

X Congress of the European Society for Cognitive Psychology

Program and Abstracts

September 13 - 17, 1998

Jerusalem, Israel

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Acknowledgements

The Organizing Committee gratefully acknowledges the contribution of the following sponsoring universities:

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GENERAL INFORMATION

Conference Venue

Radisson Moriah Hotel, 39 Keren Hayessod, Jerusalem. Tel: 02-5695695,
Fax: 02-6232411.

Dates

Sunday, September 13th – Thursday, September 17th, 1998.

Registration / hospitality desks

The Registration and Hospitality Desks will be open as follows:

Sunday, September 13th, 1998 - 14:00 - 20:30.

Monday, September 14th, 1998 - 08:30 - 19:30.

Tuesday, September 15th, 1998 - 08:30 - 14:00.

Wednesday, September 16th, 1998 - 08:30 - 19:00.

Thursday, September 17th, 1998 - 08:30 - 13:30.

The Registration fees for a Participants includes

Participation in all Conference sessions, book of abstracts, Conference kit, refreshments during breaks, Get-Together reception, Bus-Tour and Reception at the Israel Museum.

The Registration fees for Accompanying Persons include

Conference kit, Get-Together reception, Bus-Tour, Reception at the Israel Museum and Gala-Dinner.

Conference Language

The official language of the Conference is English.

Conference Kit

The Conference material which you received upon registration contains a Program and Book of Abstracts, invitation to all social events, a name tag, etc. Please wear your name tag for the full duration of the Conference and to all of the Conference functions.

Dress

Dress for the Conference will be informal.

Posters

Posters will be presented in 2 Sessions. Poster presenters are kindly requested to mount their posters no later than lunch time in the day of their presentation and to dismantle their posters by the end of the day's sessions. The Authors are requested to stand by their posters throughout the pre-designated time. Please check your poster-board number in the Program and Book of Abstracts.

Pre- and Post- Conference Tours

In addition, pre- and post- Conference tours in Israel will be available to Conference participants.

Car Rentals

Special congress rates can be obtained from Europcar. Further details can be obtained from the Tourist Services Desk.

Tourist Services

Dan Knassim Ltd., will operate a desk during the Conference. Participants requiring additional accommodation in Israel, tours, domestic flights, car rental, etc., may apply to the Tourist Desk for their convenience.

Reconfirmation of return flights

Participants must reconfirm their return flights at least 72 hours prior to departure. Please complete the reconfirmation form in your bag and return it to the Tourist Desk within the first day of the Conference.

Congress Secretariat

Dan Knassim Ltd., Organizers of Conventions, Exhibitions and Special Events

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Social Events

Sunday, September 13, 1998

19:30 - 21:30 Get-Together Reception at the Radisson Moriah Hotel

Tuesday, September 15, 1998

14:30 - 19:00 Bus trip, touring Jerusalem

19:00 - 21:00 Reception at the Israel Museum

Wednesday, September 16, 1998

20:00 - 24:00 Gala-Dinner at the "Caravan Inn" Oriental Restaurant,
Abu-Ghosh

SCIENTIFIC PROGRAM

Program

Sunday, September 13, 1998

14:00 - 18:00 Registration (will continue throughout Monday)

18:00 - 19:30 Broadbent Lecture:

Anne Treisman (Princeton): Feature binding, attention, and object perception. *Chair Person - Vicki Bruce*

19:30 - 21:30 Get-together party, Moriah Hotel.

Monday, September 14, 1998

09:00 - 10:30 Parallel oral presentation sessions

Word Perception - I

Chair Person - Marc Brysbaert

09:00 - 09:30 Georgije Lukatela & M.T. Turvey (Belgrade): The English pseudohomophone test in the lexical decision task.

09:30 - 10:00 Nathalie Bedoin (Lyon): Phonetic features activation in visual word recognition: the case of voicing.

10:00 - 10:30 Zofia Kaminska (London): When TODES feel damp, but TOWELS do not: Shades of false memory from pre-lexically computed phonology.

Thinking and Reasoning - I

Chair Person - Philip Smith

09:00 - 09:30 Kristien Dieussaert, W. Schaeken, W. Schroyens, & G. d'Ydewalle (Leuven): Exploring reasoning strategies with expanded conditionals: The illusion of suppressing conditional inferences.

09:30 - 10:00 Andre Vandierendonck, G. De Vooght, C. Desimpelaere, & V. Dierckx (Ghent): Implicit model representations in indeterminate spatial linear syllogisms.

10:00 - 10:30 Markus Knauff, R. Rauh, C. Schlieder, & G. Strube (Freiburg): The effects of term order in spatial relational inference.

Spatial Attention

Chair Person - Yehoshua Tsai

09:00 - 09:30 Yaffa Yeshurun & M. Carrasco (New York): The effects of cueing spatial attention on acuity and texture segregation tasks.

09:30 - 10:00 Halit Dori, A. Henik, & A. Gotler (Beer-Sheva): The movement of attention in the visual field: Implication for an attentional gradient.

10:00 - 10:30 Francisco J. Tornay, E.G. Milan, P. Tudela, & E. Madrid (Granada): Spotlight failure with peripheral cue.

Executive processes - I

Chair Person - Daniel Gopher

- 09:00 - 09:30 Nachshon Meiran, & A. Daichman (Beer-Sheva): Parallel processing of tasks in the task switching paradigm: Evidence from error analysis.
09:30 - 10:00 Gesine Dreisbach, H. Haider, S. Kowski, R.H. Kluwe, & A. Luna (Hamburg): Facilitatory and inhibitory effects of cues on switching tasks.
10:00 - 10:30 Daniel Gopher, L. Armony, & Y. Greenspan (Haifa): Switching tasks and attention policies and the ability to prepare for such shifts.

10:30 - 11:00 Coffee break

11:00 - 13:00 Parallel oral presentation sessions

Morphology

Chair Person - Laurie Feldman

- 11:00 - 11:30 Laurie, B. Feldman (New Haven & Albany): Semantic and orthographic aspects of morphological processing.
11:30 - 12:00 Avital Deutsch & R. Frost (Jerusalem): Morphological decomposition is constrained by detection of structure, not of lexical individual morphological units.
12:00 - 12:30 Michal Raveh & L.B. Feldman (Storrs): The contribution of morphological relation and affix position to morphological processing.
12:30 - 13:00 Helene Giraudo, J. Grainger, & P. Cole (Aix-en-Provence): Roots and Affixes as lexical units: An incremental priming report

Action - I

Chair Person - Bernhard Hommel

- 11:00 - 11:30 Bernhard Hommel (Munich): Binding between perceptual objects and action plans: The temporal dynamics of event-file construction.
11:30 - 12:00 Koen Van der Gooten G. De Vooght, J. Lammertyn, B. Caessens & B. Hommel (Ghent): The temporal course of action concepts.
12:00 - 12:30 Marcel Brass, H. Bekkering, A. Wohlschlaeger, & W. Prinz (Munich): Voluntary action: Imitation versus reactions to symbolic cues.
12:30 - 13:00 Doris M. Dehn & J. Engelkamp (Saarbrücken) Item-specific and relational information in remembering actions.

Perception - I

Chair Person - Carlo Umiltà

- 11:00 - 11:30 Lothar Knuf, G. Aschersleben & J. Musseler (Munich): Task-dependent mislocalizations during position judgements of moving stimuli.
11:30 - 12:00 Mieke Donk & C. Meinecke (Amsterdam): The effects of display size and display density on feature search.
12:00 - 12:30 Gunther Knoblich & W. Prinz (Munich): Recognizing individual characteristics of drawing from a moving point.
12:30 - 13:00 Talis Bachmann (Portsmouth): The speed of elementary visual recognition in Parkinson's disease as measured by the mutual masking method: Support for perceptual retouch theory.

Working Memory -

Chair Person - To be determined

- 11:00 - 11:30 Eva Kemps & B. Reynvoet (Ghent): Confusion errors in visual working memory. *Feldman*
11:30 - 12:00 ~~Valerie Camos & P. Barrouillet (Dijon): Counting span due to memory decay or cognitive space?~~
12:00 - 12:30 John Towse, G. Hitch, & U. Hutton (London): Children's performance on three working memory span tasks: "All for one, one for all"?
12:30 - 13:00 Sandrine Vieillard & J-C Bougeant (Lyon): Effect of emotional state on updating processes in working memory.

13:00 - 14:30 Lunch Break

14:30 - 15:30 Keynote address:

Tom Bever (Tucson) Cerebral asymmetries and cognitive dynamics.
Chair Person - Shlomo Bentin

15:30 - 16:00 Coffee break

16:00 - 18:00 Parallel oral presentation sessions

Face Processing

Chair Person - Vicki Bruce

- 16:00 - 16:30 Mike Burton, S. Wilson, & M. Cowan (Glasgow): Recognition of faces in poor quality video.
16:30 - 17:00 Shlomo Bentin & L. Y. Deouell (Jerusalem): Structural encoding and identification in face processing: ERP evidence for separate mechanisms.
17:00 - 17:30 Vicki Bruce, Dick Terry & Karen Smith (Stirling): Visual and non-visual factors affecting repetition priming of face.
17:30 - 18:00 Raphael Loiselet & O. Koenig (Lyon): Priming by facial expression: Evidence from a face familiarity judgement task.

Problem Solving

Chair Person - To be determined

- 16:00 – 16:30 Clare Harries & N. Harvey (London): Improvement of probabilistic reasoning? Effects of response format and problem structure on the pruning bias in a familiar and unfamiliar scenario.
16:30 – 17:00 Evelyne Clement & E. Sander (Rouen): Analogies with familiar sources in problem solving situations.
17:00 – 17:30 Nigel Harvey & F. South (London): Effects of time pressure on judgement: Mediating effects of problem frame.
17:30 – 18:00 Joseph Glicksohn & Chanita Goodblatt (Ramat Gan): Metaphor comprehension as problem solving: An on-line study of the reading process.

Speech production

Chair Person - Patrizia Tabossi

- 16:00 – 16:30 Femke van der Meulen & A. Meyer (Nijmegen): Viewing and describing pictures: The coordination of eye movements and speech planning in the production of noun phrases and pronouns.
16:30 – 17:00 Claudy C.E. Oomen & A. Postma (Utrecht): The effect of increased speech rate on speech monitoring.
17:00 – 17:30 Peter Starreveld (Leiden): Phonological effects obtained with the picture-word task: What do they tell us about language production?
17:30 – 18:00 Simona Collina, P. Marangolo, & P. Tabossi (Trieste): The production of nouns and verbs: A case study.

Memory: Aging and Pathology *Chair Person - Moshe Naveh-Benjamin*

- 16:00 – 16:30 Roy P.C. Kessels, A. Postma, E. H. F. de Haan (Utrecht): Impairments of spatial memory after stroke.
16:30 – 17:00 Gery d'Ydewalle, S. Utsi, K. Luwel, & E. Brunfaut (Leuven): Time- and event-based prospective memory as a function of age: The importance of ongoing concurrent activities.
17:00 – 17:30 Moshe Naveh-Benjamin (Beer-Sheva): Adult-age differences in memory performance: An associative deficit framework.
17:30 – 18:00 Rosalind I. Java, J. M. Gardiner & A. J. Parkin (London): Are we slowing down or do we not remember?

18:00 – 19:30 Poster Session I – Cash Bar (see page 21)

Tuesday, September 15, 1998

09:00 – 10:30 Parallel oral presentation sessions

Memory for temporal order

Chair Person - Hans-Georg Geissler

- 09:00 – 09:30 Elke van der Meer (Berlin) Memory for temporal order of past events.
09:30 – 10:00 Hans-Georg Geissler & R. Kompass (Leipzig): Mental time quanta: New findings in event perception and memory search.
10:00 – 10:30 Vincent Monfort & V. Pouthas (Paris): Memory for duration: An ERP study.

Motor Control – I

Chair Person - Wolfgang Prinz

- 09:00 – 09:30 Frank Miedreich, G. Aschersleben, & J. Gehrke (Munich): Temporal control of repetitive movements in the synchronization task: An empirical test of the Wing-Kristoffersson model.
09:30 – 10:00 Natalia V. Dounskaia, S.P. Swinnen, & A. Schuddink (Leuven): Visual and nonvisual constraints imposed on bimanual coordination.
10:00 – 10:30 Birgit Elsner & B. Hommel (Munich): Impact of conditioned action effects on the control of voluntary action.

Thinking and Reasoning – II

Chair Person - Andre Vandierendonck

- 09:00 – 09:30 Philip T. Smith, J. Cockburn, & P. Hruszak (Reading): Varieties of absent-mindedness.
09:30 – 10:00 Alice McEleney & R. Byrne (Dublin): Spontaneous counterfactual thoughts and explanations.
10:00 – 10:30 Dietmar Janetzko (Freiburg): Assessing cognitive structures via knowledge tracking.

Object and Space-Based Attention *Chair Person: Claus Bundesen*

- 09:00 – 09:30 Y. Tsal & D. Lamy (Tel Aviv): Object identity properties, object locations and object-files: Which does selective attention activate and when?
09:30 – 10:00 Asher Cohen & U. Feintuch (Jerusalem): Object and space based attention as a function of a task demands.
10:00 – 10:30 Angus Gellatly & G. Cole (Keele): Responses to abrupt onset visual objects: Perceptual facilitation and response inhibition.

10:30 – 11:00 Coffee Break

11:00 – 13:00 Parallel oral presentation sessions

Word Perception – II

Chair person - Ram Frost

- 11:00 – 11:30 Marc Brysbaert, M. Lange, I. Van Wijnendaele (Ghent): Independent effects of age-of-acquisition and frequency-of-occurrence in visual word recognition: Evidence from Dutch.
- 11:30 – 12:00 Daniel Zagar & V. Buzenet (Dijon): The time course of orthographic and phonological activation of consonants in French.
- 12:00 – 12:30 Noud A.W.H. van Kruysbergen, A.M.T. Bosman & G. O. Stone (Nijmegen): Statistical analysis of the bidirectional inconsistency of spelling and sound in Dutch.
- 12:30 – 13:00 Manuel Carreiras & M. Perea (Tenerife): Masked priming effects with syllabic neighbors in the lexical decision task.

General Cognition and Music Cognition

Chair Person - to be determined

- 11:00 – 11:30 Warren Brodsky & A. Henik (Beer-Sheva): Demonstrating inner hearing among highly trained expert musicians.
- 11:30 – 12:00 Sami Gulgoz, M.E. Aktunc & T. Kumkale (Istanbul): Effects of need for cognition, text coherence, and prior knowledge on learning from text.
- 12:00 – 12:30 Eyal Cohen & E. Ruppin (Tel Aviv): From parallel to serial processing: A computational study of visual search.
- 12:30 – 13:00 Barbara Tillman, & E. Bigand (Dijon): A spreading activation account of global and local harmonic expectancy.

Implicit memory

Chair Person - Gezinus Wolters

- 11:00 – 11:30 Yonatan Goshen-Gottstein & N. Peres (Tel Aviv): Priming on implicit and explicit tests of memory within and across languages: Evidence for dissociative performance on perceptual and conceptual tasks.
- 11:30 – 12:00 Gezinus Wolters (Leiden): Interference effects in implicit tests of memory.
- 12:00 – 12:30 Eli Vakil & Y Hoffman (Ramat Gan): The effect of attentional load and depth of processing on the performance of perceptual and conceptual priming.
- 12:30 – 13:00 Rene Zeelenberg, R. M. Shiffrin, D. Pecher, & J.G.W. Raaijmakers (Amsterdam): Priming in free association.

Perception – II

Chair Person - Vicki Bruce

- 11:00 – 11:30 Pertti Saariluoma (Helsinki): A Constructivist theory of consciousness: Evidence from chess players' thinking.
- 11:30 – 12:00 Martin Juttner and I. Rentschler (Munich): Pattern classification learning and generalization across visual field.
- 12:00 – 12:30 Francesca Peressotti, R. Job, & R. Cubelli (Padova): How do we recognize proper names: Do capital letters matter?
- 12:30 – 13:00 Cristina Cacciari & M. Massironi (Bologna): The color of words: The comprehension of perceptual metaphors.
- 13:00 – 14:00 Keynote address:
Asher Koriati (Haifa): The subjective monitoring of one's own knowledge. *Chair Person - Daniel Gopher*

14:30 – 19:00 Bus trip, touring Jerusalem (Fallafel lunch).

19:00 – 21:00 Reception at the Israel Museum.

Wednesday, September 16, 1998

09:00 – 11:30 Parallel oral presentation sessions

Dyslexia and Communication disorders *Chair person - Miri Faust*

- 09:00 – 09:30 Marie Montant & M. Behrmann (Marseille): Phonological activation in pure alexia.
- 09:30 – 10:00 Miri Faust & A. Silber (Ramat Gan): Differences in hemispheric asymmetry between dyslexic and normal children on the lateralised sentence priming-lexical decision task.
- 10:00 – 10:30 Cristina Romani & A. Olson (Birmingham): Formal lexical paraphrasias in a single-case study: Where 'masterpiece' becomes 'misterpieman' and 'curiosity' 'suretoy'.
- 10:30 – 11:00 Catherine Transler, J.E. Gombert, & J. Lebaert (Dijon): Phonological sensitivity varies as a function of speech manipulation skills in deaf children.
- 11:00 – 11:30 Bjorn Lyxell & U. Andersson (Linkoping): Phonological representation and speech understanding in deafened adults.

Unattended interference

Chair Person - Shlomo Bentin

- 09:00 – 09:30 Elisheva Ben Artzi & L.E. Marks (Ramat Gan): Additivity in interference of unattended information.
- 09:30 – 10:00 Avishai Henik, T. Ro, R. Rafal, & R. Egly (Beer-Sheva): Lateral prefrontal cortex involvement in the Stroop effect.
- 10:00 – 10:30 Soledad Ballesteros & J-M Reales (Madrid): Performance on the emotional Stroop task in normal subjects: The effect of word fragmentation level.
- 10:30 – 11:00 Lilach Shalev & G.W. Humphreys (Tel Aviv): Length and size perception in unilateral neglect: Compression or magnification?
- 11:00 – 11:30 Celin Borg, & J-C Bougeant (Lyon): Selective inhibition of irrelevant information in anxiety.

Learning – I

Chair Person - Josef Tzelgov

- 09:00 – 09:30 Vered Yehene, & J. Tzelgov (Beer-Sheva): On the complexity of learning in simple tasks: The case of lexical decision.
- 09:30 – 10:00 Eric Soetens & A. Melis (Brussels): Implicit sequence learning is related to automatic sequential effects in random serial reaction-time tasks.
- 10:00 – 10:30 Joachim Hoffmann & A. Sebold (Wurzburg): Sequential learning in SRT tasks might not be what it is supposed to be.
- 10:30 – 11:00 Michael Ziessler (Berlin): The effect of the response-stimulus interval (RSI) on learning in serial reaction tasks: The delay of the response effect impairs implicit learning.
- 11:00 – 11:30 Dieter Nattkemper, & M. Ziessler (Berlin): Effects of additional load on serial pattern learning.

Priming

Chair Person - Maria-Teresa Bajo

- 09:00 – 09:30 Maria Teresa. Bajo & C. Puerta-Melguizo (Granada): Naming and categorizing pictures: Time course of semantic and phonological priming.
- 09:30 – 10:00 Jonathan Grainger, & R. Dell'Acqua (Aix-en-Provence): Subliminal Semantic priming revisited: Category compatibility effects of picture primes.
- 10:00 – 10:30 David Anaki, H. Cohen, A. Henik, & N. Shilo (Beer-Sheva): The effect of prime letter search on semantic and associative priming.
- 10:30 – 11:00 Diane Pecher, R. Zeelenberg, & J.G.W. Raaijmakers (Amsterdam): Priming effects in perceptual identification are automatic.
- 11:00 – 11:30 Juan Lupianez, P. Tudela, B. Milliken, & C. Rueda (Granada): Semantic negative priming in Spanish and English: No effect of eccentricity.

11:30 – 12:00 Coffee Break

12:00 – 13:00 Keynote address:

Endel Tulving (Toronto): PETting memory. *SiRCened on strike*
business meeting
Chair Person - Moshe Naveh-Benjamin

13:00 – 14:00 Lunch Break

14:00 – 15:00 Business Meeting

15:00 – 15:30 Coffee Break

15:30 – 18:00 Parallel oral presentation sessions

Word & Syllables Processing *Chair Person - Jonathan Grainger*

- 15:30 – 16:00 Giovanni, B. Flores d'Arcais, & H. Saito (Padova): Orthographic and phonological features of the radicals in the recognition of Kanji characters.
- 16:00 – 16:30 Johannes C. Ziegler & L. Ferrand (Aix en Provence): Orthography shapes the perception of speech: The consistency effect in auditory word recognition.
- 16:30 – 17:00 Patrizia Tabossi, S. Collina, M. Mazzetti, M. Zoppello (Trieste): Syllables as processing units in spoken Italian.
- 17:00 – 17:30 Carlos J. Alvarez, M. Carreiras, & M. Taft (Laguna Tenerife): Syllable frequency and BOSS frequency in visual word recognition in Spanish.
- 17:30 – 18:00 Niels O. Schiller (Nijmegen): The effect of masked syllable priming on the naming latencies of bisyllabic nouns and verbs.

Visual and Auditory Attention *Chair person - Asher Cohen*

- 15:30 – 16:00 Carlo Umiltà, T. Farroni, & F. Simion (Padova): The gap effect in newborns.
- 16:00 – 16:30 Eduardo Madrid, P. Tudela, J. Lupianez, E.G. Milan, & F. Tornay (Granada): Electrophysiological indices of visual spatial attention with the geodesic dense array sensor net.
- 16:30 – 17:00 Michel Schmitt, A. Postma, & E. De Haan (Utrecht): Crossmodal exogenous attention in vision and hearing.
- 17:00 – 17:30 Andre Dufour (Strasbourg): Attentional mechanisms in audiovisual interactions.
- 17:30 – 18:00 Istvan Czigler & I. Winkler (Budapest): Pre-attentive unitary auditory memory trace: An event-related potential study.

Memory

Chair Person - Asher Koriat

- 15:30 – 16:00 Arild Lian, & A. Glass (Oslo): Are there empirically predictable deviations from the Tulving-Wiseman function?
- 16:00 – 16:30 Albert Postma (Utrecht): The influence of decision criteria on remembering and knowing in recognition memory.
- 16:30 – 17:00 Morris Goldsmith, A. Koriat, A. Weinberg-Eliezer, & A. Pansky (Haifa): The strategic regulation of the "Grain size" of memory reports.
- 17:00 – 17:30 Giuliana Mazzoni, & E.F. Loftus (Firenze): Changing autobiographical memory.
- 17:30 – 18:00 Brigitte Nevers & R. Versace (Lyon): Activation and construction of memory traces: Frequency effects on repetition priming depend on prime duration and prime/target delay.

Decision Making and Judgement Processes *Chair Person - Ilan Yaniv*

- 15:30 – 16:00 Daniel Gopher, M. Weinstein & J. Meyer (Haifa): Tabular vs. graphic displays- Differences in sensitivity and decision criterion.
- 16:00 – 16:30 Sandrine Rossi, & J.P. Caverni (Aix-en-Provence): Hypothesis testing strategies in a rule discovery task about a disconfirmation bias.
- 16:30 – 17:00 Ido Erev & G. Barron (Haifa): Video games, cognition, and choice behavior.
- 17:00 – 17:30 Sharon Gilat, D. Sonsino, I. Erev, & G. Shabtai (Haifa): On the likelihood of repeated zero-sum betting by adaptive (human) agents.
- 17:30 – 18:00 Ilan Yaniv & Yaakov Schul (Jerusalem): Choice procedures: Elimination versus acceptance.

18:00 – 19:30 Poster Session II – Cash Bar (see page 24)

20:00 – 24:00 Gala Dinner

Thursday, September 17, 1998

09:00 – 11:00 Parallel oral presentation sessions

Action – II

Chair Person - Johannes Engelkamp

- 09:00 – 09:30 Dirk Kerzel, B. Hommel, & H. Bekkering (Munich): A Simon-effect to induced motion: Evidence for a linkage between cognitive map and motor responses.
- 09:30 – 10:00 Harold Bekkering, A. Wohlschlaeger, & M. Gattis (Munich): Imitation of gestures in children is goal-directed.
- 10:00 – 10:30 Dragan Rapaic, G. Nedovic, J. Ivanus, S. Slavnic, & N. Jovanovic (Belgrade): Movement execution in closed head injured subjects.
- 10:30 – 11:00 Wolfgang Prinz, A. Schubo & G. Aschersleben (Munich): Assimilation and contrast between perception and action.

Reading

Chair Person - Avital Deutsch

- 09:00 – 09:30 Tatjana A. Nazir & V. Aghababian (Marseille): Developing reading skills.
- 09:30 – 10:00 G. Brian. Thompson (Wellington): Lexicalized phonological recording at the commencement of the acquisition of reading skill.
- 10:00 – 10:30 Reinhard Beyer & Thomas Guthke (Berlin): Use of temporal organization of knowledge on sentence and text comprehension dependent on age.
- 10:30 – 11:00 Cesare Cornoldi, R. De Beni, P. Palladino, & F. Pazzaglia (Padova): Updating processes and reading comprehension ability.

Learning – II

Chair Person - Joachim Hoffman

- 09:00 – 09:30 Iring Koch & Joachim Hoffman (Wurzburg): Sequence learning: The importance of spatial structures.
- 09:30 – 10:00 Sander A. Los & D.L. Knol (Amsterdam): A conditioning model of preparation during the foreperiod.
- 10:00 – 10:30 Hilde Haider & P.A. Frensch (Berlin): Strategy shifts in cognitive skill acquisition.
- 10:30 – 11:00 Michael Waldmann (Munich): Interindividual differences in implicit learning: Evidence from a twin study.

