtain meanings that are unlicensed syntactically. Moreover, the notion that interpretations are built up from words and their structural organization leads us to predict no systematic role for nonverbal information such as disfluencies, repairs, hesitations, and repeats. The conventional view is that to understand a sentence such as Mary uh uh walked the dog, the comprehender strips away the extraneous material and then proceeds as if the sentence had never included it. Our experiments show that people's interpretations are systematically influenced by this nonverbal information, because it influences syntactic parsing decisions.

Eye Movements and Spoken Language Comprehension: Bridging the Language-as-Action and Language-as-Product Traditions

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Most research on real-time language comprehension has either used text or idealized forms of spoken utterances. I will begin by presenting (1) theoretical arguments for the importance of studying the on-line processing and generation of spoken utterances in conversational contexts in which the participants have clear behavioral goals and (2) methodological obstacles to studying the real-time processing of natural utterances. I'll then review recent work from my laboratory establishing that (1) eye movements can be used to trace the time course of lexical, syntactic, and referential processing in natural tasks and (2) the earliest moments of spoken language comprehension, including syntactic processing and reference resolution are affected by the speaker's perspective, and by event-specific properties of potential referents (i.e., the particular actions and objects involved in an action). I'll close by suggesting some novel research strategies for moving these investigations into the realm of fully interactive, goal-oriented conversational language.

Anticipating What Will Come Next: Sentence Processing in English and Japanese

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In this talk I shall describe recent work that capitalises on the relationship between language and visual attention: specifically, we can use language-modulated shifts in visual attention to study, as a sentence unfolds in time, the manner in which information conveyed by different aspects of a sentence interacts (e.g., lexical, syntactic, semantic); the nature and content of the mental representations that are constructed during this time; and the manner in which these representations are evaluated against the (visual) context. A series of studies in languages with grammatical structures as diverse as English (typically subject-verb-object) and Japanese (typically subject-object-verb) suggest that sentence processing proceeds through the prediction at each moment in time of what linguistic material will follow. These predictions are driven by a range of information, from knowledge of syntactic conventions to knowledge of real-world plausibility.

Effects of Relative Character Brightness on Landing Position in Discrete vs. Continuous Stimuli

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The purpose of the present experiments was to examine whether a simple physical stimulus property, namely relative character luminosity, can exert an influence on the saccadic computation system. Experiment 1 used a bisection task and compared landing position in words, non-words, strings of sharps and solid lines. In each case, the relative brightness of a few elements

(located at the beginning or the end of the stimulus) was manipulated. This manipulation had no effect on landing position for discrete stimuli, but did act to deviate landing position for continuous lines. This outcome is interpreted in terms of the relative irrelevance of changed brightness to the computation of saccade extent toward a stimulus composed of discrete elements. Experiment 2, using a “mindless reading” paradigm, examined this effect under the circumstances of an imposed quasi-natural reading rhythm. The results revealed that both variations in luminance and reading rhythm can act to modulate landing position on discrete as well as continuous stimuli.

Evidence for Two Levels of Representation Involved in Task Shifting

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By employing precues that indicated a forthcoming task shift with a validity of .88 we investigated whether precuing results in a temporal advancement of processes of task-set reconfiguration into the precuing interval while leaving the nature of these processes unchanged. In doing so we exploited a characteristic profile of shift costs that can be observed when participants have to shift within a set of four dimensionally organized tasks. Without advance information this shift-cost profile is determined by the inter-task relation. With temporally advanced task-set reconfiguration it should be replaced by a profile that is determined by the precue-to-task relation. While we observed an effect of the precue-to-task relation that evolved as the duration of the precuing interval increased, at the same time the effect of the inter-task relation remained virtually unchanged. Furthermore, both effects exhibited a different qualitative characteristic. We interpret these findings as suggesting that there are two kinds of action representation involved in task-set configuration.

Keep the Unexplained, Forget the Explained: Working Memory Limitations and Abductive Reasoning

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Abductive reasoning is the process of finding a best explanation for a set of observations. In many abductive problems, like medical diagnosis, an amount of information far beyond the capacity limits of working memory (WM) must be processed. On the basis of a computational model of abductive reasoning and of theories of text comprehension we propose a mechanism that reduces WM load during abductive reasoning. It suggests that only unexplained symptoms are kept in working memory, explained symptoms are transferred to long-term memory reducing WM load.

The availability of the mental representation of symptoms during abductive reasoning was examined in three experiments, each using a different memory test for symptoms presented during the task.

The results confirm that unexplained symptoms are more available than explained ones. But explained symptoms seem not to be represented in long-term memory, possibly due to the structure of the reasoning task we used.

CHANGE Awareness and Change BLINDNESS: The Roles of Ventral vs. Dorsal Streams

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Observers are surprisingly poor at detecting a change if it occurs during a brief visual disruption, such as a ‘flicker’ (“change blindness”, Rensink et al., 1997). Here we used functional magnetic resonance imaging (fMRI) to distinguish the neural correlates of change awareness from those of change blindness. Subjects were scanned while attempting to detect a visual change occurring during a screen flicker. Change awareness resulted in enhanced activity in parietal and right prefrontal cortex as well as category-selective regions of visual cortex (e.g., fusiform gyrus for changing faces). In contrast, when subjects were blind to the change, although there was some ventral visual cortex activity, the dorsal stream activations were clearly absent. These results demonstrate that conscious detection of visual change relies not only on regions of ventral visual cortex specialized for the visual category that changed but also on parietal and prefrontal cortex.

Selective Attention for Identification Model (SAIM): Modelling Data from Visual Search Experiments

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We have presented a computational model called SAIM, that accomplishes translation-invariant object identification by mapping inputs on the retina to translation-invariant “focus of attention” (FOA). The contents of the FOA are then identified by simple template matching. SAIM can account for a broad range of psychological phenomena on attention and following lesioning, the model mimics attentional disorders (Heinke & Humphreys (submitted)). In this paper we report on work that extends SAIM to model data from visual search tasks. The results show that SAIM can capture important aspects of findings in visual search experiments, including error rates on present and absent trials, search asymmetries, variations of search slopes with the salience of targets, and the search slope ratio between target absent and present trials. In addition, SAIM is capable of simulating the reaction time gain resulting from redundant targets and the violation of the Miller inequality. The theoretical implications of these results are discussed and related to concepts in stochastic modelling of visual search tasks.

Heinke, D. and Humphreys, G. W. (submitted) Attention, spatial representation and visual neglect: Simulating emergent attentional processes in the Selective Attention for Identification Model (SAIM), submitted to Psychological Review.

Causal Relations and Text Comprehension

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This paper deals with the understanding of causal relations between sentences. Causal relations can be described at different linguistic levels. At the semantic level, the relation exists between states of affairs in the world (“John came back because he loved her”). At the epistemic level, the relation exists in the mental activity of the speaker (“John loved her, because he came back”).

Two experiments are reported that show that epistemic relations require more processing time than semantic relations. Although these results are rather robust (see also Traxler et al. 1997), it is not quite clear how to explain them. One explanation is that epistemic relations involve subjectivity; another explanation is that epistemic relations require more inferencing; a third explanation is that epistemic relations do not describe facts. These different explanations will be contrasted with each other in a third experiment in which clause reading times are measured.

Visual Perception and Response Selection: A Psychophysiological Study

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To reveal the interaction between perception and action in the flanker congruency task, we recorded event-related potentials (ERP) and response force while subjects were presented with targets and flankers that varied on two dimensions (letter and colour). Choice responses were required to letters (Exp. 1) and colours (Exp. 2) using congruent, neutral, and incongruent conditions. Reaction times and error rates but not response force measures were influenced by congruency. The results for the lateralised readiness potential (LRP)—an index of selective hand activation suggested a premotoric locus of the congruency effect. Moreover, analysis of behavioural and electrophysiological measures separately for fast, intermediate, and slow responses indicated initial hand activation not to depend on flanker identity. These results clearly support the notion of a premotoric origin of the flanker congruency effect consistent with the assumption that response selection for simple features is constrained by perceptual processes (Cohen & Shoup, 1997).

Response Selection Factors in Visual Search

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Research on visual search has mainly focused on the role of visual attention in finding a target element among distractor elements presented in the visual field. Far less research has been aimed at unraveling the processing characteristics of elements that are not selected. In this talk I present several experiments that examine whether distractor elements that are most likely not visited by focal attention can nevertheless affect the reaction time to a target element. In order to investigate this issue, certain characteristics of the flanker task were introduced in visual search tasks. The

results of a number of experiments showed clear effects of compatibility of the distractor elements with the target. The implications of the results for a number of influential models of visual search are discussed.

Inspection-Time Effects in the Selection Task Using a Rule-Separation Paradigm

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Studies of performance on abstract versions of Wason's Selection Task have provided evidence that pre-conscious heuristics direct attention to relevant aspects of the problem and influence card selections. Evans (1996) employed computer-presented selection tasks with instructions for participants to indicate (using a mouse pointer) those cards under consideration. The 'inspection-time effect' observed (i.e., longer inspection times for selected cards) was taken as evidence for the heuristic account of task performance. Roberts (1998), however, claimed this evidence was artefactual in nature, arising from task-format biases. Three experiments by Ball, Lucas, Miles and Gale (2000), using eye-movement tracking to measure on-line attentional processes, challenge a purely artefactual account of the inspection-time effect. The present experiment further generalises the effect to a task format where rule and card presentations were separated such that participants were unable to devote processing time to rule re-inspection. Overall, our results provide good support for Evans' heuristic account.

Importance of Eye Position and Eye Movements in Auditory Localization

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A number of studies have demonstrated that localization of auditory targets is performed more precisely when a textured visual field is seen than in the dark, even though the sound source itself is not visible in either condition. While some authors suggested that visual cues provide a frame of reference to which auditory signals are referred (Frame of Reference hypothesis), others posited that visual cues only serve to stabilize eye movements which in turn help to update and stabilize auditory memory for location (Eye movements hypothesis). Using a pointing test, by the means of a laser pointer, we tried to see under which conditions, visual cues (LEDs) interact with eye position and eye movements in auditory localizing. Results showed that visual cues improved auditory localization performance only when subjects were allowed to fixate them. This suggests that visual facilitation of auditory localization is essentially mediated by eye position or eye movements.

Electrophysiological Examination of Attentional Constraints in Visual Information Encoding

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Two experiments are presented in which subjects were exposed to a rapid serial visual presentation of characters for detection of a low-frequency probe event (T2). In the first experiment, T2 was preceded at variable SOAs by a to-be-reported target event (T1) embedded in the stream of characters. In the second experiment, T1 was replaced with a double-pitch tone that required a speeded discriminative response. In both experiments, an attentional blink (AB) was found, T2 report accuracy was reduced at short SOAs. The behavioral pattern of results was accompanied by a sensitive modulation of the event-related brain potentials elicited by T2 presentation. In both experiments, the P3 component of the event-related brain potentials elicited by T2 was suppressed (Exp. 1) or reduced (Exp. 2) in amplitude at short SOAs. The results are discussed in relation to current hypotheses about the functional locus of the attentional blink effect.

The Influence of Practice on Abstractness of Content and Accessibility of Mental Operators

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Two important dimensions of mental operators are the abstractness of their content and their accessibility. To investigate the impact of practice on these dimensions, knowledge about alphabet-arithmetic operations ($A+2=C$) had to be used in one of three different ways by selecting the missing information if two elements of an operation were specified ($?+2=C$, $A ?=C$, $A+2=?$). To ensure item-specific learning, participants had to apply their knowledge to applications of four operators until response times for tasks involving a large distance (+4,-4) were equal to those involving a small distance (+2,-2). In a test phase, participants had to apply their knowledge to the same and new examples of operator applications. Performance was generally worse, if the start letter of an operator application had to be retrieved. For both other tasks, the correspondence of task and identity of letters were independent sources of improved performance. The implications for theories of knowledge representation will be discussed.

The Role of Stimulus Colour Consistency in Negative Priming

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To focus attention on a specific location, object or image in a visual scene is a most basic cognitive task. Such selectivity of attention can be studied using the negative priming paradigm which is

deemed to index the consequence of selection. In the present experiment negative priming was observed for pictures of everyday objects which subjects identified by colour naming. Negative priming occurred, both when the colour of the ignored item on the prime was the same on the probe display (consistent trials) and when the colour of the ignored item differed between prime and probe displays (inconsistent trials). The present findings are consistent with Houghton and Tipper's (1984) inhibitory approach which sees inhibited representations as central, abstract and neutral in terms of colour. However these data refute involvement of feature mismatch (Park and Kanwisher, 1994) as significant negative priming was obtained when no stimulus features changed between prime and probe.

The Roles of Salience and Strategy in Conjunction Searches

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In conjunction searches, there are two types of distractors, each sharing one feature with the target. Manipulating the relative number of elements in the two groups reveals that participants do not search exhaustively through the entire display, but limit their search primarily to one type of distractor. In some cases they can search through the smaller group, while in other cases search is limited to those elements with a particular feature. With large dense arrays, participants could search through the smaller of two groups even when the discriminability of one of the target's features was greatly reduced. Further, when one of the distractor types predominated across trials, participants limited their search to the objects that were generally less common. Together, these experiments show that conjunction searches can be guided primarily by bottom-up salience, but that top-down expectations can drive flexible responses that make search more efficient.

Conditional Reasoning, Semantic Memory Retrieval, and Mental Models: Testing and Developing the 'Semantic Memory Framework'

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This study tests the core assumptions of a framework that explains the effect of alternative and disabling conditions (Cummins, D. D. 1995. *Memory & Cognition*, 23, 646–658) on causal conditional reasoning. The framework is based on the mental models theory and proposes a mechanism for retrieving information from semantic memory while reasoning. In Experiment 1A, recording reaction times in a replication of Cummins' inference study showed that MP and AC inferences took longer when additional model construction was hypothesized. This supported the assumption that additional falsifying mental models are constructed for conditionals with many disabling or alternative conditions. In addition, results for MT and DA indicated that the available number of alternatives and disablers can affect the order in which additional models are constructed. Experiment 1B supported the assumption that construction of additional models depends on the result of a semantic search process. Efficiency of memory retrieval was measured

by a limited time, disabler generation task. Consistent with the framework's predictions, better disabler retrieval was related with lower acceptance of the MP and MT inferences.

Top-Down and Bottom-Up Control of Visual Selection

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In order to understand how we select relevant information from our environment, we have to address the issue of attentional control. Goal-directed control occurs when priority is given to stimuli that are in line with the observer's goals. Stimulus-driven control occurs when selection takes place irrespective of the observer's intentions. In this talk I will provide an overview of studies providing evidence that early in processing both attention and eye movements are under stimulus-driven control. Visual search studies show that attentional allocation is entirely based on the salience of features. Eye movement studies show that not only attention is captured by the most salient element; also the eyes tend to go to there, even though subjects are not aware of this. In line with neurophysiological evidence we suggest two parallel pathways: a reflexive subcortical pathway depending on the superior colliculus, and a 'top-down', cortical pathway depending on the frontal eye fields.

Factors Affecting Cognitive Change: Follow-Up Studies of the Scottish Mental Survey 1932

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On June 1st 1932 all children born in 1921 and attending school sat the same mental ability test. This cohort formed the Scottish Mental Survey 1932 (SMS1932). We are following up members of the SMS1932 in the Aberdeen and Edinburgh areas. To date, over 500 people have been recruited and there are medical, physiological and psychological data on these people who are now almost 80 years old. A subsample of about 80 people have had structural MRI examinations of their brains. In this presentation we report associations with individual differences in cognitive change over the period from 11 to almost 80 years. These factors include demographic, lifestyle, medical, brain structural and genetic variables. The aim of this part of the follow-up project is to identify those factors, after controlling for early life IQ, that predict mental ability level in old age.

Age, Emotions and Intelligence

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The frontal lobes of the brain show adult age-related decline earlier than other brain areas, and are known to be involved in emotional processing. The current studies investigate the effects of age on emotional processing. In the first study (n = 60), the age changes in scales designed to assess 'emotional intelligence', other emotional processing measures, and fluid and crystallised intelligence were assessed. There was age-related stability in the ability to understand and interpret emotions, despite correlations with fluid intelligence. However, an age decline in ability to attribute theory of mind to others was noted. A second study (n = 90) is currently being analysed out to examine the relationship between a larger battery of emotion measures and cognitive and neuropsychological changes with age. These results again indicate age stability in emotion-related problem-solving. Neuropsychological and sociocognitive explanations for these results will be considered.

Quality of Life and Cognitive Functioning in Older Adults

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The aim of the present study was to examine the relationship between health, cognitive functioning and quality of life. A sample of participants was drawn from an existing database of 15,411 individuals who took part in an epidemiological study in Paisley between 1972 and 1974. This study investigates correlations between previous health risk factors (such as blood pressure, smoking and cholesterol), current cognitive functioning, and perceived quality of life. Adults aged over 70 have been tested on a large battery of tests including traditional measures of intelligence and cognitive functioning, and 'real-world' problem solving, and the relationship between these cognitive indicators and quality of life was also investigated. In the currently tested sub-sample of 50 individuals an association between intelligence measures and real world problem solving was found. There was also a strong relationship between previous health risk factors (blood pressure and cholesterol) and perceived quality of life.

Age-Related Differences in Strategy Use and Execution in Currency Conversion Tasks: Case Studies of French Franc to Euro and Euro to French Franc Conversions

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Younger and older adults were taught new strategies for converting into Euros amounts presented in French Francs, or into French Francs amounts presented in Euros. The choice/no-choice method was used to obtain information on how often each newly learned strategy was used as well as information on the speed and accuracy of strategy use. The results showed that both younger and older participants (a) could learn new conversion strategies and accomplished currency conversion tasks fairly easily, (b) used them unequally often, and (c) had strategy preferences that were justified by the relative ease of execution of each strategy. Implications of these

results for understanding how people accomplish currency conversion tasks and aging effects in strategic aspects of cognitive performance are discussed.

Processing of Foveal and Parafoveal Word Information: Parallel or Serial?

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In reading, our eyes move along the line of print with a series of saccades separated by eye fixations. On each of these fixations, information from a set of letters is available for processing, and in most cases, the letter information concerns both the foveal and parafoveal words. The question then arises as to whether the system processes the letters from both foveal and parafoveal words in parallel or serially on the basis of a selective-attention mechanism. To investigate this issue, we conducted a series of experiments in which subjects were presented with pairs of orthographically (un)related words that were displayed respectively in foveal and parafoveal vision. Subjects were asked to read both words while their eye movements were registered. Fixation times on the 'foveal' word were measured in the different conditions. Preliminary results indicate the presence of parafoveal-on-foveal effects, which favors a parallel hypothesis.

Parafoveal Error-Detection

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Eye movements were monitored as participants read short sentences like (1) for comprehension.

(1) Il repare la chaine de velo avec un tournevis. (He is mending the bicycle chain with a screwdriver).

Hereafter, 'chaine' will be referred to as N1 (first noun), 'de' as prep. (preposition), and 'velo' as N2 (second noun). In half the cases, a typographical error was formed by replacing the first letter of N2 with another letter (typo condition). The changed letter-string was invariably a non-word. The familiarity of the initial bigram of N2 was maintained constant in the non-typo and typo conditions. A contingent presentation procedure ensured that the error was present only while the eyes were left of the boundary between the preposition and N2. The first fixation recorded on N1 was significantly shorter in the typo condition than in the no-typo condition, although no significant typo effect was obtained for the first fixation duration when more than one fixation was made. These results will be interpreted in the framework of the parafoveal-on-foveal cross-talk hypothesis (Kennedy, 2000).

Kennedy, A. (2000). Parafoveal processing in word recognition. *Quarterly Journal of Experimental Psychology*, 53A, 429–455.

Parafoveal Pragmatics Re-Visited

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The time taken to verify that a pair of sentences are physically identical shows a strong effect of pragmatic plausibility. For example, Murray (1998) showed that inspection time on the verb of sentence pairs containing a plausible rather than implausible NP1-V relationship (e.g., 1 rather than 2) was shorter. In addition, his data also suggest that time on the noun phrase itself was shorter when the (as-yet unfixated) verb provided a more plausible continuation of the sentence.

(1) The hunters stacked the tulips The hunters stacked the tulips (2) The bishops stacked the tulips The bishops stacked the tulips

This paper replicates Murray's initial experiment with a control for the visibility of the verb. Unsurprisingly, if the verb is masked until directly inspected the parafoveal-on-foveal effect is removed. However, masking in this task produces theoretically interesting side-effects: the obtained plausibility effect on the verb itself disappears and parafoveal-on-foveal effects, not evident in normal presentation, are revealed.

Murray, W. S. (1998). Parafoveal pragmatics. In G. Underwood (Ed.). *Eye guidance in reading and scene perception* (pp 181–199). Oxford: Elsevier.

On Processing of Meaning from Parafoveal Words in Reading

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To what extent do readers process the meaning of words to the right of their fixation in reading? The fact that about a third of the words in text are skipped (with highly predictable content words being skipped more than unpredictable words) is consistent with the idea that the meaning of a parafoveal word is processed when it is skipped. More interesting is the issue of the extent to which the meaning of a parafoveal word is obtained when it is not skipped. There are basically two issues: (1) to what extent is meaning obtained from word n+1 (when the eyes are on word n) on the subsequent fixation? and (2) to what extent does the meaning of word n+1 influence the processing of word n? These issues, which have typically been discussed in the context of (1) preview benefit effects and (2) parafoveal-to-foveal effects, will be discussed along with relevant data.

Use of Semantic Knowledge on Sentence Comprehension in Brain-Damaged Patients

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Disturbances of knowledge activation are recently (Chiarello, 1998) discussed as one possible property of right fronto-temporal lobe damage. The study concerns the question if such brain-damaged patients show in comparison to control subjects a lower degree on knowledge activation on sentence comprehension. The subjects had to read a sentence and afterwards a probe word. In a recognition task the subjects were required to decide whether or not the probe word

had been part of the sentence. We varied the existence and the type of semantic relation between sentence and test word (prospective vs. retrospective). A knowledge activation should lead to a delay on rejection of negative but semantic related probe words. The following result is most interesting: Subjects with right hemisphere damage produced no delay effect and subjects with left hemisphere damage produced a stronger delay effect than control persons without damage.

Response Selection Causes Inhibition of Task Sets in Task Switching

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Shifting tasks causes costs when compared to repeating tasks. We explored the role of response selection for such shift costs. In Experiment 1, we varied task preparation time but also introduced unpredictable no-go trials that did not require responses. After go-trials, both strong task preparation effects and shift costs occurred. After no-go trials, however, preparation effects remained but shift costs were totally absent. This implies that response selection is critical for shift costs to occur. In Experiment 2, we further explored the mechanisms of response selection by adding a third task. This was done to examine “backward” inhibition of task set when shifting back to a recently abandoned task. The data revealed both preparation and inhibition effects after go-trials, but no inhibition after no-go trials. Together, the data suggest that shift costs are, at least partly, due to inhibition of competing task sets in order to control response selection.

The Role of Mental Imagery in the Phenomenon of False Memory

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Deese (1959) showed that people tend mistakenly to recall a nonpresented target word (e.g., “needle”) when they have been asked to remember a list consisting of words that are highly associated with the target word (e.g., “thread”, “pin”, “eye”, etc.). Roediger and McDermott (1995) found that in this paradigm nonpresented target words yielded a high false-alarm rate in a subsequent recognition test. It has been suggested that this phenomenon of “false memory” arises from the use of mental imagery to elaborate the list items, but the evidence for this is ambiguous. An experiment is described in which the participants carried out a conventional false-memory experiment and were then asked to complete a postlearning questionnaire in which they reported the different kinds of mediating strategy (i.e., imagery, verbal, repetition, other, or none) that they had employed to remember each of the original items. Unbeknownst to the participants, however, the postlearning questionnaire contained both presented items and the nonpresented target items. The results shed light on the processes responsible for the false memory phenomenon and on the validity of retrospective mediator reports.

What Makes Simultaneous Interpreting So Hard?

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Simultaneous interpreting is a difficult task in which the interpreter is routinely involved in comprehending, translating and producing language at the same time. It is suggested that three aspects are major sources of its difficulty: to comprehend and produce speech at the same time, to reformulate a message and to do so in another language. In this study we tried to disentangle these three aspects of interpreting. We compared repeating sentences (shadowing), reformulating sentences in the same language (paraphrasing) and translating sentences. Subjects performed these tasks either immediately after each sentence was finished or while listening to the sentence (simultaneous). We measured task performance, ear-voice span and recall of the stimulus sentences. Preliminary analyses suggest that simultaneity of stimulus and response on its own can be dealt with. Combined with translation, however, performance drops. Interestingly, recall appears to show the opposite pattern.

View-Specific Priming and Parietal Damage

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Based on results of experiments conducted with normal participants Stankiewicz, Hummel and Cooper (1998) argued that attention is necessary to create a view-invariant structural description of an object's image. To further address this issue we tested hemineglect patients in experiments where they saw on each trial two objects presented successively and had to name the second object (experiment 1) or to decide if the objects had the same or a different name (experiment 2). The second object could be identical, a left-right reflection of the first picture, a different exemplar or a different object. In experiment 1, priming was found for identical stimuli but not for reflected items. In experiment 2, patients were impaired for reflected items compared to identical stimuli. No such difference was found for controls in either experiment. These results provide new evidence that attention is important to allow object recognition to be viewpoint invariant.

Eye Movements and Attention Shifts As Disrupters in Spatial STM: Evidence from Corsi Span

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The Corsi blocks procedure (De Renzi & Nichelli, 1975) has been widely adopted as a measure of spatial short-term memory in both experimental and applied settings, but the nature of the cognitive mechanisms employed by participants to encode and maintain spatial information during the task remain unclear. A series of experiments will be reported which have examined the effect of a range of secondary tasks on Corsi span, including continuous and saccadic eye movements, attention shifts without eye movements, concurrent hand movements, saccadic eye movements without visual input, concurrent articulatory suppression, and dynamic visual noise. In all conditions participants eye movements were monitored using EOGs to establish that they were complying fully with experimental instructions. On the basis of the results of these experiments it will be argued that current theories of rehearsal in spatial short-term memory may have underestimated the importance of cognitive systems related to oculo-motor control.

The Influence of Temporal Connectives on Language Comprehension

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In the literature, there is much controversy concerning the specific role of connectives and their contribution to language comprehension (cf. Millis & Magliano, 1999; Townsend et al., 1997). This study investigated the influence of temporal connectives (before, after) on the comprehension of semantic relatedness between word stimuli. Participants were given event- feature pairs with or without temporal connectives (e.g., after heating-% warm (Exp. 1); heating-warm (Exp. 2)) and had to recognize whether or not they were meaningfully related. The temporal orientation of items (chronologic, reversed), and the answer condition (semantically related, unrelated) were manipulated. The pattern of results indicates that the connective condition was higher in processing difficulty (recognition times, error rates) than the non-connective condition. The results are consistent with the findings of Millis, Graesser, & Haberlandt (1993) for expository texts. Implications for models of how connectives influence language comprehension are discussed from the perspective of resource limitations, elaborations, and the semantic compatibility of the connectives to the information given.

Intention and Reaction

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Most movements made in every day life combine intentional actions and reactions. Norman and Shallice's (1986) Supervisory Attentional System (SAS) suggests a framework for the interrelation of the putative intentional and reactive motor systems. The SAS can interrupt ongoing reactions to stimuli, allowing intentions to cause willed action.

Other plausible relationships between intention and reaction include mutual facilitation, inhibition and competition (e.g., switching).

Experiments involving subjects producing identical motor responses with different causes (intention or reaction) indicated that when subjects prepare intentional actions and are forced to react by randomly presented truncating stimuli, an RT cost of 54 ms. is incurred. This has been termed the RT cost of Intention (truncated RT-SRT). Possible causes have been examined. The effect has been localised to motor preparation rather than stimulus processing. It is suggested that this RT cost is due either to switch costs or inhibitory links between the intentional and reactive motor systems.

Are There Different Sensory Representations in Mental Imagery?

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The ability to generate and manipulate visual images is the focus of most research on mental imagery. Less attention is reserved to mental representations based on sensory modalities other than the visual one.

The goal of this study is to address the issue of intermodal mental image generation. Representations generated by verbal cues referring to the five senses so as to create somatic and motor images were assessed by means of a self-evaluation questionnaire of 90 items (10 related to each of the sensory modalities and 20 related to abstract concepts). Subjects were requested to indicate the principal sensory modality implied in each item and the vividness of each image. These data were compared to fMRI results collected by means of the same items (M. Olivetti Belardinelli, C. Del Gratta, R. Di Matteo, A. Ferretti, G. Romani, 2001). Results show the existence of intermodal modalities in imagery and of concepts not tied to a specific sense.

Restrictions on Listener Modelling In Language Production

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Speakers are thought to tailor their utterances to internal representations of the listener's needs, except under time or task pressure[1]. If listener-modelling also competes with obligatory processes in language production, then the faster-cycling processes should be less listener-friendly. Pronunciation is planned in smaller, faster cycling units (syllables or phonological words) than form of referring expression (syntactic or intonational phrases)[2]. Both were examined in spoken references to landmarks by 64 undergraduates conducting a route communication task around maps which independently manipulated speaker and listener knowledge. The usual acceleration of pronunciation with repeated mention [3] ($p < 0.005$) was unaffected by an intervening change in listeners, overt negative feedback, or inferrable knowledge of the landmark. The usual simplification of referring expression over mentions [4] was blocked only when listeners changed. If pronunciation and phrasal construction permit no and little on-line listener-modelling respectively, then listener-modelling may not be pervasive in language production.

[1] Horton, W., & Keysar, B. (1996). *Cognition*, 59, 91.

[2] Smith, M, & Wheeldon, L (1999). *Cognition*, 73, 42.

[3] Fowler, C., & Housum, J. (1987). *JML*, 26, 489.

[4] Ariel, M. (1990). *Assessing noun-phrase antecedents*. London: Routledge.

A Hierarchy of Attentional Systems: Evidence from the PRP Paradigm

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The concept of selective attention has been used in a variety of contexts. Is there a single mechanism used in multiple cognitive contexts, or are there multiple mechanisms of attention?

One paradigm where this question can be explored is known as the Psychological Refractory Period (PRP) paradigm. Previous findings with this paradigm indicated that spatial attention (as measured by spatial cueing tasks) can be done concurrently with selection for action, suggesting that action-related selective attention and space-related visual attention are distinct.

In this study we use the PRP paradigm, and provide evidence that attention for color (as measured by a color cueing paradigm) can also be done concurrently with action-related selection. In

contrast, resolving color-based response incompatibility cannot be done concurrently with selection for action. The combined set of findings suggests that there are separate lower-level visual attention (for color, space and possibly other attributes), and higher-level attention for action.

The Role of Working Memory Capacity and Inhibitory Processes in Retrieval

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The role of working memory capacity in retrieval has been reported by Rosen and Engle (1997) in several experiments. They argued that the retrieval process is relatively automatic for the low-span participants, whereas it is more controlled for the high-span participants. In a series of experiments, we tested high and low working memory-span participants in a category fluency task under single-task or dual-task conditions.

Both low spans and high spans showed a decline of the performance in the verbal fluency task, which suggests that the difference should not be interpreted in terms of controlled or automatic process. Analyses of the number of repetitions made during the fluency task indicate a role for attentional processing at retrieval. More precisely, the results suggested a role of inhibitory process. We discuss the findings in terms of strategies of inhibition, which are different for the low-span and the high-span participants.

A Psycholinguistic Approach to the Feeling of “Comfort”: From Semantics to Psychophysics

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Our investigations on multimodal perceptions (auditory, kinaesthetic, vestibular, visual) (Dubois, 2000) lead us to challenge the psychophysics paradigm used in the investigation of subjective judgements. We present the results from a method of investigation that starts from a morphosyntactic and lexical analysis of 300 subjects' verbal reports of their feelings of “comfort” in an ecological setting. We found that

1. The different modalities contrast in subjects' involvement and distance from the stimulation: kinaesthetic stimulations integrate subjects' experience within the environment whereas acoustic and visual informations are rather processed as standing “out there” in the world.
2. Subjective evaluations highly depends on subjects' activities (sitting, standing up or walking).
3. Judgements depend on changes in states or events rather than on single modality stimulations.

Our results challenge a modular conception of cognition mainly borrowed from visual research and entail further methodological consequences in designing ecological experimental settings.

Dubois, D. (2000) Categories as acts of meaning: the case in olfaction and audition. *Cognitive Science Quarterly*, 1, 35–68.

(This research has been conducted in collaboration with F. Quentin, research Department, SNCF (French Railways))

On the Mechanisms of Selective Attention: Engaging Inhibition Impairs Distractor Rejection

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The hypothesis that rejection of perceived yet irrelevant distractors involves active inhibition was tested. We assessed the effects of engaging response inhibition mechanisms in one task (either a stopping task, e.g., Logan, 1981, or a task involving responses that are spatially incompatible with the target, e.g., Kornblum et al., 1990) on subjects' ability to ignore irrelevant distractors in a subsequent selective attention task. Greater distractor interference was found following stopped (vs. 'go') responses, and following spatially incompatible (vs. compatible) responses. Since both stopping responses and executing spatially incompatible responses are assumed to engage inhibition (of 'go' responses in the former, and of spatially compatible responses in the latter case) these results suggest that rejection of irrelevant distractors depends on the availability of inhibition mechanisms. These inhibition effects were found in situations of low but not high perceptual load suggesting that inhibition was required for suppressing only responses to perceived distractors (e.g., Lavie, 1995).

Non-Integration of Spatial Memories: Evidence for Exclusivity of Recall

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In reasoning about an object's location, how do we integrate spatial information from multiple sources? Theoretically, combination of memories is most commonly modelled as independent. However, exclusivity and redundancy are theoretical alternatives (Jones 1987).

Several experiments are reported where the location of a target on a horizontal plane in a simulated surveillance task is presented in relation to left or right anchor points separately. Retrieval is cued either by a single anchor point or with both present as a composite. Using estimates of recall to single anchors, predictions for recall to both anchors are made and tested for each model of combination. Results show that only one model—exclusivity—can predict the outcome: Participants are unable to access two spatial memories concurrently or even resample memory after one attempt to recall has failed; even if further information is available in memory. The theoretical consequences of this finding are discussed.

Imaginary Memories

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New studies show the power of imagination and suggestion to make people believe that they have had experiences that they didn't have. People have been led to remember nonexistent events from the recent past, non-existent events from their childhood, and even non-existent events from the day after they were born. They can be led to falsely believe that they have had familiar experiences, but also rather bizarre or implausible ones. These findings fill in our understanding of the rather flimsy curtain that separates imagination and memory.

Dissociation and Self-Reports of Childhood Trauma

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The idea that individual differences in dissociative tendencies critically depend on a history of trauma is almost an article of faith. In this presentation, we summarize evidence that cast doubts on this view. It is argued that high scores on the Dissociative Experiences Scale are accompanied by fantasy proneness, heightened suggestibility, and susceptibility to pseudomemories. These correlates of dissociation may promote a positive response bias to retrospective self-report instruments of traumatic experiences. Thus, the possibility that dissociation encourages self-reported traumatic experiences rather than vice versa merits investigation.

Memory Distortion and Dissociation: Exploring the Relationship in a Student Sample

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There is a growing interest in the relationship between the tendency to have dissociative experiences and performance on several cognitive tasks, in particular the susceptibility to memory distortions. Participants are shown a video of a crime and then are given a postevent questionnaire that has several misleading questions. Later, participants are questioned about the event and the sampled showed a large range in susceptibility to the postevent misleading information. This susceptibility was related to their responses to a dissociative experiences questionnaire (based on the DES) designed for non-clinical populations. Implications for both eyewitness accuracy and theories of memory distortion are discussed.

Tracking False Beliefs and Memories About the Past

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A series of studies were conducted to examine the effects of base rate information about the likelihood of a childhood event on the perceived likelihood that an event had taken place. In the first test session (Day 1), participants were individually asked to complete a Life Event Inventory (LEI). They were told this was part of a study on the development of reliable questionnaire measures of life events and that they would be completing several questionnaires over a course of the next few weeks. One week later, participants were exposed to 3 critical events (earthquake, tooth extraction and skin test). One event was merely exposed, a second was an event for which they received information suggesting the event was very likely to have happened to them and a third in which they were told the probability that they could have experienced the event was low. A week after exposure to the critical events, participants were given the LEI to complete again and also asked to describe any memories for a sample of events from the LEI including the critical items. All participants were then asked to complete the VVIQ and DES. Discussion will focus on the effects of mere exposure and base rate information on the development of false beliefs about critical events on the LEI.

Crashing Memories and Reality Monitoring: Distinguishing Between Perceptions, Imaginations and False Memories

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Research has shown that the memory characteristics questionnaire (MCQ) can be used to discriminate between 'memories' of perceived events and 'memories' of imagined events. The present study extended this research by examining the utility of the MCQ in distinguishing the 'memories' of participants who erroneously claim to 'remember' an event which they could not have witnessed (a non-existent film of the car crash in which Diana, Princess of Wales was killed). The MCQ ratings of three groups of participants were compared: (1) those who indicated that they had seen the non-existent film, (2) those who were asked to imagine having seen the film and (3) a control group who were asked to rate their memory of when they first heard the news of the crash. Analysis revealed that scores on only one of the eight MCQ subscales differed significantly between two groups of participants (control vs. imagined). Implications are discussed.

Creating a Past That Never Was (Discussion)

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Discussion

The Role of Global Top-Down Factors for Eye Movement Control in Reading

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Although it is beyond doubt there are top-down, “strategic” influences on information processing and eye movements in reading, their nature and role is not well understood. An analysis of about 100 experiments suggests there are two major sources of variation: the reading task used (simple verification tasks vs. complex comprehension questions) and the format of the material (single sentences vs. coherent text). These factors were studied in an experiment using a 2×2 design including a nested 3×3 variation of word length and frequency for one target word per sentence. On top of to-be-expected results (e.g., difficult tasks slow down reading) top-down factors turned out to have substantial effects on local fixation patterns. In semantically demanding reading, initial fixation positions are shifted to the left and the size of word frequency effects on reading time measures is markedly increased. These results are theoretically significant and can also help to sort out seemingly contradictory data from different laboratories.

Parafoveal Processing: Distinct Subsystems for Spatial and Linguistic Information

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Three experiments examined readers’ use of parafoveal word length in reading. The length (number of constituent characters) of a parafoveally previewed target word was manipulated in all experiments so that it was either accurately or inaccurately specified. In Experiment 1, parafoveal previews also either revealed or denied useful orthographic information. In Experiments 2 and 3, parafoveal targets were either high- or low-frequency words. Eye movement contingent display changes were used to present the intact target upon its fixation. Examination of target viewing durations showed completely additive effects of word length and orthographic information in Experiment 1, viewing durations being shorter in the accurate length and the orthographic preview conditions. Experiments 2 and 3 showed completely additive effects of word length and of word frequency, target viewing being shorter in the accurate length and high-frequency conditions. Together these results indicate that distinct subsystems control the use of spatial and linguistic information.

Word Skipping in Reading: On the Interplay of Linguistic and Visual Factors

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Data of an eye-tracking experiment will be reported in which target words of 2 and 4 letters were presented in sentences that strongly raised the expectation of a particular word. There were three possible conditions: either the expected word was presented, an unexpected word of the same length, or an unexpected word of a different length (all continuations were grammatically acceptable; the latter two were just difficult to predict). Our purpose was to test one of the core

assumptions of the Extended Optimal Viewing Position model of eye guidance in reading (Brysbaert & Vitu, 1998). This model states that word skipping is mostly a function of the length of the upcoming word. This leads to the prediction that expected and unexpected continuations will not differ greatly if the target words have the same length, and that an unpredicted word may be skipped more often than a predicted word if it is shorter.

Brysbaert, M. & Vitu, F. (1998). Word-skipping: Implications for theories of eye movement control in reading. In G. Underwood (Ed.). *Eye guidance in reading and scene perception* (pp 125–147). Oxford: Elsevier

On the Nature of Cognitive Influences on Saccade Onset Times During Reading

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The eye fixation duration is a frequently used behavioural indicator of aspects of perceptual and cognitive processing. There is ample evidence that cognition influences saccade onset times, and, hence, fixation durations. In this paper, we consider the nature of this influence, comparing current cognitive models of eye movement control in reading with a new competition-interaction model. We argue for: (a) a prominent role of a visuo-oculomotor strategy rather than cognitive events in triggering saccades, (b) cognitively-tunable parameters controlling the strategy, (c) processing-difficulty-induced inhibition (or fixate centre activation), and (d) a race between movement activation and inhibition signals, as the primary bases for determining saccade onset times. Implications for using eye movement recording as a basis for studying language processing in reading will be considered.

Intentional Coding Can Reverse Spatial Cross-Task Compatibility

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Performing a perceptual identification task followed by a reaction task is known to produce response postponement with short interstimulus intervals (Jolicoeur & Dell'Acqua, 1998). In the present study, an additional spatial cross-task compatibility variation was introduced by using a lateral stimulus movement for later verbal report in a perceptual task and a lateral finger movement as response in the logically independent reaction task. Experiment 1 replicated the response postponement effect but also showed shorter reaction times with cross-task compatibility (CTC). Experiment 2 changed the encoding instruction by asking subjects to report the origin rather than the direction of the perceptual stimulus movement. This changed instruction resulted in a significant reversed CTC effect. Together, the data suggest that CTC results from interference between encoding perceptual task information and retrieving response task information. Intentional coding strategies affect the representations that are functionally effective.

Influence of Reasoning Mode, Form and Order of Premises in Conditional Reasoning

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According to Girotto, Mazzocco and Tasso (1997) 16- to 19-year olds studying sciences perform better on modus tollens when the minor premise is presented first. Evans, Handley and Buck (1998) do not observe the same results in older subjects. Evans, Legrenzi and Girotto (1999) claim that the form of the major premise (universal vs conditional) has no influence on psychology undergraduates' performances.

In this paper we examine systematically the influence of reasoning type (MP vs MT), order and form of premises in all 16- to 19-year olds:

1. subjects solve modus tollens problems as well as modus ponens ones;
2. the reverse order of premises influences reasoning capacity negatively;
3. the conditional form of the major premise influences reasoning capacity negatively.

The first observation suggests that our subjects use a biconditional mode of reasoning. Our study suggests the relevance of links between linguistic content and mental model theory.

Blinks of the Mind: Memory Effects of Attentional Processes

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The Attentional Blink (AB) is a recently described phenomenon showing strong restrictions of our capacity to attend to incoming information. In the AB paradigm, identification of a first target produces a sustained reduction in the ability to identify a second, the period of interference lasting for several hundred milliseconds. Although subjects are often unaware of targets falling within an AB, some unconscious processing of 'blinked targets' cannot be ruled out. In three experiments we measured the level of unconscious processing of words falling within an AB, using implicit memory tests. Combinations of two words were presented at varying stimulus onset asynchronies (SOA), and attention was systematically manipulated. The preliminary results show no perceptual priming for blinked items, but normal conceptual priming. This suggests that the meaning of a word falling within an AB is still being processed, while at a perceptual level processing of the item is wiped out completely.

Anticipating Self- and Other-Generated Action Effects

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According to the "common coding-principle" (cf. Prinz, 1997), the perception of action effects should activate at least some of those representations that are activated in action planning, too.

Insofar as these representations are sufficiently interindividually different and intraindividually consistent, the above hypothesis can be tested by a comparison of the perception of one's own action effects versus the perception of another subject's action effects. For this purpose, it is necessary that the ordinary temporal contingency between the execution of one's action and the occurrence of its action effects is excluded. In three experiments, a temporal or spatial anticipation of spatially defined events was demanded. These consisted in direction changes within self-generated (writing) movements or those of another participant. Though a distinct anticipation performance in the case of self-generated movements could be observed only under specific conditions, the results give evidence that the perception of action effects does activate action representations.

Move Evaluation and Strategy Development in Problem Solving

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Three groups of participants solved a five-ring Tower of Hanoi (TOH) problem whilst evaluating each move in a different way. Participants were then asked to solve the same problem again whilst engaged in one of three secondary tasks. The results of this study show that solutions to TOH problems tend to be affected to the greatest degree by very simple tasks thought to affect the ability to articulate verbally. However, this effect only exists for participants who originally evaluated moves explicitly (i.e., by giving an explicit verbalised reason for every move. Apparently more complex secondary tasks affecting central executive processes have smaller effects. In contrast, visual suppression tasks affect those solutions where each move was initially evaluated using a simple good/poor criterion. These findings suggest that different types of move evaluation can engender different forms of learning. Solutions to such problems, when they rely upon explicit strategies appear to depend upon the ability to plan and this is disabled when secondary tasks are administered which affect this process. Implicitly evaluated solutions are affected by visual secondary tasks but not by verbal or by central executive tasks. This suggests that the effects of evaluation and verbalisation may not be as straightforward as some researchers suggest. In particular, different forms of verbalisation may give rise to fundamental differences in learning and in the strategies that subsequently arise from this.

Further Investigation into the Perceptual Load Theory Utilizing Interference and Negative Priming

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Previous research has shown a relationship between perceptual load, interference, and negative priming (Lavie & Fox, 2000). Interference and negative priming were found during low, but not high load conditions, and distractors always appeared more than 1° from the target. The present experiment attempted to replicate Lavie and Fox's (2000) experiment four when the distractor appeared 0.5° from the target.

A strong version of perceptual load theory hypothesizes that interference and negative priming would occur during the low load, but not the high load condition. A weaker version predicts

that the distance between the target and distractor could override perceptual load when they appear close together. Interference was found for the low load and not for the high load condition. Negative priming was observed for both low and high load conditions when the distractor was near (0.5°).

This indicates that prime and probe trials may be measuring different attentional processes.

The Processing of Emotional Facial Stimuli in Anxiety Based on the Inhibition of Return Paradigm

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The inhibition of return paradigm (Posner & Cohen, 1984) is said to have occurred when there is a delay in returning to a previously attended location. There is evidence that anxiety is related to biases in selective attention (Williams, Watts, Macleod & Mathews, 1997). Thus the current study considers the relationship between the inhibition of return paradigm and anxiety. High and low social anxious were randomly allocated to either a negative (i.e., filming) or neutral (i.e., no filming) mood manipulation condition and were tested on the inhibition of return paradigm. Emotional and neutral facial stimuli served as cues and innocuous targets were presented either in the same location as the cue (valid trials) or in the opposite location (invalid trials). It was predicted that anxious participants would be quicker on valid trials and slower on invalid trials following threat-related cues in comparison with low anxious individuals. Effects of the mood manipulation were also investigated. Contrary to predictions, experiment 1 revealed an overall slow response rate to targets following valid cues compared to invalid trials, and this did not interact with valence. Preliminary results revealed high anxious subjects responded quicker to targets following threatening stimuli in the neutral mood compared to low anxious subjects, $t(26) = 9.88, p < 0.05$. Two further studies are underway in which schematic facial stimuli rather than pictures of real faces are employed as cues.

A Mental Model Theory of Arithmetic Word Problem Solving

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Arithmetic word problem solving requires individuals to construct a representation of the situation the text describes and to find some unspecified values. We have recently developed a mental model theory that specifies the structure and content of the representations used by children and adults to solve word problems. Two experiments will be presented which tested two main predictions issuing from this theory. First, the hypothesized structure of the representation elicited by the text predicts which strategy individuals will use to solve a given problem and when they will perform calculations during reading. A new paradigm based on an operand recognition task allowed us to confirm these predictions. Second, in line with one of the main assumptions of the mental model theory, we verified that the representations used to solve problems do not preserve the verbatim details of the text but only the relational structure of the situation it describes.

Study of the Temporal Processing in Schizophrenia Using Non-verbal Complex Auditory Sequences

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In this study, schizophrenics were compared to Controls in temporal auditory processing tasks which measured listeners' abilities to: 1) segregate a complex sequence into auditory streams, 2) focus attention on one stream by the use of a pregiven cue, 3) detect local temporal irregularities within a stream. All the auditory sequences presented were composed of up-to-three simultaneous isochronous subsequences of different event rates (tempi).

The lowest level of processing examined here—stream segregation—appeared to function equally well in patients with schizophrenia as in our controls. However, attentional focusing was less efficient in schizophrenics, illustrated by the impaired use of contextual information (pregiven cue). Moreover, schizophrenics were also less sensitive than controls in the detection of small temporal irregularities within streams on a large band of tempi. These results may therefore be interpreted as being in favor of the hypothesis of higher-level deficits (focal attending and time processing) in schizophrenia.

Visual Chunking in a Connectionist Model: Behavioural Data and Eye-Movements

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We present a connectionist network that integrates relevant aspects of object recognition, long-term memory and dynamic binding to model the highly flexible process of generating a complex scene representation in working memory. Based on the recognition process, sensory information is temporarily linked to concepts in LTM. This forms a dynamic entity, which can be held in memory, while other processing takes place. In this work we focus on the chunking mechanism of the model. By this mechanism, a complex object divided into many segments prior to classification can be 'compressed' into one cognitive entity due to LTM but by losing a certain amount of resolution. We present an experiment where we used the short-term encoding of object part locations to determine the remembered amount of resolution. The behavioural data as well as the recorded eye-movements support the predictions of the model.

Syllogistic Reasoning and Cognitive Aging

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Gilinsky and Judd (1994) demonstrated that age-related impairment in syllogistic reasoning was attributable at least in part to a reduction in working memory capacity. In the present study, 30 older (average age 66) and 34 younger persons (average age 24) were tested on syllogisms of various types as well as on a range of other measures. Older persons were impaired in their ability to process one-model syllogisms and syllogisms for which there is no valid conclusion. Interestingly the age difference was not significant for three-model syllogisms where both age groups performed poorly. However, overall the age-related deficit remained significant following control for age differences in various components of working memory. Leaving aside the age effect, overall syllogistic reasoning was significantly correlated with years of education, information processing speed, word span, and measures of word fluency. The correlations with visuo-spatial processing and random letter generation were just short of significance.

The Role of Working Memory in Visual Selective Attention

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The hypothesis that working memory is crucial for minimizing irrelevant distractor effects by maintaining priorities on relevant information was tested in neuroimaging and psychological experiments. Availability of working memory for a selective attention task, requiring to ignore irrelevant distractor faces, was manipulated through a concurrent working memory task in which subjects had to rehearse digits in a different order on every trial (high working memory load), or always in the same order (low working memory load). Higher working memory load, associated with increased prefrontal activity, resulted in greater interference effects from distractor faces on behavioral performance, plus increased face-related activity in visual cortex. These findings confirm a major role for working memory in the control of visual selective attention.

The Role of Within-Category Variance in Infant Categorization: Predictions from a Computer Model and Confirmatory Experimental Data

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Quinn & Eimas (1993) demonstrate a striking categorization asymmetry in infants. Infants who saw a series of pictures of cats followed by a dog and a novel cat, show significantly more interest in the dog than in the cat. However, when the order of presentation is reversed, the cat attracts no more attention than the dog. Mareschal, French, & Quinn (2000) proposed that this asymmetry arises naturally from the asymmetric overlaps of the feature distributions of the two categories. The values of the cat features, being less variable, are subsumed by the more variable dog features, but not vice-versa. In the present experiment, we artificially manipulated the

within-category feature variance of the two sets of stimuli, so that dog features became overall less variable and were subsumed by the more variable cat features. Our model predicted a reversal of the original categorization asymmetry and this prediction was confirmed experimentally.

Visual Object Learning as a Function of Polysensory Prior Knowledge

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We have investigated how various forms of prior knowledge and the availability of depth cues influence learning speed and recognition performance of previously unfamiliar objects. Prior knowledge was varied in terms of sensory modality (visual versus haptic versus visuohaptic). The degree of depth information was modified by comparing stereoscopic versus non-stereoscopic viewing conditions. Learning speed was defined as the number of training cycles necessary to reach a given criterion concerning the classification of a fixed learning set of two-dimensional (2D) views of the test objects. Recognition was measured as generalization performance with respect to a set of novel 2D views of the same objects. There was a significant effect of sensory modality on both learning rate and recognition performance. In particular, a short prior haptic exploration proved to be much more effective than enhanced depth information during learning. The results emphasize the role of polysensory information in the ontogenesis of visual representations of 3D objects. The implications for theories of human object recognition and related computational models are discussed.

Dissociation of Endogenous and Exogenous Components of Task Shift Costs

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Within the task set shift paradigm shift costs are computed as reaction time differences between task shift and task repetition trials. Current results (Allport & Wylie, 2000, Mayr & Keele, 2000) have shown that shift costs reflect not only the effort of executive control processes while shifting an intention, but also contain exogenous components like negative priming or repetition effects.

We suggest a new method to dissociate negative priming, repetition effects, and the effort of executive processes by combining the task set shift paradigm with a Go/Nogo paradigm. Our results clearly show that costs for executive control processes exist when the cue-stimulus-interval is short (100 ms.), but large parts of the shift costs are due to negative priming and repetition effects. With long cue-stimulus-interval (800 ms.), i.e., when subjects have time to shift intention, shift costs only contain negative priming and repetition effects. In two more experiments it is shown that negative priming and repetition effects can be influenced selectively.

Visual Search for Dimensionally Redundant Pop-Out Targets: Evidence of Parallel-Coactive Processing of Dimensions

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Two visual search experiments investigated the detection of singleton feature targets redundantly defined on multiple dimensions. Targets differed from the distractors in either orientation or color or both (redundant targets). In Experiment 1, the various target types were presented either in separate blocks or in random order within blocks. RTs to redundant targets significantly violated Miller's (1982) 'race model inequality' (RMI), but only when there was constancy of the target-defining dimension(s) within trial blocks. In Experiment 2, there was dimensional variability within blocks. Consistent with Experiment 1, constancy of the target-defining dimension(s), but this time across successive trials (rather than within blocks), was critical for observing violations of the RMI. These results provide evidence for parallel-coactive processing of multiple dimensions. Experiment 3 investigated redundancy gains for single and dual odd-one-out feature targets. Redundant-target displays contained either (1) a single target defined in two dimensions, (2) dual targets each defined in a different dimension, or (3) dual targets both defined in the same dimension.

The redundancy gains, relative to single non-redundant targets, decreased from condition (1) through (2) to (3). Further, violations of the RMI were manifest only in conditions (1) and (2), and in the latter condition only when the two separate targets occupied adjacent locations. Thus, target signals in different dimensions (but not signals in the same dimension) coactivate a common mechanism in a location-specific manner. This suggests that the coactivation effects are 'perceptual', rather than 'response-based', in nature.

Investigation of Automatic and Attentive Processing in Texture Segmentation with Event-Related Brain Potentials

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In texture segmentation tasks, the detection of a discontinuity in an otherwise homogeneous surrounding is sometimes considered an automatic process in visual information processing. However, in such experiments, participants are usually instructed to respond to the texture stimuli, i.e., attention is explicitly allocated towards them. With the recording of event-related brain potentials (ERPs) we investigated the automaticity of texture segmentation by varying task relevance of the texture stimuli, the complexity of a primary (no texture segmentation) task, probabilities of homogeneous and inhomogeneous textures, and participants' knowledge about the occurrence of discontinuities. Inhomogeneous textures elicited a posterior negativity in the N2 range and a positivity in the P3 range. Both effects were also observed when texture segmentation was task-irrelevant. However, in contrast to the posterior N2, the P3 was found to be dependent on attentional resources left over by the primary task.

Visual Marking and Visual Change

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Five experiments investigated the types of changes that are required to disrupt the preview effect in visual search—the benefit gained in difficult search tasks from presenting half the distractors earlier in time (Watson & Humphreys, 1997, 1998). We found that a shape change with or without an overall luminance change occurring at the location of a visually marked item was sufficient to disrupt the preview effect (Experiments 1 and 3). In contrast, an equivalent luminance change alone (Experiment 3) or an isoluminant color change (Experiments 4 and 5) was not disruptive. The results suggest that: (1) relatively low-level visual changes may not be sufficient to abolish the benefit, (2) the benefit most likely occurs via inhibition applied to locations within a location master map, and (3) inhibition need not be applied to item / feature information. These results are discussed in relation to the physiological and psychological mechanisms underlying the preview effect.

Top-Down and Bottom-Up Control in Visual Marking

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In a standard visual marking experiment, observers are presented with a display containing one set of elements (old elements) followed after a certain time interval by a second set of elements (new elements). The task is to search for a target among the new elements. Typically, the time to find the target only depends on the number of new elements in the display showing that observers only search among the new elements. This effect of prioritising new elements over old elements is explained in terms of top-down inhibition of old objects, i.e., visual marking (Watson & Humphreys, 1997). In five experiments we show that prioritising does indeed occur in a top-down manner; yet unlike the claims of Watson & Humphreys (1997) prioritising is not the result of inhibition of old elements but instead the result of the fact that the new elements are presented with abrupt onset.

The Preview Benefit in Search: Multiple Mechanisms For Prioritising New Objects

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Visual search for a conjunction target can be facilitated if observers are given a preview of half the distractors: the preview benefit. I will review evidence from behavioural studies examining the effects of colour on the preview benefit and from studies of evoked potentials indicating that this benefit is based on several processing mechanisms, including: an attentional set for new items

and inhibition of old groups. These combined processes facilitate the selection of new objects in a top-down manner.

The Duration of the Present

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Physical theory has been able to define an arrow of time, but has never been able to operationally define what is meant by the notions of past, present, and future. These notions, accordingly, are usually assigned to the realm of life and consciousness. Recent developments in psychophysics and neuroscience, however, have confirmed the impossibility to thresh out, within a conscious perception, immediate perception from immediate memory (Dennett; Fuster). In addition psychophysics experiments, after those of R. Sperry and B. Libet, have shown the power of the brain to create or impose coherence whenever sensory input is discordant. This collection of facts imposes a critical revision about the possibility of sharply defining the present, and questions some recent proposals about the possibility of binding together, through the synchronization of coherent neuronal oscillations forced upon large territories of the brain, the different modalities that contribute to the making of a conscious perception.

The Human Sense of Time: Biological, Cognitive and Cultural Approaches

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Human time estimations almost always differ from objective (physical, clock) time. Time perception is often described and explained by means of biological and psychological variables. The relation between subjective (psychological, perceived) time, the feeling of how time is now passing, or how long a time we feel has gone by, and universal objective (physical, clock) time depends not only on the biological time sense, but also on learning, cognitive ability, experience, physical and social environment, personality, culture and so on. Humans in all cultures exhibit the ability of time estimation; it seems to be universal. This ability also allows us to use time in ways denied to other species, in particular the ability to form a time perspective. Disruption of psychological time is often found with many kinds of psychopathology. Some results obtained from my empirical research are presented and interpreted in terms of biological, cognitive, neuropsychological and cultural factors. Evolutionary aspects are taken up in several contexts.

Is Subjective Time Incommensurable with Neurophysiological Time?

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Three main differences were revealed by experiments between subjective and physical time: units of measure, the past-present-future structures and basic properties. In contrast to physical time the subjective one is nonlinear, local and oriented by the breaks in the continuity of reality. These special points we called “events” (Tatko, Perception, 1988, v. 17, n. 3, p. 399). In the subjective world we have to distinguish between several families of past-present-future lines.

The creation of the lines by the subject is an infinitive process similar to decision making in some pathology cases of confabulations (Tatko, Proceedings of the 3rd International Congress of Neuroethology, Montreal, 1992, N 228).

In the XIX century the tradition of F. Brentano and W. Dilthey’s psychology was replaced by “experimental psychology” paradigm. At the same time the object of psychology was changed from the psyche itself to the physiological manifestations of the psyche (M. Heidegger, 1923–1944). It is paradoxical that the further development of experimental psychology led to understanding of essential differences between observed and experienced time (Tatko & Riazanova, Toward a Science of Consciousness, 2000, Imprint Academic, 2000, pp. 124–125).

Mapping Motor Timing and Time Perception in fMRI

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Evidence exists for motor timing and time perception to be mediated by different neuronal networks. fMRI is applied to elucidate the higher-level executive function of motor timing and the ability of fine-temporal discrimination in the perceptual domain in health, in development and in psychiatric disorder. The studies on motor timing will show the neuro-activation of healthy volunteers during timing of a motor response, the normal development of this neuro-activation from adolescence to adulthood and the abnormal neuro-activation in adolescents with attention deficit hyperactivity disorder (ADHD). To elucidate the neural substrates of perceptual time estimation, functional activation will be shown of adults during fine-temporal discrimination of milliseconds, the normal development of this neuro-activation, and the neural substrates of its dysfunction in ADHD. Similarities and differences between the neuro-network activations of the normative, the developmental and the psychiatric studies of motor timing and time perception will be discussed.

Developmental Changes in Temporal Constraints of Motor Control and Articulatory Timing

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Developmental remodelling in temporal information processing (TIP) was studied on the level around 300 ms., associated probably with the voluntary motor control. Sixty children classified into three age groups: 6–7, 9–10, and 3–14-year-olds were tested. TIP was assessed with Finger-Tapping Task (FTT) performed with a maximum and personally chosen tempo. As there are many close anatomical and functional relationships between motor systems and language, we also applied a Syllable-Repetition Task (SRT) performed with a maximum and personal tempo.

The results showed no developmental effect on both the personal FTT and SRT. In contrast, the acceleration with cognitive development in both these tasks performed with the maximum tempo was observed. We conclude that temporal control of finger movement, like that in speech, is tied to cognitive development in tasks performed with a maximum tempo. Our results may support the notion of highly co-ordinated coexistence of temporal mechanisms controlling both motor processing and speech.

Inferences from Single Words

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Our current research aims to give an account of comprehension that both incorporates the insights of minimalism and the mental models theory. In particular, we aim to specify which of the potential inferences that do not contribute directly to a coherent interpretation of a text are made.

One class of inferences that may be made even when they are not necessary for establishing coherence, and hence that may be nonminimal, are those that are based on the semantic and pragmatic information associated with a single word. The studies to be reported explore inferences from with single words in three different contexts: stereotypical gender information, “anaphoric islands” and implicit causality associated with verbs.

Effects of the Semantic Transparency of Distractor Words on Picture Naming

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Word recognition studies show that semantic transparency modulates the amount of priming obtained for morphologically related prime-target pairs. We investigated whether this also obtains in speech production, using the picture-word interference paradigm. Distractor words were either compounds morphologically related to the picture name (e.g., hummingbird or jailbird with a picture of a bird) or pseudo-compounds (e.g., trombone with the picture of a bone). Two variants of picture-word interference were used. In the immediate variant, distractors and pictures were presented in close temporal vicinity, in the delayed variant, distractors and pictures were separated by intervening material (as in long-lag repetition priming). Both variants revealed strong facilitation of picture naming due to morphologically related distractors, but not a hint of a semantic transparency effect. Pseudo-compounds facilitated picture naming in the immediate variant only, and to a lesser degree than real compounds. We present a model that accounts for our data.

Spatial Stroop Effects Can Be Modulated By Spatial Cueing

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A common way to account for Spatial Stroop effects is that irrelevant information about target location is processed faster than information about its direction. If this is so, Spatial Stroop would be increased by manipulations that speed the processing of location information. Following this logic we examine the joint effects of Spatial Stroop and Spatial Cueing. In Experiment 1, the results revealed that Spatial Stroop depended on cueing, but was smaller for cued than for uncued trials. In Experiment 2, we introduced a distractor that appeared simultaneously and in the location opposite the target. The distractor had two effects. First, it eliminated the dependence of Spatial Stroop on cueing; Spatial Stroop was equally large for cued and uncued trials. Second, it modulated the temporal course of cueing effects, as the shift from facilitation to inhibition (IOR) was observed when the distractor was present but not when it was absent. These two results will be discussed within a framework that focuses on the selective use of location information provided by the cue to guide performance.

Effects of Semantic Ambiguity in Lexical Decision and Word Naming

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Several studies report faster lexical decisions for ambiguous words (e.g., bark) compared with unambiguous words, suggesting a benefit in the race for recognition for words with multiple lexical entries. Rodd et al. (in press) challenge this view, and emphasise the linguistic distinction between word meanings and word senses; while words with many related senses (e.g., twist) are recognised faster, multiple unrelated meanings (e.g., bark) delay recognition.

The experiments reported here investigate whether these two types of ambiguity affect naming latencies for words with regular spelling; no previous studies directly address this issue. We find no effect of word senses, using stimuli that show the expected sense benefit using lexical decision. Similarly, we find no disadvantage for words with multiple meanings. We conclude that ambiguity effects in lexical decision reflect competition to activate semantic representations, and that naming words with regular spelling does not require this semantic competition to be resolved.

Storage and Computation of Inflectional Morphology: a Distributed Connectionist Account

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One source of evidence concerning the role of storage and computation in the processing of morphologically-complex words comes from frequency effects. Experiments reported by Baayen, Dijkstra and Schreuder (1997) are interpreted as evidence for a dual-route race model since lexical decision times to singulars are predicted by the summed frequency of singular and plural forms (suggesting decomposition of plurals), while responses to plural forms are predicted by surface frequency (indicating that inflected forms are stored). In this paper we demonstrate that a distributed connectionist model trained to map from orthographic input to a representation of the meaning and inflectional status of words provides a simple account of this pattern of results

without requiring separate computational mechanisms. Simulating frequency effects depends critically on including homonymous affixes in the training set. The relationship between the network's vocabulary and results obtained from different experimental paradigms (frequency effects, priming) will be discussed.

Interactive Effects in the Anterior Cingulate of Sadness and Selective Attention: A PET Study

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To investigate functional changes in the Anterior Cingulate (AC) associated with cognitive impairment in depression, 15O-water PET was used in 9 healthy women in a factorial design orthogonally varying Mood (Nonsad vs. Sad) and Attentional Conflict (Low vs. High) in a conventional Stroop task. Sadness was provoked with autobiographic sad memories.

Significant Stroop effects were present for vocal RT and errors. Mood effects included an overall slowing in RT, and a significant MoodXStimulus interaction for errors, due to a Stroop effect only while sad.

PET results: Stroop Effects. Right dorsal AC was activated in the NonSad state. In contrast, in the Sad state, rostral, ventral and dorsal left AC were activated instead. Most interestingly, the effects of Sadness and Attentional Conflict were interactive in L rostral AC24a, with activation during High Conflict only. This region was previously activated in the Emotional Stroop task, and predicted treatment response in acute depression.

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The Role of Language on Thought in Spatio-Temporal Metaphors

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Spatial and temporal metaphors are often used interchangeably, and thus offer a unique way of exploring the relationship between language and thought. Both spatial and temporal speaking incorporates two systems of motion: ego-moving, when the individual moves from one point to another, spatially, or from the past to the future, temporally; and object- (or time-) moving, when the individual is stationary and observes objects, or time, moving towards him/her. This study explored the effect of a spatial environment on the ambiguous temporal question: Next Wednesday's meeting has been moved forward two days—What day is the meeting now? Results reveal that when participants are immersed in an ego-moving spatial environment, such as a virtual reality game, and receive an object-moving linguistic prime, they are more likely to perform a target task consistently with the prime, although it contradicts the spatial motion they've just experienced in the testing environment.

Frequency in the Child Written Lexicon and Adult Word Naming Time

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The effects on adult word naming of lexical-semantic variables (e.g., frequency and age of acquisition) are reduced in languages with shallow orthography. This study investigated the effects on Italian word naming of a lexical variable usually not disentangled from others: The frequency of written words in the lexicon of elementary school children. Italian adults' word naming was affected by child written frequency, when confounding variables (i.e., adult written and spoken frequency, age of spoken acquisition, familiarity, imageability, concreteness, length, bigram frequency, neighborhood size) were controlled. Neither adult written frequency nor age of acquisition affected word naming, with other variables controlled. By contrast, lexical decision showed effects of both child and adult written frequency, and age of acquisition. The results evidentiate lexical reading in a language with shallow orthography, with the availability of orthographic lexical representations influenced by the frequency with which written words are encountered in the first years.

When It is Difficult to Inhibit Our Mother's Name: A Stroop-Like Procedure Using First Names Related to Subjects' Families

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Difficulties in retrieval and recognition of proper names are a widespread fact among adults and quite common among older people. This study investigates the automatic access to first names belonging to the subject's family, which represented very accessible emotional words, when conflicted and non-conflicted information are presented to young and older adults. We have used two tasks: a computerised "Emotional" Stroop task in order to test the inhibitory processes involved when very accessible words are used, and a "Family Relationships" task. Results concerning the Stroop-like task show that the inhibition of first names is much more difficult when they belong to the subject's family within the two groups of subjects. Findings concerning the second task show that when irrelevant information are presented, elderly have difficulties to inhibit the false information to answer. The results are discussed in terms of general slowing and impairment of inhibitory processes.

Tracking the Time Course of Literal Word Meanings During the Production of Idioms

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During idiom production speakers produce words that all have a meaning on their own that does not contribute to the overall meaning of the phrase. Nonetheless, Cutting and Bock (1997) found evidence for the activity of literal word meanings during idiom production. This finding is consistent with our superlemma model of idiom representation. It combines simple lemma access with access of a superlemma that represents the idiom as a whole. Due to indirect activation of the word's concepts, the superlemma model predicts that the word forms of the words involved are active in parallel or even before their corresponding literal word meanings. We combined idiom production with the naming of words that are either phonologically or semantically related to the noun of an idiom. By manipulating the timing relationship between idiom and word naming we track the activation of literal word meanings during idiom production.

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Processing Mechanisms for Nouns and Verbs in Written Italian

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Many recent studies in psychology and neuropsychology of language have provided evidence in favour of the conclusion that lexical representations of nouns and verbs are functionally distinct. In our research, we investigated the differences in the input representations of verbs and nouns in the process of recognition of Italian written words. In a series of visual lexical decision experiments we exploited the stem homograph effect in order to ascertain whether differential effects on noun and verb targets were found. Strong inhibitory effects on verb targets preceded by stem homographs relative to non homographic word pairs were found. By contrast, weaker and less reliable effects were found on noun targets. The pattern of results provides support for the hypothesis that noun and verbs might be differently represented in the Italian orthographic input lexicon.

Subjective Awareness, Objective Awareness, Stroop and Predictive Effects: An Unexpected Finding

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Four experiments investigated awareness of pattern-masked words, and their priming effect on a Stroop colour-naming task. These experiments were designed to examine Merikle et al's (1995) claim that 'prediction based on stimulus redundancy only occurs when the predictive stimuli are consciously perceived'. The results did not support this claim—predictive effects were found at very short masking latencies. In addition, the subjective measure pointed to a non-linear disruption of conscious processing at the shortest masking latency, 17ms. This unexpected result could not have been found using an 'objective' measure of awareness. However, other objective evidence supports it. A fifth experiment examines identification accuracy for anticipated and unanticipated stimuli. It is found that the 'objective' measure of awareness dissociates from

the capacity to identify unanticipated stimuli, which might be called ‘spontaneous recognition’. These findings have methodological implications for future studies of perceptual awareness.

Predicting Time Course Effects: An ACT-R Model of Lexical Decision

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We present a model for signal-to-respond lexical decision (Hintzman & Curran, 1997) that is based on the ACT-R theory. The model is equipped with a lexicon consisting of all English four letter words with resting activations based on CELEX frequencies. The stimulus is presented to the model as four individual letters. The activations of the word entries in the lexicons are updated by means of associations between the letters and words. The strength of the associations are derived from the token frequency of the letters. As long as time is available, the model sequentially retrieves the most active entries, and compares these to the presented stimulus. A word response is given if the retrieved entry equals the presented stimulus. The probability of a nonword response increases as a function of examined words. This model is able to predict time course effects that are related to nonword lexicality, word frequency and repetition priming.

Developing Normal Reading Skills: Orthography and the Effect of Age-of-Acquisition

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Children from different grades were tested in a lexical decision task. Word-stimuli consisted of words that children acquired in their respective grades, and in grades previous to their own. Nonword-stimuli were derived from words acquired in the same year as word-stimuli; half of them were homophones of the base-words. The results showed that the proportion of errors for newly acquired words increased steadily with grade (i.e., 1st graders made fewer errors with words of grade one than 5th graders with words of grade five). However, the proportion of errors for words acquired in a given grade remained constant throughout the following grades (5th graders made as many errors with words acquired in grade 1 as 1st graders). For pseudohomophones a qualitatively different response profile was observed, suggesting different strategies for the identification of the two types of letter-sequences. Coherent with a theoretical proposal by Ellis and Lambon Ralph (2000), these results suggest that age- or order-of-acquisition of words have an influence on the way the word will be recognized thereafter. When tested with the same stimuli, these effects of acquisition were still evident in adult readers.

Intermodal Crosstalk in the Identification of Visual and Auditory Letters

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Observers were presented with pairs of simultaneous stimuli consisting of a visual and an auditory letter. In the divided-attention condition, observers were requested to report both the visual and the auditory letter. In the visual focused-attention condition, only the visual letter should be reported; in the auditory focused-attention condition, only the auditory letter should be reported. Presentations were calibrated so that the proportions of correct reports were nearly the same in the two focused-attention conditions (.74 and .75, respectively). With this calibration, the proportions of correct reports were almost the same in the divided-attention condition (.74) as in the focused-attention conditions (no significant divided-attention decrement). However, in all attention conditions, significant information transmission was found from visual stimulus letters to responses to auditory letters and from auditory stimulus letters to responses to visual letters (intermodal crosstalk). The strength of the crosstalk was no weaker in focused- than in divided-attention conditions.

Working with Mental Contents: Examples from Investigating Economic Thought Errors

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Working with mental contents: Examples from investigating economic thought errors

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Abstract: In modern psychology, several explanatory approaches are used. Some people explain behavioural phenomena in terms of neural concepts, some others use capacity limits. Both explanatory approaches are effective in investigating many kinds of psychological problems, but these concepts have also their explanatory limits. For example, neural explanations are seldom effective in organizational psychology. Therefore, it is important to develop alternative explanatory approaches. One of them is content-oriented psychology, which explains behavioural phenomena on the grounds of required mental or representational contents.

Economic thinking is a typical content-oriented problem. We know that around 10 to 20% of solutions make the economy worse than had been expected and this is a very large social problem. In this presentation, it shall firstly be demonstrated that many errors are caused by faulty thought models. Secondly, the function of these models and other content structures in constructing mental representations (or in apperceiving) shall be addressed. Finally, some practical suggestions as to how one can work with mental contents and use the contents of mental representations as the basis for explanations in psychology shall be discussed.

Lexical Similarity in Visual Word Recognition: The Effects of Sublexical Units in French

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Several studies reported that lexical similarity influences the recognition of a written word. Orthographic neighbourhood effects show that letter representations mediate access to the word. However, recent findings in Spanish on syllabic neighbourhood suggest that syllable representations are involved in visual word recognition (Perea & Carreiras, 1998). The present study aimed to investigate in the French language sublexical units larger than the letter unit. Two lexical decision tasks were performed on words with no higher frequency orthographic neighbours. The orthography influence was tested in Experiment 1 by manipulating the first-bigram frequency. Low-frequency words with a low-frequency bigram were longer to respond to than a set of words made up of high-frequency words and low-frequency words with a high-frequency bigram. The phonology influence was tested in Experiment 2 by manipulating the number of higher frequency syllabic neighbours. We found an inhibitory effect of syllabic neighbourhood. The results are discussed in the framework of interactive activation models.

Abstruse and Target-Related Neologisms in Jargonaphasia: Where Do They Come from?