Temporal Factors in Attention *Chair Person - Avishai Henik*

- 09:00 – 09:30 Joseph Tzelgov, V. Yehene, L. Kotler, H. Falkov, & A. Alon (Beer-Sheva): Automatic comparisons of artificial digits never compared.
- 09:30 – 10:00 Christine Moroni, M. Boucart, & C. Belin ((Avicenna): Influence of semantic information on the attentional blink in the RSVP paradigm on pictures.
- 10:00 – 10:30 Victor I. Belopolsky & A.V. Belopolsky (Moscow): Time course of warning effect in detection task.
- 10:30 – 11:00 Emilio G. Milan, F. Tornay, P. Tudela, & E. Madrid (Granada): Attention, intention and action.

11:00 – 11:30 Coffee Break

11:30 – 13:30 Parallel oral presentation sessions

Bilingualism

Chair Person - Giovanni Flores d'Arcais

- 11:30 – 12:00 Albert Costa, A. Caramazza, M. Miozzo, & N. Sebastian-Galles (Cambridge, MASS): Bilingual lexical access in speech production: Do words from non-response language compete during lexical selection?
- 12:00 – 12:30 Rosa M. Sanchez-Casas, J.E. Gracia-Albea, & J.M. Igoa (Taragona): Morphological relations and lexical organization in the bilingual subject.
- 12:30 – 13:00 Janet G. van Hell (Nijmegen): Knowing APPLE affects seeing APPEL: On the influence of foreign language knowledge on native performance.
- 13:00 – 13:30 Anna M.T. Bosman, J.G. van Hell & G.C. Van Orden (Nijmegen): How do you read error and error? Bilingual proofreading.

Thinking and Reasoning – III *Chair Person - Dan Zakai*

- 11:30 – 12:00 Jan Eichstaedt (Hamburg): Switch costs can reflect the cognitive expenditure of free will.
- 12:00 – 12:30 Raquel Navarro-Prieto & J.J. Canas (Granada): Mental representation and imagery in program understanding.
- 12:30 – 13:00 Joseph Krems, M. Baumann, & C.F. Sheu (Chemnitz): Order effects and frequency learning in belief updating.
- 13:00 – 13:30 Pierre Barrouillet & J-F Leacas (Dijon): Conditional reasoning and mental models: A developmental application of Johnson-Laird and Byrne's theory.

Syntactic processing

Chair Person - Antje Mayer

- 11:30 – 12:00 John C.J. Hoeks & W. Vonk (Nijmegen) Processing coordination in context.
- 12:00 – 12:30 R. J. Hartsuiker, Ines Anton-Mendez, & M. van Zee (Nijmegen): Object attraction in subject-verb agreement construction.
- 12:30 – 13:00 Ralf Rummer, & J. Engelkamp (Saarbrücken): Phonological and syntactic representations in sentence recall.
- 13:00 – 13:30 Sheila Meltzer, J. Demestre & J.E. Garcia-Albea (Tarragona): Agree or crash: The brain reacts.

Attention: Models and Theories *Chair Person - Daniel Algom*

- 11:30 – 12:00 Claus Bundesen (Copenhagen): Varieties of visual search.
- 12:00 – 12:30 Dietmar Heinke & G.W. Humphreys (Birmingham) Computational modelling of attention and disorders in the human visual system.
- 12:30 – 13:00 Søren Kyllingsbæk, W. X. Schneider & C. Bundesen (Denmark): Attention Capture and Automaticity.
- 13:00 – 13:30 Edward Necka (Krakow): Attention working memory and arousal.

Poster Sessions

Session I

- 1) Uri Bibi & J. Tzelgov (Beer-Sheva): Auditory interference for color naming Properties of the cross-modal Stroop effect.
- 2) Sharon Zamir & A. Henik (Beer-Sheva): The examination of the time course of word processing and color processing, and the interactions between them in a flanker task.
- 3) Michal Marom, J. Tzelgov, A. Henik, & A. Cohen (Beer Sheva): Is blue really blue? Automatic word processing in the Stroop task; using voice recognition in the Hebrew language.
- 4) Wido La Heij (Leiden): A paradoxical exposure-duration effect in the Stroop task.
- 5) Miriam Dishon-Berkovits (Ramat Gan): The Stroop effect: The role of dimensional correlation.
- 6) L. Auclair & E. Sieroff (Chambery): Influence of spatial attention on word and pseudoword identification.
- 7) Carmel Mevorach & Y. Tsai (Tel-Aviv): Further evidence for attentional receptive fields in visual attention.
- 8) Limor Sheffer & G. Ben-Shakhar (Jerusalem): Relationship between the ability to divide attention and standard measures of general cognitive ability.
- 9) Peter Wuhr & J. Musseler (Munich): Time course of blindness to response-compatible stimuli.
- 10) Salvador Soto (Barcelona): Repetition deafness under low memory load: Effect of ISI and attention.
- 11) Bianca Posse & Bernhard Hommel (Munich). Automatic task cueing.
- 12) Mylene Estades & J. -L. Juan de Mendoza (Nice): Hemispheric specialization and memorization of words: An approach in dichotic listening.
- 13) Sylvie Chokron, P. Bartolomeo, K. Benichou & G. Hefft (Paris): Scanning direction and line bisection in French and Israeli normal subjects and unilateral neglect patients.
- 14) Alario F.-Xavier, J. Segui & L. Ferrand (Paris) : Dissociation of semantic and associative priming in picture naming.

- 15) Sandrine Delord, D. Holender & R. Reuter (Lyon): Prime processing in orthographical and phonological priming: When the mask doesn't mask the prime but the target does.
- 16) Baya Boudia & O. Koenig (Lyon): Pre- and post-lexical phonological effects in cross-modal repetition priming using lexical decision.
- 17) Arnaud Rey, A.M. Jacobs, F. Schmidt-Weigand & J.C. Ziegler (Marseille): On the role of subsyllabic components in visual word recognition: A phoneme effect.
- 18) F.Y. Padilla, & M.T. Bajo (Granada): Suppression and lexical access in comprehending text by professional interpreters.
- 19) Alejandro Castillo, A. Catena & L.J. Fuentes (Granada): Effects of distracter location on negative priming in a letter - matching task.
- 20) Edward Necka & A. Mikolajska (Cracow): The influence of priming on the process of categorization.
- 21) Leon Gold, Z. Kaminska & S. Miller (London): Triggering temporal integration processes in vision: The role of off-responses to a following stimulus.
- 22) Stephanie Ducrot & J. Pynte (Provence): The influence of attentional factors on landing position.
- 23) Elie Rantickx, M. Brysbaert & G. d'Ydewalle (Ghent): Are interhemispheric transfer times longer for 7-year-olds than for adults? A failure to replicate.
- 24) Marie-Pierre Vernier & O. Koenig (Lyon): The role of the left hemisphere in the processing of coordinate spatial relations.
- 25) Vicky Franssen (Ghent): The role of expectancies about a duration- triggered by structure- On the estimation of short time intervals.
- 26) C. Elisa Van Den Heuvel, S. A. Los, A.W.A. Van Gemmert, & G.E. Stelmach (Vrije Universiteit): Motor preparation during the foreperiod.
- 27) Luca Surian, M. Mazza & M. DeLellis (Padova): Do children with Autism see the trees but not the forest?
- 28) Yolande Mouchetant-Rostaing, M.H. Giard, S. Bentin & J. Pernier (Lyon): Different neural activities for implicit and explicit face gender processing in humans.
- 29) Noam Sagiv & Shlomo Bentin (Jerusalem): Exploring the function of the face structural encoding mechanism: ERP responses to faces and schematic faces.
- 30) Ganel T. & Goshen-Gottstein Y.: Repetition priming for unfamiliar faces using a gender-decision task: Evidence for a common route for gender and identity processing.

- 31) Christie Manning (Hamburg): Spatial situation models and story actions.
- 32) Severine Lajoie, S. Delord & O. Koenig (Lyon): Coordinate and categorical spatial relations in size processing.
- 33) Anne Louvegnez & O. Koenig (Lyon): Motor and kinesthetic components of motor imagery: The influence of intense competitive sport activity.
- 34) Ronnie Lidor (Israel): Enhancement of self-paced motor tasks by the implementation of cognitive strategies: Awareness vs. non-awareness approaches.
- 35) Vicky Dierckx, A. Vandierendonck & G. De Vooght (Ghent): Working memory usage in one-dimensional spatial and temporal reasoning problems.
- 36) Kevin Crowley, J. Wilding & A. Day (Wales): The effects of articulatory suppression on short-term retention of musical and verbal stimuli.
- 37) Petri Paavilainen, M. Jaramillo, I. Winkler & R. Naatanen (Helsinki): Event-related brain potentials reflect processing of abstract features of auditory stimuli at the sensory-memory level.
- 38) Maria Rosa Baroni & C. Nicolini (Padova): Natural conversation and research interview: The influence of gender on interactional style and on memory for content.
- 39) Shiri Pearlman-Avnion, A. Koriat & H. Ben-Zur (Haifa): The subjective organization of input and output events in memory.
- 40) Jean-Marie Reymond & J.L. Roulin (Chambrey): Path length effect and recall probability.
- 41) Patricia Bisiacchi & R. Cubelli (Padova): Is recency in immediate free recall affected by lexical and semantic variables?
- 42) Ralf Rummel & L. Konieczny (Saarbrücken): Processing difficulty modulates the role of semantic information in sentence recall.
- 43) Giuliana Mazzoni, M. Vannucci & E. F. Loftus (Firenze): Misremembering self-generated material
- 44) M. Naveh-Benjamin & J. Guez (Beer-Sheva): The effects of divided attention on encoding and retrieval processes in human memory: Further support for an asymmetry and a componential analysis.
- 45) Maria Victoria Sebastian, J. Menor & R. Elosua (Madrid): Implicit memory in Alzheimer disease.

- 46) Moshe Naveh-Benjamin & T. Keshet (Beer-Sheva): Adult-age difference in memory performance: Further support for an associative deficit framework.
- 47) Ravit Levy-Sadot & Asher Koriat (Haifa): The basis of feeling of knowing: Interactive influence of cue-familiarity and accessibility.
- 48) Monika Nisslein, J. Muesseler & A. Koriat (Munich): The on-line extraction of sentential structure during reading: Evidence from the function-disadvantage effect in German.

Session II

- 1) Nicolas Gutierrez, A. Palma & J. Santiago (Granada): On the role of lexical stress in visual word recognition.
- 2) Frederique Bozon (Cambrey): Frequency and neighborhood size effects as a function of the neighborhood characteristics of the fillers added to the lexical decision task.
- 3) Manuel Perea, L. Fernandez & M. Carreiras (Valencia): Sequential effects in the lexical decision task: The role of the item-frequency of the previous trial.
- 4) Marco Zorzi, S. Sibisa, & P. Tabossi (Trieste): Lexical stress effects in reading Croatian words.
- 5) Pierre-Andre Halle, C. Chereau & J. Segui (Paris): Interference between surface form and abstract representation in spoken word perception.
- 6) Hubert Chavand & N. Bedoin (Lyon): Phonetic features activation in visual word recognition: The role of place and manner of articulation.
- 7) Stephanie Mathey & D. Zagar (Dijon): Same words but different neighborhoods: An influence of typography and neighborhood consistency in French word recognition.
- 8) Remca Burger & F. Wijnen (Utrecht): Effects of stress, linear word position, and consonant-vowel transition on stuttering.
- 9) Alberto Dominguez (Tenerife): Prosodic and orthographic similarity in visual word recognition.
- 10) Jose E. Garcia-Albea & R. Sanchez-Casas (Tarragona): Does orthographic distinctiveness play a role in same-script languages?: Data from Catalan and Spanish.
- 11) Ludvic Ferrand, E. Spinelli & J. Grainger (Paris): List context effects, neighborhood size effects, and base-word frequency effects in pseudohomophone naming and phonological lexical decision.

- 12) Lisa Davidson & R. de Diego Balaguer (Barcelona): Processing of verbal morphology in the Spanish lexicon.
- 13) Arnaud Rey, J.C Ziegler & A.M Jacobs (Marseille): Graphemes are reading units in English and French.
- 14) Nicolas Gutierrez, A. Palma & J. Santiago (Granada): Are syllables 'frames' or 'chunks' in Spanish?
- 15) Cathy Lemer, J. Leybaert, A. Content, P. Mousty & M. Fayol (Brussels): The role of phonological loop in mental multi-digit addition.
- 16) Angels Colome (Barcelona): Sublexical activation in the non-employed language: a bilingual study.
- 17) Ilse Van Wijnendaele & M. Brysbaert (Leuven): Language representation in bilingual brain: Evidence from masked phonological priming.
- 18) Rapiq Ibrahim & S. Bentin (Jerusalem): Bilingual organization of spoken and literary arabic in native arabic speakers: Two languages or one?
- 19) Leo Noordman, I. Dassen, M. Swerts & J. Terken (Tilburg): Prosodic expressions of text structure.
- 20) Sabine Schmid & T. Baccino (Nice): Processing of procedural texts and text format.
- 21) Frederic Lavigne-Tomps & F. Vitu (Nice): Local and global semantic processing in text reading: Context effects depend on subject's reading strategies.
- 22) Hamutal Kreiner, A. Koriat & S.N. Greenberg (Haifa): From print to prosody: The extraction of structure during reading.
- 23) Isabelle Bonnotte & Patrick Lemaire (Lille): Time course of processing semantic features of verbs: A case study of durativity and resultativity in French.
- 24) Chiara Levorato, A. Tasso, F. Franco & J. Russel (Padova): Implicit causality in vision verbs: A cross-linguistic comparison between English and Italian speakers.
- 25) Michel Hupet & M.A. Schelstraete (Louvain): The role of conceptual information in the encoding of number agreement.
- 26) Cecile Ucelli & J. Pynte (Provence): Lexical information influences early components of eyes-movements.
- 27) Antonio Corral & M. Sergio (Madrid): The effects of rule clarification and attentional factors on Wason's abstract selection task.
- 28) Joseph F. Quesada, J. Canas & R. Navarro (Granada): Experts and novices: Cognitive flexibility in complex problem solving.

- 29) Salvador Algarabel, E. Rosa, C. Dasi, J.C. Ruiz & A. Gotor (Spain): Knowledge representation: A study in a natural setting comparing multidimensional and pathfinder scaling techniques.
- 30) Pertti Saariluoma & P. Niemi (Helsinki): Thought errors in practical economic life: Some early findings.
- 31) Bruno G. Bara, M. Bucciarelli, & V. Lombardo (Torino): Development and changes in the ability to reason.
- 32) A.M. Borghi & N. Caramelli (Bologna): What kind of information is elicited by goal derived categories?
- 33) Idit Ben-Dov & D. Leiser (Beer-Sheva) : Judging randomness in 2D distributions.
- 34) Patrick Lemaire, C. Masse & M. Lecacheur (Provence): How to assess strategic aspects of human cognition? The example of arithmetic strategies.
- 35) Ziv Chorev & N. Meiran (Beer-Sheva): Phasic arousal affects the residual task switching cost.
- 36) Alex Gotler (Beer-Sheva): Is there a true limitation on the ability to prepare for task switching.
- 37) Y. Poznanski, J. Tzeglov & V. Yehene (Beer Sheva): The components of "after learning" performance in the ALG paradigm under various conditions of implicitness.
- 38) Annemie Melis & Eric Soetens (Brussels): Age effects in implicit sequence learning.
- 39) Iwona Soltysinska (Krakow): Does the level of arousal explain intra-individual changes in cognitive task performance?
- 40) Pilar Ferre Romeu (Spain): Latent inhibition and electrodermal conditioning.
- 41) Carlos J. Gomez-Ariza & M.T. Bajo (Granada): Interference and integration in memory: A developmental study.
- 42) Maria Teresa Bajo, C. Gomez-Ariza, P. Gonzalvo & M.C. Puerta-Melguzio (Granada): Changes in categorization as a function of expertise and context in elementary mechanics.
- 43) Erminiella Peron, S. Falchero, H. Staats & A.T. Purcell: Models of affective experience of the environment: Some experimental evidence.
- 44) Carlo Arslan (Padova): Some cognitive factors influencing teachers' scoring.
- 45) Astrid Maria Ricci (Torino). Impairments in communication and neuropsychological correlates in schizophrenia.

ORAL PRESENTATIONS

Feature binding, attention and object perception

Anne Treisman

Dept. of Psychology, University of Princeton

The seemingly effortless ability to perceive meaningful objects in an integrated scene actually depends on complex visual processes. The "binding problem" concerns the way in which we select and integrate the separate features of objects in the correct combinations. Experiments suggest that attention plays a central role in solving this problem. Some neurological patients show a dramatic breakdown in the ability to see multiple objects; their deficits suggest a role for the parietal cortex in the binding process. However, indirect measures of priming and interference suggest that more information may be implicitly available than we can consciously access.

The English Pseudohomophone Test in the Lexical Decision Task

Georgije Lukatela and M. T. Turvey

University of Connecticut and Haskins Laboratories

The pseudohomophone test is whether the processing of a word target can be facilitated by a masked homophonic nonword prime independently of the visual similarity between them. The significance of the test is in respect to the hypothesized contributions of phonological and orthographic codes within dual-route theories. Using the mask-prime-target presentation sequence and prime durations typical of form priming experiments (e.g., 57 ms), we found that pseudohomophone primes (e.g., KLIP) reduced lexical decision times to targets in dense neighborhoods (e.g., clip) relative to visually similar control primes (e.g., PLIP). We also found superior pseudohomophonic priming at a prime duration (29 ms) previously considered too brief for the emergence of phonological codes. The basis for these successful pseudohomophone tests in English was overall phonological similarity of prime and target rather than common onsets, rimes or number of overlapping letters. The results underscore the need for models of visual word recognition in which phonology assumes the leading role.

Author: Bedoin, N.

Title: Phonetic features activation in visual word recognition: The case of voicing.

This study focuses on the role and the nature of a phonological code in printed word recognition process. We aim to assess whether this code is organised or not in terms of phonetic features.

In various lexical-decision tasks conducted in French, we manipulated the infra-phonemic resemblance between prime and target.

In Experiments 1-3, we kept the phonemic similarity between prime word and target word equivalent, but made the phonetic overlap vary. In the high resembling condition (HR), the only difference between prime and target was based on one or two phonetic features of the initial consonant (e.g. passe-TASSE); in the low resembling condition (LR), there was an additional difference about the voice feature (e.g. basse-TASSE). Data showed longer latencies for HR than for LR, and this effect was observed across various SOAs (100, 66, 33 msec). These results suggest a fast and automatic activation of phonetic properties in silent reading. Moreover, the effect of voice contrast persisted whatever the prime word (i.e. more or less frequent than the target word).

In Experiments 4-5, similar results were found with pseudoword primes (both for 33 and 66 msec SOA).

These data provide evidence of a crucial role of phonetic features in the elaboration of the phonological code involved in printed word recognition. The greater latencies for target words sharing many phonetic features with the prime suggest that bigger is the number of phonetic features by two phonemes, stronger the lateral inhibition between corresponding units will be. Therefore, it seems that assembled phonology is involved in early stages of print processing and is fine enough to provide very accurate phonetic distinctions.

**When TODES feel damp, but TOWELS do not:
Shades of false memory from pre-lexically computed phonology.**

**Zofia Kaminska
City University
London, UK.**

The question of whether implicit activation of a lexical representation by phonology computed pre-lexically and without conscious awareness from orthography leaves a memory trace for that item was explored using a masked homophonic priming paradigm. Target words (TOAD) never visually exposed were primed by masked homophonic lexical (TOWED) and non-lexical (TODE) letter strings. Homophonic, though not control orthographic, priming led to the creation of false memories for non-presented target items, with a dissociation emerging between different shades of illusory memory experience. These findings have a dual implication: they underline the primacy of phonology as an early source of lexical activation in visual word analysis, and they pinpoint implicit partial activation of a lexical representation as a source of memory.

Exploring reasoning strategies with expanded conditionals
The illusion of suppressing conditional inferences

Kristien Dieussaert, Walter Schaeken, Walter Schroyens, & G ry d'Ydewalle

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Rumain, Connell, and Braine (1983) showed that nonvalid conditional inferences can be suppressed by adding an extra conditional premise indicating an alternative condition for the consequent to be confirmed. They argue that nonvalid inferences are not based on mental rules as valid inferences do, but on a reasoning strategy by which people inverse the meaning of the premises.

Byrne (1989) stated that 'inversion' doesn't explain the results because valid inferences can also be suppressed by adding an extra conditional premise, indicating an additional condition for the consequent to be confirmed.

We conducted five experiments in order to explain the underlying processes of suppression and the strategies people use to handle these reasoning problems. We obtained the same results as Byrne (1989): Valid inferencing was suppressed by additional conditionals, and nonvalid inferencing by alternative conditionals. Secondly, we repeated the same experiment with an extensively enlarged number of answer alternatives because in the previous experiment people couldn't give a conclusion including all propositions. We presented the propositions in a simple, disjunctively or conjunctively combined way. Due to this manipulation, we observed a totally different answer pattern. Most answers were combined and no suppression was found. It seemed plausible that people processed the stated premises by integrating them in one model, as Byrne (1989, 1991) proposed. We conducted another experiment, where we presented the problems in a production task. The results were in accordance with previous experiments. Some answer patterns of both experiments, however, were difficult to explain by integration.

We hypothesized another strategy, that we called amendment, possibly involved in this complex inference processing. Suppose that people infer in a first stage a conclusion based on one conditional premise and the categorical premise and they adapt this putative conclusion in the light of the facts in the other premise in a second stage.

In two new experiments we tested both strategies against each other. The first experiment proposed the integration strategy by combining the premises disjunctively or conjunctively. The latter experiment proposed the amendment strategy by presenting the premises in sequence. The results differ for both experiments and confirm the use of the predicted strategies.

Implicit Model Representations in Indeterminate Spatial Linear
Syllogisms.

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In linear syllogisms with sequential premise presentation, reasoners usually construct an integrated spatial representation. Due to the increased load, indeterminate or multi-model problems are more difficult than determinate or one-model problems. The paper raises the question whether three-model problems are more difficult than two-model problems and whether multi-model problems are explicitly represented by means of separate models. Data are presented that show that the difference between two-model and three-model problems is very small, so that it cannot be explained by assuming that the reasoner builds an explicit representation of all three models. Besides, premise reading times show that the last premise, the one that also initiates the multi-model nature of the problems, requires more reading and processing time than other premises. In these data, the difference between two- and three-model problems is small but statistically reliable. Moreover, it is shown that inferences that involve the term that is introduced in the last premise require more time than comparable inferences that do not involve this term, even though inference accuracy is similar. The data are taken to indicate that the representation constructed leaves the additional models implicit by entering a marker that can be easily elaborated out when needed.

The Effects of Term Order in Spatial Relational Inference

Markus Knauff*, Reinhold Rauh*, Christoph Schlieder** & Gerhard Strube*

*University of Freiburg, Germany

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There is evidence from syllogistic and relational reasoning that in *n*-term-series problems the order of terms in the given premises affects the order of terms in the conclusions generated by reasoners. Premises such as $[X \text{ r } Y; Y \text{ r } Z]$ favor conclusions in the form $[X \text{ r } Z]$, whereas premises in the form $[Y \text{ r } X; Z \text{ r } Y]$ favor conclusions in the form $[Z \text{ r } X]$. This is often called "figural bias" and can be explained in accordance with the two most important theoretical accounts of human reasoning, namely rule-based mental proof theories (Rips, 1994) and mental model theory (Johnson-Laird, 1983; Johnson-Laird & Byrne, 1991). However, the effect of term order has not up to now been investigated in the domain of spatial reasoning. For this reason, we conducted an experiment with spatial three-term-series problems where the term orders in the premises were varied $[X \text{ r } Y, Y \text{ r } Z; Y \text{ r } X, Y \text{ r } Z; X \text{ r } Y, Z \text{ r } Y; Y \text{ r } X, Z \text{ r } Y]$ and subjects had to generate possible conclusions. In agreement with results from other studies (e.g. Johnson-Laird & Bara, 1984) we found a "figural bias": subjects generated $[X \text{ r } Z]$ conclusions more often if the premise term order was $[X \text{ r } Y, Y \text{ r } Z]$ than for the other term orders, whereas $[Z \text{ r } X]$ was used most often for the premise term order $[Y \text{ r } X, Z \text{ r } Y]$. Another result was striking as it can only be explained by mental model theory rather than rule-based approaches. Contrary to the results of Johnson-Laird and Bara (1984) we found no general bias towards $[X \text{ r } Z]$ conclusions. In fact, subjects tend to generate conclusions of the form $[Z \text{ r } X]$. In the framework of mental model theory this $[Z \text{ r } X]$ preference can be explained by a cognitive process that inspects a mental model by means of a spatial focus. According to this explanation, after constructing the mental model the focus should be positioned on the last end-term of the three-term-series problem, namely *Z*. If this is the starting point of the scanning process, it is plausible that the first term in the conclusion is *Z* and not *X*, because for $[X \text{ r } Z]$ conclusions the focus must be shifted back to the term *X* before the scanning process starts. In contrast, $[Z \text{ r } X]$ conclusions do not need time consuming re-focussing, which explains the preference of our subjects for these conclusions. These results challenge the rule-based theories of spatial reasoning.

The Effects of Cueing Spatial Attention on Acuity and Texture Segregation Tasks

Yaffa Yeshurun & Marisa Carrasco

New York University

We explored the effects of covert attention on spatial resolution in a variety of visual acuity and texture segregation tasks. Attention was manipulated by peripherally precueing the target location. Target eccentricity ranged from 0 to 12 deg. We reasoned that if attention enhances spatial resolution by changing the size of the spatial filters at the attended location, performance would be differentially affected depending on whether task performance can benefit from heightened spatial resolution. Whereas an enhanced spatial resolution would benefit acuity judgments at all eccentricities and texture segregation at the periphery, it would impair texture segregation at foveal locations, where the spatial filters are too small for the scale of the texture.