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Jargonaphasic patients make a large number of neologistic errors on tasks requiring spoken word production. Target-related neologisms have a high phonological overlap with the target, indicating that the correct lexical representation has been accessed. However, the source of abstruse neologisms, which show low overlap, is unclear. Impaired lexical access may lead to the subject generating an unrelated filler item, or to perseveration of previous responses. Alternatively, the correct lexical entry could be selected, but severely distorted at either phonological encoding or articulatory implementation.

We contrast data from two jargonaphasic patients: subject VS's errors consist of abstruse and target-related neologisms whereas JH's responses are unrelated to their targets. We looked at whether neologisms preserved phonological information, metrical structure or CV structure. Phonological information that did not come from the targets was analysed to determine where it was generated. Results are discussed with reference to current models of speech production.

Phonological Development and Spelling Across Orthographies: Role of Sonority and Sound-Spelling Consistency

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As sonorous consonants (e.g., liquids) are linguistically closer to the vowels than obstruents (e.g., stops), it might take the child longer to represent phoneme-level information for rimes with sonorous consonants. In addition, transparent orthographies should provide consistent feedback about grapheme-phoneme relations which can be used to increase the specificity of the child's phonological representations. Consistent with the first prediction, we found that phonological identity judgements on the coda were more accurate for stops (e.g., pig / leg) than for liquids (e.g., chill / bowl) in 1st Graders. Most of the children were followed up in a spelling

task 6 months later. Consistent with the first and second predictions, we found a main effect of sonority (stops spelled more accurately than liquids), and a main effect of sound-spelling consistency (consistent rimes spelled more accurately than inconsistent rimes). We also found an interaction between sonority and consistency, showing an amplification of the effect of sonority for inconsistent rimes. Parallel experiments are being carried out in French.

Stimulus Repetition Effects and Response Repetition Costs in a Simon Task

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In a serial Simon-task with 4 colours mapped to 2 response keys we observe an interaction between the irrelevant location sequence and the response sequence. The mere response repetition effect is observed for location repetitions only. With long response-stimulus-interval (RSI) there is a response repetition cost for location alternations in the reaction times (RTs). In error rates (ERs), this response repetition cost is also observed in the short RSI-condition. The dissociation between the RTs and the ERs is in line with earlier suggestions that RTs reflect facilitative processes, whereas ERs tend to reflect inhibitory processes. Neither in RTs nor in error rates do we observe an interaction between the location sequence and the colour sequence. This suggests that stimulus-response links are stored rather than object files. In contradiction to our expectations, the Simon effect does not interact with the stimulus nor with the response repetition effect.

Attention in Depth: Visual Spatial Cueing in the Third Dimension

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In four experiments it was found that when looking straight ahead there was no effect of cueing attention in depth. The first experiment repeated one of the two studies in the literature which have looked at cueing attention in 'real' space. The original results were shown not to replicate. In further experiments this was again shown both when the normal time course of cueing was used and when large separations in depth were studied. In a fourth experiment with further controls the same result was found. In a control experiment cueing effects were found with the same apparatus and procedure but with cueing in the horizontal plane. While this finding is in contrast with what is commonly assumed, it can be seen to be consistent with existing literature where simple detection is used with stimuli in depth separated by a small visual angle.

Morphological Effects in Lexical Access: Evidence from Cross Modal Masked Priming

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Morphological priming has been used to explore the access/representation of complex forms. We present data from 3 experiments using a new design, masked cross modal priming, which uses visually masked primes followed by auditory targets. Overt cross modal morphological priming reduces form effects but suffers from potential strategic effects. Visual masked priming removes strategic effects and shows little or no semantic priming but consistent differences between morphological and form priming have not been found. Cross Modal Masked Priming combines the advantages of these two designs, while avoiding their potential flaws. Data appear qualitatively different to visual masked priming. No orthographic or phonological effects were found, but identity priming and morphological priming was robust. Identity priming was effected by the frequency of the target. Differences between inflectional and derivational priming were found. The data from these experiments suggest that the locus of masked cross modal priming is the central lexicon and this level is morphemically organised.

Individual Differences in Children’s Comprehension Skills: Does Working Memory Play a Role?

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In this paper we explore the relation between children’s working memory capacity, their text comprehension, and their performance on tasks that require the monitoring and integration of information. These skills are important in the construction of text representations and have been hypothesised to be determined by working memory capacity.

Children participating in a longitudinal study were assessed when aged 7–8, 8–9, and 10–11 years of age. At each time point, working memory capacity explained unique variance in reading comprehension after the contribution made by vocabulary, word reading, and verbal IQ had been taken into account. In addition, comprehension monitoring and inference making ability explained unique variance in text comprehension, after the same controls. Contrary to predictions, the relation between these skills and text comprehension was not wholly mediated by working memory. We discuss these findings in relation to other factors that may contribute to performance on these tasks.

Phonetic Compensation for Phonological Variation in Speech Perception?

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Phonology rules that ‘garden’ may be pronounced ‘gardem,’ if it occurs before ‘bench,’ but not before ‘chair’. Gaskell and Marslen-Wilson (1998) argued that listeners filter out such variation at an abstract phonological level. ‘Garden-bench’ and ‘gardem-bench’ should thus sound more alike than ‘garden-chair’ and ‘gardem-chair’ due to phonological inference. In a series of four

experiments, we show that listeners indeed filter such variation, but that this filtering might be phonetic rather than phonological in nature. In a forced-choice task, listeners made a substantial number of errors by perceiving possible changes (as 'gardem-bench') as canonical pronunciations (as 'garden-bench'), even if feedback was provided. Two more behavioural experiments ruled out that this effect is an artefact of masking or lexical involvement. Finally, an ERP-passive listening experiment measuring the mismatch negativity corroborated the behavioural results. This suggests that 'phonological' variation is filtered out at a phonetic level already.

Influences of Stimulus Properties on Saccade Preparation during Reading

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This study investigates saccade preparation during reading. A previous study (Yang & McConkie, Vision Research, in press) suggested that, in reading, saccades are triggered by strategy-based activation rather than by cognitive events, and that cognitive effects are primarily inhibitory in nature. The current study employed the same method: a gaze-contingent display change occurs during occasional saccades as the subject reads, replacing normal text with another stimulus pattern (randomly-selected letters or Xs, spaces filled or moved, case of letters changed) for the period of a single eye fixation. Frequency distributions of saccade onset times were compared to see the time and nature of the effects of these variables. The earlier results were replicated. Filling spaces did not prevent most normal saccades. Most conditions began delaying saccades at about 175 ms. but inhibition patterns varied. Results are discussed with reference to Findlay & Walker's (1999) framework of saccade control.

Say 'No' With Confidence: Grammaticality Judgements in Artificial Grammar Learning Depend on Correctly Rejecting Non-Grammatical Stimuli

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Grammaticality judgements in artificial grammar learning (AGL) tasks may simply require the correct rejection of non-grammatical items. 32 participants studied items taken from a grammar for 5 minutes. Participants were divided into two groups. Each group judged the grammaticality of 28 new items. Half these items were from the original grammar. The remaining items were from a different grammar. The groups differed in the bigrammatic overlap with the original grammar of the distractor items. It was found that both overlap groups performed above chance. However, confidence ratings were not above chance for correctly accepted items but were for the rejected items. Higher confidence ratings for correctly rejected items were associated with better performance on the task. It is argued that rejecting non-grammatical items plays a crucial role in judgements of grammaticality in AGL. Previous results examining confidence ratings have ignored an important, possibly explicit, component of grammaticality judgements.

Affix Priming in French

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We investigated the lexical status of affixes in French with priming experiments. Using cross-modal priming paradigms, it has been shown previously that derived words prime their stem. This has been interpreted as showing that derived words were lexically represented as stems linked to derivational affixes, as in happy + -ness. However, to establish a pure combinatorial approach to lexical representation we have to determine if derivational affixes are represented as independent entities in the mental lexicon. Our cross-modal priming experiment reveals a facilitatory priming effect only for prefixes, not for suffixes. We will discuss the nature of this effect in the light of masked priming results. We will contrast our results to those observed in English and we will conclude by defending a model where derived words are decomposed but where only the stem unit is accessed as a morphemic unit.

Effect of the Nature and the Valence of Discourse Information on the Occurrence of the Resonance Process

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In two experiments, we investigated readers access to prior textual information during reading. More specifically, we studied whether the nature (neutral versus emotional) and the valence (positive versus negative) of information determine the occurrence of the resonance process, expected to promote the reactivation of prior textual information (see McKoon, Gerrig & Greene, 1996; Albrecht & Myers, 1995, 1998). In both experiments, participants had to read narrative texts in which two sentences were either consistent or inconsistent with the representation previously elaborated. On-line measures (reading times) confirmed the intervention of a resonance process and also showed that the amount and the speed of the reactivation process are sensitive to the nature and the emotional valence of encoded information. These results provide new information on what we already know on the characteristics of the resonance process.

“Lipreadability” And Syllable Structure Complexity in Deaf and Hearing Children: Effects in Reading and Writing Tasks

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A series of three experiments investigated whether deaf and hearing young readers were sensitive to “lipreadability” and syllable structure in lexical decision, proofreading and writing. The initial syllable (CVC or CCV) of the stimuli was either easy or difficult to read on the lips.

In both silent reading tasks, weak lipreadability decreased performance, which is consistent with previous data (Paire-Ficout & Bedoin, 1996) whereas only deaf children were affected by lipreadability in writing.

Although proofreading remained unaffected by the syllable structure, performance in lexical decision decreased for CCV syllables in both groups but the effect was restricted to syllables that were difficult to read on the lips. In the writing task, hearing children had a tendency to make more errors for CCV syllables and deaf children’s spelling errors almost exclusively consisted of erroneous organisation of phonemes in the syllable such as CCV → CVC or CVC → CCV.

Learning Complex Associations in Amnesia: A Comparison Between Probabilistic and Deterministic Sequential Material

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While amnesic patients exhibit intact implicit and procedural learning (Cohen & Squire, 1980; Reber & Squire, 1998), the extent to which this preserved capacity reflects the involvement of specific memory systems remains unclear. In sequence learning situations (Nissen & Bullemer, 1987), amnesic patients have been shown to be able to learn sequences involving either simple associations or higher-order contingencies. Curran (1997), however, showed that amnesic subjects did not learn complex material as well as control subjects did. Our hypothesis is that these discrepant results might be accounted for by the fact that sequence learning systematically involves both implicit and explicit knowledge. When the sequence is deterministic—as in most existing studies—normal subjects develop both implicit and explicit knowledge of the sequence, whereas amnesic patients are limited to acquiring weaker, implicit knowledge. Testing both normal subjects and amnesic patients on probabilistic material (Cleeremans & McClelland, 1991) might therefore offer better grounds for comparison. A series of relevant experiments is currently underway. Preliminary results indicate that amnesic patients are indeed able to learn complex contingencies when the material is probabilistic. Full results and discussion will be presented at the conference.

Towards a Theory of the Lexicon: Neuropsychological and Cross-Linguistic Evidence

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Theories of the lexicon in language production have focussed almost entirely on the representation and access of nouns, and have relied mostly on two types of data: analyses of slips of the tongue and naming latencies in picture-naming tasks. Here I will argue that the picture that has emerged from this narrow focus is misleading. The data from aphasia suggest that the grammatical properties of words play a crucial role in the organization of the lexicon and in the process of lexical access. This conclusion is strengthened by consideration of cross-linguistic studies of

noun-phrase production where the role of words' grammatical properties is brought to the fore. The evidence from various studies shows that phonological and grammatical properties interact in noun phrase production. I will provide a sketch of a theory of lexical access that incorporates the major findings from neuropsychology and cognitive psychology.

Sex Differences in Inhibitory Executive Resource Development

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This research has looked at the development of verbal and spatial inhibitory processes in boys and girls aged between 7 years and 11 years. The research rationale reflects the suggestion that sex differences (and potentially more general individual differences) in spatial ability may in part be attributable to variability in working memory efficacy. The research employed boys and girls between the ages of 7 and 11 years. The primary measures were the Hayling and Brixton task measures, assessing verbal and spatial inhibitory processes respectively. In addition a speed of processing measure, speech articulation rate, was taken. The initial results indicate differential competencies in the major tasks between the female and male participants. These results also suggested that different developmental patterns between the sexes occurred in the Hayling and Brixton measures. The results are discussed within the context of individual differences in working memory and spatial abilities in general.

Cognitive Aging, Flexibility, and Processing Resources: A Case Study of Arithmetic Problem Verification

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The present study examined age-related changes in cognitive flexibility (as defined as the ability to use different strategies) in arithmetic problem solving, and determined whether these age-related changes are mediated by processing resources. One hundred forty four participants (aged 20–80 y.o.) were asked to verify simple (e.g., $2+4<07$) and complex inequalities (e.g., $214+141<356$) and to accomplish a series of processing resources tasks (i.e., speed of processing, inhibition, and working memory). For both simple and complex inequalities, the splits of the proposed answer were manipulated (e.g., $2+4<07$ vs. $2+4<13$), thereby inducing different strategies (i.e., complete vs. partial calculation strategies). Data showed decreased flexibility with age, especially in complex inequality verification task. Moreover, this decrease was partially mediated by processing resources. The implications of these findings on arithmetic problem verification and cognitive aging are discussed.

Memory for Temporal Context: Effects of Aging and Encoding Conditions

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Whether the memory for temporal context information is mediated by automatic or controlled processes is a matter of debate. If the coding of temporal context information is automatic, memory for temporal context should not be affected by intention to learn and aging. In order to address this issue, we administered a list discrimination task to young and older adults in either an incidental or an intentional encoding condition. The results showed that the list discrimination performance of the older adults was inferior to the performance of the young subjects. In addition, both young and older subjects' discrimination performance did not improve in the intentional encoding condition. These results support the hypotheses that the temporal context of an item is encoded automatically.

Negative Priming Effect By Ignored Repetition of the Distractor from the Prime Trial to the Probe Trial

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In their Study, Milliken, Joordens, Mericke & Seiffert (1998) asked subjects to read a single red word in a prime, followed by a green word distractor in the probe. They showed that a negative priming (NP) effect occurred. The authors considered that the "selection against the distractor" on the prime trial is not necessary to obtain NP. However, from prime to probe, if the target word identity changed, the colored support of the target (CST) did not change (it's always red). Thus it is possible that the the NP obtained would be due to the ignored repetition of the CST. By using a Stroop reading task, the influence of "the CST ignored repetition" versus "word attended repetition" on the reading RTs was examined. The analysis revealed that in the "CST ignored repetition" condition, a NP effect was observed, whereas the "word attended repetition" produced no effect. Results are discussed relating to the Milliken et al. (1998) data.

The Time Course of Object-File Construction

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Attending to a visual object was been assumed to establish a so-called "object-file", an integrated episodic trace containing information about the relationship between object features and their location. We studied how stimulus-feature bindings emerge over time. With very short stimulus-onset asynchronies (SOAs) feature repetition produced nonspecific effects, that is, priming effects due to the repetition of a single stimulus feature. With longer SOAs benefits of feature-conjunction repetitions were found, presumably indicating feature binding. There was no trend toward higher-order interactions, suggesting that features are not integrated into a single, global superstructure but enter several independent local bindings. Local bindings emerged after about a quarter of a second and, once formed, were stable over time.

Relation Between the Perceptual Capacity and the Efficiency of Irrelevant Perception in a Discrimination Task

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A discrimination task in which attentional load (the number of presented elements) and distractors' features (static and moving presentation) were modulated, was used to assess Lavie's theory of attention (1995). To confirm a relation between the perceptual capacity and the irrelevant processing, we proposed a perceptual span test to the subjects.

Lavie's results were only replicated for the static display.

However, our results indicated that a mixed-randomized motion presentation (linear vs. stochastic) reduces the effect of the increase of attentional load. Contrary to the linear motion presentation, stochastic motion is still taken into account whatever the attentional load. Furthermore, a negative correlation was found between the capacity to ignore irrelevant information and the perceptual span. Our findings suggest that perceptual load can be discussed in terms of attentional feature-based priority of information processing.

Measurement of Subclinical Attention Deficits in a Patient with Right Basal Ganglia Damage

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We report on a patient with subclinical attention deficits due to haemorrhagic brain damage. MRI showed the lesion to be localized in the right basal ganglia. Together with 6 age-matched controls, the patient was tested by whole and partial report procedures. Colour report and perimetry were included as sensory control tests. Results were analyzed in terms of Bundesen's (1990) Theory of Visual Attention (TVA). Whole report showed bilateral reduction of attentional capacity in the patient, involving both visual processing speed and visual short-term memory capacity. Partial report revealed subtle leftsided extinction, analyzed into purely attentional and sensory components. Traditional neuropsychological testing was inadequate for measuring the patient's attention deficits. The study demonstrates the specificity and sensitivity gained by combining psychophysical testing with TVA-modelling in the analysis of visual attention disorders.

Distracting Attention Reduces Task Shift Costs

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There is evidence that the cognitive representations of action effect codes are not only acquired; they are actually used to control future actions. We tried to demonstrate that action coding is part of the preparation to act and that it is influenced by the stimulus dimension the actor is attending

to. We measured interactions between attention and action coding in a task switching design. When people shift between tasks their performance is usually worse after a task switch than after a task repetition. Participants performed choice reaction time (RT) tasks on 2-dimensional stimuli. Each task was based on 1 stimulus dimension only. A cue preceded the target stimulus and instructed the participant about which (randomly selected) task to perform. Shifting between tasks was associated with a RT cost. However, the task shift costs were reduced by distracting the attention during the time of the overt response.

Task Switching and Task-Set Inertia: A Computational Model

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When subjects switch between a pair of stimulus-response tasks, reaction time is slower on trial N if a different task was performed on trial N-1. We present a parallel distributed processing model that simulates this effect when subjects switch between word-reading and colour-naming in response to Stroop stimuli. Reaction time on “switch trials” is slowed by an extended response selection process which results from a) persisting, inappropriate states of activation and inhibition of task-controlling representations (‘task-set inertia’) and b) associative learning which allows stimuli to evoke tasks sets with which they have recently been associated (as proposed by Allport & Wylie, 2000). The model provides a good fit to a large body of empirical data, including findings which have been seen as problematic for this explanation of switch costs, and shows similar behaviour when the parameters are set to random values, supporting Allport & Wylie’s proposal.

Do Associations in Long-Term Memory Influence the Deployment of Selective Attention Across Visual Arrays?

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Several models of visual attention, e.g., the Biased Competition model, postulate that stimuli activate corresponding representations in the brain, which then compete for attention. It has been proposed that top-down control signals, in particular from working memory, influence this competition. However, the model does not consider another potentially important factor; associative links between representations. We report several studies designed to assess the impact of long-term memory associations on deployment of attention. Experiments were based on a visual search paradigm using photographs as stimuli. Results showed that sometimes observers falsely reported seeing the target when, instead, only an associated item was present. In a separate experiment, following a search task, verbal report of associated items was higher than that of control items. Further experiments attempted to control for potential confounds in the results to narrow the argument focus towards attentional rather than alternative potential explanations.

Linguistic Exchanges Between Air Traffic Control and Pilots: Are the Effects of Workload and Shift Work Disruptive?

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This study investigated how workload and shiftwork affect communicative performance in a setting where language is crucial for safety and efficiency: Air Traffic Control. Ten hours of communications between air traffic controllers and pilots of a medium Italian airport were sampled, transcribed and analyzed considering the following variables: workload (maximum vs. minimum); work shift (morning, afternoon, night); work position (tower controllers vs. approach radar controllers). The analyses were aimed at detecting errors and incorrectness possibly causing ambiguity and misunderstandings. Multivariate variance analyses showed that communications were more incorrect during the phases of low workload and particularly during the night shift where a peak in errors rate was registered, probably related to a decrease in vigilance. Workload had a non-linear effect depending on its interaction with the shifts; differences in communicative features were also associated with the work position. Possible relations with vigilance and other factors are discussed.

Writing the Stroop-Effect: Colour Naming with Handwritten Responses.

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We investigated response selection and execution in a Stroop task with handwritten responses. Incorrect responses, indicating processing of the word meaning (e.g., 'bred' in response to the word "RED" written in blue), were typical in the incongruent condition. The Stroop effect was significant when comparing the first letter of the congruent and incongruent conditions: the former was written more fluently and its execution time varied less. There was no difference in the mean execution time in the two conditions (see Logan and Zbrodoff, 1998). These results are explained by a model of an on-going selection process that runs in parallel to an execution process. According to the model, the echo of the attempt to execute the wrong response finds its expression either in an incorrect response or in an increased variation in the execution time for the first written letter.

Does Absence of a Distractor Mean Absence of Selection? Evidence from the Spatial Negative Priming Paradigm

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Many researchers suggested that probe selection is a necessary condition for Negative Priming (NP). In contrast, in a spatial NP paradigm, Neill, Terry and Valdes (1994) demonstrated an NP effect regardless of whether or not the probe target was accompanied by a distractor. Accordingly, they concluded that NP does not require probe selection. It is important to note that their task required a key-press corresponding to a target location, which we suggest involves response selection.

In our first experiment we used a similar paradigm and replicated the NP effect. In our second experiment the stimuli were the same and subjects were asked to detect the probe's target and to respond with a single key-press, regardless of its location. Hence, there was no response selection. The NP effect was eliminated. We conclude that the NP effect depends on probe selection and that response selection is sufficient to produce NP.

Affordances in Inhibition of Return

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When a target is preceded by an irrelevant stimulus (cue) there is a delay in the response if cue and target are in the same location. The phenomenon is called inhibition of return (IOR) and it is linked to superior colliculus. Location-based IOR is a quite robust effect, but other components have been described, related to object representations. Objects are represented both in the ventral and in the dorsal streams but with different purposes. The dorsal stream, which receives important contributions from the superior colliculus, is related to the visuomotor integration. In the following study we examined the role of potential actions automatically afforded by visual objects for IOR. The cue was the presentation of a full upright tool with the lower part commonly used to grasp the object. The cue was followed by the target (upper or lower part of the same or different tool) in the same or different location. The results showed that IOR is greater when the target was the lower part of cued tool demonstrating an effect due to the affordance of the object.

Marking Electrified: An Event-Related Brain Potential Analysis of Visual Marking

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Visual marking (an attentional mechanism to prioritise search of new objects to old objects) was investigated with event-related brain potentials. Participants searched for one of two targets among distractors. First, half of the items were displayed for 1000 ms. followed by the remainder. In the Preview-condition, items in Display 1 could be excluded from search by visual marking because targets always appeared as one of the new items in Display 2. In the Control-condition, old items changed when new items appeared, and the target was at an old or a new position: marking is unlikely to be engaged. In the Search-condition, targets appeared either in Display 1 or Display 2. The results showed attentional modulations of N1-components. Additionally, a sustained negativity was obtained in the 350–700 ms. time range after the onset of Display 1 for

the Preview-Control comparison which is interpreted to reflect processes involved in setting up visual marking.

Inhibition As a Means of Sequential Task-Set Control: Evidence for Reduction of Task Competition

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Endogenously initiated transitions between tasks are associated with inhibition of the mental set for the task preceding the transition. This has been inferred from increased reaction times for switches to a task that had been abandoned one trial earlier relative to switches to a task not executed as recently (Mayr & Keele, 2000). We report evidence that this backward inhibition selectively reduces competition from the directly preceding task-set on performance in a novel task. Employing a task switching paradigm we presented task switch trials with irrelevant material from the directly preceding task or from a control task. On precued task switches (not on unpredictable task switches, though) interference from the directly preceding set was reduced relative to interference from the control set. Though dependent on the option to prepare for a task switch, the magnitude of the effect did not vary as a function of degree of task preparation.

Attention in Depth: A Failure to Replicate

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To investigate under which conditions attentional selection occurs in depth, this study set out to replicate findings by Atchley, Kramer, Andersen and Theeuwes (1997) who suggested that attentional selection in depth is more likely to occur under high perceptual load conditions. Stereographic displays were used in which two out of four possible target locations were at near depth and two were at far depth locations. One of the four locations was cued before target presentation. In two separate conditions, targets were either presented with or without distractors. In contrast to Atchley et al.'s findings, the results showed that in both conditions, the effect of depth on the costs of invalid cueing was not significant, suggesting that the effect is susceptible to small experimental variations.

Central and Local Aspects of Attentional Control

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Are modules responsible for dual task performance controlled centrally or locally? If they are controlled from the central level, interference between tasks A and B should be specific: task A is performed worse not only because an interfering task B has to be controlled simultaneously but also due to the fact that relative difficulty of task B has just increased. If the control is local, interference should be nonspecific: task A is performed worse due to the sheer fact that task B has to be controlled simultaneously. Results of seven experiments indicate that if the main task is simple, manipulation with its difficulty level does not affect the secondary task's performance. However, if the main task is complex, manipulation with its difficulty level directly affects the secondary task's performance. Thus, attention seem to switch flexibly between central and local levels of control, depending on relative complexity of its job.

Perceptual Attention Gating and Attentional Blinks

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Effects of attention at perceptual processing on the attentional blink (AB) were examined with varied stimulus saliency. On a trial, 20+ letters and 2 target digits (T1 and T2) were singly presented in rapid succession. The lag between T1 and T2 was varied. Saliency (by color) of T1 and T2 was varied in Exp 1; whereas in Exp 2 a salient T1 and a non-salient T2 were used, and the saliency of the distractor prior and subsequent to T2 was varied. Recall of T1 was about 95%. Recall of T2 was impaired (i.e., the AB) at lags of 200–500 ms. when neither T2 nor the distractor prior to T2 was salient. A salient T1 enhanced the deficit. However, the deficit was absent when either T2 or the distractor prior to T2 was salient. Results suggest significant contribution of attention gating at the perceptual processing stage to the AB.

Long-Term Inhibition of Return: Retrieval of Inhibitory Processes from Episodic Memory?

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In attentional search tasks, response to a target that appears in a cued location is slower than response to a target that appears in an uncued location. Although this inhibition of return (IOR) effect is traditionally described as the result of temporary, on-line inhibitory mechanisms, we report in this poster the results of several experiments that question this assumption. In particular, over several experiments we found IOR effects with naturalistic, complex stimuli when there is a delay of several minutes and dozens of trials intervening between the cue and the target. Furthermore, our results suggest that these long-term IOR effects are mediated by the familiarity of the stimuli. Accordingly, it is proposed that long-term IOR effects reveal an inter-relationship between inhibitory and episodic memory processes in attentional search tasks.

The Attentional Blink: Evidence for Implication of Perception and Working Memory in the AB Effect

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The attentional blink paradigm, instigated by Raymond, Shapiro and Arnell (1992) shows a deficit in target detection (T2) between 180 and 450 ms after identification of a first target (white letter, T1), when these targets appear among a stream of distractor letters. This effect is called attentional blink (AB).

The classical AB effect is replicated in experiment 1. In experiment 2, the white colour of T2 eliminates the AB, whereas in experiment 3, when T2, in white, is to be identified, the AB effect appears once again. This shows that if perception is implicated in the AB effect, it is not necessary to produce it. In experiment 4, when three different T2 are to be memorized (only one appears in each trial), the AB effect is stronger and longer than in experiment 1. This result puts forward the implication of working memory in the AB effect.

Shifting Attention Between Multiple-Component Tasks

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When subjects have to shift between simple mental tasks in a block of trials then their performance is reduced compared to conditions with a constant task. This even holds for long preparation intervals between the trials. To explain these residual shift costs, it is usually assumed that passive mechanisms such as interference or cross-talk between the relevant task sets or stimulus-response mappings are responsible. However, by using multi-component task in a series of experiments we could show that also the number of variable components affects the shift costs. These components seem to represent independent selection steps during task execution. Thus, our result supports the idea that attentional (supervisory) control is not only required for task preparation but also for task execution under task shifting conditions.

Anxiety and Selective Inhibition

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Anxious subjects appear to be unable to efficiently inhibit irrelevant information when this information is negative in valence. So, one experiment, in which we used a negative priming paradigm, has been conducted in order to determine how experimentally induced anxiety could influence inhibitory mechanisms involved in selective attention. The results indicated that affective incongruency of distractor and target of the prime-trial produced a slowing of the responses on the probe-trial if the probe target is affectively congruent with the distractor of the prime-trial. This pattern mainly appears when negative congruency is manipulated between the distractor of the prime-trial and the target of the probe-trial. However, the results have shown no difference in the mean reaction times for the experimental groups tested (induced vs. control subjects). This last result is compatible with the experimental data observed by Fox (1994, Experiment 3), when focused attention is involved.

Flanker Interference from Multiple Distractor Features in IOR

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Fuentes, Vivas & Humphreys (1999) suggested that is necessary to distinguish between IOR and inhibitory processing at a location subject to IOR. This latter mechanism, inhibitory tagging (IT), would act in a late level of processing. In the present study we explored this hypothesis, combining flanker interference with an IOR procedure. In Experiment 1, participants responded to the color of a central target that could vary in color or shape, flanked by a distractor stimulus at cued or uncued locations. Results replicated the striking reversal of the flanker effect at cued locations (Fuentes et al., 1999) but only for distractors incongruent in color, supporting the conclusion that IT is applied to task-relevant features of the stimulus. In Experiment 2, participants responded to a combination of color and shape. Results showed a tendency for the inversion of the flanker interference at cued locations. These results contribute to the understanding of the mechanisms involved in IOR.

Acquiring Action-Effect Knowledge: Automatic or Intentional?

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Recent evidence strongly suggests that anticipations of environmental effects of actions play a functional role in action planning. This conclusion emerged from experiments where participants perceived in an initial acquisition phase that each of their responses would produce particular events (the action's effect). In a succeeding test phase targets were presented together with noise elements which (among others) would or would not represent the effect of the to-be-executed response. We obtained an effect of the effect-compatibility: Noise elements representing the effect of the to-be-executed response allowed for faster responding than noise elements representing the effect of an alternate response. This observation implies that participants acquired some knowledge about the relations between actions and their effects (action-effect knowledge). Here, we address the question of whether the acquisition of action-effect knowledge is the result of automatically operating associative mechanisms or, rather, the result of mechanisms that are bound to intention.

Learning to Categorise Novel Visual Stimuli: Assessing the Role of Within-Category and Between-Category Comparisons

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A series of web-based experiments compared the ability of participants to learn to categorise simple, novel line drawings of leaf-like stimuli. Participants used trial and error learning to make un-

speeded decisions about which of two categories a given stimulus belonged to. They received immediate feedback. We investigated the relative importance of information about within-category and between-category similarities and differences across the leaf stimuli. The importance of these two factors was measured in terms of the number of training trials required for subjects to learn to categorise accurately. Learning was consistently much faster when comparison stimuli from both categories were present on a trial, indicating that between-category comparisons were important when learning to categorise. Unexpectedly, though, there was little influence of within-category variation on performance, either when varying the number of exemplars of a given category on a trial, or when reducing such variation by aligning the orientation of all stimuli.

Organisation of Knowledge About Attributes of Living Things in Healthy Young Adults, Healthy Older Adults and Individuals with Dementia of the Alzheimer's Type (DAT)

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Set of property verification tasks (word and picture versions) were presented to young adults, healthy aging and patients with DAT to assess age- and disease-related change in knowledge organisation in semantic memory. A longitudinal study with DAT (every 6 months) investigates the progressive disorganisation of this knowledge.

Results showed the existence of a taxonomic organisation of properties for living things in three groups and a progressive damage for patients with DAT. This deficit was influenced by the retrieval level of information (entry level versus supra-ordinate level) and by the nature of information (functional versus structural).

Our data showed that both "loss of knowledge" and "difficulty in retrieval" hypotheses may contribute to explain the semantic difficulties generally observed in DAT.

A cross-comparison between the experiments revealed the influence of the access modality on semantic knowledge retrieval and highlighted the facilitation due to mental imagery.

When Are Decisions Involving Risk Independent of Common Outcomes? The Role of Similarity-Contingent Editing

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Process tracing studies have shown how the similarity structure of risky choice problems can trigger the application of alternative editing heuristics (cancellation-by-similarity, amalgamation and option grouping). These restructuring operations lead to simplified representations of tasks. A selective review is presented of previous findings on the conditions under which common outcomes influence decisions under risk. It is argued that similarity-contingent editing (SCE) can account for much of the evidence. Three studies are described which further examine the conditions under which transparent common outcomes might influence gamble choices. The main finding was an effect of transparent common outcomes that can be explained by SCE but

not by generalised utility theories. The role of SCE in the decision process is discussed, together with the wider implications of the results for cognitive and formal models of decision making under risk.

Misunderstanding the Probabilistic Option in a Life-Death Decision Making Problem

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It was previously shown that, confronted to a modified version of the Tversky and Kahneman life-death Asian disease decision problem, involving the whole human population, 50% of the participants played the survival of humankind on a 1/3 probability. Lieberman and Klar (1996) demonstrated that decision makers tend to probabilise a deterministic rule. In this view, participants might have understood the 2/3 probability of losing the whole population as “losing almost all the population” and then accepted the gamble. To test this hypothesis 448 new Ss were asked to answer a simple question about the number of people saved in the 3 outcomes involved in the problem. Results showed that 50% of them did not fully understand the gamble option. The most common error consisted in equating a 1/3 chance to save the whole population with the survival of 1/3 of them. These results question the framing effect experiments.

Effects of Emotional Traits and Cognitive Performance

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Research on emotion and cognition has tended to focus on the effects of transitory emotional states on cognitive performance. We present a study of the links between cognition and stable emotion-related personality traits. We hypothesised specific relationships between people's emotional profile and performance on diverse tasks (memory, problem solving, categorisation) that involve emotion-related stimuli. In this study, 100 adults (age 18 to 50) completed cognitive tasks and measures of stable emotion-related traits. In particular the cognitive battery included categorisation of emotional stimuli, convergent and divergent thinking, and verbal ability. The emotion-related measures consisted of questionnaires concerning attention devoted to emotion, clarity of emotions, affect intensity, emotional stability, emotional expressivity, mood repair tendencies and emotional intelligence. Results concerning significant relations between emotional traits and cognitive performance will be presented and discussed.

Cross-Modal Affective Priming Using Musical Chords As Primes

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Affective priming studies have demonstrated that response latencies to target stimuli are mediated by the affective relation between prime and target. Targets preceded by primes with the same affective valence are processed faster than targets preceded by primes with the opposite affective valence. In our study, two consonant and two dissonant musical chords, respectively, were used as primes and positive and negative words as targets. Results showed that target words were evaluated faster if preceded by an affectively congruent chord (e.g., consonant-holiday) as compared to affectively incongruent chord-word pairs (e.g., dissonant-humour). These results show that the affective priming phenomena can be extended to the auditory domain. In conclusion, our investigation might be a first step towards the experimental study of the implicit connections between musical elements and affective processes which they can trigger.

An Exploration of Executive Dysfunction Using the “Six Element Test”: Can We Predict Everyday Life Difficulties of Brain Damaged People with This Test?

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The aim of this study is to examine the consequences of cognitive and behavioral deficits more often attributed to brain damaged people on their everyday life activities. To achieve this goal, we used the “Six Element Test” (SET, Shallice and Burgess, 1991). This “multiple goal test” should involve everyday life activities (programming, planning), and should permit the exploration of executive processing and an examination of correlation between the SET and a questionnaire testing social and professional activities.

The SET allows us to conclude that brain damaged people used less adaptive strategies, and produce more executive and interpretative mistakes than control subjects. Planning and organisation are impaired and cause an inability for patients to inhibit behavioral routines and to self-regulate their behavior.

Lack of organisation, rule transgression, lack of mental flexibility and deficit awareness can be considered as indicators of an inadequate social and professional integration.

Imaginal Switches of Position in Remembered Surroundings

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Difficulties of imaginal switches of spatial position are often interpreted as extra costs resulting from mental transformations of one’s spatial representation of the surrounding. An alternative account states that imaginal repositionings are difficult, because they lead to extra costs resulting from interference effects between conflicting cognitive and sensorimotor spatial codes during memory retrieval and response selection. In three experiments subjects had to point to unseen object locations after imagined self-rotations and self-translations. Disparity of object directions between actual and imagined position (0–180°) and the time-period during which advance position information was available (SOA 1–5 s.) was varied. Results indicate that pointing latencies and errors increase with amount of disparity and that subjects are not able to use advance position information to reduce performance differences between rotations and translations. Both

findings speak in favor of an interference and against a transformational account of imaginal repositionings in space.

Age-of-Acquisition and Word Frequency Effects in Lexical Decision

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Although English studies have supported separate age-of-acquisition (AoA) and word frequency effects, French data is lacking to highlight this issue. The aim of this study was to investigate whether both AoA and word frequency effects would appear in a lexical decision task. In the first experiment, an AoA effect was observed with objective word frequency controlled for. In a second experiment, a reliable frequency effect was found with AoA controlled for. Using the same stimuli, Bonin, Fayol and Chalard (in press) obtained reliable AoA effects in written and spoken picture naming but no significant word frequency effects. The findings are in line with the hypothesis that AoA affects the output lexicon whereas word frequency has its primary locus in the input lexicon.

Do Pronouns Alter Immediately the Activation of Referents in Spanish?

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Two experiments were carried out to investigate whether pronouns alter immediately the activation of their referents in Spanish. Gernsbacher (1989) found that pronouns did not alter the activation of their referents in English, though, non-antecedents were affected, becoming less activated at the end of sentences. However, Carreiras (1997) found a deactivation of non-antecedents immediately after pronouns in Spanish. He considered that morphological differences, like stronger gender salience in Spanish, could account for the two effects. However, materials were also different. In these two experiments the same materials used by Gernsbacher (1989), literally translated into Spanish were used. The experiments showed again that immediately after the pronouns there was not facilitation for referents, but there was a suppression effect for non-referents. The results are discussed in terms of current models of anaphoric processing.

The Effects of Similarity in Meaning and Syntactic Structure on Subsequent Sentence Processing

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Effects of similarity in meaning and syntactic structure on subsequent sentence processing were studied using a variation of the lexical decision task. Subjects were presented pairs of sentences, reading the first (prime) and deciding if the second (target) was in correct or scrambled order. Targets in correct order were identical to primes in meaning but not in syntactic structure (meaning similarity condition), identical to primes in syntactic structure but not in meaning (syntactic similarity condition), or unrelated in meaning and syntax (unrelated condition). Facilitation in sentence processing was indicated by shorter reaction times to the first two conditions than to the unrelated condition. A large facilitation effect was found for the meaning similarity condition and a weak facilitation effect was found for the syntactic similarity condition, suggesting a substantial effect of the activation of meaning and a smaller effect of the activation of abstract syntactic structure on subsequent sentence processing.

Processing External and Middle Letters in Printed Word Perception

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Three experiments are reported that investigate letter position coding in printed word perception. The masked priming technique with 9-letter target words was used, and the position of the letters shared by the prime and the target stimuli was varied. In Experiment 1, the prime and the target shared middle letters and either the first letter (vtagi-vantaggio) or the last letter (atago-vantaggio), or both external letters (vtago-vantaggio). Significant facilitation relative to unrelated primes was only observed when both external letters of the target were present in the primes. In Experiment 2, similar amounts of priming were obtained independently of the position of the middle letters shared by the prime and the target stimuli (vanto-vantaggio; vtago-vantaggio; vggio-vantaggio). In Experiment 3, a significant priming effect was obtained even when the middle letters were not adjacent letters in the target stimulus (vnago-vantaggio). A tentative model of letter position coding is discussed on the basis of this pattern of results.

Phonological Priming in Auditory Word Recognition: The Role of Target Frequency

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Three experiments were carried out to examine phonological priming effects in a shadowing task. Auditory primes and targets shared the first syllable. Replicating observations by Spinelli, Segui and Radeau (1999), Experiment 1 showed that processing of bisyllabic targets (e.g., /kulis/) was facilitated by monosyllabic primes (/ku/) but not by bisyllabic primes (/kutyR/). This finding was accounted for in the framework of the Cohort Model (Marslen-Wilson & Welsh, 1978) which postulates that words included in the initial cohort are deactivated once the incoming phonological code does not match the candidate word. However, in Experiment 2, bisyllabic primes (/kulis/) facilitated monosyllabic targets (/ku/). Because monosyllabic targets in Experiment 1 were of higher frequency than bisyllabic targets in Experiment 2, the role of target frequency

was examined in Experiment 3. It appeared that bisyllabic primes facilitated frequent bisyllabic targets. Possible modifications of the initial cohort model are discussed to explain the data.

Intrasyllabic Structure and Sonority of Consonants in Printed Stimuli: Differences between French and English Readers

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Previous research suggests that the rime in printed monosyllables can be broken into a vocalic nucleus and a coda. This hierarchical organisation mirrors speech perception units. Additionally, postvocal cohesion in CVCC printed pseudowords has been found to differ as a function of letters sonority, the fourth letter being better identified if preceded by a sonorant than by an obstruent (Gross, Treiman, & Inman, 2000). Sonorants may have a closer affinity with the vowel nucleus.

This effect disappears in French and can be interpreted in terms of language differences in intrasyllabic organisation.

A 7-year-old bilingual child (English/French), who has been taught to read only in English, performed the letter identification task on the French list and exhibited the effect related to consonant sonority found in English. A longitudinal investigation on this child (currently learning French reading) is in progress.

Verification Modality Affects Listening Span Measure

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Even low-level processes in language production that do not require much planning, put cognitive load on working memory. Two groups of 20 participants each were presented with a listening span task. The verification task (i.e., to judge the content of each sentence as true or false) involved either verbal behavior (speech production) or motor behavior (pointing to nameplates); recall of the relevant words was performed orally in both conditions.

Listening span was significantly higher in the pointing verification group as compared to the speech production verification group ($p < .01$). However, a subsequently conducted word span measure revealed no differences between both groups, indicating that they would not differ regarding their working memory capacity.

This result, combined with evidence from other experiments on the effects of cognitive load through language production, emphasizes the role of verbal response mode in the true measurement of cognitive processes.

Cerebral Hemispheric Asymmetry in Voicing and Manner of Articulation Processing in Reading

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Previous research has produced evidence for pre-lexical activation of phonetic properties in reading (Bedoin, 1998; Chavand & Bedoin, 1998, 1999). A phonetic similarity between printed stimuli delays lexical decision in priming and increases recall in backward masking. The time course of effects varies with phonetic category (voicing, place, manner), arguing for the cognitive status of separate hierarchical feature tiers (Clements, 1985).

To investigate their neuropsychological status, phonetic similarity between printed CV targets and CV masks was manipulated. Both target and mask were presented either in the left visual field (LVF/RH) or in the right visual field (RVF/LH). Voicing similarity effects on target recall were restricted to the LVF/RH (Experiment 1), suggesting that the right hemisphere is crucial in voicing processing in reading as in speech perception (Simos, Molfese, & Brendan, 1997). Manner of articulation similarity only affected performance in the RVF/LH (Experiment 2), arguing for specific involvement of each hemisphere in phonetic processing.

The Onset Effect in Word and Picture Naming

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This study investigates the so-called onset effect in the naming task. Forster and Davis (1991) found that form-priming effects in word naming are reducible to an onset effect, i.e., a shared initial segment. They established that the onset effect is non-lexical in nature and it occurs 0 only for target words whose pronunciation relies strongly on the non-lexical route. Grainger and Ferrand (1996) found that phonologically 0 and orthographically similar words yielded the same priming effect as segmentally dissimilar words as long as they share the onset. We show that form-priming effects can be obtained even when prime and target have a different onset. This priming effect seems to be phonological in nature since it also occurs in picture naming. However, there is an asymmetry between begin and end-related priming conditions. An account of these effects is offered in terms of the WEAVER model (Levelt, Roelofs, & Meyer, 1999) of speech production.

Repair or Backward Priming: Cross-Modal Priming with Pseudowords

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The effect of mismatching speech information on lexical activation is often investigated by using cross-modal priming (/ *domato/ —PAPRIKA). The more lexical representation and speech signal overlap, the larger the degree of lexical activation (Connine, Blasko, & Titone, 1993). Lexical activation reflects the degree of overlap. Marslen-Wilson (1993), however, proposes that every illegal deviation results in deactivation. The intended lexical representation is recognised by a second-pass recovery pass.

Cross-semantic priming can be caused by various priming effects besides feed forward spreading of activation, e.g., backward priming, semantic matching, expectancy generation. The latter priming effects and the second pass repair mechanism profit from additional processing time.

The interstimulus interval was varied in two cross-modal semantic priming experiments with naming as task. The pattern of results contradicted the proposal of a second-pass recovery mechanism. A contribution of backward priming, expectancy generation or semantic matching was also improbable.

Emotional Connotation's Impact on Inferences' On-Line Activation During Text Comprehension

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Since the 90's, research on emotion and text comprehension aroused great interest (i.e., Gernsbacher, Goldsmith & Robertson, 1992; de Vega, Leon & Diaz, 1996). In our study, we examine the impact of emotional connotation on inferences' on line activation. In order to so, we have constructed emotional and neutral stories, each inducing the same type of inference, that is, causal consequence inferences. The stories' construction ensured these stories to be identical in their structure and content, and consequently, to differ only in their emotional connotation. Three hundred participants took part in a reading task in which we presented emotional and neutral inferences at different moments in the texts, that is, at the moment they are supposed to be produced and after several subsequent sentences. Reading times indicate that both type of inferences are elaborated on-line but emotional inferences are maintained activated longer than neutral ones.

Previous Knowledge's Impact on the Use of the Connective "But": Study in Normal Aging

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A research of Caron (1983) has shown that readers do not always associate a relation of contrast to the connective "but". Productions reveal that they can associate a limit of the proposition truth but also that an useful part of information must be taken into account for the final interpretation. The aim of the present study is to examine the role of previous knowledge on the production of sentences after the adversative connective "but". Younger and older participants generated sentences after reading familiar and unfamiliar propositions. Results do not show an age effect on productions but previous knowledge influenced subjects' answers. When sentence topic is familiar both groups generated more contrasts. When sentence topic is unfamiliar, they principally generated limits of the proposition truth. It appears that the knowledge bases associated to the adversative connective "but" proposed by Murray (1995) must be completed.

The Mental Representation of Gender in German Monolingual and German-Italian Bilingual Speakers

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Gender has been studied as a linguistic category, but little is known about its role in language processing and production. This study investigated the role of conceptual and grammatical gender in 82 native German speakers using the semantic Simon paradigm (De Houwer, 1998), and an article production task. It was predicted that conceptual gender would be processed automatically as part of a noun's meaning whereas grammatical gender would not, and that article production would be faster and less error-prone for nouns with conceptual gender. Predictions were confirmed with the exception that the effect of automatic processing for conceptual gender was weaker than expected. Results from studies on German-Italian bilinguals, currently in progress, will also be reported.

The Development of Analogical Processes in Reading Acquisition in French

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Goswami (1986; 1993) suggested that prereaders could use rime analogies contained in clue words to help them read new words. The goal of our experiment was to study in a longitudinal way the development of analogical processes in reading. 22 children were tested from the nursery school to the first grade. An adaptation of Goswami's procedure was proposed. The clue word was presented on the screen before the auditory target. The children were instructed to decide whether the target word by the computer was identical or not to the target. Four clue word-target word pairs which shared a large unit (body or rime) or a small unit (onset or coda) were presented. Only beginning readers used analogy but in large shared units condition only.

Until now, such on-line experimental situations have been sparsely used in young readers and may provide promising tools for further investigation.

Communication Prostheses in Dementia

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One consequence of dementia of the Alzheimer-type (DAT) is a reduction in social interaction through reduced conversational ability. Two areas of cognition important for conversation are particularly implicated in DAT: speech production and short term memory. We present evidence from examination of DAT speech indicating that deteriorating speech output does not equate with impaired comprehension. As such, finding ways to tap into stored knowledge is vital for maintaining communication. Preliminary work into ways to ease the short term memory problem in DAT suggests that computer technology, presenting a multimedia interactive experience as a prompt for conversation, can be beneficial and might be the starting point for developing

a range of cognitive prostheses. Initial investigations indicate that touch screen technology presenting a simple interface, with photographs, videos and songs, can be successfully used in both one-to-one and group settings to enhance and promote social interactions in DAT.

Rhyming Abilities in Deaf Prereaders

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Several studies (Hanson, 1986; Alegria & Leybaert, 1995; Harris & Beech, 1998) have shown that deaf children's speech production quality determines the way in which speech representations are involved in cognitive processes. The goal of this study is to investigate the ability of deaf children to make rhyme judgements and to generate rhymes.

We compare two groups of deaf orally educated prereaders (intelligible I versus not intelligible NI group) and two groups of deaf prereaders educated or not with Cued Speech (Cornett, 1967). Results show that the two groups I and NI do not differ significantly. But, it is shown an positive effect of Cued Speech on rhyming ability.

These data are compatible with Leybaert's results (1998). The development of phonological representations in deaf children depends more widely on early experience with auditive situations in which all phonological contrasts are well specified rather on speech production quality.

Where is the Syllable Priming Effect?

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Recent studies using the masked priming paradigm have reported facilitating effects of syllable primes in French and English word naming (Ferrand, Segui, & Grainger, 1996; Ferrand, Segui, & Humphreys, 1997). Other studies did not however manage to replicate these effects in Dutch and English (Schiller, 1998; 2000). In Experiment 1, using the same stimuli and procedure as Ferrand et al. (1966), we did not replicate the syllable priming effect in French. In Experiment 2 and 3, when prime duration was increased (from 30 to 45 and 60 ms.), we did not obtain a syllable priming effect. In Experiment 4, with a similar hardware equipment and mask as Ferrand et al. (1966), we failed again to replicate the syllable priming effect. We conclude that the syllable priming effect is far from being a reliable effect and that it should not be used to constrain models of polysyllabic word processing.

Evaluating Computational Models of Reading with Highly Reliable Data ($r > .95$)

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Several studies have reported naming latencies for a small number of participants (30) and a large number of words ($N > 1000$). These databases have been used to “bring computational models of word naming down to the item level” (Spieler & Balota, 1997). In the present study, we examine the reliability of such databases and their adequacy for model evaluation. Response times to a small number of items (120 monosyllabic English words) but from a large number of participants (140) were collected in a perceptual identification task. We show that, with few participants (30), correlations on mean item latencies for different participant groups are relatively low (between .5 and .6). In order to reduce error variance, a grouping procedure derived from Vincentizing was used. This resulted in higher correlations between participant groups ($r > .95$), thus yielding a more reliable database for evaluating computational models of reading.

“We Didn’t Grow Up As Soon in the Olden Days”: The Influence of Cognitive Aging Upon Age-of-Acquisition Ratings

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The age at which a word enters the vocabulary of native-speaking, monolingual children, its age-of-acquisition (AoA), has increasingly emerged as an important lexical processing property. One widely accepted methodology to measure AoA utilizes adults’ retrospective AoA ratings. This has proved a statistically reliable way of providing a robust chronology, but equivocal in identifying precise ages-of-acquisition. Two studies investigate whether these effects are mediated by cognitive aging. Participants assigned AoA ratings for 298 verbs, 35 mental and 35 physical skills. In comparison to younger participants, elderly adults consistently and significantly underestimated developmental verb acquisition by almost one year. However, chronology was preserved, with an almost perfect correlation between the groups’ ratings. This pattern was reflected for both mental and physical skills, but Elderly participants’ AoAs for modern children, rather than themselves, were significantly earlier than even young adults’ self-ratings. Cognitive aging explanations are discussed, together with implications for future AoA research.

Psychological Reality of the Conceptual Features Defined By François (1988, 1990, 1997)

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Introduction: In the framework of propositional models, sentence meaning is depicted like a psychological proposition where verb is considered like a relational entity relying the arguments. François (1988, 1990, 1997) proposes two conceptual features (i.e., Dynamicity and Change) considered like being a part of the verb meaning and intervening in the connection of the predicate with its arguments. Our aim is to examine the psychological reality of this theory.

Methods: 75 participants accomplished a semantic decision task. They had to read 40 sentences followed by a target. Response times were recorded.

Results: Analyses of Variance were conducted for each feature, showing a significant interaction between “feature instantiation in the sentence” × “target”.

Conclusion: Results are interpreted in the light of the featural model for semantic decisions of Smith, Shoben & Rips (1974). They suggest the conceptual features Dynamicity and Change are a part of the verb meaning.

Naming Multidimensional Objects in a Referential Communication Task

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Current approaches to the production of complex NPs including specifications of color and size fail to account for the high frequency of redundant color specifications and the canonical ordering of adjectives (size before color). Participants described target objects appearing together with similar context objects (referential communication task). The analyses of naming latencies and eye movements suggest that perceptual grouping processes based on early color information lead to overspecifications of color. The information about color and size of the referent is available early enough for a simultaneous grammatical encoding of both dimensions under consideration of adjective ordering rules. The occasional occurrence of adjective inversions (color before size) under increased task demands is due to less effective perceptual grouping and time pressure. NPs are then constructed incrementally according to the order of detected dimensions. The generation of complex object specifications can thus be characterized as trade-off between semanto-syntactic and procedural constraints.

Grammatical Gender can Constrain Lexical Access of Spoken Words: Evidence from the Processing of Homophones

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We examined whether grammatical gender can constrain lexical access of spoken words in French. For that purpose, homophones whose different meanings are associated with words of different genders (e.g., /sEl/, meaning salt masculine or saddle feminine) were used in two cross-modal semantic priming experiments. In the first experiment, in which homophones were presented in isolation, facilitation was found for targets related to both the masculine (e.g., poivre, pepper) and the feminine (e.g., cheval, horse) meanings of the homophones. In the second experiment, in which homophones were presented with a gender-marked definite article (e.g., /la sEl/, meaning the saddle), facilitation was found for targets related to the meaning matching the gender information given by the article (e.g., cheval). No facilitation was found for targets related to the meaning mismatching the gender information (e.g., poivre). We argue that contextual gender information is used to constrain lexical access of spoken words.

A Cognitive Role for Natural Language? New Evidence from Covert Semantic Network Activation in Bilinguals

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My presentation addresses the question of whether at least some of our private thoughts take place in natural language or, as advocates of the “Mentalese” camp maintain (cf. Fodor, 1975), a universal, non-natural-language-specific format. The answer to this question is important in determining the level of emphasis natural language should receive in scientific psychology, in shedding light on the Sapir-Whorf problem, and in explaining the phenomenological sensation bilinguals report of “changing mental channels” when switching language.

I will describe an original model of language-thought interaction (Henser, 2000b and submitted) I have developed which assigns natural language a key role in propositional knowledge representation and in qualitatively enhancing cognition. I will then report on some of my empirical work (Henser, 1999, 2000a, 2000b, 2001, in press) in which I stimulated covert thought in Japanese-English/E-J bilinguals and tested for language-specific semantic network activation. The results were suggestive in favour of the model.

Sexual Connotations of Grammatical Gender

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Traditional linguistic theories view grammatical gender as either an purely arbitrary grammatical phenomenon or as based on the biological sex of animated referents of words. Recently, a new theory has been proposed which suggests that grammatical gender depends on the metaphorical conception that the speakers of that language hold of the referent, no matter if it is animate or inanimate: masculine words would carry male connotations and feminine words female connotations. Two experiments are reported that tested this hypothesis. We asked Spanish subjects to evaluate names of inanimate referents in the bipolar adjectives of the Semantic Differential and compared pairs of synonyms that differed only in grammatical gender (“nevera”, “fridge”, is feminine, whilst “frigorífico”, also “fridge” is masculine). We then compared the evaluations with those obtained by the words “hombre”, “man”, and “mujer”, “woman”. Experiment 1 presented pictures of the referents together with the word, and experiment 2 presented the words embedded in sentence contexts. The results supported the predictions. We discuss their implications for the linguistic relativity hypothesis.

A Database of Naturalistic Speech Errors in Spanish

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This paper presents a database of more than seven thousand Spanish speech errors. It includes a description of the method of collection, the structure, and a general descriptive analysis. The database and the resulting statistics are compared with the other speech error corpus available in Spanish (del Viso, 1992). The control procedures used to ascertain the validity and viability of each error are described and their advantages and disadvantages are discussed. In future research the results will be used to analyse the processes involved in production and the mechanisms that underlie language planning and production.

Emotional Inconsistencies in Reading: An Event Related Potentials Study

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A set of short stories was presented for reading, while event related potentials were been registered. The first sentence of each story introduced a character, specifying if he/she knew an event of emotional relevance. In the second sentence, the character's reaction was described; it could be either consistent or not with his/her state of knowledge. For example, "Candido Learnt (Candido didn't know yet) that his loyal dog had just died, so he felt depressed". Results indicated the presence of a delayed positivity (P600), located in the central-parietal area, when the emotion label was inconsistent with the character knowledge. These results were somehow unexpected: in our texts only discourse level inconsistencies were presented, and P600 is generally associated with some sort of syntactic violations.

Two Phones for the Single Letter 'x': Do Listeners Mind?

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The single letter 'x' is pronounced /ks/ or /gz/ in French. In a similar case of two phonemes "hidden" within a single letter (the kana NI), Japanese have trouble in detecting /i/ or /n/ in /ni/. We suggest this behavior is an instance of an orthographic influence on speech perception. We thus explored how French listeners detect /k/ in words such as "taxi". An increased processing cost was induced by 'x' compared to 'ct'. The different phonetic contexts /s/ vs. /t/ did not explain the processing cost for 'x': no such cost was found for 'cc', also pronounced /ks/ in words such as "vaccin". More directly, we compared the 'x' and 'cc' spellings (e.g., "taxi" vs. "vaccin") for the detection of either /k/ or /s/. Here again, 'x' lead to an increased difficulty compared to 'cc'. These findings confirm that literate listeners can't help seeing the words they listen to.

Individual Differences in Semantic Short-Term Memory Capacity and Language Comprehension

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A limited-capacity working memory (WM) system is thought to play a role in language processing. Experimental results have shown that storage-plus-processing measures of WM capacity (e.g., reading span) predict language comprehension better than storage-only measures (e.g., word span, non-word span). It may be however, that since those measures require primarily phonological WM, they underestimate the full contribution of WM-storage to language processing. Since recent studies provided support for a semantic storage component in WM, we developed a new storage-only measure of WM, the conceptual span test, to provide a relative index of the capacity of the semantic WM component. We demonstrate that this measure is sensitive to semantic information and that, like the reading-span test, it predicts language comprehension. The results demonstrate that, although language comprehension still obtains the highest correlation with reading span, the correlation with the conceptual span is larger than with word and non-word span. Moreover, only the conceptual span is sensitive to the effects of semantic manipulations on sentence processing.

Aging and on-Line Processing of Adversative Connectives in Narratives

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The ability to suppress the activation for old information in a text was examined by asking young and older participants (respectively 23.4 and 70.4 years old) to read narrative passages either linked by the adversative connective “but” or without connectives.

Usually, in French, the interclausal connective “but” indicated 1) either that the highly predictable outcome of an event will not happen 2) or that the expected consequence (i.e., the event will not happen) will be nevertheless the one that happen. Therefore, in that case, we assumed that older readers should have difficulties to activate information corresponding to the new consequence of the event because of inhibition problems (Stolzfus, Hasher & Zacks, 1996). We observed that reading times for the second clause were shorter when the clause was introduced by “but” and for young readers. Response times to comprehension questions were longer for old participants especially when the connective “but” signaled a concessive type relation.

Distinguishing Words from Nonwords in a Lexical Decision Task: Are There Visual-Word-Form Specific Memories?

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When a skilled reader is asked to recognize a briefly presented word a systematic variation of performance with the location of the eyes in the word is observed: the word is recognized best when fixated slightly left of center and performance decreases as fixation moves away from this “optimal viewing position”. Curiously, although the viewing position effect (VPE) is consistently

observed with words, it is not observed with non-words in a lexical decision task. The probability of correct non-word rejection does not vary with fixation location, suggesting that “non-word” decisions may rely on different processes than “word” decisions. In the present study we provided better control over lexical variables (e.g., bigram frequency; number of neighbors) that may be responsible for this dissociation. Notwithstanding these controls, there is no evidence for a VPE in non-words. We interpret our findings as indicating that word-specific visual pattern memories could be involved in reading.

150 words.

Effect of Word Emotional Valence in Word Processing

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Two experiments examined when emotional information about words is accessible in memory. In the first experiment, we measured reaction time in a lexical decision task on negative or positive emotional words and pronounceable non-words. In the second experiment with the same set of words, we used a valence decision task: participants were instructed to decide as quickly as possible whether each word was positive or negative. Results showed that positive valence of words facilitated performance in lexical decision even though negative valence facilitated performance in valence decision. On the other hand whatever the valence of the words, reaction times were larger in the valence decision task than in the lexical decision task. Results indicated that emotional information is accessed once lexical representation is accessed.

Grammatical Priming Facilitates Word Naming: Evidence from Serbian

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A review of the literature suggests that semantic context consistently affects word recognition, while evidence on grammatical context effects on word recognition remains equivocal. Previous studies in Serbian employed grammatical priming of only one word class in each experiment, failing to detect effects of grammatical context on word naming. In our two experiments target words of two classes were preceded either by single-word primes constraining target word class (nouns by congruent prepositions, verbs by congruent personal pronouns), or by neutral linguistic primes. Grammatically constraining context speeded target naming by 24 ms. in the first experiment that used stimulus onset asynchrony (SOA) interval of 600 ms. Experiment 2 replicated a grammatical priming effect (21 ms.) at 300 ms. SOA interval, indicating that effects of grammatical priming should not be attributed to manipulations in SOA interval.

These results suggest that focusing on word class effects could be fruitful in the quest for mechanisms of grammatical priming.

Do Good and Poor Readers Differentially Understand Idioms?

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Poor readers are less efficient in the suppression of irrelevant information, and also have limited capacity of exploiting contextual information. These abilities are essential for children to understand the figurative meaning of idioms. We investigated the comprehension of familiar idioms in good and poor readers of two age levels: 7 year-old and 9 year-old children. We used “opaque” idioms whose constituent words did not contribute to the figurative interpretation of the string, and “transparent” idioms whose figurative interpretation could be figured out from the words forming them. Idioms were embedded in literal or idiomatic contexts. If indeed poor readers were less efficient than good readers in suppressing irrelevant information and using context, then we should expect poorer performances in the comprehension of idioms both when they are embedded in an idiomatic contexts and when semantically opaque.

Illusory Conjunctions in French: The Nature of Sublexical Units in Visual Word Recognition.

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Illusory conjunctions have been showed to reflect the perceptual units involved in the visual word processing (Prinzmetal, Treiman & Rho, 1986). However the precise nature of these units has been largely debated. While some authors provided evidence in favour of syllabic units (Prinzmetal et al., 1986; Rapp, 1992) others suggested that these units emerged from the statistical properties of the distribution of letters in the lexicon (Seidenberg, 1987: the bigram trough hypothesis). In a first experiment we showed that neither the syllabic hypothesis nor the bigram trough hypothesis can fully account for the illusory conjunction data. The results suggest that reading units could be defined in a more complex way involving both phonological and orthographic representations. Experiments 2 & 3 investigated how reading units can therefore be characterized.

Interlingual Orthographic Neighborhood Effects in Visual Word Recognition

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Interlingual orthographic neighborhood influences in French-English bilinguals are examined in two experiments. The processing of words with at least one higher frequency neighbor in the other language is compared with that of language-specific words both in language decision (i.e., in which bilinguals decide on the language of the words presented) and lexical decision tasks. The results show, for both languages, an inhibiting effect of increased interlingual neighbourhood frequency on visual word recognition. They suggest that a target language word can activate lexical representations simultaneously in the two languages. The overall pattern of results is interpreted using the Bilingual Interactive Activation (BIA) model (Dijkstra, van Heuven, & Grainger, 1998).

Effects of Interference Tasks on the Linguistic and Perceptual Representations of Categorical Spatial Relations

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Kemmerer and Tranel (2000) found neuropsychological evidence that linguistic representations of categorical spatial relations (e.g., above, below) are separate from perceptual representations. The aim of the present experiment—which is currently being conducted—is to further distinguish representations of categorical spatial relations based on linguistic information from those based on perceptual information. Normal subjects are presented with pictures (perceptual condition) or sentences (linguistic condition) expressing simple categorical spatial relations (e.g., triangle above square). After a delay (2–10 seconds) a picture is presented and subjects have to indicate whether the same or a different spatial relation is presented. On half the trials the subjects execute an interference task during the delay. These interference tasks are chosen to load the visuo-spatial sketch pad (spatial tapping task) or the phonological loop (canonical number generation). We will examine whether there are selective interference effects on decision times in the perceptual and linguistic condition.

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What is the Role of the Semantic System in Acquired Dyslexia in a Transparent Orthography?

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The role of semantics in word naming in transparent Turkish has recently been reported to differ from English (Raman & Baluch, in press). It is thus of interest to examine how the role of semantics in word naming in acquired dyslexia in a totally transparent orthography compares to English (Saffran, Bogyo, Schwartz & Marin, 1980). A case study of a native speaker of Turkish with acquired dyslexia (age 67) is reported. The patient was asked to read aloud a list of high and low frequency words manipulated factorially with imageability. There were significantly more errors on low frequency words than high frequency words but no difference in errors between high and low imageable words. Implications of findings are discussed in relation to orthographic transparency.

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How Do Readers Resolve Inconsistencies in Narrative Passages?

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This study examined whether readers detect an inconsistency during reading between an earlier described characteristic of a protagonist (“Mary was vegetarian”) and a subsequent target action carried out by the protagonist (“She ordered a cheeseburger”). According to O’Brien et al. (1998), when the reader encodes the target sentence, that information reactivated all the information about the protagonist and a global coherence break appears. However, Bower & Morrow (1990) assumed that the reader updates his situation model throughout reading any time he encounters information about the protagonist. To test those explanations, a qualified sentence appeared before the target sentence (“when Mary dined out, she ate everything”). In a first reading, we noticed longest reading times for the inconsistent version but no difference between consistent and qualified version. In the second reading, reading times were similar for the three conditions. This suggested that updating mental representations was not made according to the here/now point of the narrative.

Reading Misspelt Words in Sentences

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Sentence reading studies in Finnish (Hyona, 1995) and German (Radach et al, 2000) and artificial tasks in French (Beauvillain et al, 1996; Beauvillain and Dore, 1998) suggest that orthographic regularity can modulate the landing position of the first fixation on a word. This study uses English sentences containing misspelled words to test this claim. For example, the base word “university” was spelt correctly in condition one; misspelt with a high trigram frequency in condition two (“usiversity”); misspelt with a low trigram frequency in condition three (“ubiversity”); misspelt with an illegal but pronounceable trigram in condition four (“ufiversity”) and misspelt with an illegal and unpronounceable trigram in condition five (“dniversity”). Landing positions on the misspelt word and reading time measures for the prior region will be compared across conditions. The results will be discussed in relation to current models of eye movements in reading.

Is Grammatical Gender Selected in Bare Noun Production? Evidence from Picture Naming

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Psycholinguistic studies have investigated whether information about the grammatical gender of words is always retrieved, even when the task does not explicitly require it, or if it becomes automatically available only in sentential context. In the present study we have addressed this issue by using a double-picture paradigm. We have manipulating the semantic relationship between the pictures, the congruency of their names’ gender, the interval between the onset of the stimuli and the onset of the cue indicating which picture to name. In Experiment 1 (SOA -40) there is

a facilitation for semantically related targets; in Experiment 2 (SOA +80) there is a facilitation for gender incongruent targets. In both Experiments there is an interaction between gender and semantic relation. In Experiment 3 (SOA +250) no effect proved significant. The results show that grammatical gender is mandatorily selected, and that such retrieval follows access to the semantic representation of the word.

Similarity Neighbourhood Analyses of Portuguese Young Children's Lexicons

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Assuming that the structural organization of words in the mental lexicon influences auditory word recognition processes, it is important to investigate changes in the structural organization of the lexicon across development. We present a structural analysis of the productions of 3-, 4-, and 5-year-old native Portuguese speakers using the similarity neighbourhoods paradigm. A phonological neighbour was defined as any word that differs from a given target word by a one phoneme substitution, deletion, or addition, in any position.

Results show structural differences between shorter (3–5 phonemes) and longer words (6–9 phonemes). Sixty percent of shorter words have 1–3 neighbours, 20% have 4–11, and 20% have no neighbours. Also, an age-related increase in density was found. In longer words, 56% have zero neighbours, 33% one, and 11% 2–4 neighbours. Results will be compared with those of adults and discussed in the context of the Lexical Restructuring Model.

Orthographic Rime Neighbourhood Size and Word Frequency Effects on Naming

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Psycholinguistic research has shown that orthographic and phonological regularities affect visual word recognition. Two experiments were conducted which investigate whether orthographic rime neighbourhood size affects naming. In Experiment 1, participants were asked to name mixed lists of words and pseudowords (mixed condition). In Experiment 2, words and pseudowords were presented separately (blocked condition). The two experiments showed that words with many rime neighbours were named faster than words with few rime neighbours. High-frequency words were named faster than low-frequency words. The interaction between word frequency and orthographic rime neighbourhood size was also significant. The rime neighbourhood effects were larger for low-frequency than high-frequency words. Furthermore, words were named faster in the blocked condition than in the mixed condition, whereas for pseudowords it was the opposite. No rime neighbourhood size effect was observed on pseudoword naming. These results were discussed in terms of current models in visual word recognition.

Sponsors, Race Drivers, and Mechanics: Interaction of Language Production and Memory Processes

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Sentence production is constrained by memory processes, especially if structures usually treated as recursive are involved. Simulations with a localist connectionist model of language production (Schade & Eikmeyer, 1998) predict a specific point of fracture based on memory overload while producing embedded relative clauses.

To investigate the interaction of memory and syntactic processing, we asked subjects to complete sentence beginnings (Bock & Miller, 1991). The beginnings were either simple (“The generous sponsor whom the famous race driver...”) or complex (“The generous sponsor whom the famous race driver whom the skilled mechanic...”). Subjects produce omissions and break offs in the complex cases, as predicted by the model.

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Spelling in French: The Acquisition Of Orthographic Procedure

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The objective of this study is to evaluate spelling procedures used by French first graders in dictation. The main hypothesis tested in this research is that we can observe, at the very early beginning of spelling acquisition, effects assumed to be a manifestation of orthographic processing such as frequency (high frequency versus less frequency words) and analogy (pseudowords with or without orthographic neighbour). In January and June, first graders ($n = 36$ and 31) were required to spell inconsistent frequent and rare words, and pseudowords made or not by analogy of real words. As expected, the effects of frequency and analogy are observed in the both sessions. This results suggest that children possess orthographic representations and can use orthographic process to spell as early as four teaching months.

The implications on stage developmental models (Frith, 1985; Ehri, 1998) and “self-teaching” theory (Stage, 1995; Sprenger-Charolles, Siegel & Bonnet, 1998) will be discussed.

Effects of the Lexical Co-Activation in Bilinguals’ Language Production

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Our aim was to investigate whether lexical selection in bilinguals is affected by the activation of words in the non-target language. Previous results were contradictory: Costa et al. (1999) claimed that lexical selection was restricted to the words in the target language, while Hermans et al. (1998) defended the participation of all the activated words. This work intended to replicate Hermans et al. results employing Costa et al. much more balanced participants in a picture-word interference task.

Experiment 1 showed within-language semantic interference and phonological facilitation. However, naming latencies were not affected by the presentation of a word phonologically related to the translation of the picture name. Thus, we claimed lexical selection was taking place exclusively within the target language.

Experiment 2 used a SOA of 150 ms. to study whether the interference of the non-target language reported by Hermans et al. might be taking place at the sublexical level. Again, no effects of the non-target language were obtained. Therefore, our experiments support the language-specific models, both for lexical and sublexical selection.

Category Learning Without Labels: A Simplicity Approach

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In an extensive research tradition in categorization, researchers have looked at how participants will classify new objects into existing categories; or the factors affecting learning to associate category labels with a set of objects. In this work, we examine a complementary aspect of categorization, that of the spontaneous classification of items into categories. In such cases, there is no “correct” category structure that the participants must infer. We argue that the this second type of categorization, unsupervised categorization, can be seen as some form of perceptual organization. Thus, we take advantage of theoretical work in perceptual organization to use simplicity as a principle suitable for a model of unsupervised categorization. The model applied directly to similarity ratings about the objects to be categorized successfully predicted participants’ spontaneous classifications. Moreover, we report evidence whereby perceived similarity is affected by spontaneous classification.

Simon Effects Without Dimensional Overlap

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In all previous Simon studies, there was an overlap between the responses and the irrelevant feature of the stimuli. I report two Simon studies in which the responses and irrelevant feature of the stimuli were related only through task instructions. In the first study, (some) participants said “CALE” to green squares and stimuli referring to the concept “left” (i.e., an arrow pointing left and the word LEFT) but said “COLE” to blue squares and stimuli referring to the concept “right”. These participants needed less time to say “CALE” to green squares presented on the left than to green squares on right. “COLE” responses were given faster for right blue squares than left blue squares. In Experiment 2, a similar extrinsic Simon effect was observed but now with valence as the irrelevant feature. These findings suggest that response cues can be integrated in the representation of the actions.

Comparing Learning Curves of Novices and Experts: A New Approach to the Study of Training Simulators

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We describe a new approach to the study of simulator fidelity and training efficiency. It is based on comparing learning curves in the simulator, for novice trainees and domain experts. The major claim is that if a simulator represents a relevant environment for the training of the simulated operational task, domain experts performance should show a major advantage over novice trainees. Two measures of domain expert performance are important in the evaluation of the simulator. One measure is the distance (in training hours, or sessions), between performance levels of novices and domain experts. It reflects the difficulty of the measured dimension and the predicted amount of training required by novices, to achieve expert levels. A second measure which represents fidelity, is the distance between expert performance and performance asymptote in the simulator. The approach has been successfully applied in the study of aviation simulators.

The Usefulness of Non-Linearity: Effects of Considering Multiple Reader Perspectives on Learning By Hypertext Writing

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In our research the process of hypertext writing by learners and its impact on knowledge acquisition is examined. Our paper focuses on the effects of considering two different reader perspectives during the 'construction' of hypertexts. This research is theoretically based on the 'knowledge-transforming model' (Bereiter & Scardamalia, 1987) and the 'Cognitive Flexibility Theory' (e.g., Jacobson & Spiro, 1995). In the experiment to be reported subjects were asked to construct two hypertexts by linking prepared text elements (i.e., nodes) in two sessions. In the experimental group (n = 20) two different reader perspectives had to be considered. In the control group (n = 20) no potential readers' perspective was specified. Processes of construction, the resulting hypertexts and learning effects were examined. The results confirmed assumptions of the 'Cognitive Flexibility Theory': For example, the experimental group showed more knowledge in the tests regarding relationships between nodes and knowledge transfer.

Egocentred and Allocentred Pointing After Primary and Secondary Learning

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To move effectively in the environment it is necessary to acquire spatial information, either by direct interaction with the environment (primary learning) or by using maps (secondary learning). Furthermore, it is crucial to keep track of the things around us, that is to locate objects in relation to us and in relation to other objects. In the first case people rely on egocentric coordinates, whereas in the second case on allocentric coordinates. We hypothesised that secondary learning facilitates locating objects in relation to other objects, whereas primary learning facilitates locating objects in relation to us. In 2 experiments, participants had to study 8 common objects either directly or by a map. Next, they had to locate these objects in relation either to themselves or to other objects. We found that secondary learning facilitates both kinds of localisation, whereas primary learning makes the egocentric condition easier than the allocentric one.