In the acuity tasks observers judged whether a gap was on the right or left side of a Landolt-square, which appeared at one of 16 locations, or the direction of a vernier offset. The target was presented alone, without distractors that introduce decisional noise. In the texture task observers indicated the interval containing a texture target (2AFC), whose lines differed from the background lines by 90°. In all tasks, performance was compared for cued trials (50% of total trials) versus neutral trials (50%), and the cue did not convey information about the correct response. Display duration did not allow eye movements to take place.

As predicted, acuity performance, for both Landolt-square and vernier targets was significantly faster and more accurate for the cued than neutral trials at all eccentricities. In contrast, for texture segregation the attentional effect interacted with eccentricity: Cueing improved performance at all locations except at fovea, where performance was impaired.

These results illustrate that basic visual tasks such as gap detection and texture segregation, considered to be performed effortlessly, are aided by the deployment of attentional resources to target location. Moreover, the enhanced performance in tasks designed to measure spatial resolution (e.g., Landolt-square) and the drop in performance for the cued foveal locations in the texture segregation task support the hypothesis that attention enhances spatial resolution.

The Movement of Attention in the Visual Field: Implication for an Attentional Gradient

Halit Dori, Avishai Henik and Alexander Gotler

We can differentiate between two mechanisms of orienting visual attention, endogenous and exogenous. Several researchers suggested that when subjects orient attention endogenously, there appears a *meridian effect* characterized by a larger cost to a target in the uncued visual field than to a target in the cued field (both invalid conditions). It was also suggested that the meridian effect is found only at short SOAs (the time between cue onset and target onset). However, several researchers have not found a meridian effect when expected.

This work presents two experiments designed to examine the meridian effect in displays that controlled the distances between the cue and target locations. The first experiment employed a circular display and exogenous and endogenous cues. There was no meridian effect for either one of the cues. The second experiment employed only endogenous cueing, and compared three different displays, 1) half a circle, 2) a vertical array and 3) a horizontal array. We replicated the results from the first experiment and found no meridian effect for the circular display. However, we found a meridian effect for the two linear displays (vertical and horizontal).

We suggest that there is a difference between attention mechanisms evoked by an exogenous cue and those evoked by an endogenous cue. The exogenous mechanism is characterized by the same cost for all invalid locations. In contrast, the endogenous mechanism is characterized by different costs for various invalid locations. We propose that the endogenous mechanism is characterized by two components; 1) a facilitatory component at the cued location, and 2) a static *gradient of inhibition* starting at the midpoint of the visual field, which is the most inhibited location in the visual field, and spreads to the periphery, which is much less inhibited.

Spotlight failure with peripheral cue

Francisco José Tornay, Emilio G. Milán, Eduardo Madrid y Pío Tudela
Universidad de Granada

It is usually assumed that there is a certain type of attentional mechanism which is determined by spatial factors. It would work like a "spotlight" that moves from one location to another. Results obtained in costs and benefits tasks are usually interpreted in terms of such a spotlight. Nevertheless, recent results have cast doubt on the spotlight interpretation. Kingstone (1992) compared attentional effects (costs and benefits) obtained when discriminating between two letters which differed in their frequency of presentation. Attentional effects were only present for the more frequent stimulus. This so-called "spotlight failure" effect proves the influence of non-spatial factors in the costs and benefits paradigm. Kingstone used a central cue, which has led to interpret the effect in terms of a "central executive" mechanism, different from an automatic attentional movement. In this work we present data supporting the existence of spotlight failure with peripheral cue. This result implies the presence of non-spatial factors even in automatic attentional capture and seems to support an attentional mechanism based on objects rather than on pure spatial information.

Nachshon Meiran and Alex Daichman
Ben Gurion University of the Negev

Our question was whether rapid task switching involves parallel processing or complete switching. Subjects indicated the position of a target stimulus within a 2 x 2 grid in two tasks: UP-DOWN and RIGHT-LEFT, and responded quickly to produce errors. An instructional cue informed which task to execute and the Cue-Target Interval was varied to induce different degrees of preparedness. Two paradigms were compared. In the 2-key paradigm, each pair of nominal responses was mapped to a single key-press, e.g., UP and LEFT were indicated by the upper-left key. In the 4-key paradigm, each nominal response was mapped to a separate key-press. This paradigm allows to determine the degree of correct execution of the wrong task (responding UP instead of LEFT to an upper-left target), which served as evidence for parallel processing. In the 4-key paradigm, task switching was associated with a transient phase of parallel processing that was eliminated when the Cue-Target Interval was long. The probability of correct execution of the wrong task in the 2-key paradigm was assessed by using a generalized Process Dissociation Procedure, where the degree of independence was estimated rather than postulated. We compared the estimates from the 2-key paradigm to actual performance in the 4-key paradigm. Almost all the discrepancy was due to two factors: There was more parallel processing in the 2-key paradigm than in the 4-key paradigm, and (b) in the 2-key paradigm only, preparation (Cue-Target Interval) did not eliminate parallel processing. These results support Meiran et al. (submitted) model, that suggests that subjects are able to dynamically switch between different interpretations of the target stimulus (change the stimulus mental set), which is required in both the 2-key paradigm and the 4-key paradigm. However, subjects are less able to quickly switch between different interpretations of the responses (change the response mental set), that is required in the 2-key paradigm only.

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The experimental paradigm of switching tasks is conceived as an example for cognitive requirements that presumably involve mechanisms of executive control, in order to abandon the previous task set and to activate the new one. With regard to the nature of such control processes so far, the available results do not provide a clear picture. 4 Experiments were performed that address (a) the question of endogenous versus exogenous control of task set shift, and (b) the question of reconfiguration, being based either on activation or inhibition, or both?

All experiments followed a similar procedure: Blocks of tasks were constructed including switch trials and nonswitch trials. Cues preceded tasks, carrying information about the next task. The specificity of cues and the cue target interval were experimentally manipulated. Specific cues provide information about the next operation to be performed, unspecific cues only announce a task shift. CTI has been varied between 1500ms and 500ms. Experiment 1 shows that specific cues yield a significant reduction of shift costs, this effect depends on the foreperiod, with an increased reduction of shift cost when prolonging foreperiod. No such effect was obtained for unspecific cues. However, when examined separately in Experiment 2 and 4, then a clear reduction of shift cost also results for unspecific cues. Since unspecific cues do not provide any information about the next task, the facilitatory effect may be caused by an inhibition of the previous, now irrelevant task. The results of Experiments 2, 3, and 4 support this assumption. It is demonstrated that cues, unspecific as well as specific, cause increases of response latencies when preceding nonswitch trials, which suggests two effects of the reconfiguration process: inhibition of the previous task, and pre-activation of the new task. The results corroborate the position put forward by Meiran (1996) and Rogers & Monsell (1995) as well, according to which shifting task set may be based on a stagelike reconfiguration process. When given opportunity, e.g. by cues and prolonged CTI, parts of this process can be started before the stimulus is available; this supports the assumption that endogenous as well as exogenous control is involved when switching between simple tasks. In addition, the observed facilitatory and inhibitory effects of cues suggest that the process of reconfiguration is based on both, inhibition of the previous task and pre-activation of the new task.

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Switching tasks and attention policies and the ability to prepare for such shifts

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ABSTRACT

The determinants and costs of control were studied in six experiments. They examined the performance costs of changing stimulus dimension or attention strategies, on the first trial after task transition. Also compared were the costs of transitions involving task shift and those that require reconsideration only. All experiments employed the same general task and were based on 15 trial blocks with a single transition point. Stimulus dimension was manipulated by requiring subjects to judge either the value of digits or the number of digit elements in single rows of equal value digits. Attention strategy was changed via speed accuracy instructions. Transitions were preceded by a 1200 msec. warning interval. Preparation ability was studied by presenting all the transition information at the beginning of the block, or only prior to each transition. Results showed pronounced transition costs that were linked with the first trial after a transition. These costs were separate from those associated with basic task performance. Costs were sensitive to global control considerations and were larger for task dimension changes than for attention strategy shifts. Transition costs involving task dimension could be reduced with advanced preparation, but attention strategy changes could not be prepared for. The results are discussed in relation to contemporary models of control. A new distinction is proposed between activation and execution of control strategies and their application to internal versus external task constituents.

Semantic and orthographic aspects of morphological processing.

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Theoretical accounts of word recognition often minimize the role of the morpheme and attempt to explain effects of morphological relatedness as reflecting, instead, orthographic and phonological patterning of letter units, or semantic similarity in conjunction with shared orthographic and phonological structure. The first study in this program of research with skilled readers of English contrasts morphological effects in a visual lexical decision task with effects due to semantic similarity or to orthographic and phonological similarity (Exp. 1). The second examines semantic similarity in conjunction with morphological relatedness under purely visual and under cross modal presentation conditions using the lexical decision task (Exp. 2).

Morphological decomposition is constrained by detection of structure, not of lexical individual morphological units

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Hebrew verbs are composed of a root morpheme, consisting of consonants, interweaved with a verbal-pattern morpheme, consisting of a cluster of vowels or both vowels and consonants. Previous research, based on the masked-priming technique, revealed a morphological priming effect induced by each of these morphemes. Accordingly, it was suggested that the root and the verbal-pattern morphemes serve as an organizing principle of the Hebrew lexicon, and govern the process of morphological decomposition during lexical access of verbal forms. In the present study the masked priming technique was used to examine the decomposition of verbs derived of "missing roots"; roots in which one of the three consonants is missing in some of the roots' derivation. The results suggest that when one of the consonants is missing there is no indication for the extraction of the verbal-pattern morpheme during lexical access. Results are discussed in terms of the mechanism of decomposition. We suggest that the process of extracting the verbal-pattern morpheme depends on identifying a root structure consisting of three consonants, rather than on the identification of a specific root morpheme. The interrelation between the processing components of extracting two independent lexical units - the root and the word-pattern morphemes - are discussed.

THE CONTRIBUTION OF MORPHOLOGICAL RELATION AND AFFIX POSITION TO MORPHOLOGICAL PROCESSING

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The verbal system in Hebrew differs from that of English and most Indo-European languages because morphological relation (inflection vs. Derivation) and affix position (prefix vs. Suffix) are not confounded. In the present study, we exploited this property and investigated the role of morphological relation and affix position on lexical decision latencies using the masked short-term priming paradigm with Hebrew materials.

When both prime and target were presented visually and targets were simple past tense forms (Exp. 1), target facilitation was larger for pairs related by inflection (sharing both root and word pattern) than for pairs related by derivation (sharing root only). For both types of morphological relations, target facilitation following prefixed and suffixed primes did not differ. Similarly, when targets were suffixed past tense forms (Exp. 2), facilitation was greater following primes related by inflection than by derivation and there was no effect of affix position. Finally, when primes were auditorily presented and (suffixed past tense) targets were visually presented (exp. 3), facilitation was greater following inflected than derived primes and there was a tendency for suffixed primes to produce greater facilitation than did prefixed primes.

In summary, affix position relative to the root did not influence decision latencies although morphological relation did. Because inflectional and derivational forms may differ with respect to syntactic and semantic similarity, results are discussed with respect to the role of semantic (and other) properties of morphological constituents. Finally, we consider the implications of our findings for accounts that claim that the linear organization of morphemes plays a critical role in the processing of morphologically complex words.

Roots and Affixes as lexical units : An incremental priming report.

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Morphological complex words are composed of at least two morphemes, an affix and a root. The lexical representation of these morphemic units was investigated in a set of experiments using the incremental priming technique (Jacobs, Grainger & Ferrand, 1995). This novel technique uses the masked priming paradigm while gradually increasing the prime duration from zero to 57 msec. Therefore, it allows on the one hand, to evaluate a priming effect compared to the other priming conditions and on the other hand, to obtain a precise measure of the nature (inhibition or facilitation) of a particular priming effect regarding its own time course. Experiment 1 shows a robust facilitatory priming effect (beginning at a SOA of 42 msec) when primes and targets shared the same root (e.g., *surnom* - *prénom*). However, when the word pairs shared an identical affix (e.g., *préface* - *prénom*) non significant differences were observed compared to an unrelated condition. Experiment 2 focused on affix priming while using two baseline priming conditions for affixes : an orthographic (e.g., *préfet* - *prénom*) and an unrelated condition (e.g., *brebis* - *prénom*). Globally, the results report a significant positive priming effect only for prefixed words. This affix priming effect proved to be independent of orthographic similarity because no priming effects were found when primes and targets shared the same initial letter sequence without a morphological relation. These data suggest that morphemes, whether roots or affixes, are explicitly represented in the mental lexicon.

Jacobs, A. M., Grainger, J. & Ferrand, L. (1995). The incremental priming technique : A method for determining within-condition priming effects. *Perception & Psychophysics*, 57, 1101-1110.

Binding Between Perceptual Objects and Action Plans: The Temporal Dynamics of Event-File Construction

Previous experiments provided evidence for the emergence of spontaneous, episodic bindings not only between features of the same stimulus ("object files"), but also between stimulus and response features ("event files"; see Hommel, 1998). In these studies, subjects performed an already prepared manual left- or right-hand keypressing response (R1) to the onset of a visual trigger stimulus (S1), followed by a second visual stimulus (S2) that signaled another left- or right-hand keypress (R2). The effect of (S1-S2) stimulus repetition interacted with that of (R1-R2) response repetition: Repeating a particular stimulus feature was only beneficial if the response was also repeated; otherwise feature alternation produced better performance. This suggests that the co-occurrence of S1 and R1 leads to the binding of S1 and R1 features, even though R1 does in no way depend on any feature of S1.

The present study investigates the temporal conditions of S-R feature binding and the time course of event-file construction. Results replicate previous findings in that only task-relevant, but not irrelevant stimulus features become associated with the response. They further reveal that event files emerge in less than 600 msec after stimulus (S1) presentation and are maintained for at least 3 sec. The temporal relationship between S1 and R1 is not overly critical: Evidence for S1-R1 binding is observed even if R1 is triggered by a tone, not the visual S1, and even if S1 precedes or follows this tone by up to 500 msec. As it seems, S-R feature integration is fast, automatic, and operates within a rather broad time window.

Hommel, B. (1998). Event files: Evidence for automatic integration of stimulus-response episodes. *Visual Cognition*, 5, in press.

The Temporal Course of Action Concepts

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According to the common-coding principle, cognitive codes for action and perception are mutually exchangeable, for they are coded within the same cognitive system. When performing an action, stimulus features and action characteristics are integrated into an action-concept in order to control our intentional actions. Recent investigations suggest that once codes are integrated or bounded in an action-concept, these codes are less available to concurrent feature binding. The data also suggest that there are two processes involved in the construction of an action plan: activation and binding. This hypothesis is tested in two sets of experiments. The first set of experiments investigates interference of the action component of a task. These experiments combine two tasks in which there is feature overlap between the response on the first tasks and the stimulus on the second task. The response on the first task is postponed until a Go-signal is given after which it is speeded. The second stimulus is presented with a positive or negative timespan to the Go-signal of the first task. The second set of experiments uses a psychological refractory period design and aims at investigating the interference of the perception component of the task. In this set of investigations, the stimuli of both tasks are presented in varied but close temporal proximity. The results are in correspondence with the assumption of a two-stage process in action-planning and are discussed with reference to the construction, the binding, and possible interference between action-concepts.

Voluntary action: Imitation versus reactions to symbolic cues

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Since the end of the last century, an interesting view in research on the initiation of action is that actions are controlled by their effects. From this point of view, imitation is a special case of voluntary action, because it is characterized by a maximum overlap between the stimulus which instructs the action and the perceived action. Observed action provides an external cue for activating an internal representation of the action effect, which might allow for a direct specification of action.

The present study elaborates this notion by comparing imitation and symbolically cued action. Static or animated pictures of a human hand were displayed on the computer screen. Subjects' task was to lift the finger indicated by a cross on the finger nail (symbolic cue condition) or indicated by an upward movement of a finger (imitative condition). In both conditions the respective imperative cue was presented in isolation or in combination with the alternative (irrelevant) cue. The results of the first experiment showed that in the symbolic cue condition, actions were facilitated when the irrelevant finger movement was congruent (the same finger moved) and that actions were interfered when it was incongruent (a different finger moved). In the imitative condition there was no facilitation in congruent trials by the symbolic cue and only a slight interference in incongruent trials. To address the question whether the observed differences are due to a greater perceptual salience of the moving finger or to the match between perception and action, we varied the relationship between the observed and executed movement. In this experiment, the stimulus constellation was exactly the same as in experiment one, but subjects had to react by moving the index or middle finger downward. Importantly, now no facilitation effect of the moving finger in the symbolic cue condition was found.

Together, the experiments indicate that the overlap between the perceived movement and the executed movement seems to be critical for the differences between symbolically cued action and imitation. The present study suggest that imitation of simple movements lead to a more direct specification of action than symbolic instruction does.

Item-specific and relational information in remembering actions

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When individuals are requested to learn a list of action phrases (such as "to lift the pen") memory performance is usually enhanced by enacting the denoted action in addition to verbally processing the phrase. The memory enhancing effect of self-performing a phrase is referred to as *enactment effect* or *SPT* (for *subject-performed task*) *effect*. Enactment also mostly yields a memory advantage over observing someone else - usually the experimenter - performing the action. Recently, though, some factors have been identified that influence whether self-performance yields a memory advantage over experimenter-performance. Among those factors are the way the encoding manipulation is carried out (between- vs. within-subjects) and the kind of memory test used. In this regard, the enactment effect shows a close resemblance to other memory phenomena like, for instance, the generation effect, the bizarreness effect, and the word frequency effect.

The rather complex pattern of results can be explained on the basis of the distinction between item-specific information (i.e., information on unique features of an item) and relational information (i.e., information on the association of items): It is assumed that enacting a phrase improves item-specific information, but hinders relational information. The extent to which item-specific and relational information supports memory depends on characteristics of the encoding situation (like type of encoding task and design type) as well as on the memory test used. So precisely these factors determine whether an enactment effect will or will not occur.

In a series of experiments, we investigated whether memory for action phrases can in fact be predicted as a function of item-specific and relational information. As an independent variable, we manipulated 1) the type of encoding (self-performed vs. experimenter-performed), and 2) the type of manipulation (between- vs. within-subjects). Memory performance was measured on the basis of recognition, free recall, and reconstruction tests.

The choice of experimental manipulations was guided by the following considerations. Switching between encoding conditions (as required in a within-subjects design) should hamper relational encoding in comparison to a single encoding task (as required in a between-subjects design). Item-specific information, on the other hand, should not be influenced by the design manipulation. With regard to memory tests, a recognition test should draw on item-specific information, whereas a reconstruction test should draw on relational information. A free recall is thought to reflect both item-specific and relational information.

Combining these considerations, we expected

- a) for the recognition test: an enactment effect which is independent of the design type,
- b) for the reconstruction test: a reversed enactment effect which should be more prominent in the between-subjects condition, and
- c) for the free recall: an enactment effect in the within-subjects design, but no enactment effect in the between-subjects design.

Taken together, the results of the experiments supported our hypotheses. This adds weight to our conjecture that the empirical results on the enactment effect can be parsimoniously explained by applying the distinction between item-specific and relational information.

Task-dependent mislocalizations during position judgements of moving stimuli

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Abstract

When subjects are asked to determine a certain position of a moving stimulus, subjective localization is typically shifted from the true position in the direction of movement. Such mislocalizations have been observed, for example, for judgements of the position where a moving stimulus starts to move and also for judgements of its final position. Indications of similar effects were found with paradigms in which the position of a moving stimulus should be judged in relation to a suddenly appearing comparison stimulus.

Some of these effects were examined with regard to their dependence on stimulus characteristics or the context in which they occur. Theoretical explanations focus mainly on low-level perceptual mechanisms or on attentional processes. In most cases, however, mislocalizations are investigated and interpreted as pure perceptual phenomena while the actions of the observer remain widely without consideration.

We will report findings that have been found under conditions in which subjects observe a point moving on a circular orbit. First experiments were used to establish classical mislocalization effects when subjects are asked to judge the position of the point in a specific stage of movement. In addition to spatial aspects, temporal measures were examined under different task conditions in subsequent experiments.

Keywords:

localization, movement perception, task dependence.

The effects of display size and display density on feature search

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Several studies have found that increasing the number of elements (display size) may improve detection performance in search for a unique line orientation among lines of another orientation. To account for this result, researchers have pointed out that from small to large display sizes, display density generally increases. Consequently, it has been suggested that high densities contribute to the observer's ability to select (localize) the relevant target position by either nontarget-grouping (Bacon & Egeth, 1991) or the detection of local feature differences (Sagi & Julesz, 1987).

The aim of the present study was to rigorously investigate the separate and combined effects of display size and display density on localization and identification performance during visual feature search. In a series of experiments participants searched for a target with a unique line orientation among distractors containing another orientation. Coarse localization performance as well as identification performance were measured as function of display size and display density, separately for different retinal target eccentricities. The results showed that localization and identification performance increased with increasing display size and display density. Increasing identification performance with display size was not only due to a better ability to select the target, for identification performance was partly independent of localization performance. Furthermore, identification performance was particularly high if both, display size and display density were high. The results are in disagreement with previously proposed mechanisms to account for performance improvements with display size.

Recognizing Individual Characteristics of Drawing from a Moving Point

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Demonstrations by Johansson (1973) and studies that followed provide evidence that the visual system can derive various aspects of an event from moving point light displays. These aspects may include individual characteristics of one's own movements as suggested by a study by Beardsworth & Buckner (1981) showing that individuals are able to recognize moving point light displays of their own gait. The aim of our study was to find out if the same is true for drawing.

There are two possibilities how own drawing may be recognized from a moving point light display. Recognition could be achieved by forming a shape representation from subsequent positions and matching it against a stored representation containing individual shape characteristics. The second and more interesting possibility is that individual characteristics of the timing of a movement are recognized because motor programs containing timing information are activated during recognition.

We conducted an experiment to address the question if and what characteristics of one's own drawing can be recognized from moving point light displays. In a first session we asked participants to draw a large set of familiar (e.g. Latin script) and unfamiliar symbols (e.g. Thai script) in a fixed stroke order. They did not see their hands while drawing and received no visual feedback. One week later in a second session they saw two moving point light displays on each trial, one reproducing the trajectory of their own drawing and one reproducing that of another person's drawing of the same symbol. The displays were matched for size and in neither case did the moving point leave a trace on the screen. The task was to decide which of the displays reproduced one's own drawing.

Results show that the recognition rate for own drawings was above chance level and did not differ for known and unknown symbols. This is in favor of the timing hypothesis as the shape hypothesis predicts a higher recognition rate for familiar symbols.

In the first experiment the overall durations of the two moving point light displays in the recognition session were not matched. Therefore participants may have recognized their own drawing by the time it took to complete a symbol. To exclude this possibility we conducted a second experiment in which the moving point light displays were matched for overall duration in the recognition session. The pattern of results are the same as in Experiment 1 showing that overall duration is not crucial for recognition of one's own drawing.

THE SPEED OF ELEMENTARY VISUAL RECOGNITION IN PARKINSON'S DISEASE AS MEASURED BY THE MUTUAL MASKING METHOD: SUPPORT FOR PERCEPTUAL RETOUCH THEORY

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Abstract. Pairs of mutually different, spatially overlapping letters were exposed for recognition to the groups of patients with Parkinson's disease (PD) and to the age-matched control group. Stimulus onset asynchrony (SOA), medical treatment status (*de novo* vs treated), and predominant symptoms (tremor vs hypokinetic rigidity) were other main variables. The efficiency of recognition significantly increased with SOA, however the highly significant effect of the health status demonstrated slowing of elementary visual recognition operations in PD. It is important to notice that the results are based on the method that requires neither speeded manual responses nor tracking of the display events by saccadic eye movements (both of the latter can be typically impaired in PD). Significant interaction between the temporal order of stimulus exposure and the health status showed that impairment due to the PD was more pronounced for the first stimulus, including with *de novo* group. Qualitatively similar recognition functions in the binocular and dichoptic conditions showed that the typical pattern of results -- prevalence of S2 over S1 at intermediate SOAs of 40-95ms -- cannot be attributed to retinal processes and should be originating from central processes. An earlier finding (Bachmann, 1994) that PD patients whose nonspecific thalamic nuclei were stimulated intracranially produced qualitatively unusual recognition functions should have been the result of stimulation, rather than PD as such. This finding supports the perceptual retouch theory of visual masking: the slower nonspecific thalamic systems provide thalamocortical modulation of the activity of the specific cortical representational neurons which is necessary in order to create conscious representations of the exposed stimuli. Due to this relative slowness, the main stimulus to be consciously perceived will be the second stimulus because its arrival coincides with the moment of arrival of the modulating input that was evoked by the first stimulus. The findings reported here, if combined with data from earlier research, provides additional converging evidence for the group of theories that regard nonspecific thalamic processes as crucial in cognitive activities (eg, as suggested by Benjamin Baars, David LaBerge, sir Francis Crick, Joseph Bogen, James Newman, or the present author).

Confusion errors in visual working memory

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The aim of the present study was to investigate the characteristics of visuo-spatial working memory based on the assumption that an analogous approach to the one used for studying the phonological loop may provide a useful methodological framework for the further exploration of the visuo-spatial sketch pad. To this end an experiment was conducted to pursue the research of visual confusion errors in short-term memory, analogous to the phonological similarity effect. An immediate visual recognition task was administered. Non-verbal stimuli without a corresponding auditory code, i.e. Chinese characters, were employed to prevent verbal recoding. Visual similarity and complexity of the characters were taken into account in a preliminary study. Results of the recognition task revealed a clear visual similarity effect. Concurrent articulatory suppression and spatial tapping did not impair performance. However, both visual interference and central executive suppression were found to significantly reduce the recognition scores. These findings suggest that subjects relied on a visual code for the retention of the Chinese characters, and thus support the notion of a visual temporary storage system.

Counting span due to memory decay or cognitive space ?

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We'd like to contrast two hypothesis explaining differences observed in counting span between adults and children.

Case, Kurland and Goldberg (1982), asking adults to count with an unfamiliar chain, show that adults' counting span does not differ from the 6-year-olds' span. They conclude that increase in memory span do not result from increase in processing space but in efficiency of operations. These operations require less processing space and there will be more space available for storage (cognitive space hypothesis).