Response Effects and Motor Sequences: Making the Sequence Length Effect Disappear

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Data presented at the last ESCOP conference showed that response-specific action effects can improve serial learning in a serial reaction time task. The present experiments were conducted to differentiate the underlying mechanisms and to link the results to current motor theories. To this end, participants trained short sequences of keypresses, sequence length and response-effect mapping being the independent variables. Contingent, distinct key-effect relations were contrasted with either contingent but uniform or no response effects. The results show an impact of response effects above all in the early phases of sequence acquisition. This impact is evident mainly in sequence initiation times, suggesting a link between anticipated action effects and response programming. The most striking result is the fact that appropriate response effects can eliminate the sequence length effect on initiation times: Long sequences are initiated as quickly as short sequences. Results are discussed with reference to ideo-motor approaches to motor control.

Automaticity in the Implicit Sequence Learning Paradigm

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The goal of this series of studies was to determine whether sequence learning is automatic. Subjects responded to sequences of words written in colors by reading the words or naming the colors. The words appeared one by one on the screen. The sequence of words was fixed and that of the colors was random. One group of subjects was instructed to learn the word sequence intentionally, while another group learned incidentally by being instructed to read each word. In the third group the subjects were instructed to name the colors. Thus, in this group learning was automatic. In the test, all groups performed the generation task, i.e., they had to generate the next word in every trial. We found indications of learning in all three conditions.

Is the Right Hemisphere Capable of Reading and Understanding a Word?

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We examined effects of semantic and orthographic neighbors on lexical decisions. In three experiments we found: 1. Faster RTs for words with larger numbers of semantic neighbors (the semantic neighborhood effect) for words flashed to the RVF (right visual field). 2. Faster RTs for words with larger numbers of orthographic neighbors (the orthographic neighborhood effect) for words flashed to the LVF (left visual field). 3. Frequent words produced a semantic neighborhood effect in the RVF for both concrete and abstract words, while in the LVF it appeared only for concrete words. 4. Words that were both frequent and concrete produced an orthographic neighborhood effect in the LVF. Wernicke's patients produced results similar to those found in the LVF.

Our results suggest that the right hemisphere has a semantic network composed of words that are both concrete and frequent, and it has the ability to recognize a word by its orthography.

How do Children Learn Statistical Structure in SRTs?

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Sequential learning has been investigated with the serial choice reaction task (SRT): Individual stimuli are successively presented to the subjects and they have to react with corresponding responses.

Statistical structure in the sequence of stimuli and responses decreases reaction time, indicating sequential learning. It is still an issue if the learning of stimulus and response sequences is based on the same learning mechanism and how sequence learning develops.

In the present SRTs, playing cards were used as stimuli and pressing keys of a keyboard as the responses. Frequencies and transitions of stimuli and responses were separately varied in four experiments. The subjects were 8- and 10-year-old children and adults.

The results show that statistical regularities in the sequence of responses have a much stronger impact on learning than in the sequence of stimuli. The data of children and adults demonstrates differences in explicit vs. implicit knowledge and speed vs. accuracy.

Intentional Fixation: Preference of R-E Learning Over S-R Learning

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At the XI ESCOP Conference in Gent we reported experiments which showed that if participants strive for attaining certain goals, reinforcements of response-effect (R-E) relations result

in substantially faster learning than equally consistent reinforcements of S-R relations (Stock & Hoffmann, in press). The present experiments show that this preference of the acquisition of R-E relations is not merely due to attentional factors. Furthermore, experiments are presented which show that the preference for R-E learning is a reliable phenomenon that holds also under more ecological conditions: Participants were required to colourise everyday objects by different colours. The correct action (reinforcements) either depended on the object (S-R) or on the required colour (R-E). Again, participants needed substantially more trials to learn the S-R than the R-E relations. The findings are discussed in terms of the ideomotor principle, that claims that behavioural competence is based on bidirectional action-effect relations

Implicit Performance in a Complex Artificial Grammar Learning Task

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The effect of performing under implicit versus explicit test conditions was evaluated in an artificial grammar learning task with a complex structure. Participants perform better on a categorisation task when they are unaware of applying the knowledge acquired implicitly during training (Experiment 1). In Experiment 2, this finding was replicated. In addition, we tested the influence of the test conditions on the nature of the knowledge applied, i.e., grammatical knowledge or pattern learning. We used a new measure to describe pattern characteristics, which accounts for pattern distinctiveness, in addition to frequency of exposure. In both implicit and explicit test conditions, categorisations of the strings correlated higher with the strings' grammaticality than with their pattern characteristics. The results point at the importance of the test conditions for the level of performance in artificial grammar learning.

On the Potential Value and Limitations of Emphasis Change and Other Exploration Enhancing Training Methods

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Two experiments are presented that examine the efficiency of training methods that force trainees to explore the strategy space of a task. Both experiments employ a two-dimensional search task. Experiment 1 studies a method that enforces exploration by preventing repetitions within short sequences. It shows that the effects of this "inhibition of return" method in abstract settings is similar to the effects of "emphasis change" training (see Gopher, 1993) in high cognitive workload tasks. Specifically, in complex strategic spaces, the method leads to low initial performance, and improves long-term and transfer performance. Experiment 2 examines a method that enforces exploration by blocking some of the strategies independently of trainees' behavior. The results show that an effective usage of this method requires a good understanding of the underlying strategic structure. These findings shed light on the limitations and the potential of exploration facilitating training methods.

Disproportionate Dual Task Costs for Episodic But Not Semantic Memory Retrieval

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There has been disagreement in the literature as to whether older adults have a disproportionate deficit in dual tasking. This research examines both task difficulty and domain as possible moderator variables of dual task cost in older adults. In an earlier experiment, 36 older adults and 36 younger adults retrieved either previously learned word paired-associates (episodic retrieval) or overlearned category members (semantic retrieval) under no working memory load and with a working memory load condition. The proportional cost of dual tasking was age-invariant for semantic memory retrieval but was particularly marked for episodic memory retrieval. The data did not support an account based on task difficulty and suggests the age effect in dual task studies is domain specific. To investigate the episodic/semantic distinction further, younger and older adults' performance was examined using another set of episodic and semantic tasks again under conditions of load. The results of both of these experiments will support the argument that dual tasking involving episodic memory retrieval is problematic in older adults.

Identifying Mr Typical: The Effects of Facial Distinctiveness, Lineup Construction and Presentation Type on Eyewitness Accuracy

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Two experiments compared the effects of target distinctiveness, lineup construction and presentation types on eyewitnesses identification accuracy. Both experiments utilised a $2 \times 2 \times 2$ between subjects design, in which the factors of facial distinctiveness (typical or distinctive), construction type (match-to-description or similarity-to-suspect), and target presence (present or absent) were manipulated. Lineups were presented either simultaneously (experiment 1) or sequentially (experiment 2). 240 participants served as witnesses to a video-taped scenario. One week later they were presented with a photographic lineup. For both experiments, identification accuracy was not significantly affected by target distinctiveness. A further study, using an old/new face recognition task, showed the expected advantage for distinctive faces. As the advantage for distinctive faces was only found using the traditional old/new recognition paradigm, it is proposed that the well-documented advantage for distinctive faces is either a) paradigm specific, or b) only valid when the same images are used at encoding and test.

New Objects Semantic Categorisation at Different Levels of Hierarchy

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A priming experiment investigated the effects of the learning context on the level of hierarchy at which a new object is stored in memory. In Phase 1, subjects pointed out the semantic intruder among three drawings (a new object and two familiar ones). To perform the task, the new object had to be classified in the same category as one of the familiar objects, either at a supra-ordinate level (bird, mammal, musical instrument, tool) or at an ontological level (animal, artefact). In Phase 2, these new objects were associated with other familiar objects and had to be classified at the same level as in Phase 1 or at a different level or were presented only in Phase 2.

Data demonstrated that the “supra-ordinate context” induces subjects to store new object representations at this level, whereas every new object was spontaneously classified at the ontological level whatever the context. Additionally, data provided evidence for the mammal category to be an ineffective level in the hierarchical organisation of semantic memory.

Retrieval Fluency and Self-Evaluation of Memory Performance

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Research has shown that retrieval fluency influences meta-cognitive judgments, such as feelings of knowing. We assessed the effect of retrieval fluency on the evaluation of one’s own performance. Specifically, participants were given category production tasks, e.g., listing as many flowers as they could. Production time was 15, 30, 45, or 60 seconds (Experiment 1; oral production), and 30, 60, 90, or 120 seconds (Experiment 2; written production). Afterwards, they provided estimates of (1) how many exemplars they retrieved and (2) how good they thought they were at this task. In Experiment 1, participants both underestimated the number of provided exemplars and thought their performance was worst when production time was highest. In Experiment 2, participants’ estimates of number of provided exemplars were accurate if production time was shortest and were underestimated for the other production time conditions. In conclusion, retrieval fluency underlay the evaluation of one’s own category production performance.

Intra- And Interindividual Differences in Visuo-Spatial Working Memory Tasks

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Logie suggested that the visuo-spatial working memory has a visual and a spatial components. Our hypothesis is that different modes of presentation should call differently on the visual or on the spatial component: A simultaneous presentation should rely more heavily on the visual cache, whereas a sequential presentation should essentially call on the spatial component. Two studies will be reported; their objectives were to explore the correlation between the two components and to study intra- and inter-individual differences, by administering a visuo-spatial task in which a number of positions were to be retained. In Experiment 1, positions were shown simultaneously or sequentially. In experiment 2, subjects were administered the same visuo-spatial working memory task twice, either under a simultaneous presentation or under a sequential presentation. According to our hypothesis, the results showed a correlation between modes of presentation and components; the focus will also be on inter- and intra-individual differences.

False Memories and Accuracy Assessment Through Confidence in Episodic and Semantic Memory

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The purpose of this study is to examine whether subjects are capable of estimating the accuracy of their responses in a T/F recognition test based on confidence values. Three types of materials were used: general knowledge, an event, and an expository text. Moreover, half of the subjects were given two practice tasks and feedback to illustrate the problems that can come from estimating our episodic or semantic knowledge when we assess accuracy through response confidence. The practice task had no effect on either accuracy or confidence. In terms of materials, there were two response patterns: while subjects placed higher confidence on correct answers than on incorrect ones for both true and false sentences in general knowledge and the text, they accepted false information not presented in the event with even more confidence than their correct rejections.

No Feedback, Please! Detrimental Effects of Feedback on Performance in STM Tasks

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Would it be possible to increase human ability to store information for a short time with the use of feedback information? Participants were shown a panel of 16 letters, which disappeared after 50 ms. Then, they had as much time as they needed to recall these stimuli. Some letters were arbitrarily defined as “valid”. Any time a participant correctly recalled a “valid” letter, he or she obtained positive feedback information (extra points or money). Negative feedback was given for erroneous recall but accurately recalled “nonvalid” letters were not accompanied with any feedback. Three experiments, in which the principle to define “valid” stimuli was manipulated, showed that control condition (no feedback at all) resulted in better performance than any feedback condition. It also appeared that even in the easiest condition participants recalled only four items per trial at the average. It seems that STM capacity cannot be increased with feedback information.

Phonological Similarity in Free and Serial Recall: The Effect of Increasing Retention Intervals

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Nairne (1990) proposed an alternative to Baddeley’s interpretation of the Phonological Similarity Effect (PSE) observed in immediate recall: if list items sound similar, their mnemonic representations would contain many overlapping features leading to incorrect trace interpretation at retrieval.

Nairne & Kelley (1999) showed that when the retention intervals are short, a PSE is observed because recovering an item's correct position within a list is more difficult when list items sound similar. As the delay increases, the list dimension would play a more important role in determining final performance: phonological similarity could help in list discrimination by providing a list-based retrieval cue. This effect could be interpreted also within a more general framework as underlying two essential processes of item-specific and inter-item information (Tversky, 1977; Hunt & Mc Daniel, 1993; Shortridge, 1999). Serial immediate recall would necessitate the differentiation of each specific item in order and free recall would necessitate the retrieval of a search set constituted by list item. In this case, a reversed PSE should be observed whatever the delay in free recall. An experiment was conducted in order to replicate Nairne & Kelley's results and to confirm the role of item-specific and inter-item processes in serial and free recall.

Effects of Task Difficulty and Invested Mental Effort on Peripheral Vasoconstriction

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Mental effort is supposed to be indexed by changes in the sympathetic activation. One of the changes associated with increased sympathetic tone is vasoconstriction, where blood flow in peripheral vascular beds is reduced so that possibly more blood is preferentially directed from the periphery to the brain and heart. A good site for evaluating such a response is the finger because it is densely innervated with sympathetic vasoconstrictor efferents.

We ran four experiments to check whether peripheral arterial tone reflects changes in mental effort. Finger pulse wave amplitude was recorded by means of a finger plethysmograph while subjects were performing visuomotor and memory tasks. We manipulated either objective task demands (levels of task difficulty) or subjective effort (by experimental instruction).

The results suggest that peripheral vasoconstriction may be more sensitive to the amount of voluntary effort invested in the task rather than to the objective task demands.

The Orthographic Distinctiveness Effect in Explicit and Implicit Memory

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Several experiments aimed at investigating the orthographic distinctiveness effect—better memory for orthographically distinctive words than for orthographically common ones—using explicit and implicit memory tests.

The first two experiments were conducted to study the effect of presentation type (lowercase, capital letters or presented orally) on the orthographic distinctiveness effect. Subjects performed a free recall test on mixed lists they had had either to memorize (Experiment 1) or to rate for visual distinctiveness (Experiment 2). Results showed an orthographic distinctiveness effect in every conditions except when words were presented orally in Experiment 1 indicating that a visual processing of words is necessary for the effect to appear. Moreover, Experiment 3 compared

performances on semantic cued recall and word association tests. Because the orthographic distinctiveness effect only appeared in the explicit test and not on the implicit test, it indicated that intentional retrieval is necessary for the effect to appear.

Evidence for a Pacemaker-Gate-Counter Model of Temporal Judgement

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In a task in which subjects reproduce a learned time interval, Fortin et al (1993) showed that the real time subjects took to process the interval increased as a function of the time taken by a concurrent short-term memory task. Other findings (e.g., Triesman et al., 1990) have indicated that the real time taken to process a subjective interval can be systematically reduced by manipulating the frequency of high tempo external stimuli (click-trains). Here, the two experimental manipulations are combined. The results indicated that the two effects do not interact with each other in terms of their effects upon mean temporal judgements. Additionally, changes in mean judgement caused by click-trains were accompanied by changes in variability of performance, which was not the case for changes in mean judgement caused by the concurrent short-term memory task. A pacemaker-gate-counter model of temporal judgement is used to explain this pattern of results.

Working Memory, Controlled Attention and Automatic Processes

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Engle, Kane and Tuholski (1999) have suggested that working memory span tasks measure capacities for controlled attention. Thus, high and low span individuals should differ in tasks that require controlled attention, such as counting arrays, but not in pre-attentional processes (subitizing), or in automatic retrieval from memory (e.g., when solving simple arithmetic problems). We present results showing that high span are faster than low span participants not only in counting large arrays from 5 items, but also in solving simple additions with operands varying from 1 to 4, and in subitizing small arrays up to 4 items. These results suggest that the individual differences assessed by working memory span tasks affect not only complex processes like counting but also alleged one-step and automatic processes such as direct memory retrieval and subitizing. These results are discussed in the light of Cowan's and Anderson's working memory models.

Do Changes in Time Estimation with Aging Result from Impaired Memory and/Or from Slowing of Processing Speed?

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Young (mean age=24), middle aged (mean age=55) and old (mean age=72) adults had to produce and reproduce durations of several seconds in two conditions (counting aloud and performing a concurrent task). They also underwent different tests assessing memory and a processing speed task. Results revealed no difference between productions and reproductions of the three age groups in the counting condition. In contrast, with the concurrent task productions of old adults were longer than those of young and middle aged adults and, reproductions of middle aged and old adults were shorter than those of young adults. Results also showed differences between age groups in working and episodic memory tests as in the reaction time task. Memory scores, however, were the only ones correlated with production performance. These findings suggest that age-related differences in time estimation are rather due to reduced memory capacities than to a slower processing speed.

Visual Similarity Effect on Free and Serial Immediate Recall

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In immediate serial recall, lists composed of similar-sounding items are remembered less well than lists of dissimilar items. This phonological similarity effect is one of the classical Short-Term Memory (STM) effects. However, this effect is only observed when the task requires the retention of serial order. Thus, Watkins, Watkins & Crowder (1974) and Shorridge (1999) showed that the phonological similarity facilitates retention in an immediate free recall task. They assumed that similarity enhances one's ability to retrieve a set of items in memory while it disrupts one's ability to discriminate an item position within a list.

Experiments reported here were designed to test this hypothesis using visuo-spatial material (visually similar versus visually dissimilar items), in children and adults.

The results showed a standard visual similarity effect on serial recall and no effect on free recall. So, the visual similarity effect seems to be associated with the type of processing required by the task, rather than with a STM system per se.

Cognitive Psychological Research Using the Internet: Possibilities, Issues, Solutions

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This paper gives an overview of the current possibilities for conducting cognitive psychological research studies on the Internet. After an initial outline of some of the general advantages afforded by Internet-mediated research (IMR) as compared with more traditional methodologies, a review of the types of studies and areas within cognitive psychology which may lend themselves to an IMR approach is given. Issues and caveats are considered and some solutions offered. Issues raised include sample representativeness, accuracy of measurement, control over

factors such as presentation format, timing, participant identity, and ethical considerations which emerge within an IMR context. Finally, a case study is presented and analysed with regard to positive and negative aspects, and suggestions for improvement offered. It is concluded that the Internet provides a valuable tool for cognitive psychological researchers, and that Internet-administered studies can have a number of advantages over traditional methods.

Action Timing with Loss of Tactile and Kinaesthetic Sensations: The Prediction of the Movement's Sensory Consequences

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Sensory feedback is assumed to be crucial for the temporal control of movements, e.g., timing of simple finger movements has been shown to rely on both, intrinsic (proprioceptive) and extrinsic feedback (distal sensory consequences). As we were interested in the specific contribution of intrinsic feedback, we investigated the performance of a deafferented patient (IW) with complete loss of tactile and kinaesthetic sensations. The patient and control subjects performed a synchronization task in which they synchronized repetitive finger movements to an isochronous auditory signal, either with no extrinsic feedback or with additional feedback tones. Even in conditions without any feedback, the patient maintained a stable phase relationship in his movements. Providing extrinsic sensory feedback had a relatively large effect and led to an improvement in the patient's performance. These data suggest that the control of movements could rely rather efficiently on an internal prediction of the movement's sensory consequences.

Comparing the Serial RT Task and the Discrete Sequence Production Task: Towards a Common Framework

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Two experiments are reported that included extensive practice on the discrete sequence production task and the serial reaction time (RT) task. Participants in both tasks exhibited effector-specific sequence learning while awareness of the sequences was limited. Sequence length effects on RT and execution rate in the discrete sequence production task corresponded to differences in awareness of longer sequences. It is concluded that the same general mechanisms underlie sequencing performance in the serial RT task and the discrete sequence production task. A general framework for movement sequence production is proposed that assumes that explicit sequence knowledge is used for either planning or control of movement sequences, whereas implicit sequence knowledge gradually develops at both an effector-specific and an effector-aspecific level.

Investigation of Cumulative Neuropsychological Effects Associated with Heading Footballs in Boys Aged 14–16

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An investigation of cumulative neuropsychological effects associated with heading footballs in boys aged 14–16 is ongoing, as part of a larger project funded by the Wellcome Trust. To 30 school team footballers and 60 low-footballing referents (30 contact sport participants and 30 non-contact sport participants) were applied a series of neuropsychological tests covering the cognitive areas of episodic memory, attention, working memory, mental agility and executive function. Further data collected include head injury incidence in all participants and observed and estimated data relating to heading frequency per player. Comparisons between groups will assess whether any neuropsychological decrements are associated with football play in general. Analysis of the relationship between test scores and heading frequency will assess the contribution that cumulative football heading may make to any neuropsychological decrements. Preliminary results will be discussed.

Multiplication Facts and the Age-of-Acquisition Effect

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The acquisition of vocabulary in childhood has been linked to age-of-acquisition (AoA) effects in adult naming. However, vocabulary is not the only realm of knowledge that develops through childhood. Mathematical knowledge develops in parallel with literacy, thus it is likely that early learned number facts (e.g., $3 \times 4 = 12$) will also be learned and represented hierarchically in long-term memory. The experiment adopted a product verification paradigm in which RT data was recorded from 24 adult participants. To nullify the ‘problem-size’ effect the commutativity ($a + b = b + a$) principle was utilised. It was postulated that children learn multiplication tables in a relatively stable order (i.e., we learn our $2 \times$ table before our $6 \times$ table). Thus, if the AoA effect is present we predict that participants will be faster to verify that $6 \times 2 = 12$ than $2 \times 6 = 12$.

The results from this initial study appear to confirm this.

Perception Grows Faster: Inferences from the Flash-Lag Effect

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Perceptual objects are extended in time. A question emerges—are the samples of the signals extracted from the same object processed with invariant speed? Based on the experiments with the modified flash-lag display, we show that immediately after the initial exposure, signals from a perceptual object become extracted for visible representation with accelerating speed, respective latency becoming asymptotic at about 150 ms. This process does not depend on the total number of stimulus samples, but depends on the time that has elapsed from the onset of stimulation. The probable mechanism for the perceptual acceleration consists in proactive facilitation of the processing of subsequent signals by the modulation process set in motion by the signals from a spatially overlapping or adjacent, preceding object(s).

Semantically Mediated Priming Between Faces and Objects

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While much research has shown how our cognitive systems are particularly attuned to face recognition, it remains unclear whether face-specific processing is performed by specialist cognitive systems or by a unified system that also deals with objects. This obscurity is especially evident at the level of semantic processing. We present a series of experiments showing semantic priming between objects and faces (and vice versa). Prior presentation of semantically-related objects (ie: football boots), facilitated recognition of related faces (ie: David Beckham) and also some instances of categorisation—i.e., when asked to identify whether the target individual was a sportsman, but not when the task involved a nationality decision. Effects were also observed when faces primed objects. Results are interpreted in terms of models of semantic processing in which semantic representations of both faces and objects are either shared or stored within systems that have a high degree of interconnectivity.

Does the Meaningfulness of a Stimulus Encourage a Whole-Based or a Part-Based Representation? Evidence from a Part-Search Task

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A part-search task was used to examine whether there was a difference in the representations of meaningful and meaningless objects. The participants studied a stimulus for as long as they wanted. They were then shown two parts, and made a two-alternative forced choice about which part had been in the stimulus. There was a significant interaction between the complexity and the meaningfulness of the stimuli. Both meaningful and meaningless stimuli showed an effect of stimulus complexity, but this was greater for the meaningful objects. This suggests that the representations of the meaningful objects were more whole-based than the representations of the meaningless objects. In both a whole- and a part-based representation it would be more difficult to discriminate a part in a complex stimulus than in a simple stimulus. However, in a whole-based representation, the increased dependence among the parts would make the difference across complexities more pronounced.

Face Processing and Familiarity: An Eye Movement Study

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Behavioural data obtained by Ellis et al (1979) and Young et al (1985) suggested that the internal features of famous faces are more important for recognition than external facial features, whereas this distinction does not exist when processing unfamiliar faces. However, Althoff & Cohen's

(1999) eye movement study found no evidence in support of these findings. The present study further investigates the processing of familiar and unfamiliar faces using eye movement measures. Eye movement recordings were taken from 15 participants while they decided whether a series of faces were familiar. Each of the 40 target faces (pre-rated by a matched group of participants as familiar or unfamiliar) was displayed for 5 seconds. Preliminary analysis ($n = 10$) reveals that people look at internal facial features more than external facial features, but this does not interact with familiarity. The results will be discussed in relation to the Bruce and Young (1986) model.

Involuntary Intermodal Transfer of Discrepant Information Between Touch and Vision

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Integration of stimulus information from different modalities is often investigated using material encouraging an assumption of unity. A series of four experiments investigates if intermodal integration can also be achieved using markedly incongruent stimuli.

Aluminum (exp. 1 & 2) or plastic (exp. 3 & 4) objects were simultaneously presented in vision and touch. Objects could differ between modalities. These objects consisted of central bars of different length (45,60,75 mm) with inward or outward facing fins (Mueller-Lyer Illusion) and a vertically finned control figure. The task was length estimation of the central bars, with a standard bar (available visual, haptic or bimodal) as reference.

Dependent on stimulus combination, interaction between modalities effected a weakening of the illusion or a distortion of the control figure assessment toward the illusion. Dominance of a modality varied between experiments depending on response mode, stimulus and modality of the standard control length.

An ‘Other-Race’ Effect in Age Estimation from the Face

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Previous studies have shown that, in person recognition tasks, people perform better for faces belonging to their own race than to another race. Recently, however, this “other-race” effect has also been found in a sex discrimination task. The present study investigated whether this finding extends to age perception. African and Caucasian males and females were asked to estimate the age of faces from both ethnic and gender groups. The main result of this experiment is a significant “race of subject \times race of face” interaction showing that the Caucasian subjects performed better at evaluating Caucasian faces than African faces. However, African subjects showed similar performance for both type of faces. Results are discussed with respect to eyewitness reports.

Color Segregation and Negative Priming

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The aim of the present research was to examine whether perceptual segregation of target from distractors by means of color affects negative priming. Perceptual segregation was manipulated in the prime and the probe displays presenting target and distractors in a same or different colors. Contextual similarity between the prime and the probe displays was high in both the same and the different color conditions. Nevertheless, the similarity between the prime distractors and the probe target was lower in the different than in the same color condition. We used letters which presented high interstimulus discriminability (F,L,M,X) in Experiment 1 and letters which presented low interstimulus discriminability (C,D,G,Q) in Experiment 2. In both experiments, the results showed a greater negative priming effect when target and distractors shared the same color than when they presented a different color. The implications of these results for the controversy between inhibitory and memory-based mechanisms are discussed.

Changes of Cognitive Functions During the Menstrual Cycle

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It has been demonstrated that steroid hormones exert their modulating effect on the higher brain functions. The aim of the present study was to analyse influence of the female sex steroid hormones on the cognitive functions, such as short-term memory, reaction time.

Six females (age 21 to 24 years) with regular menstrual cycle length were recruited. Subjects had not taken oral contraceptives and were in good general health. Tests were performed during two different phases of the menstrual cycle, and repeated for 3–4 cycles. Cycle phases were determined by the basic temperature, length and regularity of the cycle.

Results revealed that the phase of the menstrual cycle was a significant factor influencing investigated functions. The short-term visual memory was significantly better and reaction to visual stimulus shorter during the preovulatory phase, while the short-term auditory memory and reaction to auditory stimulus were the best during the luteal phase.

Writing Two Words from Pictures: Some Insights into the “Dependency” and “Temporal Alignment” Issues.

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Participants were presented with pairs of pictures the names of which they had to write down in sequence (from left-to-right) using two bare nouns. The pairs were either semantically related, e.g., ball-racket, or unrelated, e.g., ball-cap (Experiment 1); phonologically/orthographically related, e.g., ball-banana, or unrelated (Experiment 2). In Experiment 1, written latencies were longer when the two words to-be-produced were semantically related than when they were unrelated. No form facilitation or inhibition effect was obtained in Experiment 2. The findings suggest that the semantic representations of both targets are activated before naming onset whereas form selection is restricted to the first to-be-produced target.

Autobiographical Memory Retrieval During Social Problem-Solving: Is there an Effect of Gender?

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There is some evidence that individual differences may mediate the effects of autobiographical memory on social problem-solving. One individual difference is gender. According to Schulster (1995), females are more able to retrieve autobiographical memories. Females should therefore have a better database for solving social problems. Indeed Goddard, Dritschel and Burton (1998) used a dual task paradigm to investigate gender differences on autobiographical retrieval during social problem-solving (SPS). They found that under single task conditions females performed better than males on the SPS task. The females also retrieved more specific autobiographical memories during SPS. However in the dual task condition the females' performance was significantly negatively effected while the males' performance remained largely unchanged. The present study aims to extend this research by looking how depression may interact with gender and thereby influence the retrieval of autobiographical memory during social problem-solving. The argument is that if depression takes up working memory capacity similar to the dual task effect then there should be an interaction between depression and gender on autobiographical memory retrieval during SPS. The retrieval effects should in turn influence SPS performance.

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Asperger Syndrome and Concrete Representations of Formal Systems

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A concrete representation of a formal system (CRFS) is a set of objects which are not related to the cognitive background of the subject, but are provided with technical constraints. These constraints make certain actions possible and others impossible. This in turns suggests a logical structure which might be involved in problem solving abilities.

We describe here an 18 month long observation of two young adults with Asperger Syndrome while they were involved in problem solving tasks. We used a non verbal approach based on manipulations of several CRFSs.

Our approach helped the subjects to master classification and categorization, to acquire concepts such as parity and multiple, to understand the basic mathematical operations, and to overcome their difficulties in spatial representation.

To summarize, manipulations of concrete representations of formal systems favored in our subjects the construction of adapted problem solving strategies, and the understanding of many mathematical concepts.

Individual Differences in Working Memory, Need for Cognition and Problem Solving Strategy on Wason's 2,4,6 Task

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In the 2,4,6 problem participants are presented with the triple 2,4,6 which they are told is an example of the experimenter's rule (always any ascending sequence) and they are asked to determine what the experimenter's rule is by proposing triples after which they get feedback (yes or no). Sixty undergraduates provided verbal protocols while attempting to solve the 2,4,6 task and also measures of need for cognition (NFC) and the three key components of working memory (WM). Problem solving strategies were derived using a scheme adapted from Tukey (1986). Although some strategies were associated with task success, neither task success nor any of the strategies were significantly associated with working memory or need for cognition measures. In contrast to the problems that do show this association (Stanovich and West, in press) the 2,4,6 task requires participants to engage in productive, divergent thinking and this may be the crucial difference.

Learning, Laterality and the Towers of Hanoi Task

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The Towers of Hanoi (TOH) task is considered to be a measure of planning ability. However performance on the task may reflect a variety of strategies and processes. Svendsen (1991, using a computer version of the TOH, found that response mode influenced how performance on the task changed with practice and linked this to the mode of learning employed.

Using a physical version of the TOH, the development of an efficient move sequence, following repeated attempts, was investigated as a function of which hand was used to move discs, overall direction of movement, transfer between hands, and position of the apparatus with respect to the body midline. Marked differences were observed in the rate at which subjects developed an efficient sequence of moves as a function of the hand used, and direction of movement. The results are considered in relation to proposed hemispheric functions, and the effects of attentional bias.

Intuition: Objective Closeness to the Solution and Its Subjective Experience

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Participants in a study by Metcalfe and Wiebe got different insight tasks and had to provide regularly ratings about how close to the solution they were. There was almost no increase in rated closeness up to the time the participants found the solution. This result contradicted the

objective course of closeness to the solution found in another intuitive association task used by Bowers and his co-workers: Their participants came incrementally closer to the solution. The overall pattern of closeness ratings for this task was less clear, however. We extended this study and analysed objective closeness, as rated by expert judges, and its subjective experience, using regression analysis for each participant. We found a difference between the slopes of objective and subjective closeness to the solution, suggesting that objective closeness increased more than subjectively experienced closeness within the same task.

Do Readers Infer Specific Emotions when Representing Characters' Emotional Responses?

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The experiment that will be presented shows that readers do not, as previously assumed (Gernsbacher et al., 1992; Gernsbacher and Robertson, 1992; Gernsbacher et al., 1998; DeVega et al., 1996; DeVega et al., 1997), infer specific emotions while reading, but instead, infer only general emotional information that is shared by several more specific emotions. The results show that participants took longer to take lexical decisions on inconsistent emotion words that were presented after the stories. There was no difference in lexical decision times for different emotion words consistent with the stories. However, there were also no differences in lexical decision times between emotion words that were consistent with the stories and neutral words that had no relation to the stories. This suggests that the emotional information inferred while reading is very general and is only sufficient to create a delay in lexical decision times on emotion words that are inconsistent with the stories.

Flexibility in the Acquisition and Use of Mental Models of Complex Systems.

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Mental models are internal representations developed through interaction with the environment, and provide predictive power about the system on which the model is based. As a homomorphic mapping a model may contain the results of incorrect inferences. Thus, the ability to accommodate contradictory information into the model is crucial for its development and refinement. The series of experiments reported considers such flexibility across time, and across different levels of information completeness, in complex problem solving tasks. Preliminary results suggest that flexibility in mental models may reduce over time, but not change as a function of completeness of information. Group problem solving experiments also consider the nature of flexibility and rigidity with reference to variables such as perceived status and identity between group members.

Evaluation of Small Quantities in Cerebral Palsy

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The aim of the research was to investigate the influence of manual coordination deficiency on the evaluation of small quantities (from 3 to 8). Eleven 5 to 9 year-old cerebral palsied (CP) children were tested for this capacity in two conditions: the child was either allowed to use his fingers (counting real objects) or not (counting on computer). Subitizing and children's visuo-manual coordination were also evaluated. CP children were compared to control subjects matched for age and sex. When the situation allowed it, all CP Children used their fingers to point the items as often as younger controls (5–6 years). Not being allowed to use the fingers perturbed the CP children, regardless of age, as much as younger controls. In CP children, visuo-manual coordination was strongly related to success in counting, but no compensatory strategies were observed. Unexpectedly, subitizing was also perturbed in CP children.

Eye Movements Reveal Complex Strategies in Graph-Based Reasoning

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Models of graph-based reasoning have typically accounted for the variation in problem solving performance with different graph types in terms of a task analysis of the problem relative to the particular visual properties of each graph type (e.g., Lohse, 1993; Peebles, Cheng & Shadbolt 1999). This approach has been used to explain significant differences in response time and accuracy between experimental situations where data is averaged over experimental conditions. A recent experiment is reported in which participants' eye movements were recorded while they were solving various problems with different graph types. The eye movement data revealed that the standard analysis does not capture the fine grained strategies employed by the participants. This finding extends the results of a recent eye-movement study of graph comprehension processes (Carpenter & Shah, 1998). From these eye-movement studies it is argued that there is a missing level of detail in cognitive models of graph-based reasoning.

Effect of Two Depression Subtypes on Inductive Reasoning

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A well-known phenomenon concerning inductive reasoning is the subjects' tendency to test their hypotheses using confirmative instances. However, very few studies have investigated the factors that could favour or limit the use of such a strategy. Recent work in cognitive psychopathology differentiated two subtypes of depression, associated with different information-processing alterations (Pierson & al., 1996 *Biological Psychiatry* 40 98–115). We hypothesized that following these two depression subtypes, different strategies would be used in solving inductive reasoning tasks, as the Wason's "2-4-6". We report a study in which fifty-two undergraduate students participated. Results showed that (1) high-anhedonic depressed subjects used a disconfirmative strategy all across the task, (2) low-anhedonic depressed subjects used mainly a confirmative

one, (3) non-depressed subjects shifted from a confirmative (by the beginning) to a disconfirmative strategy (by the end). Results will be discussed regarding the literature.

The Atmosphere Effect As a Content-Dependent Effect in Syllogistic Reasoning

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The atmosphere effect (Woodworth and Sells, 1933) explains the choice of the conclusion quantifier in syllogistic reasoning as a result of the atmosphere created by the quantifier of the premises.

In this paper we tested the hypothesis that this effect is suppressed by a causal-agency content. This type of content has been demonstrated to bias the conclusion towards the agent->consequence direction (Gámez and Marrero, 2000) so that the quantifier of the conclusion would be the quantifier of the agency premise, either this coincides or not with that predicted by the atmosphere effect. We carried out three experiments. In Experiment 1 we compared the conclusion given to IA syllogisms both with causal-agency and control content. Experiment 2 and 3 were additional control conditions. We found that the causal-agency content clearly suppressed the atmosphere effect. We discussed the results in the context of the role of practical reasoning in human cognition (Cheng and Holyoak, 1985).

The Effects of Comparison Focus and Question Wording on Self-Other Ratings of Similarity and Difference

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The present study looks at perceptions of similarity or difference in interpersonal comparisons. Studies have shown that others are generally seen as more similar to the self than the self is seen as similar to others (Holyoak & Gordon, 1983; Srull & Gaelick, 1983; Karylowski, 1990). We manipulated comparison focus (self compared with others, others compared with self) and question wording ("similar to", "different from", "similar to and different from"). Two predictions were derived from Tversky's (1977; Tversky & Gati, 1978) feature matching approach. First, comparing self with others should yield greater perceived distinctiveness for the self than comparing others with self. Second, distinctiveness should be greater in ratings of difference than in ratings of similarity. Comparative ratings and open-ended replies (n = 243) supported the first prediction. The findings suggest that social judgements might not primarily rely on features and that Tversky's approach might be more appropriate for object judgements.

Emotional Information Processing Biases in Sociotropic Individuals

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Recent experimental work by Dozois and Backs-Dermott (2000) suggests that highly sociotropic individuals may show selective processing biases for self-relevant interpersonally oriented information when the appropriate latent dysfunctional schemas are activated or primed.

In the present study we test this “congruent processing hypothesis” using lexical decision and self-descriptiveness rating tasks in two affective imaginal priming conditions: congruent (rejection episode) and non-congruent (failure episode).

The results, discussed within the framework of the cognitive theory of vulnerability to depression, support the notion that sociotropic personality style may play a significant role in cognitive predisposition to depression.

Are Anchoring Effect and Hindsight Bias Due to the Same Cognitive Processes?

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In studies on “anchoring” as well as on “hindsight bias”, people’s judgments are typically distorted towards previously presented anchor information. There are literally hundreds of publications that address one or the other of these phenomena. Yet, up to now both cases of cognitive biases were treated completely separately from each other. This paper presents two experiments and one meta-analysis that compared both paradigms and that found only small differences. It is therefore argued that the terms “anchoring effect” and “hindsight bias” describe the same cognitive phenomenon.

Individual Differences in Executive Resource Development

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This research has looked at the presence and development of verbal and spatial executive resources in children. The conceptual framework is derived from the research of Shay and Miyake (1996) which suggests domain specific, fractionated executive systems for spatial and verbal resources. Children aged 7–8 years, 10–11 years and 13–14 years of age were asked to undertake a series of excessive tasks. The procedures included; sentence span, counting span, a modified spatial span, and a letter fluency task. Inhibitory task procedures were also employed, excluded letter fluency, negative priming and inhibition of return and the Hayling and Brixton task procedures. In addition, speed of processing as measured by speech articulation rate was also undertaken. The discussion of the results will focus upon the presence and absence of patterns of development fractionation between the measures and the implications of the results for models of working memory and individual differences in development.

Working Memory, Intentional Binding, and Schizophrenia

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This study examined the intentional binding process of visuo-spatial information in 25 patients with schizophrenia and 25 normal controls. The object-location binding task comprised the presentation of 3 drawings of familiar objects in different cells of a 3×3 grid. Following an 8 s. unfilled delay, a target/lure object was presented and recall was requested, in 3 conditions: a) Object: Decide whether or not a target/lure object was presented in the trial; b) Location: Decide whether or not a given cell of the grid was occupied by an object; and c) Combination: Decide whether or not a target/lure object was presented in the correct cell.

Results showed that: a) Global performance was reduced in the binding condition; b) Patients were disrupted both in speed and accuracy in all conditions; and c) Patients' performance showed a specific increase of false alarms in the Combination condition where they confounded lures and targets, suggesting a defective executive binding process in working memory, even when binding is intentional.

Working Memory Span and Resource-Sharing in Adults

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It has been suggested that working memory spans in children and adults depend more on retention duration than on the memory load induced by counting, reading, or operation solving (Towse et al., 1998, 2000). We contrasted this memory decay hypothesis with the classic resource-sharing hypothesis in a first experiment in which adults were asked either to solve operations or to repeatedly pronounce "ba". The rationale was that this articulatory suppression lasted the exact same time as the operation solving. In line with the resource-sharing hypothesis, the more demanding task (i.e., operations) resulted in lower spans. In a second experiment, the "ba" condition was compared to a continuous operation task (successive operation solving) that resulted in a dramatic decrease of span while time was still kept constant across conditions. Such a difference clearly indicates that the venerable resource-sharing hypothesis accounts for working memory span and cannot be abandoned.

Timing of Processing and Recall of a Sentence-Span Task in Children

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Sentence-span tasks, which require both linguistic processing and final-word retention, correlate well with scholastic abilities; but, why? To elucidate this, the timing of processing and recall were examined in children's sentence spans, obtained in test and retest sessions. Children read

incomplete sentences, generating a sentence-final word for each one, and then recalled the generated words aloud. The results indicated a strategy shift from the first session to the retest. In the first session, spans were related to recall timing, which was load-sensitive. In the retest, however, spans were more related to sentence-processing times, which were not load-sensitive. Timing indices correlated well with achievement tests, but in a changing manner across sessions. Span retest reliabilities were lower than would be expected according to span-achievement test correlations. The data suggest that test and retest spans differentially highlight mnemonic versus linguistic abilities, both of which contribute to the correlations with scholastic tests.

Semantic Contribution to Memory Span in Children: The “Category Effect”

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The phonological loop model (Baddeley, 1986) can account for a substantial number of classical phenomena related to immediate serial recall of verbal material (e.g., the phonological similarity effect; Conrad, 1964)). However, this model does not provide an adequate explanation of the Long-Term Memory contribution to memory span (e.g., the category effect; Poirier & Saint Aubin, 1995). The present study is concerned with the effects of semantic factors on immediate serial recall in children. More specially, categorical relations were chosen as the factor of interest according to the model proposed by Nelson (1985). Nelson assumed that slot-fillers form the child’s initial category structure. Then slot-filler categories combine to form fully developed hierarchically organised context-independent taxonomic structures. In this case, the LTM contribution to memory span should be different according to (1) subject’s age and (2) categorical relationships among items composing the list (slot-filler vs taxonomic lists).

Hungarian Allomorphy Patterns and the ‘Rules versus Connections’ Debate

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One type of evidence for separate systems of regular and irregular morphology is that there are circumstances in which regular inflection is applied for irregulars as well. This happens when the entry is not a canonical root (e.g., a name). We administered a paper-and-pencil test with real words appearing in ‘root’ and ‘name’ contexts with two clinical populations: patients with Parkinson’s (impaired rule system), and Alzheimer’s disease (difficulty in retrieving lexical information). Ongoing studies and control data will be discussed. Another version was constructed to examine memory effects on overregularisation. Subjects overregularised more in ‘name’ than in ‘root’ contexts, frequency and similarity only had a significant effect in root context, thus in the case of irregulars access to the mental lexicon depends not only on abstract formal features assigned by the context, but on the weightings of connections as well. Results are supported by data from priming studies.

Memories for Negative and Positive Alcohol-Related Behavioural Outcomes Are Positively Associated with Consumption Level in Young and Mature Adults

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High and low frequency positive and negative alcohol consumption outcomes, were elicited from young adults (along with positive and negative outcomes unrelated to consumption) and subsequently presented to other young adults, in a 132-item Associations Questionnaire. Each outcome/item was prefaced with the question “what activities of yours would cause this particular outcome to occur?” There was NO reference to alcohol in the questionnaire NOR during its administration. Participants’ responses were coded as alcohol-related or not.

With young adults, significant positive associations with consumption were found for alcohol responses to both high frequency positive and negative alcohol-related outcomes but not low frequency nor the (control) alcohol-unrelated outcomes. With mature adults, similar associations were found—but also with low frequency negative outcomes and negative control outcomes. The results (including the control results) are discussed as supporting a contemporary cognitive model of alcohol consumption.

The Asymmetry Between Topic and Vehicle Imagery in Metaphors

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This study reports three experiments to explore the relationship between verbal and imagery processes in metaphor comprehension.

All experiments utilised a priming paradigm. In the imagery condition the subjects were instructed to visualise either the topic term or the vehicle term before being presented with the complete metaphor. In the verbal condition they were instructed to produce a sentence with the prime term. Time to interpret the metaphor was measured.

A significant three-way interaction between easy to visualise metaphors, prime condition and relevance of prime were found. In addition an asymmetry between imagery of the individual terms and comprehension time was found. Metaphors high on imagery topic and vehicle and low on imagery topic and vehicle took longer comprehension time than metaphors with a high-low or low-high asymmetry. It is argued that the existing models of imagery and metaphor comprehension cannot account for this result. An interference hypothesis is discussed in relation to a temporal model of metaphor comprehension to account for the data.

Age-Related Slowing in Go-No Go versus Choice Reaction Time Tasks.

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In a conceptual comparison task, younger and older participants had to compare two successively presented items by giving yes-no vocal responses or left-right manual responses (Doose & Feyereisen, 2001). Age-related slowing rates differed in the vocal and the manual modality. We assumed that older adults had particular difficulties in managing arbitrary stimulus-response associations during the response selection stage. In the present experiment, we compared the relative slowing rates in different tasks. We opposed a simple reaction time task (response execution), a go-no go task (decision making and response execution) and a choice reaction time task (decision making and response selection and execution). We recorded manual and vocal responses, and manipulated the number of competitive responses in the CRT task, by varying the size of stimulus set in the go-no go and the choice reaction time tasks.

Inhibition, Response Selection, and Age-Related Slowing

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Aging is associated with increasing difficulty to form new associations and to inhibit potent responses. Doose & Feyereisen (in preparation) reported higher slowing rates when four card symbols had to be named by means of non-words rather than by usual words. The difference could be due to particular difficulties with arbitrary stimulus-response associations or to defective inhibition of the production of usual words in the non-word condition. To test these hypotheses, we devised a spatial variant of the Stroop-like paradigm. Participants had to indicate by means of manual and vocal responses in which of four aligned squares a stimulus (a point or a digit) appeared. The digit was either congruent or incongruent with the number of the key. Stimulus-response compatibility was also manipulated (in one condition, participants had to say “one” when the stimulus appeared in the first square, in the other condition, they had to say “four”).

Evidence for Independent Simon Effects in Reaction Time and Movement Time?

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People react faster when stimulus and response locations correspond than when they do not, even when stimulus location is irrelevant for the task. This difference is called the Simon effect. In a series of experiments, we made participants react to the colour of left or right appearing stimuli by releasing a central response key and moving as fast as possible to a left or right key. We found evidence for a Simon effect in both reaction time (RT) and movement time (MT). However, the MT effect could be explained as a trade-off between RT and MT. In subsequent experiments we made participants move their fingers from a lateral to a central key. Because movement direction was opposite to response location the observed Simon effects in RT and MT were independent. The results will be discussed within the framework of the premotor theory of attention.

Processing of Visual Feature Conjunctions: Serial or Parallel?

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According to the guided search model proposed by Wolfe, one would expect more efficient searches if more information from the parallel processing stage could be included in the serial stage. In four different conditions of a search task subjects searched for targets defined by (a) shape, (b) double conjunction (shape and colour), (c) triple conjunction (shape, colour and size) and (4) four features conjunction (shape, colour, size and orientation). Target-nontarget similarity was controlled and set size was varied. RTs of target detection were measured. Conjunctions were searched for more effectively than objects defined by single features. Differences in stimulus salience (mainly: colour feature) appear to account for differences in RTs between single feature and conjunction conditions. When targets and nontargets shared one feature, RTs of conjunction searches tended to decrease with an increasing number of defining features. Simultaneously, search rates became more independent of set size.

Some Benefits and Costs of Selectivity Automatization.

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The speed-accuracy tradeoff, automatization and rigidity are cognitive effects that are frequently obtained with the use of attentional tasks. The present study aimed at investigation of the relationships between these effects. It is hypothesized that automatization reduces speed-accuracy tradeoffs and increases rigidity. 120 students were tested with the use of paper-and-pencil test of selective visual attention (SVA). Subjects detected 40 signals and ignored 40 distractors among 320 noise stimuli in a 2 minute performance period. First, SVA was administered three times to assess the automatization effect in regard to speed and accuracy. Next, SVA was used again, although in a different version to earlier trials. To assess the rigidity effect, stimuli used earlier as signals became distractors, whereas stimuli used earlier as distractors became signals. The speed-accuracy tradeoff effect was examined in performance over four tests. The obtained data are analysed and discussed in regard to theory of automatic and control processes.

Stimulus-Triggered Control Processes and Carry-Over Effects in Residual Switch Costs

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Switching from one cognitive task to another results in an increased reaction time compared to repeating the same task, even with a long preparation interval. This residual cost can be explained either as a carry-over from previous processing or as resulting from an active control process. Previous research in our lab (Vandierendonck and Caessens, 2000) studied residual switch costs in an alternating runs paradigm with two independent tasks per trial. Their results were interpreted as evidence in favour of an additional stimulus-triggered control process. In the present study we used the same paradigm with related (Stroop-type) tasks so that carry-over effects, especially negative priming could be explored. The main question was whether the

results obtained with independent tasks can be replicated and whether carry-over effects can be found in addition to the stimulus-triggered control processes. The results are discussed with reference to current theoretical approaches in task switching.

Does Serial or Parallel Processing Cause Interference Between Identical Stimuli?

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When participants did not know in advance, which of two simultaneously presented letters they had to report, identification performance was worse with identical than with nonidentical letters (Bjork & Murray, 1977). When however, participants knew the target's position in advance, interference disappeared (Keren & Boer, 1985). The explanation rested on three assumptions: (1) both stimuli are processed in parallel, (2) perceptual channels leading to the same feature detector mutually inhibit each other, (3) knowledge of target position eliminates inhibition, because only the target position is attended to. We tested an alternative account according to which stimuli are processed serially and an identical distractor impairs target processing only if it is attended to before the target. When participants did not know in advance, which of two symbols they had to report (Experiment 1), interference from an identical distractor was significantly larger when it preceded the target than when they occurred simultaneously. When participants knew the target's position in advance, interference from an identical distractor disappeared with simultaneous presentation, but it still occurred when the distractor preceded the target. The results suggest that an identical distractor impairs target processing only if it is (even involuntarily) attended to and processed before the target.

Inhibition from Semantically-Related Primes

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Considering a great deal of a literature documenting semantic facilitation in a lexical decision (LD) performance, inhibition due to semantic priming is particularly interesting. In a LD task subjects made a decision in relation to a target word which was preceded by a prime word. The prime was presented on a screen either for 200 ms. or 500 ms. In the semantic-related condition the target belonged to a category named by the preceding prime. In other conditions the prime and the target were semantically unrelated or the target was a nonsense string of letters. RT and accuracy were measured. The analysis showed a significant influence of the relation on the pattern of RTs in 500 ms. prime presentation condition. A clear tendency for inhibiting processing of the related targets, as compared to unrelated ones, was observed. The paper aims at presentation a series of experiments which explores that phenomenon of inhibition.

Experimental Manipulation of Normal Dextrals and Left Neglect Patients' Trunk Position During Visual and Tactile Bisection Tasks

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It has been postulated that in right brain-damaged patients an ipsilesional deviation of the egocentric reference (ER) would be responsible for a contralesional supramodal spatial bias (Karnath, 1997) that causes their left neglect behavior. Besides, it was proposed that the trunk orientation in space may constitute the physical anchor of the internal representation of the ER (Karnath et Coll, 1991). The aim of the present study was to study for the first time the role of the ER on visual and tactile performance in both normals and neglect patients. For this purpose, ten left neglect patients and eleven controls were thus submitted to tactile bisection, visual bisection and line extension tasks while their trunk was rotated 15° to the left or to the right relative to the head position, or aligned with the head at 0°.

Results are discussed with regards to the egocentric hypothesis of neglect and the rehabilitation techniques.

Interference in a Reaching Task: Roles of Eccentricity and Angular Distance

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Recent studies on selective attention in reaching tasks have considered interference as a late phenomenon, essentially determined by motor aspects and based on an action-centered frame of references (i.e., Tipper et al., 1992).

Instead other experiments have convinced us progressively that perceptual factors play a major role in the planning and execution of movements (i.e., Pegoraro & Mounoud, 2000). In particular, the closer a distractor is to fixation point the greater the interference on reaction time, and the smaller the angular distance between target and distractor the greater the interference on movement time.

The present experiment was planned to confirm the role of these factors using two displays: one in which the target is foveated and the other in which it is peripheral. With both displays, the eccentricity of the distractor was systematically varied.

Inhibition of Response in an Exogenous Cueing of Attention Paradigm

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We recorded the EEG to 21 psychology students (128 electrodes, Geodesic Sensor Net system) while they went over a Go-No Go task in a spatial attention cueing paradigm (SOA = 600 ms., peripheral non-predictive cue). There was 33% of no go trials. In the no go condition the participants must inhibit the most frequent "Go" response, involving in some degree an executive

control operation. This paradigm allows us to analyze the interaction of executive and orienting processes.

There was no behavioural effect of the attentional manipulation. The waveform data showed the effects of orienting (valid vs. invalid trials differences) at around 150 ms. after the no go target at parieto-occipital areas. Go targets differ from no go targets (executive processes) around 232–296 ms. at prefrontal areas.

Our pattern of results is compatible with less activation at prefrontal areas when inhibition of a response is required toward a no go target that appeared at an attended location.

Interference Effects in a Blocked vs. Random Presentation Version of the Modified Stroop Colour-Naming Task in Participants with High versus Low Anger-Trait

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Two experiments will be presented, in which we study emotional Stroop in students with elevated versus low anger-trait. Participants with high and low anger-trait performed a colour naming task, with four types of stimuli: Xs arrays, neutral (same category), positive, and negative (related to anger) words. In Experiment 1, stimulus type was manipulated between blocks, with order being counterbalanced. In Experiment 2, a computer random presentation of the stimuli were used. In both experiments, an emotional Stroop effect was observed, but only in the high anger-trait participants. Also, in the first experiment, a possible effect of fatigue was observed (bigger reaction time when increasing the trial blocks). The advantages and disadvantages of using both presentation types are discussed. The interference effect observed in high anger-trait participants is discussed in relation to the one observed in high anxiety participants. Possible mechanisms explaining the interference in both types of participants are suggested.

Positive and Negative Semantic Priming with Stroop Task: Laterality of the Inhibitory Mechanism

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In a series of experiments we combined the semantic priming paradigm with the Stroop-like task in order to study the effect of attentional modulation of conceptual codes activation on semantic memory.

Two unrelated lateralised words were presented as a prime, a cued one (to be attended to) and an uncued one (to be ignored). After that, a coloured probe word was presented at the centre of the screen. The probe word could be 1) related to the attended prime (positive priming condition), 2) related to the ignored prime (negative priming condition), or 3) unrelated to both attended and ignored prime. Participant's task consisted of naming the ink colour of the probe.

We obtained both increased interference to name the ink colour of the probe related to attended primes (positive semantic priming), and decreased interference to name the ink colour

of probes related to ignored primes (negative semantic priming) in different experimental conditions. We discuss these results in terms of influence of attentional activation and inhibition processes on semantic knowledge representations.

Visual Attention and Visual Sequential Memory in Children with Normal Articulation and Children with Dyslalia

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The origin of first word production is learning by imitation. For this kind of learning attention and visual sequential memory are important for the purpose of scanning the positions of the articulatory organs. In our experiment we observed 50 children with normal articulation and 50 children with dyslalia. We used the techniques of direct choice and of circular scanning of Bliss symbols. In our experiments subjects were exposed to 2 or 3 symbols on a PC monitor for 5 seconds. After that, the symbols disappeared and were replaced with the original symbols and a further 7–8 distractor symbols, arranged in a line of 10 symbols. The task was to find the original symbols. Our data indicated that differences between subjects with normal articulation and those with dyslalia are statistically significant ($p < 0.01$).

Mechanistic Models of Autism

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Autism is a pervasive developmental disorder characterised by impairments in social interaction, communication and imagination as well as enhanced performance on some cognitive tasks in some cases.

There have been several attempts to explain autism, many of which invoke specific damage to a cognitive module or neural subsystem. Computational models, on the other hand, have tended to attempt to capture a more global and systems-level explanation of autism, that of a presumed weak central coherence (WCC), a concentration on local detail rather than more general global organisation or significance, e.g., the connectionist models of Cohen; Gustafsson and O'Loughlin & Thagard. These model WCC by manipulating hidden unit numbers, increasing lateral inhibition in a self-organising map and increasing inhibition in a constraint satisfaction network respectively.

This paper will review this kind of mechanistic model of autism and consider whether the different explanations are distinguishable and can be made biologically realistic.

Running Memory Task: Central Executive Functioning or Inhibition?

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Running memory, primarily designed by Bjork (1978) as a test of directed forgetting, has been recently described as a “pure” measure of Central Executive functioning (see Morris & Jones, 1990, Van der Linden et al, 1994). In the task used here, subjects were required to selectively recall the N last consonants (4 vs. 6) of a list whose length was unknown to them, and they had to perform 0 to 4 updatings. To assess the role of inhibition as a mediator of age effects (older vs. younger adults) on working memory capacity, the study presented here investigates what is indeed measured by Running Memory task, relying on a detailed analysis of data and on a comparison of this task with working memory and inhibition tasks. Overall data seem to support our hypothesis that Running Memory is a measure of inhibition efficiency rather than a central executive functioning task.

Recollective Experience, Normal Aging, and Processing-Resources

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We examined the states of awareness with the Remember/Know paradigm (Tulving, 1985) during verbal recognition memory in young and old adults and the implication of processing-resources (Salthouse, 1996) in age-related variance. 49 old adults (age range 60–86 years) and 25 young adults (age range 20–40 years) participated. When they recognized a word from the study list, they indicated whether they could consciously recollect its prior occurrence (R) or recognized it on some other basis, without conscious recollection (K). We also incorporated various measures of processing-speed and working memory. The results revealed that compared to young adults, older adults exhibited a decline in the amount of R responses during the recognition test whereas the amount of K responses was not changed. Structural equation modeling indicated that a slower processing-speed associated with a limited working-memory capacity is a key to explain age-related variance in recollective experience.

Age Differences in the Three Major Functions of Inhibitory Control: Access, Deletion and Restraint

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The goal of the present work was to analyse the assumption according to which the inhibitory control over thought is unitary and partially reduced with aging (Hasher & Zacks, 1988). We examine the performances of older, middle-aged and younger adults on tasks measuring the three major functions of inhibition as defined by (Hasher, Zacks & May, 1999).

Inhibition controls access to working memory by preventing irrelevant information from entering working memory. We used a reading-aloud task with target-texts interrupted by distracting text, and an identification task of target letters flanked by incongruent letters.

Inhibition controls the active content of working memory by suppressing the activation of any irrelevant information. A garden path sentence-processing task, and a directed forgetting task were used.

Finally, inhibition prevents prepotent responses from immediately seizing control of thought, so that other less probable responses can be considered. A Stroop paradigm and an Hayling task were used.

Age Differences in Inhibitory Control of No-Longer-Relevant Information

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The goal of the present work was to analyse the assumption according to which the effects of aging on language production can be explained by inefficient inhibitory mechanisms. We used a modified version of the Hartman and Hasher (1991) task.

First, older and younger adults read a series of high cloze sentences whose ending was either very predictive or not. Then, subjects received the same list of sentences, each missing its final word, and they had to complete them by re-using the previous words (inclusion), or by a new word (exclusion).

Results of an indirect memory test (perceptive identification) are consistent with Hasher and Zacks' (1988) view of impaired inhibitory mechanisms in aging: older adults showed equal priming of inhibited and facilitated words. In contrast, the results of a direct memory test (recognition) are consistent with Burke (1997) assuming that a decline of context memory could better explain the age differences

Task-Switching, Stimulus Dimensionality and Aging

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We adapt a task-switching paradigm to examine effects of aging on cognitive control. Using an AABBA-paradigm with mixed response-stimulus-intervals, we manipulate the dimensionality of the stimuli. A bidimensional stimulus itself does not inform about which of the two tasks should be performed, thus initiation of task-set configuration by endogenous means is both useful and necessary. A unidimensional stimulus contains information about the only the relevant task, and thus about which task to perform. A condition with only bidimensional stimuli and conditions with both dimensionalities are used. In the mixed conditions, initiation of task-set configuration by endogenous means is useful but sometimes not necessary. Consistent with the intention activation account of age-related differences in cognitive control, we predict elderly to, when possible (with mixed dimensionalities), rely more on external information than younger adults. Resulting in larger age-related differences in residual switch costs in the mixed conditions compared to the condition with only bidimensional stimuli.

Age-Differences in Text Comprehension: a Question of Memory?

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Working memory, inhibition and reading comprehension relationships and their changes with age are controversial topics. Although there is a general consensus that working memory capacity and inhibitory processes decrease with age, some authors report no age-differences in text comprehension between young and old adults (e.g., Ehrlich et al. 1997). A new paradigm has been developed to dissociate, within a reading comprehension task, “text comprehension” from “memory for text”. This task was administered, together with working memory and inhibitory tests, to young (between 18–35 years) and older (over 60 years) adults. Preliminary results show that age-differences in this reading comprehension task emerge only in the memory constraint condition. Moreover, we anticipate significant correlations between the memory constraint condition and working memory.

Cognitive Maturation: Evidence from Event-Related Potentials

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Event-Related Potentials were recorded from twenty normal children in order to assess the influence of cognitive processes during childhood. Children ranged in age from 6 to 12 years, all of them were right-handed boys and had Intellectual Quotients above 90. We recorded visual and auditory P300 components and also the visual N400 component. Our results show that visual and auditory P300 latencies are correlated with the age of children, the youngest children presented the longest latencies in both cases. Moreover, this correlation is stronger for the visual P300 than for the auditory P300. A significant correlation was also found between N400 parameters and the age of children (for both latencies and amplitudes). The youngest children had the shortest latencies and the largest amplitudes. The current study suggests that cognitive maturation modifies the speed of information processing mainly for visual data and that maturation influences semantic processing.

Relationships Between Thinking Style and Net Surfing Style

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An experiment—which is part of a wider project aimed at assessing the influence of cognitive individual differences on computer use and on attitudes toward computer use—was devised to study relationships between thinking styles and hypermedia navigation strategies. Forty undergraduates, selected within a sample of more than 300 students on the basis of their familiarity with hypermedia tools and of their cognitive style (intuitive vs analytic thinking style; “survey” vs sequential spatial orientation style), participated in the study. They were requested to surf freely a hypermedia concerning history of the ancient Maya culture. Surfing behavior and strategies employed in navigating the hypermedia were recorded. Then, undergraduates were asked

some questions concerning what they had learned by means of the hypermedia. Results showed that intuitive and “survey” thinkers privileged non-sequential surfing paths and revisiting the same sections of the hypermedia; furthermore they tended to navigate all the parts of the hypermedia. These navigation patterns produced enhanced learning results.

Which Fruit is a ‘Fruit’?

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This research focused on the role of expertise in knowledge organisation about two continuous categories: fruit and vegetables. Participants were three professional groups: agronomy students, greengrocers, and farmers, and another group of students who had the lay man knowledge of fruit and vegetables as consumers. In the first study, participants had to evaluate for typicality 102 items of fruit and vegetables in order to check the way participants would break up these two knowledge domains using cluster analysis. In the second study four different groups of participants had to ascribe the same items to a category (x is a kind of...). Participants’ productions were coded according to the following categories: scientific taxonomies, folk taxonomies, season of production, place of origin, usage, and perceptual features. The data were analysed with Correspondence Analysis. Both studies highlight cross-categorization showing how participants’ expertise biases the way in which items are categorized.

Influence of Task Difficulty on Sequential Effects in Serial Reaction-Time Tasks

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Sequential effects in serial reaction-time tasks are caused by at least two mechanisms: Automatic facilitation (AF) and subjective expectancy. Earlier research has shown that increasing the difficulty of stimulus-response mapping increases AF effects. We investigated whether this is due to increasing task difficulty in general, or specifically to increasing difficulty of response processes. In a series of same/different-tasks with letters we manipulated perceptual and categorization processes by using typical or atypical letter images and by mapping individual letters or letter categories to different responses. The manipulations did not show the expected increase in AF effects. We conclude that only response-related processes moderate the effect of task difficulty on AF. This finding is consistent with earlier claims that AF-effects are due to response monitoring. The response monitoring process is assumed to be less time consuming if the response is repeated as compared to a new response.

Is Colour Categorical ‘Perception’ Truly Perceptual?

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Roberson and Davidoff (2000) argue that categorical perception (CP) effects found in colour discrimination are not truly perceptual but direct effects of verbal. They found that verbal-interference during the interval of a successive 2AFC task eliminates the advantage in discriminating colours that straddle colour name boundaries relative to within category discriminations. Attempting to replicate their results using a same-different task failed. Here we investigate why performance should be sensitive to this apparently superficial change in the task. In a series of six experiments with varying stimuli and types of interference, 2AFC tasks usually show the same general pattern as Roberson and Davidoff (elimination of CP by verbal interference), while same-different tasks, though sensitive to interference, showed persistent CP effects. The overall pattern of these results, while sometimes supporting Roberson and Davidoff's claim, suggests a more complex picture in which the particular task demands contribute to the effect of verbal interference on CP.

Factors Influencing Prescribing Decisions in the Treatment of Depression: A Social Judgement Theory Approach

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This study investigates decision-making processes and the factors which influence general practitioners' (GPs) prescribing decisions and how these factors differ from those the guidelines recommend. Brunswik's lens model, from Social Judgement Theory, was employed to explore individual treatment decision policies of 40 GPs in the Grampian region of Scotland for 20 fictitious patients with depression. These individual policies were then aggregated and compared with those derived from guideline recommendations. As hypothesised important differences emerged between the two in the utilisation of cues and there was considerable variation between GPs' policies. Guidelines placed more importance on the duration of symptoms whereas GPs gave weight also to particular symptoms, such as "thoughts of suicide" and "sleep disturbance" and patient treatment preference. GPs prescribed antidepressants at a greater rate than was recommended by the guidelines. The findings have important implications for implementation strategies, which maybe developed to accompany clinical guidelines.

Dissociating the Implicit Processing of Positive versus Negative Emotional Visual Stimuli: The Study of Two Brain-Damaged Patients

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Two brain-damaged patients with emotional disorders, DT and NG, and their controls were tested in order to investigate implicit emotional evaluation of visual stimuli. DT's lesion was localized within the right parieto-occipito-temporal junction, whereas NG's lesion was localized within the right temporal lobe. In order to test implicit emotional processing, an upper and a

lower border were added to emotional pictures taken from the IAPS. Patients and controls were asked to decide whether the two borders had the same texture or not. Results showed an effect of the emotional valence of pictures for patients only. DT responded faster for negative (unpleasant) pictures than for positive (pleasant) ones, $F(1,109) = 5.5$; $p < .03$, whereas NG responded the opposite way, $F(1,110) = 41.8$; $p < .0001$. Such opposite results suggest dissociations within the right hemisphere for emotional processing and are consistent with the hypothesis of separate subsystems for the processing of positive versus negative stimuli.

Information-Updating As a Functionally Separable Executive Process

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The question whether executive processing can be fractionated into separable executive functions is a main topic in cognitive research. To address the issue, one line of research uses Baddeley's working memory model as a theoretical framework. Following this approach, results from experiments using the Random Interval Repetition and the Random Interval Decision tasks suggest that monitoring and decision can be defined as separable executive functions. The present study introduces the RID-1 task which additionally requires the subjects to respond to the previous stimulus and to update memory each time a new stimulus arrives. In five dual-task experiments, this task was performed concurrently with a number of tasks involving executive processing. If the requirement to update the contents of working memory on each trial calls on executive processes, it is expected that primary test performance will be impaired over and above impairments due to monitoring and decision making.

The Tower of Hanoi Task: Developmental and Psychometric Considerations

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The Tower of Hanoi (TOH) task has been widely used for many years in the study of executive functioning, in a neuropsychological as well as in a developmental approach. In the research presented here, the TOH was given to children, young adults and older adults.

Surprising results, namely the absence of adult age differences, can probably be explained by a very low reliability of the task. We therefore administered a computerized version of the TOH to a sample of 50 younger adults, in order to investigate specifically the reliability of a somewhat more standardized procedure, compared with a manual setting.

Results show that, as long as the speed is not considered, the reliability is not higher than in the manual version of TOH.

These results show the importance of the psychometric characteristics of a task, and the problem that it represents for the evaluation of executive functioning.

From Images to Action Verbs: A Priming Experiment

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The aim of this experiment was to determine whether the perception of images of objects that suggest an action can prime verbs corresponding to this action. In addition, we wanted to study the role of the time of presentation of prime images. Two groups of sixteen subjects were tested in a priming experiment that consisted of two separate phases. In the study phase, one group was presented with images of objects (e.g., bucket, sponge, car) for 2 s., whereas another group saw the same images for 10 s. In the test phase, both groups were presented with action verbs in a lexical decision task, some of which corresponded to the verbs describing the actions of the study phase (e.g., wash), some others not. Results revealed a priming effect in the 10 s. condition only, which suggests that establishing the link between objects to activate the action verb takes time.

Mental Rotation and Alignment Effect in Adult and Aged People

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The extent to which individuals with different mental rotation ability show evidence of an orientation-specific map image was assessed in three experiments. Materials and procedures were taken by Rossano, Warren and Kenan (1995). Experiment 1 had as participants undergraduate students and used a simple path map as the stimulus. Experiments 2 and 3, respectively involving undergraduate students and aged people, used a map of a fictitious city. In all three experiments evidence was found for the relationship between mental rotation ability and accuracy on both aligned and non aligned directional judgments. Participants with high performances in mental rotation tasks resulted in general more accurate than participants with low performances. Differences were particularly strong in the non aligned conditions. On the whole the results supported the idea that mental rotation was involved in giving directional judgements in aligned and non aligned conditions.

Interference Between Mental Rotation and Circular Eye Movements

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Mental rotation is understood as spatial imagery. Based on interference between manual and mental rotation, Wohlschlaeger and Wohlschlaeger (1998) demand mental rotation as an imagination of a manipulative hand movement. Two experiments are presented indicating that non-manipulative eye movements may also interfere with mental rotation.

In Experiment 1, subjects had to make eye movements to follow a cursor on the screen for 4 seconds (validated by EOG). The cursor was moving circular or following a square, either in clockwise or in counterclockwise direction. The character to be mentally rotated was presented after 2 seconds. Eye movements interfered with mental rotation only if they were circular. This result was replicated in Experiment 2 even now the eye movements had to be executed only before and not during mental rotation.

The results make the assumption uncertain that mental rotation should be understood as the imagination of a manipulative hand movement.

The Impact of Backward and Forward Causal Connectives on Text Comprehension

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The impact connectives have on comprehension is a highly controversial topic: a facilitating role as well as an interfering role has been demonstrated in recent studies. The hypothesis of the present research was that some connectives are more efficient than others. Backward connectives such as because ('parce que') should be more useful to the comprehension of readers than forward connectives such as so ('donc'), because the backward connectives make explicit semantic relations that are less evident. To test this hypothesis, we conducted an experiment in which we manipulated, on the one hand, the presence or absence of the causal connectives and, on the other hand, the conceptual relation (backward vs. forward) in eight expository texts of approximately two hundred fifty words. Eighty four participants read the texts and answered comprehension questions. The results confirm our hypothesis and show that only the presence of backward causal connectives significantly improves comprehension.

Separation of Word Forms from Concepts: An Event-Related Functional MRI Study

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It is unresolved to what extent processing of word forms can be separated from conceptual information. In our study we explore the hypothesis that conceptual and lexical-semantic word processing activate different cortical networks.

In an event-related fMRI study we examined the mental search for:

1. a homonym (e.g., river / money -> bank)
2. a conceptual association (e.g., river / lake -> water)

In the analysis the time course of activations is delineated at a resolution of one second.

Processing of conceptual association as well as unsolved items in the homonym task show activation in areas comprising the well-known semantic network. For solved homonyms activations are restricted to bilateral supramarginal / angular gyri, confirming the assumption that these areas represent a visual word form lexicon. Activation of the semantic network without

access to these areas cannot result in a solution for the relation between the two homonyms is exclusively phonological.

Reading Acquisition: Morphological Use in Visual Word Recognition

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The main purpose of this set of experiments is to study the influence of morphology in visual word recognition of beginning readers. Thus, we first examined explicit and implicit morphological knowledge of first and second French graders and their explicit and implicit phonological knowledge. Then, these subjects are submitted to a classical task used for adults, a silent reading task associated with the priming paradigm. Priming can be orthographic, morphological or not connected with the target. Results of phonological tasks are better than results of morphological tasks but these results developed further than those reported in previous studies. Experiments with priming paradigm show that beginning readers morphologically process written words as soon as they can activate their phonological representations.

The Role of Perceptual Information in Categorization and Property Generalization

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Perceptual information processing is studied from a developmental point of view in contexts of categorization and property generalization. We assume that categorization should depend on perceptual similarity between objects whereas generalization should be more likely based on a mental representation, resulting from a consideration of conceptual constraints. Subjects (5-, 7-year olds and adults) were presented with an animal target and two comparison animals. They were instructed to choose the comparison animal a) that goes best with the target (context of categorization) or b) that shares the target's property (context of property generalization). The stimuli were presented either visually (visible perceptual similarity) or verbally (non-visible perceptual similarity). The effect of presentation tended to vary according to the context of the task, thus clarifying the links between formation and use of categories.

Learning from Text versus Knowing the Answer. Which Predicts Educational Achievement?

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The first part of the presentation will focus on the general relationship between literacy levels and educational achievement. The relationship was studied in Danish adults and young adults in education ($n = \text{approx } 260$). Literacy levels were assessed by means of a selection of everyday texts. Educational achievement was measured half a year later.

The second part of the presentation will focus on specific relationships between components of reading comprehension and educational achievement. These components include decoding (pseudo-homophone detection), speed and accuracy of text reading, and responses to predictable, unpredictable, and counter-intuitive pieces of information. Some component processes appear to be much better indicators of educational achievement than others—and hence, perhaps, of greater interest to future studies of adult literacy.

The Role of Fodor’s “Same-Size-Sister” Constraint in Relative Clause Attachment in French

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The aim of this study was to investigate the role of prosody in sentence comprehension during reading. According to Fodor (1998, *J. Psycholing. R.*), attachment ambiguities are resolved by the prosodically motivated “same-size-sister” constraint: accordingly the parser should equalise the length of sister constituents.

In order to investigate the effect of constituent length on attachment preference of ambiguous relative clauses, an eye-tracking experiment was conducted in French, in which we manipulated the length of potential attachment sites (NP1 or NP2).

Reading times were consistent with the “same-size-sister” hypothesis: Lengthening NP1 produced a preference to attach high, lengthening NP2 produced the reverse effect (low attachment).

In order to examine whether these results could be the consequence of prosodic packaging, we conducted a production experiment in which speakers were asked to read the same set of sentences. We will present the data concerning prosodic phrasing and will discuss them in the context of Fodor’s suggestion.

Could Unencoded Context Be an Advantage Among Elderly?

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Encoding a target information and its context leads to a better retrieval. However, older people show a deficit encoding the context explained by an age-related deficit of attentional resources.

Nevertheless, in some tasks, encoding the context can be misleading. Young subjects in divided attention condition during encoding and older adults will be favoured in this type of paradigm. They will make fewer errors because of the context than young subjects in a full attention condition will do.

In this study, word pairs (“target-context”) were presented first, then subjects took a recognition task where the target was matched with a false highly associated word related to the original context. Results support a context effect within young adults under full attention condition and no effect within young adults under dual-task condition and within elderly. The hypothesis of an age-related deficit in encoding the context due to a decrease of attentional resources seems confirmed.