Towse and Hitch (1995) have proposed an alternative hypothesis : the greater span for adults could be a consequence of the increase in speed of counting ; items maintained in memory for a shorter duration are better recalled (memory decay hypothesis). They suggest to increase the time to count without altering the cognitive cost. They compare then two conditions : one in which both the cognitive load and the time needed to complete the task were increased (difficult targets' detection) and one in which only the time was increased (resulting from a raising of arrays' size). As the two spans were similar, they conclude that spans are explained by the amount of time items must be maintain in memory.

However, raising the arrays' size induces an increase in speed but could also induce an increase in the cognitive load of counting (Camos, Fayol et Barrouillet, submitted). In order to avoid this confound, we compare two tasks of same duration but with different cognitive cost : (1) a classic counting span task and (2) a span task in which subjects had to say "baba" rather than counting. If performances in memory span depend exclusively on the amount of time to maintain items in memory, spans on the two tasks will be identical. On the other hand, if span depends on available cognitive space, span will be smaller in the counting task because counting is more demanding than saying "baba".

Children's performance on three working memory span tasks: "All for one, one for all"?

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We report a series of experiments that illustrate both commonalities and well as differences among working memory span tasks. In a series of experiments, children between the ages of 7 and 11 were asked to carry out sets of mental computations (comprising counting, simple arithmetic or reading) and remember the products of their cognitions. Trials were arranged so as to vary the retention requirements of memory stimuli while holding overall processing complexity constant. Regardless of processing domain, there was consistent evidence for time-based loss of information in working memory, while neither macro- nor micro- level analyses supported the contention that children utilised a resource-sharing strategy in performing these tasks. In a follow-up study, children were re-administered working memory span tasks after a one-year interval. The experimental effects were replicated, and individual differences were examined to consider the relationship between working memory span tasks and reading and arithmetic skills. These analyses illustrated both domain-specific characteristics of working memory span tasks and differences between reading and arithmetic in terms of links with various memory-related skills.

The findings question the frequent reliance on resource-sharing accounts of working memory span, and emphasise the importance of alternative approaches. They also illustrate the impact of the particular processing domain for working memory span, particularly with reference to real-world cognitive skills.

EFFECT OF EMOTIONAL STATE ON UPDATING PROCESSES IN WORKING MEMORY

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In the limited capacity processing models, the effect of emotional state on cognitive performances comes from the competition between cognitive activities associated with emotion (e.i. irrelevant thoughts) and task-relevant informations for space in working memory (Darke, 1988 ; Calvo & Eysenck, 1996). The increase in task-irrelevant processing reduces ressources allocated to the relevant features of the task and lessens performances.

A first experiment tested this assumption with a running span task in which subjects had to constantly update a list of consonants in working memory in order to recall the last *n* items of the list. This task involved the articulatory loop and the central executive of working memory (Morris & Jones, 1990). The effects of three factors were observed: emotional induction (anxiety versus control) ; memory span (4 versus 5 consonants) and updating process (0, 2 or 4 updatings). The results showed a significant decay in the number of correct consonants for induced subjects by comparison with control subjects in the span condition of 4 items exclusively. In accordance with our assumptions, induced subjects had longer response-latencies than control subjects in the two span conditions. Our results did not show any difference in frequency of irrelevant thoughts between induced and control subjects. These results dispute the causal role of irrelevant thoughts involved in the decreasing performances.

In a second experiment, we used the same running span task but subjects had to recall the last 3 or 5 consonants of the list. Frequency of irrelevant thoughts was not mesured. In a span condition of 5 items, the rate of presentation was slowed-down in order to allow more rehearsals. In this condition, there was not a significant difference between the two groups. However, there was an effect of emotional state with 3 items that was relevant to the first experiment. Findings in the span condition of 5 items in the two experiments might be related to the complexity of the task.

These results are interpreted in the context of the emotional interference with the processing of the working memory. Furthermore, we put forward a critical viewpoint of updating processes.

Cerebral Asymmetries and Cognitive Dynamics

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Recent computational models have demonstrated the efficacy of spreading activation learning systems that partition compound tasks into mutually inhibiting sub-models, along a dimension of computational complexity.

Cerebral asymmetries in spatial learning by the rat are consistent with this model. Using reversible unilateral mild spreading depression, we have found the following. (1) The left hemisphere (LH) learns to find rewards in a maze faster than the right hemisphere (RH). (2) This learning asymmetry is due to differences in immediate post-training consolidation. (3) When both hemispheres are mildly depressed, mutual inhibition releases and the animal actually learns new mazes faster than untreated animals. (4) The LH accesses and maintains a relatively complex map-like location of rewards in a maze; the RH accesses and maintains a relatively simple association between each reward and associated cues: this can result in apparent left or right hemisphere "dominance" for spatial representation, depending on the task. (5) Females show the same qualitative asymmetries as males, but less sharply.

Using a reversible unilateral anaesthetization of the whiskers, we have found corresponding effects that differentiate the right whiskers from the left whiskers. Thus, the peripherally induced behavioral asymmetries are contralateral to the centrally induced behavioral asymmetries. Surprisingly, this includes the asymmetric effects on memory consolidation, as a function of post-training unilateral anaesthetization of the whiskers.

These results are consistent with cerebral asymmetries in humans: the apparent right-hemisphere, left periphery "dominance" for spatial tasks in humans may be due to the kinds of tasks used. This suggests: (1) The rat is a useful model for the study of asymmetries, and the study of therapies for recovery from unilateral brain damage; (2) Recently proposed memory models may be correct, on which the hippocampus forms an immediate and long-term representation of episodes, while the cortices build up distinct long-term non-episodic, "semantic" representations.

Recognition of faces in poor quality video

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Most psychological studies of face recognition use high quality photographic stimuli. However, there are many circumstances in which face recognition takes place on poor quality images. This paper examines person recognition performance on poor quality images from a commercial video security system. In experiment 1, we examined the effects of familiarity on recognition. Three-second clips were obtained of twenty different target people entering a building. Three groups of subjects were recruited: subjects who were personally familiar with the target people; subjects who were unfamiliar with the target people; and subjects who were serving police officers, unfamiliar with the targets, but with professional experience of analysing security video. Recognition performance was tested using a procedure in which subjects had to match video clips to high-quality photographs of the target people. The results show that

- (i) subjects familiar with the targets performed very well;
- (ii) subjects unfamiliar with the targets scored very poorly;
- (iii) police officers also scored very poorly.

In experiment 2, we examined the reasons for the high levels of performance for subjects familiar with targets. A further set of video sequences was captured from the same security camera. Fifteen target people were filmed for three seconds as they walked into the building. Subjects were recruited who were personally familiar with these targets. They were shown the video clips in one of four conditions: (i) unedited; (ii) edited in order to obscure the body of the target, leaving only the moving head visible; (iii) edited to obscure the head, leaving only the moving body visible; (iv) edited to destroy movement cues by playing a sequence of half-second video stills, rather than displaying at standard frame-rate.

The results of this experiment showed that person recognition was not substantially affected by eliminating the body (and hence clothing) or the movement from the video sequences. However, performance was very substantially poorer in the condition where the head was no longer visible. This result suggests that even in poor quality video images, in which the face is represented in rather poor resolution, subjects familiar with the targets nevertheless rely on recognition of the person's face, rather than other bodily characteristics.

STRUCTURAL ENCODING AND IDENTIFICATION IN FACE PROCESSING:

ERP EVIDENCE FOR SEPARATE MECHANISMS

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The present study had two aims. The first aim was to explore the possible top-down effect of face-recognition and/or face-identification processes on the formation of structural representation of faces, as indexed by the N170 ERP component. The second aim was to examine possible ERP manifestations of face identification processes as an initial step for assessing their time course and functional neuroanatomy. Identical N170 potentials were elicited by famous and unfamiliar faces in Experiment 1, when both were irrelevant to the task, suggesting that face familiarity does not affect structural encoding processes. Small but significant differences were observed, however, during later-occurring epochs of the ERPs. In Experiment 2 the participants were instructed to count occasionally occurring portraits of famous politicians while rejecting faces of famous people who were not politicians and faces of unfamiliar people. Although an attempt to identify each face was required, no differences were found in the N170 elicited by faces of unfamiliar people and faces of familiar non-politicians. In contrast, famous faces elicited a negative potential which was significantly larger than that elicited by unfamiliar faces between about 250 and 500 ms from stimulus onset. This negative component was tentatively identified as an N400 analogue elicited by faces. Both the absence of an effect of familiarity on the N170, and the familiarity face-N400 effect, were replicated in Experiment 3, in which the participants made speeded button-press responses in each trial, distinguishing among faces of politicians and faces of famous and unfamiliar non-politicians. In addition, negativities later than the N400 were found to be associated with the speed of the response but not with face familiarity. We concluded that a) the structural encoding mechanism is not influenced by the face recognition and identification processes, and b) the negative component modulated by face familiarity is associated with the semantic activity involved in the identification of familiar faces.

Visual and non-visual factors affecting repetition priming of face

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Repetition priming of face recognition is reduced when low-level image features of the face are changed between study and test. For example, Bruce et al (1994, *Attention & Performance*) showed that if the prime phase showed images in black on white "cartoons" and the test phase showed grey-scale photographs, or vice versa, then priming was reduced considerably. Representations used for face recognition depend critically on grey-level information, a conclusion consistent with other effects such as our sensitivity to photographic negation. In contrast, colour information does not appear to be important for familiar face recognition (Kemp et al, 1996, *Perception*), and our prediction was that priming should be unaffected when there was a transformation from colour to grey-scale, or vice-versa. This prediction was supported in two new experiments reported here.

Such experiments are based upon the assumptions of the "structural" model, that priming reflects a change in the system that is responsible for item recognition, rather than arising as a result of episodic memory. To test this assumption, we have investigated how priming is affected by changing the context of the prime and test episodes. Experiments varying environmental context (Bruce et al, 1998, *Memory & Cognition*) have shown priming of familiar face recognition to be remarkably robust across a change in context. In new experiments described here, we investigated how priming was affected by a change in semantic context. Faces of people known as both actors and singers were primed and tested in consistent contexts (e.g. singer->singer) or inconsistent ones (e.g. singer->actor). This manipulation did not significantly reduce priming when items were primed and tested using the same pictures, though a second experiment did suggest priming was reduced by a change in context when the pictured exemplar at test was also changed. On balance, these results are easier to interpret within the structural model, with the assumption that connections from person-identity nodes to semantic units may also contribute to face familiarity decisions.

Priming by facial expression: Evidence from a face familiarity judgment task

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This experiment was designed to test whether facial expression can elicit priming in a familiarity judgment task. Forty-eight subjects divided into two groups (A and B) of 24 (12 females, 12 males) participated in the experiment. Stimuli were 8.75 cm x 6 cm color photographs of unknown male faces with different expressions: happiness, anger, surprise, disgust, and neutral. Face photographs had been selected according to the results of a pretest in which subjects had to rate the facial expression of a series of 300 stimuli. In the present experiment, subject participated in three familiarization phases where they were presented with a series of 24 neutral faces. In the first phase, subjects had to decide whether the faces looked friendly or not; in the second phase, they had to decide whether the face corresponded to a person who was older or younger than 24 years of age; finally, in the third phase, they had to decide whether the face corresponded to a person who was a soccer player rather than a boxer. Subjects of Group A and subjects of Group B were presented with a different series of 24 neutral faces. All subjects then participated in the test phase where 24 familiar and 24 new faces (that were the familiar ones of the other group) were presented as target stimuli. Subjects had to judge whether the target face looked familiar (i.e., was part of the familiarization phase) or not. Each target was preceded by an unknown (never used in the familiarity phases in both groups), expressive, prime face, so that the facial expression of the prime and the target face could be either identical or different.

Results revealed that subjects decided faster whether a target face was familiar or not and were more accurate when the same expression was shared between the prime and the target face, which attested for a priming by facial expression. However, the analysis on accuracy revealed that priming only occurred for familiar faces. Results are discussed in terms of the existence of distinct subsystems that extract facial expression and other facial features that are critical in familiarity judgments.

Improvement of probabilistic reasoning? Effects of response format and problem structure on the pruning bias in a familiar and unfamiliar scenario.

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Many biases in probabilistic reasoning have been reported to disappear or be reduced by alterations in the presentation of a judgement task. Here we examine the effect of response format and position of causes on the "pruning bias". This bias is the difference in judgements of likelihood made depending on whether a set of possibilities is described implicitly (a pruned condition) or explicitly (a full condition). The discrepancy in judgements made in the two cases violates the extensionality principle.

Students made causal judgements within scenarios that were familiar (reasons for inattendance of a lecture) or unfamiliar to them (causes of death). They judged likelihood in terms of probability, relative frequency or absolute frequency on either a full or a pruned set of causes. An "all other causes" category was situated at the end, in the middle or at the beginning of the list of causes.

The pruning bias occurred in both the familiar scenario and the unfamiliar scenario. On both tasks the pruning bias was largest when responses were in terms of probability compared to either relative or absolute frequency. On the unfamiliar scenario there was a change in likelihood judgements with response format on the full set of causes but not the pruned set. On the familiar scenario there was a change in likelihood judgements with response format on the pruned set of causes, but not the full set. On the unfamiliar task, but not the familiar task size of the pruning bias depended on position of the "all other causes" category. We discuss these results in relation to the predictions of three approaches to judgements of likelihood: the focal hypothesis perspective, Support Theory and the Evolutionary Perspective.

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Analogies with familiar sources in problem solving situations

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We present two experiments in which problem solving situations are analyzed as relying on analogies with familiar sources. We use a paradigm in which any knowledge in long term memory may be a potential source. No source is given to the participant and its behavior is compared with the one which can be predicted through the use of an hypothesized source. This paradigm permits to predict and to explain the difficulties encountered by participants in a wide range of situations, including those in which familiar knowledge, which can not be taught during an experimental session, is used as a source of analogy. In the first experiment, children who started to study column subtractions without borrowing are asked to solve column subtraction with borrowing. Their mistakes were predicted through the reference to two main familiar sources: subtracting is like taking a part from a whole, and subtracting is like covering a distance. A model was constructed on the basis of the use of those analogies, and the result of the simulation was compared to the pattern of responses. We are able to simulate 83% of the responses. Furthermore, the analysis of verbal reports support the hypothesis that those sources are used. In a second experiment, adults are asked to solve isomorphs of the Tower of Hanoi in which participants have to move or to change the size of objects under some constraints. Difficulties are predicted through the use of two sources depending on the isomorph: knowledge about taking a lift, and knowledge about biological growth. An analysis of the behavior and verbal reports have shown that the difficulties are due to the use of these familiar sources which is not relevant to solve the problem. Indeed, the use of those sources entails some additional constraints which are not in the instructions. The results collected in both experiments support the idea that those problem solving situations are guided by analogies with familiar sources. Those analogies permit to attribute to the new situations the properties of well known situations: the objects of the new situation are interpreted as familiar objects.

Effects of time pressure on judgment : Mediating effects of problem frame

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Previous studies of effects of time pressure on judgment have not produced consistent findings. Some have shown improvements in performance – perhaps because the stress induced by the manipulation had beneficial arousing effects. Others have shown impairments – perhaps because the manipulation resulted in a simplification in the way the judgments are made. In a first experiment, we asked people to regard themselves as directors of a manufacturing firm and to forecast future sales of their products from time series of past sales. Half the participants performed the task at their own rate. The other half were told that, as long as their error levels and task completion times were no greater than the average values of the people working at their own rate, they would be paid more the faster they finished their task. Results showed that time pressure improved performance. In a second experiment, the procedure was similar except that participants were told that they were forecasting future sales of products made by their main competitor. In this case, time pressure was found to impair performance. We discuss how this framing effect can be interpreted within the context of current models of the effects of time pressure on judgment.

Metaphor Comprehension as Problem Solving: An On-line Study of the Reading Process

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We report on the results of a study in progress of on-line metaphor comprehension. The theoretical framework underlying this project has been presented in Glicksohn and Goodblatt (1993), and developed in a number of recent papers (Glicksohn 1994; Goodblatt 1996). This framework integrates the paradigm established by Gestalt psychology with the Interaction theory of metaphor. Interaction theory advocates a process-oriented approach, which views the reader as being faced with a problem-situation presented by the metaphor and by the text. This conception of the reading process continues the line of argument made by Wertheimer (1959) in his discussion of problem solving. One objective of this study was therefore to provide empirical support for viewing metaphor comprehension in terms of problem solving, as students of literature begin to unravel a poetic text. In this respect, we are departing from the normative approach to metaphor comprehension on the part of psychologists, by employing both poetic texts (i.e., metaphor in extended context) and students of literature. The participants were asked to read the poetic text presented on a computer screen, and provide an on-line verbal report of their process of comprehension. The text was unfolded over a series of trials, such that at each trial more and more text appeared on the screen. At certain points in the text, the reader encountered a targeted metaphor appearing in boldface print. During each such trial, the reader was required to focus on the task of metaphor comprehension. Ratings of the metaphor, using a number of scales were also made on-line on each of these specific trials, after the metaphor had been discussed. Key questions for discussion are as follows:

1. Is there evidence for an act of problem solving on the part of the reader?
2. Is there evidence for a process of textual interpretation, involving revising one's comprehension?
3. Does the reader turn to an analysis of semantic fields in the reading?
4. Is there evidence for an act of semantic restructuring in the verbal report?
5. In the reading, is there evidence for an act indicative of interactive processing?

Viewing and describing pictures: The coordination of eye movements and speech planning in the production of noun phrases and pronouns

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To speak fluently, speakers must tightly coordinate in time their conceptual and linguistic planning processes and the articulation of utterances. To investigate how this temporal coordination of speech planning and execution is achieved, we registered the speakers' eye movements while they described line drawings in utterances such as "the scooter and the car". In a first series of experiments, we found that the speakers usually fixated on each object to be mentioned, presumably because objects are seen most clearly and identified most easily when represented in the fovea. The order of fixating on the objects closely corresponded to the order of mention. The time speakers spent fixating on the objects depended both on how easy they were to identify and on how easy it was to retrieve their names: Objects with high frequency names were looked at for a short time than objects with low frequency names (Meyer et al., *Cognition*, in press). We then examined how speakers coordinated eye movements and speech output when they referred to objects in noun phrases (as in "the dog is next to the table") or pronouns ("it is next to the table"). The viewing times were found to be shorter in the pronoun than in the noun condition. This reinforces our earlier conclusion that eye movements and speech planning are tightly coordinated in time --the less time it takes to identify and name an object, the shorter it will be looked at. Furthermore, the results imply that speakers use a highly sequential viewing and naming strategy. Contrary to what incremental models of language production may predict, speakers do not work on different utterance fragments in parallel, but focus on one conceptual unit and its linguistic representations until the speech plan is almost complete and only then turn to the next unit. An advantage of this serial planning strategy over a more parallel one is that it minimizes the competition among conceptual and linguistic units pertaining to different parts of an utterance.

The Effect of Increased Speech Rate on Speech Monitoring

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Speech monitoring is the process by which speakers check their own speech on correctness and appropriateness. Speakers can interrupt erroneous or inappropriate utterances in order to self-repair. Little is known about the precise nature of the speech monitor. The most widely accepted theory suggests that monitoring is essentially a perceptual function: speakers detect errors by listening to their own speech. Monitoring is a conscious and attentional activity (Levelt, 1989). Alternative theories assume that monitoring is a more automatized, integral part of the speech production system, which is not central but distributed throughout the speech production system (Laver, 1980).

The present study examined the effect of increased speech rate on monitoring. An increased speech rate is expected to affect perception monitoring, since the monitor has less time to check inner and overt speech. This could affect monitoring accuracy, as well as a number of temporal characteristics of monitoring, e.g. the time between the onset of the error and the moment of error interruption. An experimental, computerized task was developed, in which subjects described visually presented networks. Speech rate was directly manipulated by means of a dot moving through the networks, which indicated the route and the speed of the description. The dot moved through the networks at two different rates: at the normal rate, subjects could speak at their habitual speech rate, whereas at the fast rate, subjects had to speak at a fast speech rate.

The data analysis included an analysis of speech rate, of the number and distribution of different errors and self-repairs, of monitoring accuracy, and of temporal characteristics. Increased speech rate did not affect monitoring accuracy, that is, in fast speech the percentage of corrected errors did not differ from the percentage of corrected errors in normal speech. In addition, more repetitions (covert repairs) were found in fast speech. Increased speech rate affected the speed of the monitor: errors were interrupted earlier in fast speech. The implications of these findings for perception monitoring will be discussed.

Phonological effects obtained with the picture-word task: What do they tell us about language production?

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Abstract

In the picture-word task participants are asked to name a picture and to ignore an accompanying word (a distractor). Picture naming times are faster when the distractors are phonologically related to the picture's name than when they are unrelated to the picture's name. For example the picture of a cat is named faster when it is accompanied by the word cap than when it is accompanied by the word pen. However, when the words were auditorily presented in advance of the pictures, some researchers did not obtain this effect, whereas they did obtain an effect of semantically related distractors relative to unrelated ones. When words and pictures were presented at the same time, the opposite result was found: no effect of semantically related distractors, but a clear effect of phonologically related distractors. These results were interpreted as favoring strict-serial models of language production, in which a semantic/syntactic stage of processing is followed by a phonological stage. I present research that shows that phonological effects can (easily) be obtained when distractors are auditorily presented in advance of the pictures, and discuss the consequences of this finding for models of language production.

The production of nouns and verbs: a case study

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MN is an Italian agrammatic patient whose naming performance, tested by means of the BADA (Miceli, Laudanna, & Burani, 1994), was far more impaired in the production of verbs than in the production of nouns. This dissociation, commonly observed in agrammatic patients, along with the frequent occurrence of the opposite dissociation in anomic patients (Miceli, Silveri, Villa & Caramazza, 1984; Miceli, Silveri, Nocentini & Caramazza, 1988; Zingeser & Berndt, 1990), has led to the hypothesis that grammatical class is an organizational principle in the output phonological lexicon (Caramazza & Hillis, 1991). However, materials used to assess patients' naming performances, while balanced for a number of crucial factors, often fail to take argument complexity into account (Zingeser & Berndt, 1990). In fact, argument structure, which is in the syntactic information of all verbs and some nouns, is not in the syntactic information of the nouns typically selected to test patients' naming abilities (BADA; Miceli, Laudanna, & Burani, 1994; BDAE; Goodglass & Kaplan, 1972). Thus, current evidence in support of the view that nouns and verbs are represented separately in the lexicon may contain a confounding between grammatical class and argument complexity. In order to explore this issue, and to test whether argument structure may alter a patient's naming performance, three types of nouns -- with no arguments, with one argument, and with two or more arguments-- and two types of verbs -- with one and two or more arguments -- were selected to be produced in a sentence completion task and in a picture naming task. When requested to perform the tasks, MN, in contrast to his performance at BADA, showed no effect of grammatical class, but produced reliably more errors with complex than with simple items. The implications of the results for current models of mental lexical representation are discussed.

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Impairments of spatial memory after stroke

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Spatial memory involves the encoding, storage and retrieval of information about spatial layouts in our environment, enabling us to localise objects in space, or learning a route or path (Benton, 1969). Postma and De Haan (1996; in press), using an object relocation memory task in healthy subjects, found consistent evidence for a dissociation between two processes within spatial memory: 1) the encoding of the exact metric locations, independent of the object identity, and 2) the *binding* of object and (relative) spatial information. Moreover, a third mechanism could exist, which integrates the former two processes.

In the literature various anatomical structures have been proposed to play a role in spatial memory. First, there is the hippocampus, important for allocentric cognitive mapping (O' Keefe & Nadel, 1978), or the binding of spatial and item information (Kolb & Wishaw, 1995; Chalfonte et al., 1996). Smith and Milner (1981) observed spatial-memory deficits especially after right-hemispheric hippocampectomy. Second, the frontal lobes appear to be especially important for spatial *working* memory. This has been demonstrated with imaging techniques such as PET and fMRI (Jonides et al., 1993; Belger et al., 1998), as well as in patients with frontal-lobe lesions (Smith et al., 1995). Finally, the parietal cortex seems important for spatial cognition (Newcombe et al., 1987). Kosslyn (1994) suggests that the left parietal cortex is responsible for the processing of categorical, relative spatial relations, whereas the right parietal lobe is involved in coordinate, metric processing.

The aim of the present study is to examine this functional dissociation proposed by Postma and De Haan (1996) in relation to the aforementioned anatomical sites. Patients with cerebral lesions after stroke in the frontal region, the temporal cortex, as well as the parietal lobes (either unilateral or bilateral) are studied using the experimental method developed by Postma and De Haan (1996). In this way, we hope to gain more insight in the role of the anatomical structures in different components of spatial memory.

Time- and Event-Based Prospective Memory as a Function of Age: The Importance of On-Going Concurrent Activities

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Abstract

Time-based prospective memory is assumed to involve more self-initiated activities than event-based prospective memory. As age negatively affects self-initiated activities, older participants will show more prospective-memory deterioration than younger participants in time-based tasks (as already observed in Einstein et al., 1995). In Experiment 1, however, older participants did not perform more poorly in the time- than in the event-based prospective-memory task; in Experiments 2 and 3, they even performed significantly better in the time- than in the event-based task. A difference in timing constraints in the procedure may explain why the older participants in Einstein et al. (1995) did perform more poorly in the time-based task while our aging participants did not show such a deterioration, suggesting that the slowing down of mental activities may provide a better explanation than the increasing lack of self-initiated activities by the elderly. As Experiment 1 suggests a negative trade-off between the on-going concurrent activity (identification of faces) and the prospective-memory responses, Experiments 2 and 3 include several manipulations to clarify how much of the prospective-memory performance is due to the attention allocation between the two tasks. While an analysis over the 3 experiments shows a positive correlation between and a negative correlation within conditions, it is important to note that all age effects in prospective-memory performance disappear when performance at the target items (i.e., items where a prospective-memory response is required) in the on-going task is taken into account. We emphasize the need of studying trade-offs in prospective-memory research as a prospective-memory task is always embedded in another (on-going) activity.