Priming Effects of a Stimulus Word on its Associates (Strong or Weak)

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A database of free word association norms for over 204 French words, collected from 7, 9 and 11 year old children, show that a stimulus word has several associates. Among these associates, certain have a strong associative relation with the stimulus word and others have a weak associative relation. In our research, we study the priming effects of a stimulus word on its associates (strong or weak). In order to examine this effect, we use a lexical decision task in which we present a stimulus word followed either by a strong associate or a weak associate. The subject has to decide if the word which follows the stimulus word is a word of the French language or not and we analyse the decision times. The results show that the decision times are shorter for the strong associates than for the weak associates.

Effect of Emotional Information on Natural Text Comprehension

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The goal of our experiment was to investigate whether emotional information has an effect on natural text comprehension. Prior to the reading of the text, participants received either positive or negative information through the presentation of pictures, the valence of these pictures being either consistent or inconsistent with the content of subsequent textual information. Whether we expected a facilitating effect of “positive” pictures on the processing of consistent textual information (i.e., positive), pictures with negative value should impede the processing of positive as well as negative textual information. Results to on-line measures (reading times) and to off-line measures (recall task) confirmed our hypothesis for the pictures with negative valence only, and bring some new directions for studying the effect of emotional information on text comprehension.

Bimodal Speech Perception Across Languages in Monolingual and Bilingual Listeners

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There is ample evidence that visual information, when available, is used in speech perception, as shown by the MacGurk effect. How the audiovisual integration affects speech perception in bilingual listeners? In the present research we used dubbed video recordings to evaluate the effects of conflicting visual input (lip movements) on auditory speech perception.

Spanish monolingual and Spanish-Catalan bilingual participants shadowed an (Spanish) auditory message while they looked at a silent videotape of a person speaking. The visual message could be in either the same (Spanish) or different (Catalan) language than the auditory target message. We assessed the interference effects from non-matching visual information when it is in the same language as the target auditory message (L1), a different known language (L2), or different and unknown language. The results are evaluated in relation to present theories of crossmodal integration in speech perception and their implications for speech perception in bilinguals.

Is There a Primacy of Thematic Relations in Conceptual Organization?

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Previous studies have shown that conceptual knowledge organization rests more on thematic than taxonomic knowledge organization in production tasks. The present study was aimed to test whether thematic relations are evaluated faster than taxonomic relations. The materials consisted of concept-nouns of different hierarchical levels (superordinate, basic, and subordinate) and ontological kind (artifacts and natural kinds). Twenty participants were presented on a computer screen with the concept nouns (e.g., dog) followed by a noun linked to the former by either a thematic (e.g., kennel) or a taxonomic relation (e.g., animal). Their task was to evaluate whether the two nouns were associated or not by pressing a key. Response times and errors were recorded. Results are discussed in the context of recent theories of conceptual organization.

The Semantic, Orthographic, and Phonological Interactive Activation Model

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Localist connectionist models of word recognition such as the DRC model (Coltheart, Rastle, Perry, Langdon, & Ziegler, in press) and MROM-p (Jacobs, Rey, Ziegler, & Grainger, 1998) are able to account for a variety of empirical phenomena. However, these models have still limitations and problems. Both models are limited to monolingual monosyllabic word recognition. A problem, for example, for MROM-p is that it fails to activate the correct phonological representations for several types of pseudohomophones and the DRC model is unable to account for the facilitatory effects of body neighbors (Ziegler & Perry, 1998). We present a new localist connectionist model of word recognition called SOPHIA (Semantic, Orthographic, and PHonological Interactive Activation model) that incorporates orthographic, phonological, and semantic representations. Simulation results are presented that indicate that an implemented version of SOPHIA is able to overcome the limitations and problems of MROM-p and the DRC model.

Evidence for the Differential Monitoring of the Multiple Situational Dimensions and Explanations

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In three experiments, we investigated whether the representation readers construct from text reflects the multiple dimensions the situation implied (space, time, causality, motivation, emotion). In the first experiment, we highlighted that participants do not spontaneously represent spatial information whereas they represent the other types. We evoked two possible explanations for this result: Either readers do not spontaneously encode spatial information or they encode spatial information but do not permanently maintain it because of its high cognitive load. We tested the first hypothesis in the second experiment by manipulating the reading instruction (a spatial versus a normal reading instruction). However, our results did not confirm that spatial information is represented under a spatial reading instruction. In the third experiment, we tested the second hypothesis (space is the most resource consuming dimension) by interrupting the reading several times. Results revealed that spatial information becomes accurately represented, with this procedure suppressing the retrieval difficulties.

The Updating of a Situation Model: New Informative Elements

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Two studies explored how do readers update the mental representation they initially built from text. Precisely, the time course and the quality of the updating process is expected to vary according to the knowledge readers have on the situation described. In the first experiment, participants read a narrative text. One group received specific knowledge on the situation whereas the other group received general ones. Once they have constructed a model of the situation, we tested how they update it in an on-line way as well as in a backward way. Results revealed that all participants update on-line their model, but the backward integration of the modifications encountered occurred only when participants have specific knowledge. Thus, without specific knowledge, readers temporarily update their model. These results were replicated with news text (experiment 2). Overall, these studies provide new informative elements concerning a crucial process implied in text comprehension.

Hemispheric Specialization and Identification of Verbal Stimuli: Influence of Perceptual Cues

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This research is based on the assumption that the right cerebral hemisphere would process and code in memory low level perceptual features, such as word shape and length of words, while

linguistic indices (meaning, grammatical category) would be processed by the left hemisphere. This work used a divided hemifield tachistoscopic presentation of nine letters French words and pseudo-words written in low case (mécanicien) or in alternate typography (“MéCaNiCiEn”)

Results  The error rate in a lexical decision task is lower when a word, whatever its typography, is presented in right visual hemifield (initially processed by the left hemisphere). In contrast, it is lower when a pseudo-word written in alternate typography appears in the left part of the visual hemifield.  Eye movements recording confirms these results.

These results are discussed within the framework of current findings and theories supporting the general hypothesis of asymmetrical processing in the two hemispheres.

Idiomatic Phrase Perception

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Swinney and Cutler (1979) proposed that idioms are represented as lexical units in the mental lexicon. However the idiomaticity of idiomatic phrases does not fully cover the structural and thus literal processing of idioms (Cutting, & Bock, 1997). In an initial rating study we are able to demonstrate that there is a differentiation between idiomatic, literal and nonsense phrases with the same syntactic structure. Furthermore there was no difference in relation to the frequency of the constituents of the idiomatic, literal or nonsense-phrases. Nevertheless we found rating differences for transparency, metaphoric content and phrase frequency between the three conditions. It appears that the processing of idioms benefits from these three parameters. In an ongoing ERP-study we explore these idiomatic characteristics as well as the familiarity of idioms as compared to structural equivalents in literal phrases. We expect that these differences are possibly related to structural (P600) and semantic (N400) ERP-components.

Temporal Processing and Reading Achievement in Dyslexic Children

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It has recently been suggested that abnormal auditory temporal processing may be a contributing factor to abnormal language development and an inability to process fast temporal transitions may result in disruption to the acoustic processing of speech. Eleven dyslexic children (age range 9–12) and eleven age, gender and handedness matched controls were tested on a range of measures including the Tallal Auditory Repetition Task (ART) as a measure of temporal discrimination ability, a generalised reading task and two short-term memory tasks. Significant differences between the two groups were observed only in the more demanding parts of the ART. These were not due to memory deficits since no significant differences between the two groups were found on measures of short-term memory. Dissociations between temporal processing abilities and reading achievement were observed however, casting doubts on the relative importance of temporal processing skills in good reading achievement.

Building and Updating a Situation Model: Effects of Emotional Information on the Mechanism of Suppression

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We investigated the characteristics of suppression during the construction and the updating of a situation model. According to Gernsbacher's Structure Building Framework (1990), we postulated that building and updating a situation model require the suppression of inappropriate and contradictory information that readers have previously read. Participants had to read short narratives (modified from Gernsbacher, Goldsmith, & Robertson, 1992) that described daily life events. Different versions were constructed: coherent versus non-coherent emotionally and for each one of these versions, the number of sentences that interfered with target information (emotionally coherent or not) was manipulated (2 versus 5). We assumed, first, that non-coherent emotional information should trigger suppression (longer reading times); second, the scope of this effect should depend on the number of interfering sentences; finally, the valence of emotional information (positive versus negative) should influence this mechanism. Our results are discussed within the general theories of text comprehension.

Grammatical Gender Priming: Grammatical Processing or Probabilistic Associations?

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It is a well-established finding that a target noun takes longer to recognise when preceded by a gender incongruent prime article compared to a congruent priming condition (Friederici et al., 1999). The interpretation of this incongruity effect remains unclear. Two alternative hypotheses could account for this effect: one based on grammatical processing of gender and the other based on distributional regularities of co-occurrence between articles and nouns (Dahan et al., 2000).

We conducted an experiment in French to disentangle these two accounts by comparing incongruity effects for two types of target nouns: nouns beginning with a consonant whose articles are unambiguous for gender and nouns beginning with a vowel whose articles are in some cases ambiguous (definite articles, same for both masculine and feminine words) or irregular (possessives, preceding a feminine noun).

All results clearly support the hypothesis that incongruity effect is mediated by a grammatical processing of gender and does not reflect form-based statistics.

The Subjects As a Simple Random-Effect Fallacy: Subject Variability and Morphological Processing in the Mental Lexicon

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This paper addresses the vexed question of the appropriateness of standard by-subject and by-item averaging procedures for the analysis of repeated measures designs. Using parallel regression models, we show the presence of systematic variability between participants that is ignored in the standard psycholinguistic analytical procedures. By using linear mixed effects modeling (Pinheiro & Bates, 2000), we call attention to the potential lack of power of the by-subject and by-item analyses, which, for the data published in Schreuder & Baayen (1997), fail to reveal the co-existence of a facilitatory family size effect and an inhibitory family frequency effect in visual and auditory lexical processing. For a second data set, we will show that the traditional analyses in fact may be misleading. Linear mixed effect modeling shows that this is the result of treating individual differences in the average speed with which participants perform in the experiment as random instead of as systematic.

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Comprehension and Causal Network Representation of Events: A Study of Causal Criteria and Number of Connections

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Our research focuses on the nature of mental representations individuals construct during reading comprehension. A narrative is perceived and represented in memory as a coherent structure using causal reasoning. In a first experiment, using a priming recognition task, we evidenced for the psychological pertinence of the representation as a causal network in which multiple connections are allowed towards one text unit. In a second experiment, using the same implicit task, we tested the properties of events in the network, i.e., the causal connection strength and the connectivity strength (number of connections). We showed that the connection strength (mainly determined by the sufficiency of a cause for its consequence) prevails on the number of connections an event has with others in the network, during retrieval. Moreover both strengths (connection vs connectivity) have a differential influence depending on the focus of participants' attention.

Dissociating Early Detection Systems for Physical and Syntactic Deviances

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The present study examined whether the detection systems for physical and syntactic deviances in auditory language processing can be dissociated using event-related brain potentials (ERPs). Sentences were presented auditorily. In the physical manipulation condition, the terminal word of the sentence was presented either from the same or from a different location to the preceding sentence fragment. In the syntactic manipulation condition, the terminal word was either a

syntactically correct continuation of the preceding sentence fragment or violated syntactic constraints. These two factors were completely crossed. Physical deviances elicited the mismatch negativity (MMN) and syntactic deviances the early syntax-related negativity. Sentences which violated physical as well as syntactic constraints elicited a negativity which was larger than that elicited by only a physical or only a syntactic deviance. This finding suggests that the early physical and syntactic deviance-detection systems act—to a high degree—in parallel and independently from each other.

Stimulus-Triggered Control Processes and Carry-Over Effects in Residual Switch Costs

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Switching from one cognitive task to another results in an increased reaction time compared to repeating the same task, even with a long preparation interval. This residual cost can be explained either as a carry-over from previous processing or as resulting from an active control process. Previous research in our lab (Vandierendonck and Caessens, 2000) studied residual switch costs in an alternating runs paradigm with two independent tasks per trial. Their results were interpreted as evidence in favour of an additional stimulus-triggered control process. In the present study we used the same paradigm with related (Stroop-type) tasks so that carry-over effects, especially negative priming could be explored. The main question was whether the results obtained with independent tasks can be replicated and whether carry-over effects can be found in addition to the stimulus-triggered control processes. The results are discussed with reference to current theoretical approaches in task switching.

Time Differences in Activating the Two Meanings of an Ambiguous Word

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In a series of 6 cross-modal priming experiments, differences in the activation of the two meanings of ambiguous words were studied. In each experiment, 60 German two-part compounds (e.g., “Ballkleid”/“ball dress”) were presented auditorily. Visual targets were either related to one of the meanings of the ambiguous first part of the compound (“Spiel”/“game” or “Kleid”/“dress”), unrelated (“Tisch”/“table”) or nonwords (“Malg”/“malg”) and presented at different time points of the auditory speech signal. Behavioral data indicate that both meanings were activated similarly. ERP results (N400), however, show that the less frequent subordinate meaning was activated later than the dominant one during compound processing. Furthermore, there were differences with respect to the working memory capacity of the subjects. Implications for language processing in working memory and the mental lexicon are discussed.

Cognitive Load in Second Language Processing

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The aim of the study was to test cognitive costs associated with second language processing. It is assumed that it is possible to assess the cost by observing how second language competence interacts with efficacy of Central Executive. This was achieved with the use of a procedure stemming from the dual-task paradigm. The participants were asked to perform a linguistic task (sentence production) together with a concurrent task demanding motor activity (Random Generation of Time Intervals). It is assumed that the degree of impairment in the RGTI can help to recognise the level of difficulty with which sentences in second language are being produced. The participants were Polish subjects with high, intermediate and low command of English. Analysis of these data is in progress. The theoretical and practical implications of this study will be discussed with reference to hypothetical cognitive basis of second language proficiency.

The Representation of Syntactic Information for Noun Phrases: Evidence from a Syntactic Priming Study

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We present 3 experiments which investigate how syntactic information is represented for nouns. All experiments use a variation of the confederate priming technique (Branigan, Pickering and Cleland, 2000). Speakers took turns to describe pictures of coloured shapes to each other under the pretence of a picture-matching task. The descriptions could take one of two forms (e.g., 'The red square' versus 'The square that's red'). One of the participants was a confederate of the experimenter and so the syntactic structure of their utterances could be scripted. The first experiment found that the subjects were significantly more likely to produce an utterance with the same syntactic structure as the confederate's preceding prime description than with the alternative structure. The second experiment examined the effect that phonological relatedness between prime and target had on the magnitude of this effect and the third examined the effect of semantic relatedness between prime and target.

Individual Differences in Language Comprehension

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The main purpose of this research is to study individual differences in language comprehension and map the working memory background of sentence processing. The author presents two experiments investigating working memory systems and Hungarian (an agglutinative language) sentence processing. In the experiments, in a word-by-word self-paced reading task, subjects (more than 200) were 10, 12, 14 year old students, and adults. The capacity of working memory systems was measured by reading span task the non-word repetition task. Reading Span was a good predictor of processing speed of 10–12 year old subjects, but not in the case of 14 years olds and adults. The interaction of the reading span and the non-word repetition task did predict the processing times at the adult subjects in the case of complex sentences.

Individual differences in sentence processing measured by online and offline methods could be thus linked to different components of the working memory.

The Retrieval of Semantic and Syntactic Information in the Production of Verbs

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In Italian two aspectual auxiliaries (essere- to be and avere- to have) are used to form present perfect tense. In two picture-word interference experiments, we explored whether auxiliary assignment in the production of Italian verbs is purely a syntactic process or it is affected by semantic factors such as verbs' thematic grid. Participants saw a picture representing a simple action along with a distractor verb in the infinitive form: in the congruent condition the verb took the same auxiliary and assigned the same thematic role to a sentence subject as the target; in the incongruent condition the verb took a different auxiliary and assigned different role to a sentential subject. Participants named the picture producing the present perfect. Latencies were longer in the congruent than in the incongruent condition, showing a typically semantic interference effect. These results suggest that auxiliary assignment in Italian is influenced by semantic factors.

Defining and Characteristic Features in Word Meanings.

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How is meaning represented in the mind? Whilst it has been argued that concepts are represented probabilistically (Rosch, 1978), recent work has re-emphasised the role of definitions in word meaning (Medin and Ortony, 1989). A study by Keil and Batterman (1984) indicated that children's conceptual representations shift in the course of development, moving from a reliance on characteristic features to more defining representations as they get older. We replicated Keil and Batterman's original experiment on adults, presenting participants with two variant object descriptions (+characteristics/-definitions and -definitions/+characteristics), and added a new condition. Our results reveal that when individuals are asked whether descriptions matched a particular object, they rely on defining features to make their judgements. However, if they are asked which words they would ordinarily fit to the descriptions in the stories, their responses are governed by characteristic features. Adults appear to categorise like 9 year olds, but use words like 5 year olds.

Syllable Processing in Reading: Normal Beginning Readers and Dyslexic Children

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A phonological deficit in dyslexia has almost restrictively been investigated at the grapho-phonemic level but not at the syllable level.

Our purpose was to better understand the role of the syllable as a unit in printed word recognition in dyslexic children. We conducted a priming experiment with dyslexic children and normal reading children matched on reading ability.

To investigate the development of syllable role with age (from 7 to 11 year-old) we conducted a perceptual identification task (to write down the target) with polysyllabic word targets. Targets were primed by printed syllables containing 2 or 3 letters (“bal” vs “ba”) which were congruent or not with the initial consonant of the target (“balcon” vs. “balance”).

We found a classical syllable consistency effect in normal readers. An errors analysis shown that dyslexic children had specific difficulties and committed more phonological spelling errors.

Children’s Linguistic Awareness and Spelling: The Case of Derivational Morphology

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Bryant et al. (2000) showed that English children’s morphological awareness, assessed with an oral analogy task such as “to write: writer / to teach: teacher”, predicts children’s use of morphological marks in spelling. However, with this kind of item, the task could be achieved on a phonological rather than a morphological basis (i.e., add the same sound). To overcome this difficulty, this study investigates how French children (Grades 2 to 4) perform this kind of task according to whether it can be performed by using: a) phonological and/or morphological information (as in Bryant et al.’s study); b) only phonological information; c) only morphological information. Surprisingly, performance was very close in conditions (a) and (b) but much worse in condition (c). How well performance at these three tasks predicts children’s use of morphological information in word and nonword spelling tasks is discussed.

Semantic Aspect Encoding in a Multiple-Trace Memory Model

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As multiple-trace memory models do, we assume that long-term memory can be described as an accumulation of episodic and multidimensional memory traces. The goal of our research was to determine how such models can account for the semantic aspect encoding of information. Two hypotheses are proposed. 1) Semantic dimensions could be encoded within the trace, as other dimensions of a word (e.g., orthographic, phonological). 2) Semantic aspects could arise from the activation and the integration of these dimensions. Therefore, the semantic aspect of a word would not be a dimension, but a construction from other dimensions. The fact that semantic priming is usually observed with short SOA (as orthographic or phonological priming) emphasizes hypothesis-1. But our recent studies showed long semantic priming effects, that could mean that semantic aspect needs time to be built.

Perspective Taking and the Comprehensibility of Texts: Studying Experts' Assessment of Laypersons' Understanding

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Text understanding is influenced by an interaction between text features and subjects' preexisting knowledge. What happens if people are asked to estimate text comprehensibility from the point of view of a different person? It might especially be difficult if the target person has a different knowledge status.

Experts often fail to write in a comprehensible way. They might mismatch the lay-perspective when they assess how comprehensible their texts are to laypersons. We set up two studies to analyse the differences computer experts' (N = 97) ability to estimate laypersons' views about the comprehensibility of texts from the computer domain. The anticipated perspective of the laypersons as rated by the experts was compared to the perspectives of laypersons (N = 55).

The results show that the experts managed to predict the comprehensibility-rating of the laypersons with astonishing accuracy. However, there is great variability concerning different dimensions of text-comprehensibility.

What Can Abstract Sequences Tell Us About Language-Related Evoked Potentials?

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A major objective of cognitive neuroscience is to identify those neurocomputational processes that may be shared by multiple cognitive functions vs. those that are highly specific. This problem is of particular interest in the domain of language processing.

We recorded event-related potentials (ERPs) elicited by the reading of sentences that were either correct or contained semantically or syntactically violating words.

During the same experiment, subjects had to read and judge sequences of letters constructed according to arbitrary rules, linked to the presence of a particular element in the sequence. Analogically, the sequences either followed those pre-defined rules or contained different types of violations.

The results were analysed in terms of showing the differences and similarities existing in the event-related effects associated to different types of rule violations in both a linguistic and a non-linguistic task. The results were discussed in terms of related studies of syntactic and cognitive sequence processing.

Representation of Polish Compounds

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An important requirement in studying the representation and access of morphologically complex words is to provide cross-linguistic evidence to help deconfound what is language universal from what is language specific. Little work has been done cross-linguistically on the representation of synthetic compounds, such as truck-driver, whose meaning is generally more predictable from the meanings of its constituent morphemes. We report results on the representation of Polish highly and moderately semantically transparent compounds with complex morphological structure, using an auditory-auditory delayed priming experiment with 12 intervening item lags between prime and target. The first group of compounds was judged as being highly semantically compositional, and the second group was not. Nonetheless, priming was obtained for both types of compound. The alternative theoretical implications of this are discussed.

Early Phonological Priming Effects in the Picture-Word Task: The Roles of SOA Repetition and Mismatching Information

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Object naming is facilitated by the presence of a phonologically related distractor word. In speech production research, the onset of this priming effect is usually taken to reflect the onset of phonological encoding. While the effect was confined to positive SOAs (i.e., distractor presented with some delay after picture onset) and followed a phase of interference from semantically related distractors in most previous studies, Starreveld (2000) and Jescheniak and Schriefers (in press) recently obtained phonological priming effects with as early an SOA as -300 ms. In this study we explored whether differences in experimental design (SOA repetition) and materials (amount of mismatching information) can account for the conflicting findings. Our results show that an early priming effect is obtained independent of SOA repetition and for distractors containing various amounts of mismatching phonological segments (no, few, or many) alike, testifying to the robustness of this early effect.

Lexical Similarity Effects in Pseudoword Spelling

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This study investigates the influence of lexical information in pseudoword spelling. Four experiments were conducted in French using a task designed to minimise lexical activation. In prior experiments subjects heard lists composed of both words and pseudowords and had to make a lexical decision before writing the pseudowords. In our study, only pseudowords were presented and participants were simply requested to write them down using the first spelling that came to mind. Pseudowords varied according to whether they did or did not have a close phonologically similar word neighbour. Results revealed that low-probability mappings (e.g., /o/ -> aud) were used more often in spelling pseudowords with a close phonological neighbour with that spelling (e.g., /krepo/ derived from "crapaud", /krapo/) than in spelling pseudowords with no close

neighbours (e.g., /frøpo/). These results suggest that there is an interaction between lexical and sublexical processes in spelling; specific proposals will be discussed.

Facilitatory and Inhibitory Semantic Priming Effects of Missed Words Within the Attentional Blink

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Subjects had to identify three white target words (target 1, prime, probe) within a rapidly presented stream of black distractor words (presentation rate: 12Hz). Due to a processing deficit shortly after presentation of the first target, only 41% of the primes were recognized (attentional blink).

We investigated the time course of semantic priming by varying the stimulus onset asynchrony (SOA, 250, 583, 917ms.) between the prime and the probe. In addition, the semantic association strength between these two words was varied.

Recognized primes facilitate the recognition of semantically associated probes in all three SOAs. In contrast, for missed primes this facilitatory effect is only present at the shortest SOA. With increasing SOA there is a strong tendency to a reversed effect, i.e., a worse recognition of associated probes.

The results suggest that unrecognized words elicit automatic, short-living facilitatory effects which are followed by inhibitory effects.

Category Specific Effects in Automatic and Controlled Priming Tasks

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There has been some debate over the integrity of semantic priming and, in particular, whether such effects can arise only from controlled strategy use or also from automatic processing. In addition, semantic category priming differences in healthy subjects have been reported in recent years. Two experiments are reported, a paired lexical decision task and a continuous lexical decision task, which investigate these issues. Natural and artifact category exemplars were equated for typicality and frequency, and related pairs were not associated. In the paired task, two SOA conditions were administered within subjects. Young and older adults participated in each task. The results demonstrated priming, latency and accuracy differences between ontological categories, suggesting a processing advantage for natural stimuli. In addition, length of SOA interacted with category priming. These results are discussed in terms of category specific effects in healthy adults, and also the influence of type of processing on semantic priming.

Phonological Priming and Regularity Effect in Lexical Decision

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Recent behavioural evidence supporting the dual-route cascaded model of reading is based on the naming task. Three homophone priming experiments using the lexical decision task are reported in which the lexicality and regularity of primes and targets were varied. In experiment 1, using a long ISI paradigm, the results were consistent with recent naming data (Rastle & Coltheart, 1999) except for an inhibitory priming effect in word homophones (brake-break). In experiment 2, using the masked priming task with a SOA of 50 ms., only a facilitatory priming effect was found in word homophones. In experiment 3, using a paired priming task with a SOA of 250 ms., facilitatory priming effects were revealed when targets were words (brake-break and baik-bake), and inhibitory priming effects were shown when targets were pseudohomophones (burn-bern and brayn-brane). These findings are discussed in the framework of the dual-route cascaded model and competing views.

Different Processes in Regular and Irregular Inflectional Morphology in Spanish

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The current debate between dual and single mechanism models about representation of morphology is addressed studying the case of Spanish morphology, characterised by two different kinds of irregular morphology. On the one hand, “semi-irregular” verbs imply a diphthongisation of the vowel of the stem (sentía-siento), an irregular change but highly extended in the language. On the other hand, “idiosyncratic” verbs include other vowel changes and highly idiosyncratic forms (pedía-pido, iba-voy). Data from a production task of two aphasic agrammatical patients will be presented showing a clear dissociation between the two kinds of irregularities even when phonological overlap is controlled. Both patients have a high performance for regular and the most productive irregularity while low performance is obtained with highly idiosyncratic forms. This results, in addition to a behavioural experiment showing data in the same direction, give support for dual models of representation of morphology

Learning New Words in Developmental Dysgraphia: The Influence of Lexical and Prosodic Variables

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Developmental dysgraphics have a problem in learning new words that is not accounted for by either poor phonological STM, poor visual memory or poor lexical-semantic memory. We hypothesise that they set up underspecified lexical representations. This impairment may affect either the supra-segmental level (prosodic and syllabic) or the segmental level. We investigated the influence on non-word learning of lexical variables (N-count, neighbourhood frequency, word-likeness ratings and N of words generated in response to each non-word) and prosodic variables (syllabic complexity and frequency, consistency of prosodic pattern).

A deficit at the segmental level may result in strong lexical effects if the encoding of a sequence of segments is helped by the existence of consistent representations. A deficit at the prosodic level may result in better performance with lists of non-words which have easy, frequent syllables and/or consistent prosodic representations. Findings will be discussed in light of current models of lexical processing.

The Effect of Orthography on the Phonological Representations of Words: A Comparison Between French and Dutch Children and Adults

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Knowledge of orthographic representations has been shown to influence children's conceptualization of the phonological structures of words and adults' conscious representations of the syllable internal structure. In the present study, we investigated the influence of words orthographic representations on the analysis of their phonological forms in French and Dutch. These two languages display different orthographic representations of similar phonological phenomena, namely epenthesis and deletion. Phonological (syllabic) judgements on words displaying optional vowels were compared both across pre-readers and adults and across French and Dutch. The available comparisons suggest that the orthographic representations of words shape the conscious representations of their phonological structures. The longitudinal follow-up of the French and Dutch children, still in progress, will allow us to better assess the developmental influence of reading acquisition on the conscious phonological representations of words. Implication of these findings for the representation of complex syllables in these two languages will be addressed.

Perception of Stress Contrast in French and Dutch: A Comparison Between Monolingual and Bilingual Children

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Stress has no linguistic function in French but is contrastive in Spanish. Coherently, previous research has shown that French listeners, but not Spanish listeners, have difficulties in discriminating stress contrasts. We replicate this pattern of results by comparing French and Dutch adults and children on a task involving phoneme and stress contrasts. We also tested two groups of bilingual children (French native children attending Dutch schools and Dutch native children attending French schools). The results show that the Dutch monolinguals performed much better than the French monolinguals for the stress contrast, and that the two bilingual groups displayed intermediary performances between these two extremes. Moreover, the French children attending Dutch schools showed a negative correlation between vocabulary dominance in French and performance on the stress contrast. Such relation was not observed for the Dutch native children attending French schools. Implications of these findings for the acquisition of a second language will be discussed.

Semantic Interference Effect in the Production of Verbs

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Semantic interference effects have been observed in picture naming tasks. In these experiments, however, most of the time participants have been required to name nouns.

If there is an SI effect in the production of nouns, one could expect that the same should occur in the production of verbs. But, as different data show, this is not clear: Roelofs (1993), Schriefers, Teruel and Meinshausen (1998), Schnur, Costa and Caramazza (unpublished data). In the present series of experiments, we attempted to find some explanation for the lack of reliability of SI in verbs. New experiments in Spanish, a pro-drop language, were designed to control for some potential shortcomings of the preceding studies. Specifically, for the fact that in some cases participants had to utter agrammatical productions. Two picture-naming experiments were carried out: in the first one, a visual distractor was used (a written word inside the picture). In this experiment SI was observed in transitive verbs only, but not in intransitive ones. In the second experiment an auditory distractor was employed: In this experiment we obtained just the reverse pattern, that is, we only obtained SI with intransitive verbs but not with transitive ones. In both experiments an SOA of 0 was used.

These data agree with previous literature on aphasic patients suggesting that verbs may have different lexical representation to nouns.

Effect of Two Categories of Illustrations on the Learning of Domain-Related Information: States and Events

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In two experiments, we investigated and extended the study of the role of illustrations on text learning (e.g., Mayer & Anderson, 1992). We assumed that the effect of illustrations on readers' comprehension depends on the semantic nature of textual information (states or events) as well as on readers' prior knowledge. In both experiments, high and low knowledgeable subjects had to learn about a biological domain (the neuron) from two texts informationally equivalent but differing in the type of textual information illustrated (states or events). In Experiment 1, illustrations of the states (or the events) were presented simultaneously with their verbal descriptions, whereas in Experiment 2, verbal descriptions were presented either before or after their illustrations. Our results showed that text learning was facilitated only when event sentences were illustrated. Moreover, experts benefit more from the successive presentation than from the simultaneous presentation while the reverse pattern was observed for beginners.

Building a Spatial Model: Importance of the Intrinsic Structure of the Environment

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In two experiments, we investigated how subjects build a spatial mental model. In experiment 1, participants had to learn an imaginary park from a survey perspective either from textual or from pictorial information. The modality of the presented information was crossed with the order of presentation (linear versus circular). In experiment 2, subjects had to learn the same environment (see experiment 1) but the perspective (route versus survey) of the description was manipulated. After reading the text, the subject had to draw a map focusing either on one or the other perspective (survey or route) or on no particular perspective. In both experiments, the learning phase was followed by an inference judgement task. Our results showed that the accuracy of the representation requires to maintain a high level of referential coherence within the textual description. We also showed that the perspective adopted by subjects reflects the intrinsic structure of the environment.

Direct and Indirect Measures of Implicit and Explicit Sequence Learning: The Role of the Response-to-Stimulus Interval.

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Sequence learning (SL) is one of the better paradigms through which to study the relationship between learning and attention. Nissen & Bullemer (1987) have argued that a secondary tone-counting task exhausts attentional resources and prevents SL. Other authors have instead suggested that scheduling conflicts between performing the main and secondary tasks either lengthens (Frensch & Miner, 1994) or disrupts (Stadler, 1995) the response-to-stimulus interval (RSI). The resulting RSI variability then adversely influences SL because of short-term memory limitations or disruption of the sequence into chunks. More recently, Willingham et al. (1997) argued that RSI variability influences performance but not SL per se.

The goal of this work was to further explore the role of the RSI in the SL paradigm. To do so, we systematically manipulated the RSI, and assessed performance through different objective and subjective measures. We found that, in contrast to previous results, increasing the RSI improves explicit SL. We further show how a simple recurrent network accounts for the data even though the model neither uses decay nor develops chunked representations of the sequence. These findings suggest that RSI effects in SL are rooted in the temporal dynamics of learning.

Binding By Control Nodes vs. By Synchronisation: An ERP Experiment

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We present an ERP experiment that compared the predictions of two classes of formal models, both aimed at solving the binding problem. In one class of models only the control nodes, which link different components of an entity, remain active during delay—especially under task interference. The second model type is based on synchronisation, where patterns to be maintained, must oscillate in the same phase over all brain regions. The results of several ERP experiments revealed these oscillations but we claim these could be symptoms of the underlying mechanisms.

In the present ERP experiment we examined the reactivation of representations after delay. We observed a very fast initial process in prefrontal, parietal and fronto-temporal areas and a later, long lasting process in occipital and temporal areas. This is interpreted in terms of an initial process triggered by control structures and a later stable process indicating the reactivation of the whole representation.

From Instruction to Action: Implementing S-R Rules

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Do verbal self-instructions mediate stimulus-response translation in the initial phase of performing a new task, or are effective S-R rules formed immediately upon instruction?

Our experiments address this question by using a dual task procedure involving four-choice manual tasks and articulatory suppression. Articulatory suppression was added after differing amounts of practice on the choice tasks. Choice task instructions either explicitly stated the mapping between stimulus exemplars and required responses (e.g., “ink”: right index finger), or described the mapping between to-be-inferred stimulus categories and responses (e.g., “fluids” right index finger). If verbal mediation supports the implementation of new task sets articulatory suppression should be more disruptive in the initial phase of performing a new task than after practice on that task. This should especially hold for category instructions, which do not directly specify the mappings between stimulus exemplars and responses.

Visuo-Spatial Processing and Spatial Orientation: Underlying Structures and Working Memory Effects

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Recent investigations have highlighted the importance of both spatial factors and working memory structures in modulating orientation abilities. Although research has shown that spatial abilities cannot be correctly predicted by means of traditional visuo-spatial tasks such as mental rotation or figure completion, a strong relationship has been postulated with the sequential processing of visuo-spatial material. The distinction between sequential and simultaneous processes underlies recent attempts to specify working memory structures and general architecture, and the present study investigates working memory functions associated with the execution of spatial orientation tasks. Orientation abilities are evaluated using tasks tapping landmark knowledge, survey knowledge and route knowledge, and presented together with tasks designed to tap simultaneous and sequential as well as passive and active visuo-spatial working memory processes. Results allow us to understand the different functions underlying spatial orientation abilities and to integrate them in a more general working memory framework.

Confabulations and Feeling-of-Knowing Judgements

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Confabulation (the recall of erroneous memories) is a clinical symptom mostly described in brain damaged patients. Confabulation is usually assumed to result from a retrieval impairment rather than an encoding or a storage deficit. Within the retrieval processes, confabulation can result from a verification deficit, a search deficit or a combination of both. These erroneous memories are particularly observed in complex retrieval situations, in which metamemory is especially needed. However, this aspect has not been properly investigated in patients exhibiting confabulations.

In this study the feeling-of-knowing judgement (a type of metamemory judgement) is analysed in confabulators. Two tests are used: one is dedicated to semantic knowledge and the other to episodic representation. The results are discussed in terms of both memory control processes account of confabulations (e.g., Moscovitch, 1995; Moscovitch & Melo, 1997; Burgess & Shallice, 1996) and metamemory theories (e.g., Koriat, 1993).

Effects of Emotional Information on Memory: Focus on Short Term Memory

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Memory is enhanced for emotional stimuli relative to neutral stimuli. This result has usually been obtained by using both emotionally arousing pictures (i.e., Bradley et al. 1992) and emotionally valenced words (i.e., Rubin and Friendly, 1986). Several cognitive factors have been hypothesized to account for that effect. Among them are the enhanced attention for emotional stimuli, greater elaboration during encoding, greater distinctiveness and increased rehearsal for emotional stimuli (Reisberg and Heuer, 1993).

The aim of the present work is to test whether processes related to the codification stage could mediate the effects of emotion on memory. We have focused on short term memory. We have hypothesized that, if emotional information is encoded in a more elaborate way, it could result in a worse codification of the remaining information given at the same time. We have conducted two experiments with positive, negative and neutral valenced words. Tasks used have included a word span procedure and a double-task. The results show that the mechanisms responsible for the effects of emotion on memory don't seem to be located at the short term memory stage.

Location Recall in Children and Young Adults: Same or Different Processes?

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The objective of this ongoing study is to explore processes underlying recall for spatial locations, using several interference conditions, and examine how these evolve with age. A task in which positions are associated with words was presented to children (presently essentially 12 year-olds)

and young adults. Both 12 year-olds and adults showed specific interference effects: location recall was more affected by visual and spatial interferences and word recall by verbal interference. However, location recall was also affected by verbal interference, and word recall by visual and spatial interference, for both age groups. These results are coherent with Hitch et al.'s (1989) and de Ribaupierre & Bailleux's (1994) results according to which, after the age of 9 or 10 years, visuo-spatial stimuli can be processed verbally, depending on the type of stimuli used. Preliminary results with a restricted sample of 9 year-olds children did not show the same pattern of interference effects.

Can Older People Learn to Control a False Effect of Familiarity?

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The false familiarity effect can be induced by repeating distractors during the test phase of a recognition test. False recognitions of these repeated distractors are greater in older than young subjects, who could use the source of familiarity to distinguish the targets from the repeated distractors. The aim of this experiment is "to teach" old subjects to use this strategy. Subjects perform a forced-choice task with the same familiarity effect: half the pairs consist of a target item and a distractor (control pairs). A familiarity judgement is enough to correctly respond. The other pairs consist of a target and a repeated distractor (experimental pairs). The two items have the same activation level, the source of familiarity must be retrieved to correctly choose the target. The target/repeated distractors pairs induced more errors than the control ones but they didn't decrease across the experiment in spite of a greater discrimination of repeated distractors. There is no effect of having learnt this strategy on a subsequent recognition task. An explicative hypothesis is a contextual memory deficit in older people.