**Adult-Age Differences in Memory Performance:
An Associative Deficit Framework**

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Abstract

An associative framework is proposed to explain and predict older adults' deficient explicit episodic memory performance. The framework attributes a substantial part of older adults' deficient memory performance to their difficulty in associating different unrelated aspects of an episode into a cohesive unit. Experiments are reported which demonstrate this associative deficit for both inter-item relationships, and intra-item relationships. In one experiment, older adults' memory for associations among items is shown to be worse than their deficiency in remembering the items themselves. Older adults' memory for intra-item information (information relating different attributes) is shown, in a second experiment, to be deficient even when their memory for the single attributes is intact. Finally, consistent with the associative deficit framework, older adults' episodic memory performance is shown to be relatively poorer in a paired-associate task employing unrelated words, considered to require the extensive processing of associations, than in free recall or recognition tasks. Such a deficit disappears when semantically-related items are used, allowing the older adults to rely on pre-existing associations.

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ARE WE SLOWING DOWN OR DO WE NOT REMEMBER?

Recently, we (Java & Parkin, 1996) addressed Salthouse's (1980) proposal that 'mental operation time' is largely responsible for age differences in cognitive ability. We showed that the effects of age on recall and recognition were not necessarily an adjunct of cognitive slowing. An important factor was the type of speed of processing task used.

However, the influence of tasks such as the Digit Symbol Substitution Task (DSST) are impressive and interpretations differ. Thus the present study poses the question: if some of us consider that memory is mediated by age-related reductions in the speed of carrying out mental operations, where does this leave our accepted theories of how memory changes with age?

Craik (1977) suggested that older adults' episodic memory is impaired because they do not spontaneously encode material in an elaborative manner. So we went back to fundamentals and did a simple levels of processing study manipulation with groups of young and older participants. They studied words that were blocked according to semantic and graphemic orientation tasks and were tested by cued recall. Processing speed was measured by DSST, letter and digit cancellation.

A levels of processing effect was shown by each age group, though the younger adults outperformed the elderly overall. People were slower with increasing age on each of the speeded tasks. We covaried processing speed and found that the effect of age on memory still held. However by separating the recall data according to study orientation, we found that the effect of age remained a potent factor on memory in the graphemic condition only. Age related memory changes following semantic encoding were compromised by speed of processing. Thus it appears that when these elderly adults were guided towards elaborative encoding, their mental operations were partially mediated by a reduction in speed of performance.

Memory for Temporal Order of Past Events

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Temporal information cannot be separated in a meaningful way from the structure of events and episodes. Anderson (1983, 1996) postulated a special, independent mode of LTM representation for temporal order information: temporal strings, i.e. linear order codes. There are numerous arguments against the independent character of temporal strings (cf. Michon, 1993), and questions concerning the nature of time strings, too.

In order to study the nature of the postulated time strings we used an experimental framework in which the complexity of underlying episodes (series of events of high typicality) and the level of processing were manipulated (priming with lexical decision, priming with relation identification, preinformation with relation identification).

Several factors were varied between prime (or preinformation) and target concepts: the SOA (200 ms vs. 1000 ms), the temporal order (corresponding to the natural order of events in our environment, e.g. *FLOURISH - FADE* or corresponding to the reverse order, e.g. *FADE - FLOURISH*) and the rated temporal distance between presented event concepts.

The experiments produced coherent results: (1) The level of processing clearly affected the reaction times. In case of priming with relation identification an SOA of 200 ms was sufficient to produce a semantic priming reaction time effect. (2) Event sequences presented corresponding to the natural temporal order of events in our environment were processed significantly faster compared with event sequences presented in the inverse order. (3) A significant temporal distance effect was obtained: Increasing temporal distance between events caused higher reaction times and higher error rates.

These results suggest that processing temporal information of meaningful series of events is not a lexical surface phenomenon, but connected with the semantic level. Event sequences of high typicality seem to be stationarily stored in LTM and can be activated automatically. Moreover, the internal temporal dimension is directional; i.e. mental representation of event sequences emphasizes future time. This „time's arrow effect“ supports Freyd's (1987, 1992) theory of dynamic mental representations. The observed distance effect rejects the temporal string model, i.e. linear order codes. Results are discussed with reference to current models of semantic memory retrieval (McNamara, 1994; McKoon & Ratcliff, 1994; 1997).

Mental Time Quanta: New Findings in Event Perception and Memory Search

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Early suggestions of a psychological moment (PM) as a mental "time atom" are proven to be wrong for three counts: 1. There is no continuously running counter; 2. the PM hypothesis cannot explain the emergence of many different periods; and 3. even if augmented by additions permitting this, it gives no account of differences of critical periods arising as a function of modality, task and distinctions in content.

We demonstrate the existence of a quantal period (TQ_0) in entrained activity, shorter (~ 4.5 ms) than ever suggested for PM, which is extremely stable and differs between most subjects by less than 2 %. This strict determination of timing is complemented by properties giving rise to temporal fuzziness and indeterminacy (cf. [1], [2], [3]): (A) Organization into packages of multiple group oscillations which stabilize by mutual phase tuning; (B) strict coherence limitation of group oscillations leading to a break-down of information processes after a maximum of 30 periods; and (C) ambiguity of temporal-spatial representations of information. These properties are shown to optionally produce variable cascades and sequences of time windows for central information processing in the brain.

We report experiments and analytical procedures which show the presence of an elementary quantal unit TQ_0 and multiples of it, in critical periods of apparent movement (AM) and in RT data in a comparison task. Statistical evidence in AM resorts to density estimates from critical ISIs of induced break-downs. In RT experiments demonstration of quantal periods proved to be extremely difficult, because of high variability of RTs and fragile dependencies on situational conditions and individual peculiarities. We diagnose this to be a consequence of weak stimulus-task constraint, leading to ambiguities and highly indiosyncratic processing. To overcome this fuzziness we introduced a new task implying comparison of structurally regular patterns. To remove possible artifacts, tests, in one case, were based upon RTs averaged for single subjects and single conditions, and in the other case upon difference distributions calculated from the original distributions of individuals. These procedures give rise to the same conclusions as suggested by the AM data.

In the discussion we consider possible consequences of these results for theorizing, methods of data evaluation and model testing. Seemingly, our findings point to some radically new aspects and represent a challenge to future work, in particular in cognitive psychology and neurosciences.

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MEMORY FOR DURATION : AN ERP STUDY

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Internal timer models elaborated (Church, 1984 among others) provide a conceptual framework to guide the search for the neurobiological mechanisms of the interval timing capacity. The internal timer may consist in an accumulator which stores impulses given by a time base. Then, the accumulator transmits them to the working memory for temporary storage or to the reference memory for a more permanent one.

The aim of this study was twofold : (i) a better understanding of the memory components involved in the internal chronometric mechanisms, (ii) to determine whether frontal activity is lateralized during encoding in (left frontal) and retrieval from (right frontal) episodic memory of brief durations, as reported in the HERA model (Tulving, 1994) for the memorization of words, odors, faces. The task was divided into two phases : an *encoding* phase in which subjects had to memorize durations of a LED illumination : 560 ms (short), 700 ms (middle), 840 ms (long) ; a *recognition* phase in which subjects had to indicate whether the current duration was short, middle or long.

Behavioral results show an identical recognition rate for the 3 durations. Electrophysiological data reveal a frontal negativity (CNV) between 350 and 850 ms after the LED switched on. This wave peaks around 480 ms, and its amplitude is more important in the recognition phase than in the encoding one. Furthermore, neural generators modelled using the BESA software in the encoding phase show diffused cerebral activity and no dipolar source seems to be significantly active. These two results suggest that temporal information processing is deeper in the recognition phase.

In the recognition phase, the dipole modelling shows a certain similarity between the frontal areas activated in our task during the CNV temporal window and those involved in tasks which have contributed to the HERA model. The activation of the right frontal areas thus suggests a retrieval process, and the activation of the left frontal areas might reflect a « re-encoding » process of the durations during the recognition phase.

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Titel:

Temporal control of repetitive movements in the Synchronization task: An empirical test of the Wing-Kristoffersson model

Abstract:

Wing and Kristofferson (1973) have introduced a model for the analysis of the tapping task in a continuation paradigm. In this paradigm subjects have the task to execute a simple motor task in a regular isochronic beat. Typically the task starts with a short synchronization phase.

The model postulates two independent processes, one for the generation of intervals, another for motor control. To use the model in the analyses of synchronization tasks it was extended by Vorberg and Wing (1994).

The application of the model was investigated in a series of experiments. The task always started with a synchronization phase followed by an equally long continuation phase. The interval length, feedback and effector was varied in three designs. Interval length varied between 300 and 1000 ms, feedback was either with or without acoustic feedback, and effector was either the index finger or the foot.

The results are discussed in the context of existing models for synchronization.

Vorberg, D. & Wing, A. (1994) Modelle für Variabilität und Abhängigkeit bei der zeitlichen Steuerung. In H. Heuer & S.W. Keele (Eds.), Psychomotorik. Enzyklopädie der Psychologie, 3, 181-262.

Wing, A. & Kristofferson, A.B. (1973) Response delays and the timing of discrete motor responses. Perception and Psychophysics, 14, 5-12.

VISUAL AND NONVISUAL CONSTRAINTS IMPOSED ON BIMANUAL COORDINATION

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It is widely recognized that there are preferred modes of bimanual coordination (so-called "in-phase" and "anti-phase" modes) that have a higher degree of stability than other coordination modes. Identifying the reasons underlying the preference of some coordination patterns to other is the focus of the present work. Subjects performed repetitive bimanual circle drawing movements on two horizontal digitizer boards in two combinations: (1) both limbs tracked the circles in the clockwise direction, and (2) the limbs tracked the circles in different directions. An opaque screen prevented subjects from seeing their arm movements. The only visual information was delivered by a computer monitor. This monitor displayed an image of the two digitizer boards, including the circle templates. Two markers moved in real time on the computer screen in concordance with movements of the joysticks on the digitizer surfaces. The task was to track bimanually the circle templates with the markers at an assigned frequency. There were two experimental conditions, about which subjects were unaware. During the *normal* visual condition, the position of each marker on the computer screen reflected current position of the corresponding joystick on the digitizer. During the *distorted* visual condition, the right marker showed the joystick position with a delay of 500 ms.

The results demonstrated that actual movements were perfectly synchronized under normal visual conditions. Conversely, a regular delay in movement of the left joystick was observed when visual information was distorted. This delay was higher during movements in the same direction than during movements in opposite directions. These results suggest that two types of constraints emerge during bimanual movements: visual and nonvisual. The former provide coupling in the visual space, whereas the latter cause synchronisation in the joint space. The nonvisual constraints are more powerful during movements performed by homologous muscles than by nongomologous muscles.

Impact of Conditioned Action Effects on the Control of Voluntary Action

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The performance and control of voluntary action is guided by cognitive representations of goals. In order to achieve a desired outcome, we intentionally execute movements which we have formerly experienced to cause that outcome. According to this view, voluntary actions are controlled by the anticipation of the effects they are likely to produce.

But how do people acquire knowledge about the causal relationship between a particular movement and its effects? The simplest way to explore this relationship is to perform the same movement over and over again and to register the events which consistently follow this movement. The experience of several co-occurrences of a movement and a following perceivable event leads to the forming of an association between the motor pattern and the sensory code of the event. As a result, the movement is interpreted as the cause of the event and the event is interpreted as the effect of the movement.

The next question is how the acquired knowledge about movements and their effects is applied to achieve desired goals by means of voluntary action. In many cases, the anticipation of a goal (i.e. a lighted bulb) is sufficient to trigger an appropriate action (i.e. pressing a switch). This leads to the assumption that the acquired associations between movement representations and effect representations can be activated from either side. Thus, it is possible both to predict the effects a given action is likely to produce and to control voluntary action by anticipating its effects.

In several studies we have examined the acquisition of action-effect associations and the impact of conditioned action effects on voluntary action. In each study, subjects are forced to choose between two actions while being confronted with a stimulus that is identical with the conditioned effect of one of the actions. In this situation, the response which formerly produced the effect that matches the presented stimulus is performed faster, and, under free-choice conditions, is also chosen more often than the alternative response. Apparently, the perception of an action effect activates the associated action, thus leading to faster responses if the action is actually to be performed.

Varieties of absent-mindedness

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100 volunteers (aged 65 to 89 years) undertook a battery of tests that included a measure of fluid intelligence (Cattell, 1973), the Cognitive Failures Questionnaire [CFQ] (Broadbent et al., 1982) and three objective measures of prospective memory.

Our most striking result was for performance on the prospective memory task which involved the greatest delay (90 minutes between instruction and execution). Subjects with below median IQ scores who rated themselves as low on many of the CFQ items (i.e. they said they had few cognitive failures) performed worse than below-median-IQ subjects who rated themselves as having frequent cognitive failures. This exact mismatch between what the CFQ responses were suggesting and what the objective measure was telling us we put down to absent-mindedness (because the absent-minded individual may not sometimes be aware of their own failings).

We develop and extend this idea, identifying 3 varieties of absent-mindedness via a factor analysis of a subset of CFQ items. The first factor, 'mind-not-on-task', was characterized by such items as *Do you read something and find you haven't been thinking about it and must read it again?* Low-IQ subjects who scored low on this factor were responsible for the absent-mindedness effect we described in the previous paragraph. The second factor, 'self-monitoring', was characterized by such items as *Do you drop things?* This factor was important for predicting the prospective memory task that resembled a dual task (repeated switching between 2 subtasks). We speculate that this factor is concerned with central executive failures. The third factor, 'selective inhibition', was characterized by such items as *Do you fail to see what you want in a supermarket (although it's there)?* and *Do you lose your temper and regret it?* (i.e. failure to inhibit inappropriate inputs and outputs). This factor was important for the prospective memory task that involved switching attention from one task to a quite different task. We speculate that this factor is concerned with failures of inhibitory processes, which some researchers have seen as characteristic of ageing.

Spontaneous counterfactual thoughts and explanations.

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Counterfactual thinking refers to thinking about imaginary alternatives to reality. We will report the results of an experiment that examined the spontaneous generation of counterfactual thoughts and explanations. Little is known about *spontaneous* counterfactual thinking. Instead, most research has been based on "undoing" experiments in which participants are directed to imagine how an outcome could have been different. These studies have found consistent regularities in the types of changes people make when undoing the past, e.g., people tend to undo unusual events rather than routine events, and controllable events rather than uncontrollable ones. These findings have been attributed to cognitive constraints governing the construction of counterfactual scenarios. Are these factors also important determinants of spontaneous counterfactual thinking in everyday life? Recording spontaneous counterfactual thinking is essential to establish the generality and ecological validity of findings from "undoing" experiments. We compared the effects of outcome valence, outcome expectancy and controllability on spontaneous counterfactual thinking and explanation construction. 248 undergraduates were randomly allocated one of eight versions of a scenario about moving to a new town and attempting to make friends. The scenario varied in whether the outcome was good or bad and expected or unexpected, and in whether the preceding events were controllable or uncontrollable. Participants imagined themselves in the situations described and wrote diaries about their imagined experiences. Their diaries contained many counterfactuals (e.g., "If I had gone to that party, I would have made friends") and many explanations (e.g., "I haven't made friends because I missed that party"). Both counterfactuals and explanations were more frequent following bad outcomes, and this effect was stronger for counterfactuals. Counterfactuals were produced equally often to expected and unexpected outcomes, but somewhat more explanations were produced for unexpected outcomes. Counterfactuals were produced more often for controllable than uncontrollable events, but controllability did not affect the number of explanations. The findings suggest that counterfactual thinking and explanation are distinct, occurring in different situations and focusing on different aspects of events. However, the results are also consistent with the proposal that they are complementary processes that may both serve the function of establishing control over future outcomes.

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Assessing Cognitive Structures via Knowledge Tracking

Cognitive structures have been documented in a broad range of cognition. Knowledge tracking (KT) is a psychometric method for analyzing the dominating structure in problem solving. Prediction of empirical behavior derived from concept structures (networks of concepts and relations) form the basis of knowledge tracking. Quality of prediction is expressed by hit and error rates. These are taken to calculate the goodness of fit between the data predicted and the structures used for prediction. In this way, starting with a set of competing structures the structure may be identified that allows for the best prediction of empirically observable behavior. Knowledge tracking combines results from cognitive science with mathematical methods (i.e., Markov processes). Unlike earlier off-springs of this interdisciplinary cooperation, the central notion of knowledge tracking, i.e., concept structures, is amenable to a variety of knowledge representation schemata.

Evidence for change of representation has been collected in fields as diverse as problem solving, metaphor comprehension and developmental psychology. Despite all differences in these fields there is a clear common denominator of work related to change of representation: Cognitive structures determine what can principally be conceived in human cognition. Thus, selection of an appropriate cognitive structure is an indispensable requirement to address a problem successfully. Take the example of identifying a short-circuit in a complex electronic system. Intuitively, a cognitive structure that gives an account of the domain in terms of all conducting elements it is made of provides a good knowledge base to tackle the problem. Let us change the example: if a particular component of this system should be replaced by a more efficient one, the cognitive structure mentioned above is not helpful. In this case, it seems to be more promising to organize problem solving in terms of functional equivalence between components that may become part of the system. The goal of this contribution is to give an outline of knowledge tracking (KT) by showing how empirical data are analyzed with this method.

Remote calculations of knowledge tracking can be carried out via:
<http://cogweb.iig.uni-freiburg.de/KT/>

"Object identity properties, Object locations and Object-files: Which does selective attention activate and When?"

Yehoshua Tsal and Dominique Lamy

Previous research has shown that attention selects objects from a spatial representation. In six experiments, we investigated a new issue, the "identity-coding" question, and asked whether the representation on which selection occurs codes objects' identity properties, such as their color or shape. Our task was similar to Egly, Driver and Rafal's (1994). Subjects had to detect the presence of a target at 1 of 4 ends of two outline objects, differing in color and shape. A precue appeared at one of the four possible corners. The two objects could exchange locations between the cueing and target displays. When the objects abruptly swapped locations, there was an advantage in redirecting attention to the cued object location but not to cued object's identity properties when the cue indicated the target's most probable location (Experiments 1 & 2), whereas both object-location and object-identity effects were found when the cue specified the identity of the object in which the target would most probably appear (Experiment 3 & 4). When the objects changed locations by moving smoothly, there was an advantage in redirecting attention to the same object-file (Experiment 5) and to a new object-file occupying the cued object location, irrespective of whether or not it shared the cued object's identity properties (Experiment 6). The results suggest that object locations and object-files are mandatorily activated by attention whereas identity properties are activated only when they are task-relevant.

Abstract for the ESCP conference in Jerusalem, Israel.

Object- and Space-based attention as a function of task demands

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One of the dominant themes in attention research concerns the cues used by the visual attention mechanism to select stimuli for further processing. According to space-based theories, the attention mechanism selects a region in space and the stimuli located in this region are entered for further processing. Object-based theories propose that attention selects objects rather than spatial positions. Although numerous studies have been performed in recent years to distinguish between these two classes of theories, the issue is still debated.

Our research examines the hypothesis that selection cues may depend on the level of processing required by the task. Spatial cues are used for pre-object tasks in which responses are based on simple properties such as color and orientation. Object-based cues are used for higher-level tasks in which processing of objects is required. We use the flanker paradigm to explore this hypothesis. The results of several experiments support our hypothesis. Possible implications of our findings will be discussed.

**RESPONSES TO ABRUPT ONSET VISUAL OBJECTS: PERCEPTUAL
FACILITATION AND RESPONSE INHIBITION**

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ABSTRACT

A considerable number of studies published in the last few years have shown that abruptly onsetting visual objects (new objects) are associated with faster response times than are objects which have already been on the screen for a short time (old objects). Our paper describes several experiments investigating this effect. We report a detection task that yields a seemingly paradoxical result. The task requires observers to detect and respond to a target square. In the new objects condition, a search display of squares is briefly presented, one of which may or may not be a target. In the old objects condition, a display of squares is presented and, shortly afterwards, one of them may or may not become a target. There is a robust effect of conditions, with targets much better detected in new object displays than in old object displays. Somewhat surprisingly, however, reaction times are generally faster to the old object displays, sometimes greatly so. The detection and reaction time effects do not appear to reflect a speed/error trade-off. We present evidence that response inhibition slows reaction times to new object displays when the detection task is easy but that the effects of inhibition may dissipate before completion of a difficult detection task. The response inhibition effect overlays a general perceptual facilitation for new object displays which tends to speed reaction times to new objects.

Independent effects of age-of-acquisition and frequency-of-occurrence in visual word recognition: Evidence from Dutch

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Recently it has been claimed (Morrison & Ellis, 1995) that the frequency effect in visual word naming is an artefact of age-of-acquisition: Words are named faster not because they are encountered more often in texts, but because they have been acquired earlier in life. In a series of experiments using immediate naming, delayed naming, lexical decision, masked priming, and semantic word-associate generation, we found that frequency has a clear effect in tasks that primarily tap into the lexical system (naming, masked priming), and that the effect of age-of-acquisition is particularly pronounced in tasks that require semantic access (lexical decision, word-associate generation). The difference in naming between our experiments (in Dutch) and previous findings (in English) could be due to the fact (i) that the English findings were biased, or (ii) that pronouncing English words, due to the opaque grapheme-phoneme relations, requires more semantic mediation than pronouncing Dutch words.

The Time Course of Orthographic and Phonological Activation
of Consonants in French.

*

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Several empirical data suggested that consonants are very early computed during visual word recognition. In the Two Cycles model, Berent and Perfetti (1995) described two distinct systems for the assembly of consonants and vowels in word recognition. These two systems differ in their speed and automaticity. Consonants are first assembled by an automatic and fast initial cycle.

In a series of experiments we compared RTs in a Lexical Decision Task for French (e.g.

RANCUNE) either primed by 'r-n--n-' or by 'r--c-n-'. The 'r--c-n-' prime is both

orthographically and phonologically congruent with the target. On the contrary, the consonant

'n' in the 'r-n--n-' prime is orthographically congruent with the target but not phonologically.

Indeed the first 'n' in RANCUNE is pronounced [rɑ̃].

The data indicated that both primes are facilitory for short SOA (29 ms).

For longer SOA (57 ms) only the 'r--c-n-' prime is facilitory. This suggests that in French the early influence of consonants in visual word recognition is primarily orthographic.

Statistical analysis of the bidirectional inconsistency
of spelling and sound in Dutch*

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It has long been an established fact in the English language that performance in a variety of laboratory reading tasks (e.g., naming, lexical decision) is affected by a word's spelling->sound consistency. For example, naming the spelling->sound inconsistent word Pint (which is pronounced differently from Mint, Hint, and Lint) takes longer than the spelling->sound consistent word Loud (which is pronounced the same as all words with the spelling body OUD, Proud and Shroud).

Stone, Vanhoy, and Van Orden were the first to show that not only spelling->sound consistency of a written word affects lexical decision performance, but also its sound->spelling consistency. Thus, performance in a lexical decision task deteriorates in the case the pronunciation of the word's body has more than one possible spelling. For example, Heap's pronunciation body /i:p/ can be spelled as in Leap but also as in Deep. This is a remarkable phenomenon. A clearly visible letter string is processed more slowly, if phonology suggests that some other letter string could have been presented.

Until recently, the development of experimental stimuli was only guided by spelling->sound consistency. Stone et al's finding, however, necessitates including sound->spelling consistency. The relevance of this variable becomes all the more clear knowing that 76% of mono-syllabic words in English are sound->spelling inconsistent, whereas spelling-sound inconsistency of the same sample only reaches 33%.

Ziegler, Stone, and Jacobs (1996) performed statistical analyses on a corpus of French words. Spelling-sound inconsistency in French is low (12.4%), but sound->spelling inconsistency is rather high (79.1%), confirming that French is relatively easy to read, but rather difficult to spell.

A clear comparison of experimental effects in different languages has always been difficult, because a clear measure of consistency or, as it happens, consistencies was lacking. Stone and colleagues provided a practical tool, which was strongly theoretically motivated, to enhance our understanding of visual word perception and spelling. Our contribution to this development is the presentation of a similar statistical analysis on a Dutch corpus (CELEX).

*Freely rendered from Ziegler, Stone, and Jacobs (1996)

Abstract

Masked priming effects with syllabic neighbors in the lexical decision task

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Recent research in the visual recognition of words suggests that lexical units with higher frequency syllabic neighbors inhibit the processing of their lower frequency syllabic neighbors in the lexical decision task (e.g., bono because of boca; the Spanish for bond and mouth, respectively; Carreiras et al., 1993; Perea & Carreiras, 1997). This study was intended to explore whether or not syllabic neighborhood modulates the strength of priming effects. In order to minimize the influence of strategic processes, a masked priming technique was used. Four lexical decision experiments were conducted, one with high-frequency word primes (Experiment 1) and the other three with nonword primes (Experiments 2, 3 and 4). Word targets were always Spanish words of low-frequency. Similarly to prior research in form-priming effects, the results show some inhibition for word primes (e.g., boca-BONO; mouth-BOND; Experiment 1) and some facilitation for nonword primes (bofa-BONO; Experiments 2-3). Further, when monosyllabic pairs were used (ziel-ZINC; Experiment 3), no priming effects from the two first letters were found. When five-letter stimuli were used (Experiment 4), the previously observed facilitation was only found when primes and targets shared the first CV syllable, but not when they shared the first three letters (genir-GENES vs. genta-GENES). The results are interpreted in the context of activational models that take into account a syllabic level of representation.

Demonstrating Inner Hearing Among Highly-Trained Expert Musicians

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Experimental investigations of Musical Imagery have demonstrated that this representation is coded temporally, unfolds in real time, and involves explicitly musical stimuli. Further, that a special case exists whereby imagery is exclusively cued from musical notation. This has been referred to as *Inner Hearing*. While anecdotal evidence suggests that this skill can be developed, and that musicians do hear the printed page in their "mind's ear," this phenomenon remains to be speculative without there being evidence to show otherwise.

The main goal of the current study was to develop a cognitive paradigm to demonstrate Inner Hearing. Fifty-nine musicians (professional orchestra players, music academy students, university musicology and music-ed majors, and students from a specialist-music highschool) participated in one of three experiments. In the study subjects were presented with *Embedded Melodies*, that is, musical texts arranged as variations whereby both the notes and harmonic plan of the melodic source remain intact as scaffolding. Subjects were asked to judge if a theme (presented aurally) matched the melodic source embedded in the text (previously read silently). Three sight-reading conditions served as the independent variable - two concurrent interference conditions (Rhythmic Distraction and Articulatory Suppression) and normal un-interfered sight-reading. We hypothesized that demonstration of Inner Hearing would be possible if the Articulatory Suppression condition impaired performances, as demonstrated by significantly increased reaction times and greater number of errors.

The results indicate two major findings. Foremost, that effects of interference significantly impaired Inner Hearing. Most specifically, that the Articulatory Suppression condition impaired Inner Hearing more significantly than did the Rhythmic Distraction condition. A repeated measures one-way ANOVA demonstrated a significant effect of condition regarding reaction times [$F(2,34)=5.37, p<.01$]. Planned comparisons between the interference conditions to the normal un-interfered sight-reading condition produced a significant difference [$t=-2.75, df=17, p<.01$] for the Articulatory Suppression condition, while a significant difference [$t=-2.44, df=17, p<.025$] between the interference conditions was found. Another repeated measures one-way ANOVA demonstrated a significant effect of condition regarding error rates [$F(2,34)=11.5, p<.0001$]. Planned comparisons between the interference conditions to the normal un-interfered sight-reading condition produced significant differences [$t=3.47, df=17, p<.001$; $t=5.52, df=17, p<.0001$] for both the Rhythmic Distraction and Articulatory Suppression conditions. However, non-significant differences were found between the two interference conditions. Finally, the study underlines the existence of large individual differences among musicians regarding abilities of Inner Hearing. While many musicians could not successfully judge if themes presented aurally were congruent melodic sources of the arranged variations when presented silently as notation, they were however, significantly successful in completing this task when both Embedded Melodies and themes were presented aurally.

Effects of Need for Cognition, Text Coherence, and Prior Knowledge on Learning from Text

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The relationship between text coherence and learning from text are studied in two experiments. Britton and Gülgöz (1991) had used Kintsch's text processing model to repair coherence in texts. Their research indicated that improving text coherence leads to improved recall of the information. Kintsch (1994) argued that coherence may improve recall of information but learning requires integration with prior knowledge and therefore, learning may benefit more when a text is not fully coherent. This is because the gaps in the text would compel the reader to make connections with prior knowledge. Gülgöz (1997) suggested that making connections may also be a function of individual tendencies because making inferences to close gaps requires effort. He tested this by using the need for cognition scale (Cacioppo & Petty, 1982) to measure the tendency for cognitive activity. Gülgöz's (1997) results showed that need for cognition, text coherence, and prior knowledge affected recall independently. There was no effect of the variables on the cognitive structure test, which was more sensitive to integration to prior knowledge.

Current studies were conducted to study the effects of these variables on learning rather than recall. In both studies, the participants were given prior knowledge test, followed by either the original or the revised coherent versions of two different texts, test of learning with open-ended questions, and the need for cognition scale. There were 47 students participating in Study 1 and 34 in Study 2.

The results of MANOVA in Study 1 showed that the only significant effect was text version ($F(12, 28) = 2.73, p<.05$) where readers of the coherent text performing better. The analysis for Study 2 resulted in a main effect of text version ($F(13, 14) = 2.93, p<.05$) and an interaction of text version and need for cognition ($F(13, 14) = 3.83, p<.01$). Overall, the readers of the high-coherence text showed better performance but low-need-for-cognition readers learned more from the revised text while the readers with high need for cognition learned more from the low-coherence text. The results are interpreted from the perspective of the Kintsch model.

From Parallel To Serial Processing: A Computational Study of Visual Search

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A novel computational model of a pre-attentive system performing visual-search is presented. The model processes displays of lines, reproduced from Wolfe [1992] and Treisman's [1990] visual search experiments. The response times measured in these experiments suggest that some of the displays are searched serially while others are scanned in parallel. Our model operates in two phases. First, the visual displays are compressed via standard methods (Principal Component Analysis - PCA) to overcome assumed biological capacity limitations. Second, the compressed representations are further processed by a neural-network target detector to identify a target in the display. The model succeeds in fast detection of targets in experimentally-labeled parallel displays, but fails with serial ones. Analysis of the PCA internal representations reveals that compressed parallel displays contain *global information* that enables instantaneous target detection. However, in serial displays' representations, this global information is obscure and hence, a target detection system should resort to a serial, attentional scan of local features across the display. Our analysis provides a numerical criterion that is strongly correlated with the experimental response-time-slopes, and enables us to re-formulate Duncan and Humphreys's [1989] "search surface" using precise quantitative measures. Our findings provide further insight to the important debate concerning the dichotomous versus continuous views of parallel/serial visual search.

A Spreading Activation Account of Global and Local Harmonic Expectancy

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The processing of a target word (*nurse*) is faster and more accurate when it follows a prime word semantically related (*doctor*) than unrelated (*bread*). In a similar way, the processing of a target chord (say *C*) is facilitated when this chord occurs after a chord belonging to the same musical key (*Bb*) than belonging to another key (*F#*). Semantic and harmonic priming research illustrate the general influence of a previous context on the analyses of upcoming events. A key concern remains to understand how such priming effects occur in more ecologically valid situations involving larger contexts than one word or chord. In psycholinguistic, two potential sources of priming were distinguished: One source is located inside the mental lexicon (i.e. intralexical priming). A second source arises from the processes that integrate local structures within a coherent whole. In a similar way, we argue that harmonic context effects may result either from activation spreading through a schematic knowledge of western tonal harmony (Bharucha, 1987) or from higher level processes that integrate musical events into an event hierarchy. The present study further explores the effect of global harmonic context on the processing of a target chord in long chord sequences (Bigand, Madurell, Tillmann & Pineau, JEP: HPP, in press). Several factors were manipulated in order to further investigate both sources of harmonic priming. Expectations of a target chord were varied by manipulating the preliminary harmonic context while either manipulating or holding constant the chord prior to the target. The harmonic relationship of the prime was factorially manipulated at global and local levels. In addition, the tempo was varied from slow to fast. Neural net simulations were performed according to Bharucha's (1987) spreading activation model. Simulations generally fit well with human performances suggesting that priming effects in music result from activation spreading via a schematic knowledge of western harmony. In contrast to language, an integrative stage of processing seems not indispensable to account for global context effects.

**Priming on implicit and explicit tests of memory within and across languages:
Evidence for dissociative performance on perceptual and conceptual tasks**

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Four experiments examined how shifting the language between study and test would effect performance on implicit and explicit perceptual and conceptual tests of memory. In all experiments, half the words were presented for study in Hebrew and half in English, with encoding instructions equally divided between shallow and deep. During test, participants received either perceptual (i.e., fragment completion) or conceptual (i.e., sentence completion) Hebrew retrieval cues, under either implicit or explicit retrieval instructions. On the perceptual task, memory was observed only when language was not shifted across study and test, regardless of whether testing instructions were implicit or explicit. The implicit and explicit tests only dissociated with regard to the affects of encoding instructions, with deep encoding leading to better performance only on the explicit test. On the conceptual task, in contrast, memory was also observed when language was shifted across study and test. This effect was found under both implicit and explicit retrieval instructions, and was greater for words that were deeply encoded. The implications of these finding for theories of implicit memory as well as for proposals regarding the organization of the mental lexicon in bilinguals will be discussed.

Interference effects in implicit tests of memory.

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Interference can exert powerful effects on tests of explicit memory. In contrast, it has been claimed that it may have little or no effect on repetition priming as measured in implicit memory tests (e.g., Jacoby, 1983; Sloman et al., 1988). However, interference in an implicit memory test was reported by Nelson et al. (1989) using a word-ending completion task and lexically similar interfering words. They explained their results by assuming that word-completion tasks require lexical access, and that interference will occur if retrieval cues activate not only lexical representations of target but also of interfering words. Since the task allows only one response, this will cause a pure form of response competition. Interestingly, this may also explain the absence of interference effects in word-identification (Jacoby, 1983) or word-fragment completion (Sloman et al., 1988) tests. In these tests, each cue uniquely specifies only one word. Because the target word cues do not correspond with interfering words, no interference is to be expected.

Results will be reported showing that presence or absence of interference in implicit memory is completely dependent upon whether or not interfering stimuli fit the cues given in the test. A first study showed that interference does occur in a word-stem completion test if target and interfering words have word-stems in common. When target and interfering lists do not contain words with similar stems, a dissociation effect occurs: explicit recall suffers from interference, whereas implicit word-stem completion does not. Results of a second study show that the priming effect reduces (or, conversely, interference increases) as a function of the number of interfering words with the same word-stems. In a third experiment lists of 30, 60 or 90 words with different word stems were presented. Implicit and explicit memory performance was determined using the process dissociation procedure. Clear effects of list length on the controlled, but not on the automatic memory component were found. It will be argued that also dissociative effects of retention interval and list length on implicit and explicit memory performance, as well as some conflicting results, may be explained by an interference hypothesis.

**The Effect of Attentional Load and Depth of Processing on the Performance of
Perceptual and Conceptual Priming**
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The distinction between perceptual and conceptual priming is well documented. Perceptual priming was shown by several studies not to be affected by divided attention (DA). However, the reports on the effects of DA on conceptual priming are inconclusive. Two experiments were conducted in this study in order to test first, whether a very demanding DA task, shown previously to affect conceptual priming, would affect perceptual priming as well, and second whether deep encoding would compensate for the effect of DA on conceptual priming. As expected, the results of the first experiment ($n = 105$), demonstrated that under a demanding DA condition perceptual priming (i.e., partial word-identification) was impaired. In the second experiment ($n = 25$) it was shown that under a deep encoding condition, DA did not affect conceptual priming (i.e., category production) performance. The methodological and theoretical implications of these results will be discussed.

Priming in Free Association

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Three experiments investigated the mechanisms underlying priming in free association under implicit memory instructions. Experiment 1 investigated priming for ambiguous target words. At study targets were presented in a sentence context that biased a semantic interpretation of the target that was either congruent or incongruent with the later presented test cue. Priming (i.e., a higher proportion of target responses relative to an unstudied baseline) was obtained when target words had been presented in a congruent study context and not when targets had been presented in an incongruent study context. Experiments 2 and 3 studied priming for bidirectionally associated word pairs (e.g., BEACH-SAND) and unidirectionally associated word pairs (e.g., BONE-DOG) that, according to free association norms, have no association from the target response back to the test cue. In the study phase participants gave pleasantness ratings to the target words (e.g., SAND, DOG) for both types of word pairs. In the test phase participants generated an associate to the test cue (e.g., BEACH, BONE). In both Experiments 2 and 3 priming was found for targets that had an association back to the test cue (e.g., SAND), but not for targets for which such a backward association was absent (e.g., DOG). These results are problematic for theories that attribute priming in free association to the strengthening of target responses. We argue that priming in free association depends on the encoding of the relation between the test cue and target response at the time of study.

A Constructivist theory of consciousness: Evidence from chess players' thinking

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Constructivism has become one important direction of content-oriented psychology. It is important in many fields of social, educational and clinical psychology. Its basic assumptions are relatively simple such as seeing representation formation as the integration of external and internal knowledge, understanding and thing are central requirements of learning, learning is situated etc. These framework has arisen much interest in considering education and clinical problems but it seems to be also very effective in analysing some less applied problems. Here, I shall be interested in applying the constructivist framework for the analysis of consciousness in the context of chess players' thinking.

It can be experimentally demonstrated that chess players can be fully aware of the perceptual contents without having any idea about the solution. All elements are fully visible, but no conscious experience does emerge. This means that apperceptive processes characterised by external information integration with internal conceptual knowledge are crucial in human becoming conscious of something. It will be argued in the ground of empirical evidence that conscious experience cannot be achieved without apperception and its information integrating function. Mere perception is insufficient to result into conscious experience. Since apperception is a typical theoretical concept with constructivist underpinnings, the arguments presented in this paper illustrate that contents and content specific processes are essential in any serious analysis of human consciousness.

PATTERN CLASSIFICATION LEARNING AND GENERALIZATION ACROSS THE VISUAL FIELD

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The classification behaviour of human observers with respect to compound Gabor signals was tested at foveal and extrafoveal retinal positions. Classification performance was analyzed in terms of a probabilistic classification model recently proposed by Rentschler, Jüttner and Caelli (1994, *Vision Res.*, 34, 669-687). The analysis allows inferences about structure and dimensionality of the individual internal representations underlying the classification task and their temporal evolution during the learning process. Using this technique it was found that the internal representations of direct and eccentric viewing are intrinsically incommensurable in the sense that extrafoveal pattern representations are characterized by a lower perceptual dimension in feature space relative to the corresponding physical input signals, whereas foveal representations are not (Jüttner and Rentschler, 1996, *Vision Res.*, 36, 1007-1022).

We then addressed the question as to what extent observers are capable to generalize class concepts that have been acquired at one particular retinal location to other retinal sites. We found partial generalization with respect to spatial translation across the visual field. Moreover, there is, in the case of extrafoveal learning, a distinct asymmetry in performance with respect to the visual hemifield in which the signals were originally learned. The latter finding can be related to functional hemispheric specialization in pattern learning and recognition.

HOW DO WE RECOGNIZE PROPER NAMES: DO CAPITAL LETTERS MATTER?

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In the present study we compared lexical decision times to common and proper names in different experimental conditions, varying both the orthographic format of the string (all capital, all plain, first letter capital) and list composition (mixed and pure blocks). The results revealed a general effect of noun category. Responses to proper names were significantly faster than responses to common nouns. We further investigated whether the privileged access to proper names is due to the structural organization of the lexicon in which proper names are represented separately as a limited subset of nouns, or alternatively because a marker for the initial capital letter is specified at the level of the abstract graphemic representation of proper nouns.

The color of words: The comprehension of perceptual metaphors

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Many metaphors (not dissimilarly from caricatures) use the expressive properties of events and things that surrounds us for giving names to mental contents. The aim of this study was twofold: 1. to investigate the extent to which subjects presented with linguistic metaphors that used color labels (e.g., "yellow") to refer to mental subjective states were able to assign a figurative interpretation in a consistent way; and 2. whether subjects used the perceptual information provided by a color or only an abstract-conceptual representation of it during the comprehension process.

In Experiment 1, subjects were presented with short excerpts from a Virginia Woolf's novel (*The Waves*) that contained a color label used metaphorically to refer to a character's subjective experience. They were asked to provide an interpretation of the content of each of the excerpts and rate the extent to which it was comprehensible, good and innovative. In a second experiment, subjects were presented with two sets (a & b) of the previously presented metaphorical excerpts (a. easy to understand vs. b. complex to understand). The written presentation of each metaphorical excerpt was paired with the visual presentation of five different shades of the color mentioned in the excerpt (e.g., of yellow). The task of the subjects of Experiment 2 was to select, for each excerpt, the shade of color most appropriate to express the mental state intended by the writer. In Experiment 3, subjects were instead asked to rank, for each excerpt, the five shades according to their level of appropriateness with respect to the writer's intention.

Results are discussed in a framework according to which one of the main functions played by metaphor is to provide a way to filling the gap between the complexity of the perceptual world and the limitations of our literal repertoire to mean it. To capture the experiential complexity of the world we live in, language has to be "stretched" and hence used metaphorically to increase its descriptive and communicative force.

The subjective monitoring of one's own knowledge

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Cognitive processes are normally accompanied by metacognitive operations that supervise various aspects of these processes. Thus, we subjectively monitor the state of our knowledge, and we do that routinely during learning, during the search of memory for a solicited answer to a question, and following the successful retrieval of a candidate answer. Because these subjective assessments have measurable effects on behavior, it is important to examine their accuracy as well as the processes that lead to them. In this talk I will focus on the feeling of knowing often experienced when people fail to retrieve a solicited target from memory. It will be argued that such feelings are based on nonanalytic inferential processes rather than on direct access to memory traces, and that their accuracy is a by-product of the accuracy of memory itself. Because people have no direct access to the accuracy of their feelings of knowing, they normally control their actions according to such feelings even when these lack any validity.

More generally, it will be argued that the study of metacognitive processes discloses a unique, "crossover" function of subjective experience: that of mediating between implicit-automatic processes, on the one hand, and explicit-controlled processes, on the other.

Phonological activation in pure alexia

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Pure alexia or « letter-by-letter reading » is a disorder that impairs reading while sparing other language abilities in premorbidly literate adults. The hallmark of pure alexia is the word length effect : Pure alexic patients take an abnormally long time to read single words and the time they take increases linearly with every additional letter. According to a recent interpretation, pure alexia would be due to problems in accessing phonological information from printed words. We tested this hypothesis with EL, a pure alexic patient. EL showed no phonological or lexical effects in a letter identification task. However, she exhibited such effects in a naming task. These results suggest that, even though impaired, the reading system of EL is able to compute phonology from orthography to some extent. However, activation in the reading system of the patient seems too weak and/or unreliable to support the occurrence of lexical effects in tasks that do not explicitly require orthographic and phonological information to be activated (letter identification task).

Differences in Hemispheric asymmetry between dyslexic and normal children on a lateralised sentence priming-lexical decision task

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The present study used an experimental paradigm that combined sentence priming, lexical decision and visual hemifield stimulation to investigate the relationship between dyslexia and linguistic processing by the two hemispheres. The design was based on previous findings indicating that left hemisphere (LH) superiority for word recognition in normal adults is enhanced when high constraint sentences are used as primes. We predicted that deficits in LH processing associated with dyslexia will be more pronounced when dyslexics are attempting to utilize the information contained in the priming sentence for word recognition. Consequently, LH superiority for word recognition in a high constraint versus a neutral, low constraint, sentence context will be reduced, or even reversed, in dyslexic as compared to normal children. Eighty eight right handed children (13-14 years old), half males and half females, participated in the study. Forty four children were diagnosed as dyslexic and forty four were normal readers and served as a control group matched for age, sex, and IQ. The results generally confirmed the main hypotheses and provided strong support for a LH deficit model for dyslexia, but only in males. Dyslexic males showed larger left visual field-right hemisphere (RH) advantage for target word recognition when the words followed high constraint as compared to neutral priming sentences. Thus, for male dyslexics, sentence context facilitated word recognition mainly in the RH, indicating a reversal of hemispheric asymmetry for high level linguistic processing in this group. In contrast, the present study's findings for normal male participants generally replicated those of our previous study by demonstrating a larger right visual field-LH advantage for target word recognition when the word followed high constraint as compared to neutral priming sentences. For normal and dyslexic females we found no difference between the visual fields in using sentence constraint to facilitate word recognition. These findings suggest that dyslexia in males moderates the classic LH superior performance of high level linguistic tasks. Issues related to the high level linguistic deficits underlying dyslexia are discussed and the lexical decision-sentence priming paradigm is recommended as a promising means of exploring these issues.

**Formal lexical paraphasias in a single case study:
Where 'masterpiece' becomes 'misterpieman' and 'curiosity' 'suretoy'.**

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In this study, we report the case of a global aphasic, DW, who, in writing to dictation, produces mostly formal lexical errors. That is, she substitutes one word for another word and her errors are either phonologically/orthographically related to the target (e.g., wine>wide; chains>changes) or morphologically related (hunting>hunter; clip>clips), but not semantically related. Formal lexical errors are common in aphasic patients as the consequence of an input problem, but they are rarely reported as a consequence of output problems. Only three recent studies have described patients making a high proportion of these errors, but they are in spoken production and are associated with semantic errors (MF: Best, 1992; RB: Blanken, 1990; and NC: Schwartz, Saffran, Block & Dell, 1994). DW makes a similar proportion of formal lexical errors and there is evidence that these are output errors: she is almost perfect in phonological discrimination, auditory lexical decision, and spoken letter/written letter matching; moreover, in spite of evidence that her word repetition is lexically mediated, here she makes different kinds of errors.

DW's formal word errors are generally quite closely phonologically/orthographically related to the target. The most interesting feature of her performance, however, is the fact that although the great majority of her errors have a lexical basis (72%), a good portion of these errors results in non-existing words. This is most clearly shown with compounds where, by making a lexical substitution to one or both of the two words, she produces a nonsensical combination (e.g., grandson>gatesons; butterfly>butterfield). However, she also occasionally substitutes a mono-morphemic word with a combination of words (e.g., moustache> mousehart; > toaster >takespear;). Her morphological errors, show the same tendency since she produces both pseudo-inflectional (e.g., weaker>weakens) and pseudo-derivational errors (e.g., antelope> anteloper).

We rule out a number of possible explanations as the source of DW's lexical errors. First of all, their sheer number rules out that they are non-word errors like others which result in real words by chance. The severity of her dysgraphic impairment also makes it unlikely that they result from the normal influence exerted by existing lexical representations on output (as suggested in the case of the errors made by normals; see Ellis, 1985). The fact that she makes many errors which are lexically based, but which are not real words also rules out the hypothesis of output editor which allows real words but not non-words to go through the system (Buckingham, 1980). Finally, we think that the lack of semantic errors makes it unlikely that her errors arise because of an access problem from the semantic system to an output lexicon (Butterworth, 1992). Instead, we will advance the hypothesis that DW's impairment results from too much activation in the orthographic lexicon without proportional inhibition. This will account both for her lexical and non-lexical errors. Implications for lexical models will be discussed.

Phonological sensitivity varies as a function of speech manipulation skills in deaf children

Catherine Transler*, Jean-Emile Gombert**, Jacqueline Leybaert***

For a decade, authors unanimously consider that phonemic awareness development and alphabetic development are concomitant; both interact in synergy (Content, 1991; Morais, Alegria, Content, 1987). This phonemic awareness has linguistic and metalinguistic precursors that interact in a complex manner to form structured representations of spoken language. One of these precursors is the phonological sensitivity (Gombert, 1990; Morais, Mousty, 1992). Observing severe and profoundly deaf children enables to study reading processes when phonological development has been early disturbed because of the lack and deformation of phonetic inputs. In this framework, we aimed at studying if deaf children's abilities to perceive and produce speech influences their decoding processes.

Twenty-one severe and profoundly prelingual deaf children were matched on lexical level with 21 hearing children (grade 2 and 3). Three pseudo-words (target plus two tests) were presented on each page of a booklet. One test item had a greater phonological proximity with target than the other. Both test items had the same visual proximity with target (same number and localisation of letters in common) except in one condition. Subjects had to surround the test item that was « the more » like the target.

Hearing children chose test items that were phonologically similar to targets more often than chance level. However when visual proximity was higher for non phonologically congruent test item, children made random choices (homophonic condition II: *lemme*, *laine*, *lumme*; the homophone '*laine*' shares less letters with target than non homophone item '*lumme*'). Deaf children with high level of spoken perception and production showed higher scores of phonological devices than other deaf participants. The improvement of experimental scores with level of oral skills was striking in an homophonic condition (when visual proximity between tests and target was equal: *kyse*, *kise*, *kyne*) and in a condition with open syllables (e.g. *baru*, *barand*, *bardan*).

The abilities to perceive and also to produce speech seem to enable deaf children to do grapho-phonemic conversion in reading. Those results offer new perspectives concerning the study of visual, kinaesthetic and articulatory skills than can help phonological sensitivity to develop in the quasi-absence of phonetic inputs.

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Phonological representation and speech understanding in deafened adults

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Phonological representation in a group of deafened adults were examined and compared with a matched normal hearing control group. The results revealed that the deafened adults' phonological representation deteriorates as a function of absence of external auditory stimulation. Specifically, this group perform at a significantly lower level on cognitive tasks that explicitly require phonological processing, whereas there are no differences between the groups when the requirements of phonological processing are less explicit. A correlation analysis indicates a significant negative relationship between the quality of the phonological representation and duration of deafness and also the quality of overt speech. Further analysis demonstrates that it is possible to obtain a normal skill level in speechreading without an intact phonological representation, whereas an intact representation is required for auditory speech understanding with cochlear implants. The results will be discussed with respect to (a) deterioration in phonological representation as a function of absence of external auditory stimulation and (b) the role of phonological representation in speechreading and speech understanding with cochlear implants.

Additivity in Interference of Unattended Information

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Abstract

In two experiments we examined dimensional interactions with three-dimensional stimuli, using a speeded classification task. Experiment 1 examined interactions among three auditory dimensions—spoken word, pitch, and position, and Experiment 2 examined interactions among three visual dimensions—word, brightness, and vertical position. Participants classified values on one dimension while either one irrelevant dimension was held constant and the other varied orthogonally, both irrelevant dimensions varied orthogonally, or both irrelevant dimensions were held constant. In general, response times were greater with variations in one or two irrelevant dimensions, compared to baseline (Garner interference), and were greater with incongruent rather than congruent combinations of attributes (congruence effects). Performance depended on only the congruence relationships between the relevant dimension and each of the irrelevant dimensions, and not on the congruence relationships between the irrelevant dimensions themselves. An additive multidimensional model accounts well for the patterns of both Garner interference and congruence effects.

Lateral Prefrontal Cortex involvement in the Stroop effect

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Researchers have suggested that the left frontal lobe is involved in selective attention in word processing. Stroop task experiments produced mixed results. We examined interactions between color and word attributes in patients with lateral prefrontal brain injuries and age matched controls. Subjects responded, either manually or vocally, to a central color patch flanked by a Stroop stimulus. Flanker color and word attributes affected both vocal and manual responding to color patches. Patients with left frontal brain injury showed an increased flanker word effect but no such increase for the flanker color. This augmented word effect was present when subjects responded vocally. These results support the suggestion that the lateral left prefrontal cortex is involved in selective control of word processing. In addition, the results are inconsistent with translational models of the Stroop effect.