Empirical Considerations Concerning the Administration of the Corsi Task

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Although extensively used in cognitive-experimental and clinical-neuropsychological studies the Corsi Task has been criticized for its persistent lack of standardization in administration, task properties, scoring and normative data. Also the cognitive functions that are tapped by the Corsi Task are vigorously discussed.

To answer some of the still open questions we were examining the effects of path complexity, comparing a computerized and a colored-blocks version with the standard version of the Corsi Task. Additionally we explored the effects of presentation time. In summary no differences between the standard task and the computerized or the colored-blocks task were observed. On the other side an effect of path configuration could be registered. Regarding the imagined scanning path, sequences with a longer absolute distance, more crossings and more so called barriers were harder to remember. In consequence we recommend a more careful selection of sequences, with respect to different aspects of complexity for further research and clinical test administration.

The Effect of a Traumatic Burn Injury on Autobiographical Memory

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Recent research suggests that youngsters with a traumatic child abuse background were impaired in their recall of autobiographical semantic information (Meesters, Merckelbach, Tisserand, Van den Hoorn, & Huykens 2000). However, whilst this was one of the first studies to investigate the effect of trauma on personal semantic memory, it did not look at episodic recall in relation to semantic memory.

The aim of this study was to extend this finding by looking at the impact of trauma on episodic and semantic autobiographical memory. To this end, participants who suffered a traumatic burn injury were compared to age and IQ matched controls on an autobiographical memory cueing technique and the Children's Autobiographical Memory Inventory, this inventory asks for both semantic and episodic recall for specific periods in a child's life.

Simulating the "Other-Race" Effect with Autoassociative Neuronal Networks: Further Evidence in Favour of an Exemplary Density Explanation

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Own-race faces are more accurately recognized than other-race faces. This phenomenon has been reported as the "other-race" effect. However, other-race faces are faster classified by race than own-race faces. Valentine (1991) proposed a theoretical face space framework, where variations in exemplar density between races explain both of these effects. The aim of our study is to test this hypothesis with neuronal network simulations and behavioural paradigms. First, we submitted to two pixel-based autoassociative networks either a set of Caucasian- or Asian-faces. Then, we submitted to the two autoassociative memories the other-race faces. The predicted density properties of the Valentine's framework are found in the two autoassociative memories face projection space. Second, subjects were confronted in recognition and classification tasks with the same sets of faces. Behavioural results corroborate the other-race effect. Thus, our results add further evidence in favour of an exemplary density explanation as suggested by Valentine.

Influence of Diabetes on Short-Term Visual and Auditory Memory

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Injuries of the nervous system (both peripheral and central) are rather frequent complications in the case of diabetes mellitus caused by not only permanent hyperglycemic state but by frequent hypoglycemia as well. The experimental and clinical results concerning the influence of diabetes on memory are rather complex and contradictory. Therefore it is important to analyse in more details the relation between diabetes and changes in memory.

The investigation of short-term visual and auditory memory has been carried out on 30 control subjects and 16 subjects with diabetes. Visual memory was evaluated by “nine digits” test, and auditory memory—by “ten words” test.

It has been found that diabetes causes statistically significant reduction of short-term visual and auditory memory. However, no differences between gender were found neither in control nor in diabetes groups.

Influence of Thyroid Dysfunction on Short-Term Visual and Auditory Memory

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It is well known that hormones have influence on cognitive brain functions, such as learning and memory. The data exists that hormonal changes caused by dysfunction of the thyroid gland may influence cognitive and emotional activity, but there are still many unanswered questions concerning influence of the thyroid hormones on mechanisms of memory.

Short-term visual and auditory memory has been investigated in 30 control subjects and 14 subjects with dysfunction of thyroid gland. “Nine digits” test was used to evaluate visual memory and “ten words” test for evaluation of auditory memory.

The results of investigation revealed that short-term visual and auditory memory is significantly reduced in the case of subjects with thyroid dysfunction. However no differences with respect to short-term memory have been found between the groups with hypersecretion and hyposecretion of thyroid gland.

Visuo-Spatial Working Memory and the Processing of Route Directions

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Route directions are forms of spatial discourse that comprise both prescriptive and descriptive components. Prescriptions mainly take the form of directional instructions, while descriptions are based on references to visual landmarks. Furthermore, route directions can be generated from two different perspectives. Route perspective involves continuous ego-centered reference to the environment as viewed by the moving person, while survey perspective applied to the description of itineraries involves a geo-centered framework. The purpose of our study was to identify which sub-components of working memory are implicated in the processing and memory of route directions. Using the dual task paradigm, we collected data indicating that the processing of landmarks in route perspective calls upon visual and spatial components of working memory, whereas visual and verbal components are implicated in survey perspective. The

processing of prescriptions requires visual and spatial components of working memory, and this is the case for both perspectives.

Retrieval Processes in Accessing Information Within Working Memory

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In two experiments we investigated processes involved in accessing information from a memory set. Time costs for a switch of the processing focus from one member of the list to another served as a measure of access demand. With respect to each memory element we differentiate between features that provide availability of this element and features necessary for executing the required operation. We assume that both kinds of features are activated in the element actually processed whereas only the former kind is active in the other set-members. Consequently task-dependent retrieval processes should take place when a new element is accessed. To test this hypothesis we compared focus-switching costs in two tasks with identical memory material (lists of three digits) that differed in informational demand on the element to be processed. Preliminary results suggest that accessing semantic information (more/less decision) is more demanding than accessing identity (same/different decision).

Production of Consequence Inferences: The Role of Retrieval Processes

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Schematically, according the main theories of text comprehension, top down and bottom up, consequence inferences are considered either like the production of a new proposition in memory or like automatic retrieval of associated information to explicit presented textual information. In order to test these hypotheses we done two lexical decision experiments manipulating the degree of association between the prime (event) and the target (consequence inference). A Construction-Integration analysis (Kintsch, 1988, 1998) of the inferences production was performed completed by a Latent Semantic analysis (Landauer & Dumais, 1998). The goal of these analyses (CI and LSA) was to provide account of experimental data obtained. In particular the results show a priming effect increasing from the control condition to the explicit condition (Explicit<Predictive<Control). Both experimental data and simulations supported the hypothesis that highly likely consequence inferences consisted in automatic memory retrieval of strongly semantic associated information to the action or the event explicitly described.

Does the Rehearsal Loop in the Visuo-Spatial Sketch Pad Exist? Exploring By Means of Random Time Interval Generation

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Baddeley in his model of working memory distinguished the articulatory loop which is responsible for rehearsal in the verbal subsystem. It is not sure if the analogous structure exists in the visuo-spatial buffer. Probably some kind of activity is necessary to support visuo-spatial information in short time storage. It was assumed that the Central Executive was occupied while solving an STM storage task. The involvement of CE while solving such kind of task could be used to assess whether a rehearsal loop existed in the visuo-spatial buffer of working memory. A random time interval generation task (RTIG) has been used to specify the extent of CE involvement in a dual task paradigm. Involvement of CE was measured in three conditions: 1) during a single RTIG task, 2) during a memory task that required storage of visuo-spatial information, 3) during a memory task that required processing of visuo-spatial information. According to my hypothesis CE was more involved in condition 2) than 1), and was less involved in condition 2) than 3). I can draw a conclusion that in the visuo-spatial buffer there exists some structure which is analogous to articulatory loop in verbal buffer.

Distractor Interference: Proximity-to-Hand Effect Restricted to Large Target-Distractor Separations

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Distractor interference was investigated in a selective reaching task. Subjects had to reach for a green target that appeared in one out of five stimulus boxes, while on some trials they had to ignore a red distractor appearing in one of the remaining boxes. Target-distractor separation was either 5 or 20 mm. The results showed a significant amount of distractor interference in movement time (16 ms.). Moreover, whereas for the large separation front row distractors interfered more than did back row distractors (18 versus 8 ms., respectively), for the small separation front and back row distractors caused similar amounts of interference (15 versus 18 ms., respectively). These results indicate that a proximity-to-hand effect only materializes for large target-distractor separations.

Constructing Visual Space from Apparent Motion Distorts the Perception of Object Location.

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Reaching for an object requires information about the space between the hand and its goal. Retinal signals which place the object in context improve performance but little is known about how retinal and extra-retinal cues integrate to form a coherent perception. It was hypothesised that if 'constructed' extra-retinal cues are used during localisation then 'filling' the hand-target gap with

apparent motion would aid reaching accuracy. Participants ($n = 10$) reached to a virtual target while their hand was occluded from vision. The target appeared on its own, with a solid bar, real motion, apparent motion, or two synchronously flashed non-motion dots. The results showed that apparent motion presented in the reaching space significantly diminished the ability to assess target distance. To account for this a mechanism is proposed where signals from extra-striate areas create a perceptual bias through cortico-cortical connections with the structures involved in the representation of egocentric space.

Eye Movements and the Perceived Vanishing Point of a Moving Stimulus

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When participants are asked to determine the vanishing point of a moving target, the judged vanishing point is displaced forward in the direction of movement. This phenomenon has been explained with the so-called representational momentum (e.g., Hubbard, *Psych Bull & Rev*, 1995, 2, 322–338). However, eye movement control apparently plays a critical role for the occurrence of the localization error. In our experiments mislocalizations in the direction of movement could be observed only when the observer followed the target with the eyes. This localization error was reduced if the participant stopped the target movement with an internally generated key press. Accordingly, the eye trajectories showed an overshoot of the eye movements, but this overshoot was largely reduced with intentional control. These results indicate (1) that eye movements contribute to spatial representation of objects and (2) that the smooth pursuit system of the eyes takes into account spatial expectancies.

Implicit Processing of Facial Expression: A Priming Experiment

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The purpose of this study was to determine to what extent the processing of facial expression is carried out implicitly. We performed two priming experiments that made use of male faces of different expressions: anger, disgust, happiness, and surprise. A prime face and a target face were presented at each trial with the same or with a different expression. The colour of the target faces was artificially modified so that half of the targets was slightly red, whereas the other half was slightly green. The participants had to decide whether the target face was rather red or rather green after they had performed (Experiment 1) or not (Experiment 2) an explicit process on the prime, by verbally labelling its facial expression. A priming effect was observed in both experiments, attesting for an implicit processing of facial expression.

Auditory Perception of Distance: The Roles of Intensity, Familiarity and Spatial Cognitive Knowledge of Sounds

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In the auditory domain, distance processing is mainly influenced by intensity. However, the influence of the pre-existing spatial knowledge of sounds in distance judgments has not been clearly established. To investigate this issue, judgments of distance and of intensity were examined using 20 environmental sounds (familiar vs unfamiliar) taken from a normative study (in preparation). The sounds were presented at five different intensities. The spatial cognitive knowledge of sounds was manipulated by contrasting “indoors” and “outdoors” type of sound. As predicted, the results of 20 participants, using an 8 point-rating scale, showed effects of intensity and familiarity in intensity as well as distance judgments. However, the type of sound affects only the distance but not the intensity judgments. Thus, it appears that participants are sensitive to pre-existing spatial knowledges of sounds and are able to use them independently from intensity in making distance judgments of natural sounds.

Read My Lips, But Not Too Closely: What Face Information is Used in the Perception of Speech?

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The McGurk effect (McGurk and MacDonald, 1976) is often cited as evidence of the interaction between visual and auditory information in speech perception. Despite the numerous studies that have replicated and extended this finding it is not clear what properties or features of the facial movement are important in creating the illusion. This paper reports two studies that use spatial quantisation techniques of either the whole face or parts of the face to determine (a) the influence of coarse versus fine spatial scale visual information, and (b) the role of the oral aperture versus the whole face in influencing the strength of the illusion. The illusion was reported even at the coarsest level of quantisation, although at a reduced level, and that there was no support for facial information outside the oral aperture significantly contributing to the illusion. The results are discussed in terms of current models of auditory-visual perception.

Visual Word Recognition and Spatial Attention: Independent or Interactive Systems?

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Two experiments examined the dependency of visual word recognition on spatial attention in a spatially cued lexical-decision task. Participants responded to target strings preceded by a degraded or normal prime word at fixation. An abrupt onset cue appeared either simultaneously with the prime or 300 ms. later above or below fixation. Targets appeared either in the cued or uncued location. The proportion of valid trials was .50 (Exp. 1) and .75 (Exp. 2).

The spatial cue affected word processing in two ways: (a) Cue validity and prime-target relatedness interacted, with larger priming effects for invalid targets. (b) Cue appearance and relatedness interacted for degraded primes: In Exp. 1 less priming was obtained when the cue was simultaneous. In Exp. 2, however, less priming was obtained when the cue appeared 300 ms. after the prime. It is concluded that spatial attention affects either the orthographic or semantic stages of word processing.

Does Localisation of Masked Visual Targets Simulate Blindsight in Normals?

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We empirically investigate the suggestion that visual masking in normals can be used to simulate the behavior of “blindsight” patients with V1 lesions who can non-consciously localise targets in their blind-field. Our subjects could “guess” the location of peri-liminal masked targets with above-chance accuracy, but localisation was no less accurate when stimulus-response mapping was dictated by a complex and variable post-trial cue. This suggests conscious mediation of localisation rather than the “blindsight-like” effect claimed by some studies. The same pattern of results was obtained whether subjects responded using “declarative” key-pressing, or reached out to touch target location. However if claimed subjective awareness is accepted as the operational criterion for consciousness, some subjects do show blindsight-like behaviour. It is possible that masked targets attract an attentional orientation response which can be used, albeit non-consciously, as the basis for response choice in both the simple and more complex localisation tasks.

The Development of Face- And Person Recognition: Are They Both the Same?

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The current study explores the short-term processing of visual information on whole persons and on faces. Subjects had a 2AFC-recognition test immediately after a 5 seconds target inspection interval. Targets were always presented as wholes (face or person) and the recognition-test offered (a) one identical and one nearly identical face or person (one feature exchanged: faces either eyes, nose, or mouth; persons either arms, body, or legs) or (b) an identical single feature of the target face or person and a new single feature. The information (face vs. person) \times test (parts vs. wholes) \times age-group (8-years, 10-years, adults) analysis revealed a part-whole effect in adults for both faces and persons and failed to find a part-whole effect on face recognition in 8- and 10-years olds. However, both child-groups produced a part-whole effect in person recognition. Hence, results indicate different developmental lines for face- and person recognition.

Integration of Information in Face Perception

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This study investigates temporal and spatial integration of visual information in face identification. Subjects had to identify 32 faces of celebrities, presented tachistoscopically for 19 to 106 ms., in normal, lowpass- or highpass filtered versions. A model developed in the context of letter and number identification (Busey & Loftus, 1994) and common object classification (Olds & Engel, 1998) was used to describe how stimulus duration is related to performance, and how different frequency bands are utilized for identification.

The model fitted performance data well. As expected (e.g., Harmon, 1973) the high frequency part of the image was found to contribute considerably less to identification than low frequency information, but low- and high frequency information seem to be combined linearly for identification.

Thus, the model provides a quantitative estimate of the importance of different frequency bands in face perception.

Memory for a Series of Faces: Preliminary Results with the Method of 'Serial Reconstruction'

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Two experiments explored memory for serial order in the visuo-spatial domain using sequences of unfamiliar faces. Faces are meaningful visual patterns for which encoding processes already exist. However, as faces cannot be recalled as a sequence of responses, a serial reconstruction task was used (see Avons, 1998). Faces were re-presented simultaneously and participants reconstructed the order in which they had been presented. Experiment 1 manipulated sequence length and concurrent task (articulatory suppression, irrelevant speech, spatial tapping or none). Serial position curves generally showed both primacy and recency, together with a marked tendency to transpose adjacent items. These are core characteristics of memory for serial order in other domains. However, there was a small selective interference effect due to articulatory suppression, suggesting some use of verbal recoding strategies. Experiment 2 explored whether faster presentation rates would discourage such strategies, thus allowing a purer measure of visuo-spatial serial ordering. Results of the experiments are discussed in terms of current models of serial order and in terms of the suitability of the serial reconstruction task.

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Vision for Spatial Discrimination and Vision for Action: Anisotropy in the Induced Roelofs Effect

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Among arguments that suggested a separate visual space for perception and action, one was concerned with the Induced Roelofs Effect (IRE, Bridgeman, 1991). That is the location of a visual target presented with an off-centre frame is misperceived when evaluated through a verbal task (probing the cognitive representation), but not when using a manual response (probing the sensorimotor representation). According to Bridgeman, only the cognitive representation is sensitive to context information. This was however contradictory with recent studies demonstrating an effect of context information in distance perception. IRE was then reassessed, but dissociating the task in orientation and distance. With various target orientations, an IRE was observed only for verbal responses, in agreement with Bridgeman's results. Conversely, with various target amplitudes, an IRE was observed for both the verbal and motor responses. This suggested that the involvement of context information in space processing is not dependent only on the type of response selected, but also the spatial constraints of the task.

Experimental Suggestion and Suggestibility in the Categorization of Ambiguous Figural Patterns

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High, mid and low suggestible subjects were compared in their ability to categorize figural patterns, selected and classified as low ambiguous stimuli and high ambiguous stimuli inducing respectively the attribution of a low number and of a high number of meaning by an independent group of subjects. Two kinds of instruction were used, as suggestions, for inducing two different expectations. The number of meanings attributed was obtained. Multivariate analysis of variance were performed among high, mid and low suggestible subjects, between stimuli and instructions. High suggestible subjects, compared to the mid and low suggestible ones, showed many meanings attributed to the stimuli classified as high ambiguous figures and were more influenced with respect to the mid and low suggestibles by the instructions of the experimenter. These results support the hypothesis that high suggestible persons utilize a more efficient cognitive strategy to find explanations and clear solutions to ambiguous figural patterns.

Investigating the Factors Producing Categorical Perception of Face Identity

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The Categorical Perception (CP) of face identity was investigated in three experiments. Experiments 1 and 2 considered the role of long-term familiarity in producing CP. In Experiment 1, morphed faces from the same continuum were shown to familiar and to unfamiliar observers. Only the observers who knew the identity of the faces showed CP. In Experiment 2 we were again unable to show CP for unfamiliar faces except in one instance, but this result could be accounted for by the exceptional distinctiveness of one of the continuum end-points. In Experiment 3 we tested and verified the hypothesis that the CP effect can be found on continua between unfamiliar faces when one of the faces generating the continuum is very distinctive. Our results suggest that familiarity is a sufficient but not necessary condition for observing CP and that distinctiveness contributes to the producing of CP effects in continua between unfamiliar faces.

A Uniform Neurocomputational Architecture in Auditory and Visual Grouping

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We suggest a neurocomputational approach to auditory and visual grouping based on dynamic relations among neural states coding for auditory or visual features on the basis of cognitive and neurophysiological evidence. Our neurocomputational architecture is characterised by the following properties: -Perceptual features are primarily coded in terms of activation levels. -Relations among perceptual elements are coded in terms of coherence. -Neural coherence is dynamic, and enables coding of multistable perceptual patterns, as ambiguous figures or auditory streams. -Proximity and similarity relationships may be coded in a flexible manner in terms of differential coherence. -Competition among perceptual organisation forces may be reflected in graded coherence patterns. -Top-down or schema-based effects may interact with bottom-up activation and coherence, through reinstantiation processes. -A dynamic “never inert” memory may be implemented. Perceptual and memory representational states are non-separable. Our computer simulations lead to several predictions that may be tested in neuro-cognitive experiments.

Modelling Direct Perceptual Constraints on Action Selection: The Naming and Action Model (NAM)

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There is increasing psychological and neuropsychological evidence that action selection is directly constrained by perceptual information from objects as well as by more abstract semantic knowledge. A new connectionist model of action and name selection from objects—NAM (Naming and Action Model) is based on the idea that action selection is determined by convergent input from both visual structural descriptions and abstract semantic knowledge. NAM is able to simulate evidence for a direct route to action selection from both normal subjects and neuropsychological patients such as optic aphasic, anomia and apraxia. The model provides a useful framework for understanding how perceptual knowledge influences action selection. In the poster I will present the results of simulations of action and name selection tasks with normal and impaired patient populations.

Shared or Distributed Mental Models? The Effect of Task Difficulty on Distributing Cognition

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Team performance is often explained through team members sharing mental models. However it is possible that, by using a distributed cognitive process, team members divide the model between themselves. These alternatives make different demands upon team members and so one or other may be optimal in different circumstances. To test this teams with either shared or distributed mental models completed a problem solving task with different sources of difficulty. Experiment 1 manipulated the difficulty of moves and the number of moves required to solve the task. Experiment 2 manipulated the size of the model. The results indicated that more difficult tasks took longer and distributed mental models used a more distributed process. For both time and distributed process the interaction of distribution with difficulty varied for different sources of difficulty. These variations are explained through the shared mental models using a parallel process to solve the problem and the distributed mental models using a serial process.

Exploring the Role of Executive Processes in Arithmetic By Means of the Random Interval Generation Task

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“Random time Interval Generation” (RIG) was used to investigate executive processes in arithmetic: Subjects had to produce random intervals on a key while solving arithmetic problems. The main advantage of RIG is that there is interference with the central executive while the load on the slave systems is negligible. In Experiment 1, the RIG-task was combined with an addition ($8 + 4 = ?$? ?) or multiplication ($8 \times 4 = ?$? ?) production task (instead of verification as previous research mainly used). RIG had a significant effect, suggesting that executive processes are important for arithmetical fact-retrieval. In Experiment 2, the role of working memory in calculation strategy-use was investigated. Results revealed that RIG interfered with a slow and difficult but not with a fast and easy strategy. The implications of these findings and the involvement of working memory in arithmetic will be discussed.

How Creative and Intelligent People Use Cues in Convergent Verbal Tasks? The Role of Attention and Memory

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Creative people are believed to possess more complex semantic networks due to a greater number of associations between concepts. Therefore, according to the spreading activation model, their performance in verbal priming tasks should improve after the presentation of primes associated with target-words. It is also known that as a consequence of broad and defocused attention, creative people are more often influenced by incidental cues, irrelevant to the task they are performing. On the other hand, incidental, opportunistic learning has been established as a property of intelligence rather than creativity. Thus, the question arises whether intelligence and creativity can cooperate in typically non-creative tasks. Two experiments had been carried out using the anagram-solving convergent task PRYMAGRAM: the results show that subjects who were both intelligent and creative outperformed those of either high intelligence or high creativity only. It seems that the mechanisms responsible for these effects are attention and implicit memory.

The Temporal Dynamics of Number Comparison: An Event-Related Functional MRI Study

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Neuropsychological and functional imaging work have emphasized the crucial role of the inferior parietal lobule (IPL) in mental number processing. Our study investigates differential contributions of the left / right IPL in magnitude comparison.

In an event-related fMRI study we examined the comparison of a. 4, 6 (close) and 1, 9 (far) with 5.

b. 54, 56 (close) and 51, 59 (far) with 55.

Activation for each type of stimulus was modeled using temporally shifted basis functions.

For larger numbers (b), number comparison seems to be characterized by early activation of the analogue magnitude representation in bilateral IPL with a subsequent activation of left language areas. For small numbers (a), both types of stimuli lead to activation of left language related areas, while number comparison itself makes use of the magnitude representation in bilateral IPL only for the far stimuli and exclusively relies on left parietal areas for close stimuli.

Spatial Inferences and Memory in Primary School Children

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Pears and Bryant (1990), Markovits et al. (1995) have investigated the ability to make transitive inferences in tasks involving the spatial relationship higher than. In both these studies the premises were available during the test. The present study extended their investigation by considering children's inferential ability in different situations: 1) the spatial relationship was above/below; 2) inferences were linear transitive or not transitive; 3) premises were not available during the test.

168 children aged 6–8 years (1–3 grade of primary school) were presented with inference problems varying in complexity (three and four elements). Inference questions and memory premises questions were posed in randomised order. Relevant conditional and unconditional probabilities outlined the relationship between memories for premises and inferences. Observed data were further analysed as function of age, gender, and task characteristics.

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Is the Construct of Divergent Production Homogeneous? Cognitive Mechanisms of Fluency, Flexibility and Originality of Thinking

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The present study aimed at investigating cognitive mechanism of divergent production. If fluency, flexibility and originality of thinking had different functions in creative problem solving, they would have different cognitive bases. 87 students of psychology took part in an experiment. Paper tests of divergent production and a battery of cognitive tasks to assess various aspects of selective attention, divided attention and working memory were used. Flexibility was connected with strong cognitive inhibition and slow but more correct processes of information selection. It suggests that the cognitive mechanism of “flexible mind” is rather slow, but resistant on the disturbance process of stimulus selection. On the other hand, originality demands high speed of information selection as well as strong inhibition. The results also disclosed a relationship between flexibility and speed of working memory searching. The obtained data will be discussed in terms of ecological validity of the constructs of fluency, flexibility and originality in creative problem solving.

Revealing the Two Phases of Hypothetico-Deductive Reasoning By Means of Particular Indicator Feedback

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To discover a category, subjects elaborate hypotheses about which they get congruent or non-congruent feedback. The function of feedback changes according to the reasoning phase. In the inductive phase (search for the category), feedback gives useful information for discovering the category. In the deductive phase (validation of the category), congruent feedback confirms subjects' responses whereas non-congruent feedback disconfirms them. We show that (1) in the deductive phase, the amount of congruent feedback is more important than the amount of non-congruent feedback, (2) the amount of congruent feedback, in the deductive phase, is greater than in the inductive phase. These results show that congruent and non-congruent feedback trace the psychological reality of two phases in hypothetico-deductive reasoning. In addition, we show that (3) subjects elaborate preferentially specific hypotheses. These hypotheses are sufficient but not necessary to discover the correct category. So, subjects make a mistake when the category is general.

The Wording of Conclusions in Relational Reasoning

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The literature on relational reasoning mainly focuses on the performance question. It is typically argued that the difficulty of a given problem is a function of the number of “mental models” with which it is compatible. However, no study has ever investigated the wording of the conclusion that participants formulate. In the present work, we investigate the relational terms that people use in the conclusion they draw from spatial relational problems (A is to the left of B, B is to the left C, D is in front of A, E is in front C, What is the relation between D and E?). In two experiments, we show that problem difficulty, the linguistic form of premises and continuity between premises are important factors determining the conclusion expressed. However, and more importantly, our study shows that the type of conclusion produced provides an essential clue concerning the processes of premise representation.

Comprehension of True and False Propositions Within Pragmatic Contexts

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Mental model theory predicts that dealing with truth is easier than dealing with falsity (Johnson-Laird & Byrne, 1991). Barres and Johnson-Laird (1997) confirmed the prediction for comprehension of disjunctive propositions.

The aim of our experiment was twofold: a validation of the prediction within a pragmatic context, and an extension of the prediction to conjunction, bi-conditional and conditional, along with disjunction. Participants were children, adolescents and adults; thirty in each group. They dealt with two series of propositions: in a series the propositions were proffered by a sincere character, while in the other by a liar. Participants were invited to consider which cards, among a series of four, corresponded to the real state of affairs to which the proposition referred. The results reveal that participants found it easier to deal with sincere propositions than with mendacious propositions. This result held for both the single connectives and the single age groups.

Conditional Reasoning with a Spatial Content Requires Visuo-Spatial Working Memory

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In previous research, Toms, Morris, and Ward (1993) have shown that conditional reasoning is impaired by a concurrent task calling on executive functions but not by concurrent tasks that load on the slave systems of the working memory system as conceptualised by Baddeley and Hitch (1974). The present article replicates and extends this previous work by studying problems based on spatial as well as nonspatial relations both in a single-task condition and under concurrent matrix tapping, a task loading the visuo-spatial sketch pad. The findings were consistent with those of Toms et al. (1993) for problems with a nonspatial content. However, when the content was spatial, a dual-task impairment was observed: processing time of the first premise was lengthened, and for the most difficult problem types, the number of correctly solved problems diminished. The implications of these findings for the mental models theory and the mental logic theory are discussed.

How to Use the Internet to Study Human Cognition

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The Internet offers new ways to study human cognition. One example is the use of the Net in conducting psychological experiments. Another possibility is to sample personal and institutional web documents and systematically gather information about their structure and content. The approach is reasonable, if we consider websites as complex social constructs that reflect the capacities of human cognition. This kind of documentary cognitive psychology might, for example, study the perceptual organization of personal and institutional homepages, the presentation of autobiographical memories on personal homepages and the habits of updating personal web-based information. I present here an example of the application of this kind of 'ecological' method. I have sampled two hundred academic sites, analyzed their portal pages and counted the number of different grouping principles and pop-out features that have been used. Several problems related to the method are discussed.

The Role of the Human Amygdala in Attentional Orientation to Another's Gaze Direction: Evidence from Unilateral Temporal Lobectomy Patients

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Another person's gaze direction triggers a reflex shift of an observer's visual attention. However, it remains unknown whether the amygdala, the neural mechanism suggested to participate in gaze analysis, is involved in this process. To address this problem, we studied six patients with unilateral anteromedial temporal lobe resection. These patients, and eight normal control subjects, were administered an experiment of a gaze cueing paradigm using line drawn faces. Gaze cues were presented to unilateral visual fields. When these cues were presented to the intact hemispheres of the temporal lobectomy subjects or to any of the hemispheres of the controls, the valid cues shortened the subjects' reaction times for target detection relative to the invalid cues. However, when the lesion hemispheres of the temporal lobectomy subjects were stimulated, this cueing effect vanished. These findings suggest that the amygdala plays a crucial role in the attentional orientation to another's gaze direction.

Sentence Production Under Dual-Task Conditions: Comparison Between Stuttering and Nonstuttering Persons

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It was investigated how sentences produced by stuttering and nonstuttering persons differ when this task had to be performed concurrently with rhyme and category decisions as secondary tasks. 19 adult persons who stutter and 22 persons participated in the experiment. The average number of correct rhyme and category decisions was reduced when this task was performed concurrently with sentence production. The two groups of participants did not differ with respect to the correctness and latency of their decisions. Under single task conditions both groups produced comparable sentences. But under dual-task conditions, persons who stutter produced significantly shorter sentences with a smaller number of propositional units, whereas persons who do not stutter produced even longer sentences with category decisions as secondary task. These results suggest that persons who stutter need more processing capacity for sentence generation and articulation than persons who do not stutter and that both groups keep stuttering rates at a constant level by adjusting the length and complexity of their linguistic productions.

Everything Happens During Encoding: On the Role of the Central Executive in a Serial Spatial Working Memory Task

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The goal of the study was to disentangle working memory processes within a serial spatial span task. The Corsi-Block-task was used in three experiments together with different types of interfering secondary tasks. In the first experiment different subsystem-specific interference tasks were given during a five second retention interval. Results show a significant effect of the spatial interference task.

In experiment 2 central executive and subsystem-specific interference was given during the presentation of the Corsi-sequences. Span was affected by the central executive interference but not by the spatial interference. Experiment 3 was used to investigate the role of subsystem-specific parts within central executive secondary tasks. Random generation tasks based on three different modalities (spatial, verbal and motor) were applied during the encoding of Corsi-sequences. A interference effect of all three random generation tasks was found, but the strength of this effect was dependent on the modality of the secondary tasks.

Children's Span for Spatial Locations and Object-Location Associations

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The purpose of this study was to investigate age-related differences in children's short term retention of spatial information. A total sample of 147 children was examined, divided into three groups on the basis of chronological age: younger (6 years), middle (8 years), and older (10 years). First, the span for a set of spatial locations was determined by asking participants to remember an increasing number of spatial positions in a two-dimensional matrix. Subsequently, memory for object-location associations was examined with the span procedure. In this case the effect of task demand was also investigated: in one condition previously occupied positions were signalled and children only had to remember object-to-position assignment (ie "what was where") while

in the combined condition children had to perform both positional reconstruction and object-to-position assignment. Data show a different developmental trend for each task considered. Results are discussed in terms of children's working memory development.

Spatial Working Memory in the Auditory Modality

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Although there is now a large body of evidence which supports the notion of distinct visual and spatial components within working memory, the majority of tasks used to investigate the spatial working memory component have involved visual input of spatial information. Research into spatial working memory has focused on tasks such as the Corsi blocks that involve visual presentation of movements or movement sequences. However, little work has attempted to investigate spatial working memory in different modalities. Two experiments are reported which investigated recognition for locations of auditory stimuli. A dual-task approach was used in both studies to compare the disruption caused by unseen spatial tapping tasks and random interval tapping tasks. The results indicated that there was a similar degree of interference between the tapping tasks and the auditory location task. The results are discussed with reference to the attention load associated with spatial working memory tasks.

Modelling the Cortical Mechanisms of Working Memory

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We investigated the cortical mechanisms which are related to the following functional properties of working memory:

- Item retention in terms of self-sustained neuronal activity.
- Attentional modulation of working memory retention through enhanced firing rates of neurons coding for salient or focused items.
- Limited capacity of working memory in terms of between-item segregation due to the mutual inhibition between neurons coding for different items.
- Chunking of the neural representations of individual features, in terms of synchronization processes.
- Retention decay due to the autonomous decrease in ADP amplitude. Such a spontaneous decay may not occur in the presence of rehearsal processes. We assume that such processes are implemented in terms of top-down prefrontal modulation.
- Retention interference, due to incoming input. A continuum of functional processes, from highly-transient to highly sustained neural activity, is modelled.

Our neural simulations lead to novel predictions that may be tested in cognitive neurophysiological and brain imaging experiments.

Variations of the Temporal Parameters of Written Spelling Production in Children

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The study presents an on-line investigation of written spelling production in children. Thirty ten-year-old French-speaking children were requested to spell a list of 64 words which differed in frequency, polygraphy and orthographic complexity (i.e., with or without consonant cluster). Each word was spelt twice: once during a first spelling session; then a month later during a separate second spelling session. During the period between the two spelling sessions, the children were taught to learn the spelling of each word.

The words were dictated by a computer. The children wrote on a sheet of paper fixed to a graphic tablet. Three temporal parameters were recorded for each word in both spelling productions: the spelling latency, the writing time and the within-word pause time.

Comparative analyses of temporal data were carried out with two purposes:

- first, to describe the temporal monitoring of spelling production in children, and specially of the impact of word features on the temporal parameters of spelling production;
- second, to display some variations of the temporal monitoring of spelling production owing to the learning of word spelling.

The results are discussed in the theoretical framework of the dual-route model (assembling procedure vs addressing procedure) of spelling production.

Temporal Aspects of Maximum Finger Tapping Tempo in Normal Hearing and Congenitally Deaf Subjects

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Experimental evidence suggests the left hemisphere (LH) dominance both in human speech and motor control of simple repetitive movements, like a finger tapping task (FTT). With a maximum speed of FTT, we compared temporal processing in sixteen normal hearing and congenitally deaf subjects (16–18 year olds) who displayed disturbed oral speech and communicated using sign language.

The results showed that boys tapped at a faster rate than girls, independently of the group and tapping hand, which probably reflects greater muscle bulk and strength. Secondly, right hand tapping speed (controlled by the LH) was faster than that for the left hand. However, this difference was less pronounced in deaf subjects. These relations may indicate some abnormalities in hemispheric asymmetry in the deaf, probably due to relatively long linguistic deprivation.

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Task-Switching and S-R Bindings: S-R Event Priming Increases Task-Shift Costs

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When subjects switch between two tasks, performance is slower after a task switch than after a task repetition. We report two experiments showing that a large part of these “task-shift-costs” can not be attributed to a control operation, needed to configure the cognitive system for the upcoming task. In all experiments subjects switched between picture-naming and word-reading. We presented different stimuli either in just one of the two tasks, or in both of them. Shift-costs were larger for stimuli presented in both tasks than for those presented in only one task, even after about 100 intervening trials between prime and probe events. We suggest that stimuli acquire associations with the tasks in which they occur. When the current task activation is weak, as on a switch of tasks, stimuli can trigger retrieval of the associated competing task, provoking larger time costs.

Simultaneous or Dissociative Processing of Duration and Number of Sequence of Events? A Developmental Perspective

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The purpose of our experiments was to investigate changes with age of the abilities to selectively focus attention on the time or number of the same sequence of events. Children aged 5 and 8 years, as well as adults, were given either a temporal or a numerical bisection task, without or with counting. In each task, the participants were initially trained to discriminate between a “short-few” standard (2s./n = 2) and a “long-many” standard (8s./n = 8), then they had to judge if the non-standard stimuli were similar to one of standards. Two sorts of non-standard stimuli were presented: (a) Number-control stimuli, which held the stimulus duration constant (4s.) while varying number, and (b) Time-control stimuli, with a constant number (n = 4) and varied duration. The results showed that, in temporal bisection, although a counting strategy enhanced a differential control of responses by time and number, the 5-year-olds processed both dimensions, whereas the 8-year-olds as the adults were able to process only time. On the other hand, in numerical bisection, the participants easily ignored time to only process number.

Age-Related Changes in Event-Related Prospective Memory: A Comparison Between Four Prospective Memory Tasks

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The influence of age on event-based prospective memory was examined in four prospective memory tasks. The tasks were selected from the literature or developed in order to span a range of task characteristics that might determine task sensitivity to age effects in prospective memory: difficulty of the background task, perceptual saliency of prospective target events, frequency of occurrence of prospective target events, complexity of prospective memory instructions, and provision of feedback after prospective memory errors. Two of the four tasks were found to provide sensitive and reliable tools for assessing effects of normal aging on prospective memory. Correlational analyses suggested that observed age effects on prospective memory in these two tasks were mediated by a reduced ability of older adults to maintain prospective intentions in a highly activated state, and not differences in divided-attention strategies or by age effects on basic mental speed.

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