PERFORMANCE ON THE EMOTIONAL STROOP TASK IN NORMAL
SUBJECTS: THE EFFECT OF WORD FRAGMENTATION LEVEL

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The intrusion of unattended information was investigated using the emotional Stroop task. Positive and negative emotional words, neutral stimuli, and congruent and incongruent color words were presented in blue, green and red inks at four fragmentation levels (level 2 corresponded to the most fragmented stimuli while level 8 was the normal word). Implicit and explicit memory for emotional words were also assessed using word-fragment completion and free recall tests. Irrelevant emotional positive and negative words interfered more with color naming than neutral words. Furthermore, RTs for both positive and negative emotional words increased linearly as a function of the level of fragmentation of the word. That is, interference was larger as the word fragmentation increased and the emotional word appeared more completed. Incongruent color words interfered the most while performance with congruent color words was facilitated. These results suggest the role of semantics on the emotional Stroop interference effect. Moreover, level of fragmentation does not influence color naming of neutral stimuli. The implicit memory test showed priming for positive but not for negative emotional words. On the other hand, free recall for both types of emotional words did not differ. The present findings suggest that while both types of emotional words are equally retrievable under explicit conditions, a kind of unconscious perceptual bias occurred for negative words under implicit conditions.

*Length and size perception in unilateral neglect:
Compression or magnification?*

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Spatial neglect has been explained as an impairment in the representation of extrapersonal space. Milner and Harvey (1995) have proposed that the representation of the affected side is compressed but not completely lost. Thus, in size judgment tasks, neglect patients consistently underestimate the size of contralesional relative to ipsilesional stimuli. The present study tested this account and demonstrated that when the to be judged stimuli are small (up to 1 deg of visual angle) our neglect patients consistently overestimate the size of contralesional stimuli. However when the size of the stimuli is large (3 to 4 deg of visual angle, similar to Milner & Harvey's stimuli) they underestimate the size of contralesional stimuli. Therefore, the account of compression of representation can not provide a full explanation for the results of the present study. We discuss a possible explanation for the opposite trends we obtained in the present study and the implications for some of the competing theoretical accounts of unilateral visual neglect.

Milner, A.D. & Harvey, M. (1995). Distortion of size perception in visuospatial neglect. *Current Biology*, 5, 85-89.

SELECTIVEINHIBITIONOFIRRELEVANTINFORMATIONINANXIETY

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Abstract

The aim of the present study was to determine whether experimentally induced anxiety could influence inhibitory mechanisms in selective attention.

Anxious subjects would have specific difficulties in responding to stimuli when negative stimuli distractors are present, appearing to be unable to efficiently inhibit the irrelevant information. This hypothesis refers to Williams, Watts, MacLeod, and Mathews's (1988) model of clinical psychopathology, in which attentional biases associated with anxiety and depression are defined, and to Houghton and Tipper's (1994) model, in which inhibitory mechanisms in selective attention are described.

The attentional bias in anxiety for emotional information was studied with a modified Stroop task. The paradigm consisted in desynchronizing presentation of the semantic and chromatic components of the Stroop task by initially presenting a word printed in black, and after a varying delay (60ms, 120ms or 240ms), one among four colors (pink, green, blue, or red) is randomly superimposed on this same word. Subjects were asked to read silently the prime word and then to ignore this word and to name the color. Separating the color and the word stimuli made it possible to vary the time interval between the presentation of the word stimulus and the presentation of the color stimulus. This method allowed us to examine the time course of inhibition effects and permitted to demonstrate that subjects progressively applied inhibition of the distractor, following an increase in ISI, which reduced interference to control level. Consequently, we hypothesized that anxious subjects should apply inhibition of negative information more slowly than control subjects.

Firstly, the attentional bias in experimentally induced anxiety subjects was found for negative words, but also for positive words. This result supports previous findings (e.g. Mogg & Marden, 1990). Secondly, the main result indicated that color-naming interference increased up to an ISI of 120 ms, and then decreased. This result partially supports our hypothesis that the inhibition of a prime should be facilitated by an increased ISI. However, a further analysis of the time course of inhibition effects will bring arguments to base a model of the relationships between cognitive processing and emotional processing.

On the complexity of learning in simple tasks: the case of lexical decision.

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It is frequently assumed that if subjects are able to apply a learned process to new stimuli, the acquired knowledge is in a form of an abstract rule (e.g., Singely & Anderson, 1987; Novick & Hmelo, 1994; Anderson & Fincham, 1994; Whittlesea & Dorken, 1993). By contrast, the absence of transfer to new stimuli is taken as supporting the hypothesis that the acquired knowledge is represented in terms of specific exemplars (e.g., Logan, 1988; Lassaline & Logan, 1993). The present study attempts to evaluate the relative role of both learning mechanisms, by using different transfer tests.

In the learning phase subjects practiced the lexical decision task under an episodic priming paradigm. Thus, they practiced associating prime-target pairs taken from originally unrelated categories (e.g., Almonds-Cousin; Mexico-Forehead). After estimating learning by fitting power functions to learning curves, subjects had to perform various transfer tasks. The results show that even in a relatively simple task, learning is composed of various elements, each affecting performance in the transfer test. The importance of decomposing the learning task into the component elements in order to understand learning and transfer processes, is discussed.

Implicit sequence learning is related to automatic sequential effects in random serial reaction-time tasks.

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To understand the nature of the underlying mechanism of implicit sequence learning we have made use of the knowledge obtained from earlier work on sequential effects in random serial RT tasks (e.g. Soetens, 1998). In general, sequential effects in random serial tasks with spatially compatible mappings and short response-to-stimulus intervals (RSI) are caused by an automatic mechanism, whereas with long RSI or incompatible mappings they are caused by a strategic mechanism (Bertelson, 1963; Soetens, Boer, & Hueting, 1985). In a series of experiments using a four-choice, two-response spatially compatible design participants reacted to series of stimuli with a built-in grammar. Stimuli were presented on the corners of an imaginary square with left-right as the relevant stimulus dimension. Implicit learning effects were assessed by introducing blocks with random sequences near the end of the experiment. With the introduction of random sequences we found a significant increase in RTs with a short RSI, but not with a long RSI. The results indicate that implicit learning is related to the automatic and not to the strategic mechanism that causes sequential effects. The automatic nature of implicit learning in short RSI conditions was further supported by a shift in the locus of the 'repetition effect' from a stimulus- to a response-related effect with practice, and vice versa from a response- to a stimulus-related effect when random sequences were introduced. Similar shifts of the repetition effects have only been observed in previous studies in random serial tasks with RT patterns typical for automatic processes (e.g. Rabbitt, 1968). Finally, the stimulus-related repetition effect was larger for unpracticed than for practiced sequences within the random sequence blocks. In contrast to the inconsistent results in studies using a dual-task paradigm to study the influence of attention on implicit learning (e.g. Cohen, Ivry, & Keele, 1990), the present data unequivocally support the general conjecture that implicit learning is of an automatic nature.

Sequential learning in SRT tasks might not be what it is supposed to be

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In a serial reaction time (SRT) task, a sequence of actions is performed by responding to a sequence of stimuli. If there is some kind of rule, redundancy, or structure in the succession of stimuli/responses, reaction time (RT) decreases faster than if stimuli/responses follow each other at random. Obviously, subjects learn something about the sequential structure of stimuli/responses.

Besides the question of which structural features are learned in the end, one of the issues most frequently debated is whether sequential learning is based on the structure of the stimulus sequence (S-S learning) or on the structure of the response sequence (R-R learning). In the present paper, we will consider yet another alternative which has largely been ignored so far.

As voluntary behavior inevitably requires an anticipation of behavioral effects (e.g. William James, Edward Tolman), it can be assumed that there is a fundamental learning mechanism which associates actions with their contingent effects. Although behavior in an SRT task is not purposive in the usual sense, nevertheless the (re)actions produce external effects as they trigger the presentation of the next stimulus. Thus, it might be that R-S learning instead of S-S or R-R learning underlies the structure-specific RT-effects in SRT tasks (cf. also Zießler, in press).

Several experiments will be reported where in an ordinary SRT task the (re)actions produce redundant external effects in addition to triggering the next stimulus. The contingency of the action-effect relations as well as the delay of the effects are varied. The results reveal that contingent action-effect relations are learned and that they remarkably improve sequential learning if the effects appear immediately after response execution. The results are discussed with regard to the question of whether SRT tasks are an appropriate method for analyzing the learning mechanisms underlying the continuous adaptation of behavior to structural constraints in the environment.

Zießler, M. (in press). Response-effect learning as a major component of implicit serial learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*.

**The effect of the response-stimulus interval (RSI) on learning in serial reaction tasks:
The delay of the response effect impairs implicit learning**

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There is new evidence that implicit learning in serial reaction tasks (SRT) is based on response-effect learning (Ziessler, 1998). Instead of learning stimulus or response sequences, participants learn which stimulus (as an effect) will follow the response to the previous stimulus. Therefore, the response-stimulus interval (RSI) could be crucial for learning.

In different SRTs the RSI was varied from 0 to 1000 ms.

In the first task, participants responded to three regular stimulus sequences of different complexity with the same response sequence. Regarding the response-effect relations, two sequences were more complex than the third sequence. Thus, stimulus-sequence learning should result in different learning effects for all sequences, response-sequence learning should make no difference between them. Response-effect learning should produce greater learning effects for the sequence with simple response-effect relations and smaller (but identical) effects for the other two sequences. Indeed, with the shortest RSI clear evidence for response-effect learning was found. For longer RSIs, learning effects increased and the differences between the three sequences disappeared. The data pattern changed from evidence for response-effect learning to evidence for response-sequence learning. This was accompanied by increasing explicit knowledge, notably of the response sequence. Presumably, the longer RSIs enable more explicit sequence learning.

Increasing explicit learning with increasing RSIs should be less important in the second SRT with random stimulus and response sequences. The task had a search component. The location of each stimulus among irrelevant stimuli could be predicted from the identity of the preceding stimulus as well as from the last response. Learning of these relations should facilitate responses. The learning effects depended again on the response-effect relations. Contrary to the first task, the greatest learning effects were found with an RSI of 0 ms. Longer RSIs reduced learning effects. The amount of explicit knowledge was rather negligible for all RSIs.

Altogether, the experiments provide evidence for response-effect learning as a major component of implicit learning. Implicit learning is facilitated if the next stimuli follow immediately to the responses. Longer RSIs impede implicit learning but enable explicit learning of the response sequence, which was only possible in the first task.

Effects of additional load on serial pattern learning

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In an attempt to understand in greater detail the properties of the mechanisms underlying serial pattern learning we used a dual task paradigm: The primary task was the same as was used by M. Zießler (see his abstract). Subjects responded to three regular sequences of stimuli of different complexity. In addition subjects had to monitor sequences of acoustic events and count high-pitch tones while ignoring low-pitch tones. The major manipulation concerned the overlap between the primary and the secondary task. The tones were either displayed in the interval between stimuli and responses (before responses) or in the interval between responses and succeeding stimuli (after responses). This manipulation was motivated by considerations suggesting that serial pattern learning may be based on response-effect learning. Instead of (or in addition to) learning of redundancies in the sequences of stimuli or responses subjects learn which stimulus will follow (as a distal effect) the response to the previous stimulus. With this view the point in time of the presentation of the distractors might be crucial for learning to occur. When being displayed after the response before the presentation of the next primary task stimulus the tones might be effective as additional, yet, random effects of the response. This might impair the learning of the systematic relations between responses and forthcoming primary task stimuli. With tones appearing before the response no such interference would be expected. Results: Contrary to the expectations we obtained larger learning effects when distractors were presented after the response than when they were displayed before the response. This corroborates similar previous findings with a different paradigm and seems to suggest that serial pattern learning is essentially bound to processes underlying the preparation of actions.

NAMING AND CATEGORIZING PICTURES:

TIME COURSE OF SEMANTIC AND PHONOLOGICAL PRIMING

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We report a series of naming and categorisation experiments in which a masked priming paradigm was used with different prime exposures. Our aim was to study the time-course of semantic and phonological priming in naming and categorising pictures.

Current theories of picture and word processing proposed that naming a picture involves activation of some form of semantic representation before the name of the object is accessed. Naming a word, however, requires only visual recognition before accessing its name at a lexical level. These differences in processing explain why words are faster to name than pictures. In contrast, categorisation is supposed to be faster for pictures than words. Pictures' semantic access is direct, whereas a word usually needs some phonological-lexical activation before accessing its meaning (Bajo, 1988; Glaser & Glaser, 1989; Smith & Magee, 1980).

Priming paradigms have been widely used to study access to different types of representations (Ferrand et al, 1994; Starreveld & La Heij, 1996). Variations on the type of prime-target relation and of the time interval between the prime and the named target allow assessment of the time needed to access the different levels of information involved in picture and word processing. In different experiments we manipulated the type of prime (word or picture) the relation between prime and target (semantic and phonological) and the type of task (naming and categorisation) at different prime exposure times. Results showed that in picture naming and with short prime exposures, priming effects were phonological in nature. At 50 ms. prime exposures, priming effects were present if the prime and target were phonologically related or if the prime represented the name of the target. When prime and target were semantically related priming effects were absent at 50 and 75 ms. Surprisingly, at 100 ms. exposure, the presence of a related prime slowed down naming responses. This interference effect also seems to depend on phonological competition between related primes and targets. In contrast, in picture categorisation, this interference effect was not present. The pattern of results is discussed in the context of current models of picture processing.

Subliminal Semantic Priming Revisited:
Category Compatibility Effects of Picture Primes.

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A series of experiments examined the effects of briefly presented picture primes (preceded and followed by a pattern mask) on semantic categorization responses to word targets. "Living thing" versus "artefact" decision making was faster and more accurate when the picture prime belonged to the same response category as the target word. No difference was found between primes that were nominally identical to word targets (e.g., the picture of a lion followed by the word LION) compared to nominally different primes from the same category (e.g., the picture of an ELEPHANT followed by the word LION). Responding was at chance level when target words were replaced by a series of Xs and subjects asked to respond "living thing" or "artefact" to the same masked prime stimuli in a two-alternative forced-choice task.

The effect of prime letter search on semantic and associative priming

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Elimination or attenuation of the typically robust priming effect is observed when subjects are asked to perform a non-semantic task, such as letter search, on the prime. This phenomena, entitled the prime task effect, is troublesome for views which claim that the priming effect reflects an automatic process and therefore is insensitive to allocation of attentional resources. However, some proponents of the automatic priming effect view, argue that this effect is dependent upon the type of relationship between prime and target. Yet, debate still rages over the specific type of relationship, semantic or associative, that is involved in automatic priming. The aim of the present study was to investigate whether a letter search task affects semantic and associative priming differently.

Our study employed the semantic priming paradigm, short SOA (300 ms), and semantically or associatively related word pairs. When subjects were asked to search the prime for a letter, no priming effect was found for either semantic (e.g., cucumber-carrot) or associative (e.g., rabbit-carrot) related targets. In contrast, when the prime was silently read there was a significant priming effect for both types of targets. Moreover, the effect was largest for the associative pairs. These results indicate that the prime task effect disrupts priming even at short SOA which is presumed to reflect automatic processes. In addition, the elimination of priming occurs regardless of the type of prime-target relationship. The current findings further strengthen the claim that automatic priming processes rely on attentional resources. Furthermore, these findings contrast with current claims that automatic associative priming does not reflect the organization of semantic knowledge in memory, but, rather, the co-occurrence of lexical forms.

Priming Effects in Perceptual Identification are Automatic

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Three experiments investigated the influence of strategies on associative priming in a perceptual identification task. The four field paradigm of Evett and Humphreys (1981) was used in which prime-target pairs are briefly presented and masked. With this procedure the proportion of correctly identified targets is usually higher for associated pairs than for unrelated pairs. Experiment 1 showed that this priming effect was not affected by the proportion (.90 vs. .10) related pairs. In Experiment 2 we obtained priming for strong associates, but not for weak associates and nonassociative semantic word pairs. In Experiment 3 priming was obtained for mediated word pairs. These results show that priming in perceptual identification is the result of automatic processes and is not affected by strategies.

Title. Semantic Negative Priming in Spanish and English: No effect of Eccentricity.

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Abstract:

Ignoring one stimulus leads to an impairment in processing semantically related information afterwards (semantic negative priming). For instance, Fuentes and Tudela (1992) reported that Lexical Decision responses to words, displayed at the centre of the screen, were slowed when they were semantically related to a previously ignored parafoveal word. In their procedure, two words were displayed in the prime display: a target (displayed in the fovea) and a distractor (displayed to the right or to the left of the centre). After 850 ms SOA, a single central word or nonword was displayed and subjects performed a Lexical Decision Task on this target. Compared to a control condition, in which the probe word was unrelated to either the prime target and distractor, responses were faster when the probe was related to the prime target (semantic Positive Priming, PP), and slower (semantic Negative Priming, NP) when it was related to the prime distractor. This NP effect was only observed when the prime distractor was displayed close to the central target. However, Chiappe and MacLeod (1995) have argued that there is no evidence to support the existence of such a semantic NP effect.

The aim of this research was twofold: First, to replicate the semantic NP effect, and second, to explore the effect of distractor eccentricity on NP. In our procedure both target and distractor in the prime display were presented parafoveally, and the probe was presented at the centre. Subjects were instructed to pay attention to the cued prime word (target) and to ignore the other word (distractor). Target-Distractor eccentricity was manipulated across four experiments, with Spanish and English material, and in the Horizontal and Vertical axes. RTs were faster when the probe word was related to the previously attended word (PP) and slower when it was related to the previously ignored word (NP). Interestingly, the NP effect was independent of target-distractor eccentricity in both horizontal and vertical axes. Thus, we can conclude that it is relative target-distractor activation, not distractor eccentricity, that produced the decrease in the NP effect reported by Fuentes and Tudela (1992).

Orthographic and phonological features of the radicals in the recognition of kanji characters.

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The study tried to show the differential effects of the position of the radical types in the structure of the characters to the recognition of the kanji characters. In a series of experiments the authors have shown that properties of the radicals which compose complex kanji characters structured in two vertical radicals (this structure is the most frequent one in complex kanji) affect the ease of kanji recognition. In radical migration experiments the right radical, which tends to be used for coding phonological information, showed a stronger tendency to migrate perceptually, and this was interpreted as an indication of an earlier or stronger effect in recognition. The results obtained in these radical migration experiments can be interpreted in two ways. The first is in terms of the differential effect of the radical types in character recognition: the left radical tends to offer semantic information, the right one phonological information. The earlier activation of the right radical could depend on an earlier activation of the phonological information in character recognition. The second interpretation of the asymmetry in processing of the two radicals would be of attentional type. The two radicals of a complex character of the type used are different in their distribution: given the statistical properties of the distribution, for character identification it is more effective to select a right radical than a left one. The experiments described in the paper have tried to relate the statistical properties of the distribution of the radicals to the differential ease of the recognition of the kanji. A number of experiments have been carried out: they included radical migration studies and naming experiments. They have shown that it is possible to describe the results in terms of the statistical distribution of the radicals. These results have allowed to show the importance of the distributional properties of the radical in the knowledge people have about the characters.

**Orthography Shapes the Perception of Speech:
The Consistency Effect in Auditory Word Recognition**

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Inconsistency in the spelling-to-sound mapping hurts visual word perception and reading aloud (i.e., the traditional consistency effect). In the present study, we found a consistency effect in auditory word perception: Words with phonological rimes that could be spelled in multiple ways produced longer auditory lexical decision latencies and more errors than words with rimes that could be spelled only one way. This finding adds strong support to the claim that orthography affects the perception of spoken words. This effect was predicted by a model that assumes a coupling between orthography and phonology that is functional in both visual and auditory word perception.

Syllables as processing units in spoken Italian

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To date, most researchers agree that spoken word recognition is a fast process which initiates as soon as the listener receives the initial fragment of the to-be-recognized-word. This initial fragment activates a number of lexical candidates in the mental lexicon, among which the target word will eventually be selected (Marslen-Wilson, 1987; McClelland & Elman, 1986). Even though the general characteristics of this process are agreed upon, many aspects are still under debate. In particular, there is no agreement at present as to what counts as the appropriate fragment which can establish the initial contact with the lexicon. Existing hypotheses include, for instance, phonemes (Pisoni, Luce, 1987) and demisyllables (Samuel, 1989). One influential hypothesis in the perception of spoken language holds that speakers/listeners of Romance languages, such as French, Spanish or Italian, rely on syllabic units to segment speech and initiate lexical access (Mehler, Dommergues, Frauenfelder, & Segui, 1981). Available evidence, however, is rather indirect as it typically shows listeners' sensitivity to syllabic structure in various types of monitoring tasks, but provides no indication as to whether syllabic information is employed to either segment speech or access the lexicon (or both) (Pallier, Sebastian-Gallès, Feiguera, Christophe, & Mehler, 1993; Tabossi, Collina, Mazzetti, & Zoppello, submitted). Moreover, according to the syllabic hypothesis any syllable, regardless to its informativeness, duration, etc. should be equally efficient as a perceptual unit. In the present study, four cross-modal, lexical decision experiments test the predictions of the syllabic hypothesis with respect to the process of lexical access in Italian. The results suggest that various characteristics may determine whether syllables can be used by Italian listeners to access the mental lexicon and call for a reconsideration of the hypothesis.

SYLLABLE FREQUENCY AND BOSS FREQUENCY IN VISUAL WORD RECOGNITION IN SPANISH

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To recognize a printed word it is necessary to establish a connection between the sensorial analysis of the input and a representation in our mental lexicon. Several models of visual word recognition have assumed that some kind of sublexical analysis is necessary to reach the lexical access successfully. Thus, a number of studies have been devoted to the investigation of what sublexical units are functionally relevant. Several investigations in Spanish have found that the frequency of syllables in words influences lexical access. Moreover, frequency tends to delay RTs and/or to produce more errors for words with high-frequency syllables (e.g. Álvarez, Carreiras & de Vega, submitted; Carreiras, Álvarez & de Vega, 1993; Domínguez, Cuetos & de Vega, 1993; Perea y Carreiras, in press, etc.). In addition, other works in English have found evidence that the BOSS (a morphographic unit) could be the access code (e.g. Taft, 1979; 1987), although its frequency has not been manipulated. In the present work, we present two experiments using a lexical decision task. In Experiment 1, syllable frequency was manipulated in both words and pseudowords while keeping constant the BOSS frequency. The opposite was done in Experiment 2: BOSS frequency was manipulated controlling the syllable frequency. A typical delay effect was found for syllable frequency and an opposite effect for BOSS frequency: longer RTs and more errors for words (and pseudowords) with low-frequency BOSSes. The discussion is focused on the differential role of these two units in reading words and their possible relationship with other orthographic and morphological factors.

The effect of masked syllable priming on the naming latencies of bisyllabic nouns and verbs

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Psycholinguistic evidence suggests that the syllable plays an important role in speech perception as well as in speech production. Under laboratory conditions certain aspects of syllable structure and syllabification have been investigated revealing evidence for the syllable as a psycholinguistic (processing) unit (Fowler, Treiman, & Gross, 1993; Levelt & Wheeldon, 1994; Schiller, Meyer, & Levelt, 1997; Treiman & Danis, 1988; Treiman & Zukowski, 1990).

Four experiments tested the effect of masked syllable primes on the naming latencies of words and pictures. Targets were bisyllabic Dutch nouns that either had clear syllable boundaries and began with a CV syllable (e.g., *ke.tel* 'kettle') or a CVC syllable (e.g., *kak.tus* 'cactus'), or had a syllable boundary that was ambiguous, in which case they began with a CV[C] syllable (e.g., *ke[tt]ing* 'chain'). In the syllable match condition, targets were preceded by syllable primes that were identical to the their first syllable (e.g., *ke###* - *KETEL*). In the syllable mismatch condition, the syllable prime was one segment shorter or longer than the target word's first syllable (e.g., *ket##* - *KETEL*). A neutral condition was designed to determine the nature (facilitation or inhibition) of the priming effects (e.g., *%\$##* - *KETEL*). All related primes facilitated the naming of the targets significantly, but the priming effect was independent of the syllabic structure of prime and target. It is concluded that the syllable does not play a functional role in the output phonology of Dutch - in contrast to French and English (cf. Ferrand, Segui, & Grainger, 1996 and Ferrand, Segui, & Humphreys, 1997). Since the size of the facilitation effect increased with an increased overlap between prime and target, the priming effect is accounted for by a segmental overlap hypothesis.

In a fifth experiment the segmental overlap hypothesis was tested using the word naming task. Target words were verbs which either appeared in their infinitive form (e.g., *hui.len* 'to cry') or in their past tense form (e.g., *huil.de* 'cried'). Each target was presented in six different priming conditions, i.e., one neutral priming condition (e.g., *%\$%%* - *HUILEN*) and five different related priming conditions (e.g., *h%%%* - *HUILEN*, *hui%%* - *HUILEN*, *huil%%* - *HUILEN*, *huile%* - *HUILEN*, *huilen* - *HUILEN*). The results revealed that naming was slowest in the neutral priming condition. In the related priming conditions reliable facilitation effects were obtained. The size of the effect was only dependent on the amount of segmental overlap but not on the syllabic structure of prime and target. This result confirmed the segmental overlap hypothesis. The results fit nicely in a model of speech production that does not assume segments to be specified for their syllabic positions in lexical entries. The WEAVER model (Roelofs, 1996, 1997a, 1997b) assumes that segments are only marked for their serial position within a word and that their actual syllable position is determined in a later stage during phonological encoding.

The gap effect in newborns

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Reaction time (RT) to make a saccade to a peripheral target is faster on "gap trials", in which the central fixation point goes off before target presentation, than on "overlap trials", in which the central fixation point stays on during target presentation. This phenomenon has become known as the "gap effect."

The attentional hypothesis explains the gap effect by assuming that performing a saccade from one location to another requires that attention be disengaged from the starting location before the eye movement begins. The visuo-motor hypothesis maintains that the superior colliculus triggers a saccade if the saccade-generating circuit has been partially disinhibited at the time of target appearance. This disinhibition occurs during the gap, when no stimuli are present in the visual field.

Three experiments investigated the gap effect in newborns, who were tested 24-120 hours after birth. In the gap condition, the central fixation stimulus was turned off before presentation of the peripheral target stimulus, whereas in the overlap condition the fixation stimulus remained visible while the target stimulus was presented.

In Experiment 1, the central fixation stimulus and the peripheral target stimulus were both flashing lights. RT was significantly slower (783 ms) in the overlap condition than in the gap condition, thus indicating that the gap effect is present at birth. In Experiment 2, the fixation stimulus was a flashing light, whereas the target stimulus was a schematic drawing of a human face. There was a significant gap effect of 620 ms. In Experiment 3, the fixation stimulus was a flashing light, whereas the target stimulus was an upside-down schematic drawing of a human face. No gap effect was found.

The results are discussed in terms of collicular mechanisms for triggering saccades and for processing faces (Conspec).

Electrophysiological indices of visual spatial attention with the geodesic dense array sensor net.

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Peripheral cues have been shown to capture attention regardless of whether the cue predicted the position of a subsequent target stimulus. In addition, it is difficult for observers to ignore peripheral cues and their effects are insensitive to distracting stimuli or competing tasks. Peripheral cues produce a facilitation in RT at SOAs from 50-100 ms and after 200 ms RTs are slowed relative to neutral conditions, a effect known as "inhibition of return".

Visual event-related potentials were measured for peripheral target stimuli that were preceded by a peripheral dot. Targets appeared either at the same location as the dot or in the opposite visual hemifield. Same- and opposite-location trials were equiprobable. A detection response was to be made by the subject and there was 33% of catch trials.

In recording ERP's, when based on an adequate sampling from all surfaces of the brain the average reference is the best estimate of an inactive reference. We will display topographic maps based on recordings from 128 recording sites on the scalp. Such a dense array of electrodes have enough spatial resolution to provide good clues as to the generators of scalp recorded activity and to properly characterize the pattern of voltage fluctuations on the scalp.

The subjects were faster to the validly cued targets. The pattern of ERP effects were amplitude differences in the N1 over parieto-occipital areas for right visual field targets (RVFT) and over rather more anterior areas for left visual field targets (LVFT) when the average mastoid reference was used. Furthermore, we recorded a frontally distributed positivity over the right hemisphere peaking at about 200 ms post target. This positivity was stronger for invalidly cued targets than for validly cued targets both, for LVFT and RVFT. In contrast, the P300 component (300-400 ms) was enhanced by validly cued targets over ipsilateral sites but by invalidly cued targets over contralateral sites. Our results agree to some extent with other obtained with the classical 10/20 system and go further offering a near complete sampling of the scalp electrical activity.

Crossmodal exogenous attention in vision and hearing

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Recently, there is an increased interest in how different modalities integrate in spatial attention (Spence & Driver, 1996; 1997; Ward et al., in press). As a typical research method Posner's cueing paradigm is used with visual and auditory stimuli. A cue signals a probable location for the following target. Generally, valid trials - cue and target are presented at the same location - produce faster response times and less errors. If attention is automatically drawn to a certain location, for example, when cues are presented at peripheral locations this is called exogenous attention. In this case the initial advantage of validly cued locations reverses into an advantage for invalidly cued locations after 200ms. This is called inhibition of return (IOR).

Previous research indicates that there is evidence for both a supramodal system or highly interactive unimodal systems. In this light it would be of interest to know how distance - an important determinant of spatial attention - influences crossmodal integration. From unimodal studies in the visual and auditory domain we know that if targets are presented further away from fixation this results in slower response times. Moreover, cue/target distance also affects the facilitatory and inhibitory components of cueing. If cue and target are further apart this results in increased RTs but also in a decreased IOR effect. The interesting question is whether the same influence of distance will be found when presenting cues and targets in different modalities. In our study we used the cueing task with four horizontally aligned locations and stimuli that were either visual or auditory. The results seem to indicate that when spatial information from different modalities has to be integrated distance is also an important factor.

Attentional mechanisms in audiovisual interactions.

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Our environment is monitored through different sensory channels which are tuned to very different forms of energy. These sensory channels have been extensively studied in isolation. However, several psychophysical analyses have shown interactions between different sensorial modalities, attested by heightened perceptual awareness and lowered reaction time, as well as perceptual and behavioral anomalies when unrelated or spatially conflicting stimuli are combined. Recently, the involvement of attentional mechanisms in intersensory effects has received a special interest. Particularly, the possible role of audition in visual orienting, which has received less investigation until recent years, is now the point of convergence of many authors. For instance, recent findings have shown strong audiovisual links in covert spatial attention.

Using simple "feature" and "feature conjunction" discrimination tasks, we tried to see whether audiovisual interactions occur only at an attentional level of processing or if they take place at lower levels. In a first experiment, subjects had to report the orientation (0°, 90°, 180°, 270°) of a T ("conjunction stimulus") centered among distractors (four T's of different orientations). The display randomly appeared either on the left or the right side of a monitor ($\pm 4.36^\circ$ eccentricity with respect to a central fixation point). The visual display was preceded (30 ms) by a sound (band-pass noise, 440 Hz, 75 db) which was either spatially coincident with the target or at its contralateral location. The same audiovisual conditions were utilized in the second experiment. The target was a line segment ("feature stimulus") whose orientation ($\pm 45^\circ$) had to be reported. The distractors were line segments each of which was randomly tilted at $+45^\circ$ or -45° . In both experiments the short presentation duration (150 ms) did not allow eye movements. In the "conjunction" experiment (which is assumed to require focused attention to be achieved), an ipsilateral sound increased performances whereas a contralateral sound decreased performances with respect to the neutral condition. In the "feature" experiment (which is assumed to be achieved without focused attention), the sound had no effect on performances. Although further data have to be provided, these results suggest that audiovisual interactions only take place at an attentional stage of processing.

PRE-ATTENTIVE UNITARY AUDITORY MEMORY TRACE: AN EVENT-RELATED POTENTIAL STUDY

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In three experiments we investigated the organization of auditory memory trace (i.e., integration of auditory features like intensity, frequency, duration). In the studies the mismatch negativity component (MMN) of the event-related brain potentials was investigated. In all studies passive oddball tasks were used: stimuli were delivered while participants read books and ignored the auditory stimulation. In Experiment 1 series of frequent (standard: 1813 Hz, 275 ms) tones and three types or rare (deviant) tones were delivered. Deviant stimuli had either deviant duration (100 ms), deviant frequency (1655 Hz), or deviant duration *and* frequency (double deviant). Duration deviancy can be detected only after the offset of duration deviant, therefore the latency of MMN to duration deviant was longer than the latency of frequency MMN. The MMN to the double deviant extended only to the latency range of the frequency MMN. Hence the underlying memory representation and the change detection process were hierarchically organized, i.e., feature traces were parts of an unitary stimulus representation. In Experiment 2 the time constraints of the unit formation were investigated. Standard stimuli consisted of an initial constant-frequency segment (150 ms in the *short condition*, 250 ms in the *long condition*), and a glide (frequency change of 50 ms duration) segment. Deviant stimuli had either different intensity (intensity deviant), different direction of glide (glide deviant), or both different intensity *and* glide direction (double deviant). Due to the lag imposed by the steady segment, the latency of the MMN elicited by the glide deviant was longer than that of the intensity deviant. While double deviant in the short condition elicited only one MMN (in the intensity MMN latency range), in the long condition the double deviant elicited two MMN, the earlier corresponded to the intensity MMN, the later to the glide MMN. On the basis of these results the integration period was estimated as 200 ms (between 150 and 250 ms). In Experiment 3 one of the regularities involved the relationship between stimuli in succession, while the other one connected to the characteristics of a single stimulus. Stimuli alternated in frequency (600 Hz: low frequency tone, 700 Hz: high frequency tone). Infrequently the regular alternation was replaced by stimulus repetition. As another deviancy, the standard duration (250 ms) tones were replaced by a shorter (150 ms) one. Finally, double deviant stimuli appeared as repetition *and* deviant duration tones. Unlike in Experiment 1, double deviant elicited two MMNs, an earlier, repetition related one, and a later, duration related one. This result indicates, that the memory system underlying the MMN represents environmental regularities, i.e., in case of two irregular events, two mismatch processes were initiated. Furthermore, as the emergence of two MMNs within a 100 ms epoch shows (Experiment 3), the lack of later MMN in Experiment 1 and 2 were not the consequence of MMN generator refractoriness.

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Are there empirically predictable deviations from the Tulving-Wiseman function?

Nilsson & Gardiner (1993) have argued for two principled categories of exceptions to the Tulving-Wiseman (TW) function. The two categories, which are referred to as encoding and retrieval exceptions, are both positive deviations from the function. No category of negative deviations has been proposed. In a series of experiments we have provided evidence which 1. either weakens or contradicts proposed explanations, and 2. shows negative deviations which are not accounted for in the literature.

In Experiment 1, rated association between the cue and the target during study and confidence level during recall were used as measures of integration. Association strength was not correlated with the deviation from the TW function. Also confidence level was highly correlated with level of recall, and was not correlated with the deviation from the TW function when the correlation between level of recall and the deviation from the TW function was controlled for.

According to Flexser and Tulving's (1978) retrieval independence hypothesis, increased information overlap between successive retrieval tasks should produce a positive deviation from the TW function. Gardiner (1994) has argued that informational overlap between such tasks should not affect the fit of the data with the TW function. In Experiment 2, a second recognition task in which correctly paired items had to be discriminated from incorrectly paired study items replaced the usual cued recall task. In this paradigm there was more information overlap between the successive recognition tasks than in the usual paradigm. However, contrary to the retrieval independence hypothesis and to Gardiner's (1994) contextual hypothesis there was a significant negative deviation from the TW function.

THE INFLUENCE OF DECISION CRITERIA ON REMEMBERING AND KNOWING IN RECOGNITION MEMORY

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The recently developed remember-know paradigm examines the conscious correlates of recognition memory. In a standard recognition test subjects are asked not just to mark items as 'old' or 'new', but also to indicate whether they have a conscious recollection of the items – the remember responses – or simply know it has been encountered before on some other basis (e.g. a feeling of unspecific familiarity) – the know responses. Interestingly, certain experimental manipulations yield distinctive effects upon the two responses. In this light, it has been claimed that they not only reflect separate components of recognition memory, but more specifically tap different memory systems used for recognition. Remember judgements assess episodic memory. Know judgements, in turn, would derive from some other memory system (e.g. perceptual or semantic memory).

One objection against the putative distinction is that subjects simply decide between remembering and knowing on basis of subjective certainty or trace strength. Gardiner and Java (1990) have argued that this can not explain the differential sensitivity of the two types of responses for experimental manipulations. Recently, however, Hirshman and Master (1997) demonstrated that it is possible to model the observed patterns of differential sensitivity on basis of a single memory process and familiarity or strength distribution. Decisions in recognition memory depend upon two criteria placed upon the strength axis. The first criterion distinguishes 'old' from 'new'; the second 'remembering' from 'knowing'. Experimental manipulations which make the distribution shift relative to these two criteria can lead to differential effects upon remember and know rates. In this light, the purpose of the present study was to examine what would happen if the criteria themselves were altered. To this purpose, two groups of subjects were compared: one which was instructed to be very conservative in their old-new judgements, while the other group was stimulated to be very lenient instead. Remember rates increased with more lenient criteria, whereas know rates did not. These results are discussed in terms of Hirshman and Master's (1997) criteria setting conception of remembering and knowing.

The Strategic Regulation of the "Grain Size" of Memory Reports

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Abstract

Unlike in much traditional laboratory research, in most real-life memory situations people have a great deal of freedom to control their memory reporting in accordance with personal and situational goals. For instance, they may choose to report only information that they feel sure about (control of report option), or they may choose to answer at a level of generality at which they are unlikely to be wrong (control of grain size). Although such control is often treated as a mere methodological nuisance that should be eliminated or corrected for, our research is based on the premise that personal control over memory reporting is in fact an intrinsic aspect of memory functioning, whose underlying dynamics and performance consequences deserve systematic investigation. In previous work on control of report option (Koriat & Goldsmith, 1996, *Psych. Rev.*), we put forward a theoretical model that delineates the monitoring and control processes underlying the decision to volunteer or withhold particular items of information, and examined how people employ these processes to strategically regulate the quantity and accuracy of their memory performance. In the present research we extend this framework to encompass control over the level of generality or "grain size" of the information that people report from memory. Our findings indicate that here too, people utilize their monitoring and control processes in a strategic manner in accordance with competing demands to provide both accurate and informative answers. The results point toward an integrative model of the strategic regulation of memory reporting, and may also help in bridging some gaps between naturalistic and laboratory research findings.

Changing autobiographical memory

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We know that autobiographical memory is malleable, but how much can we change it? We approach this question with several studies that simulate what happens in some psychotherapy settings where the therapist proposes a hypothesis to explain the client's symptoms. In three experiments we exposed subjects to a single brief therapy simulation in which their dream material was interpreted as indicating that they had experienced certain critical events (like being lost, being endangered, being bullied) before the age of three. After dream interpretation most subjects increased their belief in these experiences, some also developed concrete memories. These findings have important implications for autobiographical memories and their modification.

Activation and construction of memory traces : Frequency effects on repetition priming depend on prime duration and prime/target delay

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The primary purpose of our researches is to study the nature and organization of knowledge in long-term memory, and more precisely the nature and organization of constructed and/or activated representations in several cognitive activities.

Our main objective is to demonstrate that long-term memory can be described as an accumulation of episodic and multidimensional memory traces. In such a model (a multiple-trace memory model), all information processing experience, or episode is supposed to result in the activation of multiple traces already stored in memory and in the construction of new memory traces. We assume that these mechanisms are responsible for memory representations (lexical and pre-lexical representations). The challenge is to determine what kind of representations could emerge from the two mechanisms, and so to define what dimensions are really activated and/or conserved in long-term memory.

Two lexical-decision tasks were conducted by using the repetition priming paradigm. In the first experiment, priming effects were studied with masked primes appearing for 15 ms, as a function of lexical words frequency and delay between the prime and target presentation (ISI of 60, 255, 610, and 1505 ms). Results showed significant repetition priming effects (even with the very short ISI), but no frequency effect on priming. In the second experiment, primes were unmasked and presented for 50 or 700 ms. The ISI was 600 ms, 1500 ms or 3000 ms. Results revealed significant priming effects, whatever prime duration and ISI. However, contrary to the first experiment, a frequency effect on priming was observed when primes were presented for 700 ms.

Frequency effects on priming are interpreted as a function of the level of representation reached by the primes. As a function of primes duration, we suppose that different levels of representation are concerned. For instance, short primes duration could not allow to reach the lexical level, hence the lack of lexical frequency effects.

Tabular vs. Graphic Displays - Differences in Sensitivity and Decision Criterion

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An experiment assessed the relative efficacy of tables and graphs in a signal detection task displaying changes in system status. The displayed information was generated from two sine functions, with signals indicated by a change of frequency on one function. Experimental conditions also varied in the duration of Post Knowledge of Results (PKR) intervals. Consistent with a earlier study (Meyer, Gopher & Levi, 1997), graph displays had a clear performance advantage over tables, in both speed and accuracy. Longer PKR intervals improved performance on both tasks, but the sources of these improvements were different. The advantage of graphs over tables and performance improvement with longer PKR intervals were mainly contributed by higher sensitivity as measured by d' . In contrast, performance improvement in tables was associated with a shift of response criteria, measured by signal rate. Criteria were adjusted to fit the performance payoff matrix. This latter finding suggests that when sensitivity is low, people tend to base their response decisions on external factors such as reward structure, rather than detection efforts. It was also found, that while performance in graphs had a normal distribution, tables showed a bi-modal distribution with a large group of poor performers, and a small group of excellent performers. It is hypothesized that these differences reflect alternative cognitive strategies: hypothesis testing in tables and perceptual detection in graphs.

Hypothesis Testing Strategies in a Rule Discovery Task

About a Disconfirmation Bias

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In the Wason's 2-4-6 problem participants have to discover a rule generating sequences of three numbers (three increasing numbers). Experimenter told that the triple 2-4-6 is an example which conformed to the rule. Typically, participants tend to adopt hypotheses that are a subset of the rule (e.g. increasing by two) and then test only positive examples (e.g. 3-5-7; 8-10-12). Such examples will be positive examples of the rule as well, so they cannot head to disconfirmation of the hypothesis. Wason claimed that participants exhibit a confirmation (or positive) bias. Previous authors argued for a manifestation of a positive test strategy. This strategy was ineffective in this task whereas it is effective in most real life problems because of the particular relationship between the participant's hypotheses (specific) and the rule (general). We hypothesized a possible artefact in the way data have been usually coded in this task. Let us consider the relationship between each triple the participant give and the previous hypothesis he/she made: we have observed that the positive examples of the current hypotheses were in up to 66% of the cases negative examples (counter-examples) of the previous hypotheses. Then, protocols have been coded along two different ways. The classical coding consisted in comparing each triple proposed by participants with its current hypothesis. With an alternative coding, each triple was compared with the previous hypothesis made by the participant. In the whole sample of participants, the proportion of confirmation strategies was reduced (89.46 vs. 48.76). Furthermore, as less confirmatory participants were also the most successful (finding the rule at the first time). Participants seemed able to test a hypothesis and its alternative, but they did so with two successive trials whereas it would have been usual to expect them to do so with only a single trial. With such a protocols coding, it can be assumed that participants exhibit a disconfirmation bias.

Video games, cognition and choice behavior

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Recent research demonstrates that simple adaptive learning models can be used to provide useful ex-ante prediction of choice behavior in a large set of abstract matrix games (see e.g., Erev & Roth, forthcoming). The current research explores the generality, normative value and some of the practical implications of these descriptive models. Experiment 1 examines if the models that best describe behavior in abstract matrix game can be used to predict behavior in video games. It focuses on "penalty kick" games that are formally identical to the abstract games studied in previous research. Experiment 2 studies interaction between virtual agents that behave according to the best models and human players (students and game theorists) under different information conditions. To assess the normative value of the models, in one of the conditions the human players will know the algorithm used by their virtual opponents. Experiment 3 use Turing and related tests to study the implications of the best model to the development of Video games.

On the Likelihood of Repeated Zero-Sum Betting by Adaptive (Human) Agents

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The paper is a computational and experimental study of the robustness of Sebenius and Geanakoplos (1983) "impossibility of zero-sum betting" conjecture. Our main goal is to check whether boundedly rational agents can learn to follow the logical reasoning process underlying the theoretical result and avoid zero-sum betting. In particular, we study the case where the agents follow (3 different versions of) a simple learning by reinforcement model to adapt their behavior along the repeated game. Simulations of the model reveal a decrease in betting-rate with experience; yet, the speed of convergence is very slow and varies drastically with the size of the underlying bet. To test the behavior of human subjects in this setting we run a controlled experiment in which two basic games were played repeatedly for 250 rounds by 24 pairs of subjects. The experimental results clearly demonstrate that human subjects do not comply with the no-betting conjecture even when the underlying game is short and the subjects are fully informed of it's structure. While the subjects have decreased their betting rate along the repeated interaction, the average individual betting rate after 200 repetitions of the game was still over 60%. Moreover, subjects that have received full information about the underlying bet accepted the bet more frequently than those that did not receive such information. Indeed, we show that the learning model variant that takes into account sophisticated considerations by the agents that are completely informed of the structure of the underlying bet provides a better fit to the experimental results obtained for our informed subjects.

Choice Procedures: Elimination versus Acceptance

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The research concerns the consequences of some basic choice procedures used in common situations. Consider the procedures used by search committees in creating a list of candidates for a job. The task of reducing a large set to a smaller one is a common process in realistic decisions that involve large sets of alternatives. A list could be generated either by including the likely candidates from the entire set of applicants (acceptance), or by eliminating the unlikely candidates from that initial set (elimination). An interesting question is whether the acceptance and elimination processes converge on the same final selection. Invariance principles of decision making imply that they should. The results from several studies indicate that individuals generate significantly larger sets of candidates in an elimination process than in an acceptance process. Thus the outcome (choice set) depends on the selection procedure used by the decision maker. This finding is a logical consequence of the non-complementarity of elimination and acceptance. We suggest a descriptive, decision-making model to explain these findings and report a series of studies to test the model and people's decision strategies under the two choice procedures. The studies span a variety of content domains such as, general knowledge questions, visual judgment, and vocational decision making. The results might have implications for the creation of efficient decision making procedures for screening alternatives and should enrich our understanding about how such procedures might be designed in daily situations involving decisions such as acceptance of papers to a journal, selection of students for advanced degrees, or listing potential suspects in a crime.

A Simon-effect to induced motion:
Evidence for a linkage between cognitive map and motor responses

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Recently, it has been argued that two distinct maps of visual space are formed, a so-called cognitive map and a motor map. Whereas the cognitive map is susceptible to illusions, the motor map is supposed to represent the physical world more veridically. For instance, Bridgeman and colleagues (1997) believe that the contents of the cognitive map are accessed by explicit retrieval. Therefore, only perceptual judgments ("what do you see?") are supposed to tap into the cognitive map. In contrast, contents of the motor map are hypothesized not to enter awareness and to directly affect responses such as pointing. However, these conclusions are at odds with findings from research on stimulus-response (S-R) compatibility where the influence of cognitive codes on motor responses has been repeatedly confirmed. A prime example of such tight perception-action couplings is the Simon effect. Responses are faster with spatial S-R correspondence (i.e. left stimulus to left response) than with non-correspondence, even if stimulus location is irrelevant for the task.

In the present study, we investigate whether contents of the cognitive map affect motor responses. Using displays similar to those of Bridgeman (1981) we induce illusory target displacement by moving a random-dot background left or right. As it turned out, a Simon-effect can be obtained to the direction of induced target motion. When subjects were instructed to respond to a nonspatial attribute (color), responses were faster when the illusory target motion corresponded to the response position. In contrast, when only a moving background was presented, no effect of real motion was observed. We interpret the results as evidence for the view that response-relevant contents of the cognitive map are not only accessed by perceptual judgements but automatically activate response codes. Thus, the contents of the cognitive map are directly fed into the motor system suggesting that the cognitive map may be less, and/or the motor map be more, "cognitive" than assumed.

Imitation of gestures in children is goal-directed
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Imitation, or performing an act after perceiving it, guides the behavior of a remarkable range of species at all ages. Three experiments use imitation errors to address the question of how perception and actions are mediated in imitation. The present study adapted a paradigm in which specific and reliable imitation errors are well-documented in young children, and introduced varying task contexts.

In Experiment 1, an adult model touched her ears with either one or two hand(s) and with either an ipsilateral or contralateral movement, and young children imitated these actions. Children exhibited a preference for ipsilateral hand movements, but only for unimanual hand movements. Children touched the correct ear, but for unimanual contralateral movements used the wrong hand. In Experiment 2, we asked children to make ipsi- and contralateral hand movements to only *one* ear, reasoning that a reduction in the number of possible goals would lead to more accurate performance. A drastic decrease of errors in the contralateral condition was observed. In Experiment 3, ipsi- and contralateral movements to dots or locations (no-dot) on a table were modeled. Using dots rather than ears as targets enabled us to manipulate the possible goals of the imitative act. Similar to Experiment 1, children touched the correct dot, but often used the ipsilateral hand when the model had touched the dot contralaterally. In contrast, in the no-dot condition, contralateral movements as well as ipsilateral movements were almost always imitated correctly.

Together the results of all three experiments suggest that imitation in children is organized by goals, such as an object (a particular ear), an agent (a particular hand), or a movement path (ipsi- or contralateral to the object) or salient features (the crossing of the arms in the bimanual contralateral gesture), not simply by a perceptual map of observed actions.

Movement Execution in Closed Head Injured Subjects

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Introduction: In this study, investigating movement execution in closed head injured subjects we have estimated cognitive deficits in their motor activities.

Subjects: In this study 62 head injured subjects were observed, 15 - 20 years of age, both sexes, divided into two groups - experimental and controls. The criterion for the experimental group required (1) head injury in traffic accident; (2) there was no neurologic occurred deficit like paresis and/or paralysis; (3) there was no sensoric aphasia; (4) at the admittance in the neurosurgical ambulance the GCS was above 8, their age was between 15 - 20 and (5) their native language was Serbian. Controls was pupils -voluntiers from the Tehnical School in Belgrade. Both groups were equalized in number, sex, age and premorbid status.

Method: Movement execution abilities were estimated applying the "Protocol for Praxis" by J.W. Brown. Examinies from the experimental group were tested if neurosurgical treatment was not required, 7 - 10 days after injury.

Results: Following results obtained in this study, they indicate on significant decay of all examined variables of the tests in experimental group. Activation or establishing the partial cognitive motor program a certain effect in lower cognitive functions werw recruited. Those movements, not related to neurologic deficit clearly indiciate the relevance to cognitive and motor behavior.

Key words: movements, praxis, apraxia, cranio-cerebral injury.

Assimilation and contrast between perception and action

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Abstract

We studied a task where subjects perform sinusoidal movements on a graphic tablet while watching sinusoidal dot motions on a computer screen. This task allows to study two effects. A motion distractor effect is obtained to the extent that the movement being performed is affected by the motion being watched. A movement distractor effect is obtained to the degree that the motion being watched is affected by the movement being executed (which is, in turn, guided by the motion watched on the previous trial). In the experiments motion distractor effects exhibited contrast while movement distractor effects showed assimilation. We offer a tentative framework for combining these two effects, suggesting that contrast relies on on-line interactions between perception and action and assimilation on off-line interactions between memory and action.

DEVELOPING READING SKILLS

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A typical finding concerning the perception of written language is that word recognition varies as a function of fixation location within the word: Words are recognized best when fixated slightly left of center, and performance drops as fixation location deviates from this position. This « viewing position effect » (VPE) is found in normal reading but can also be elicited through fixation-contingent display of the stimulus.

The present study investigated the VPE in normal and poor beginning readers. A mathematical model that provides a good description of the prototypical VPE was used to analyze the developing reading skills. The results show that the VPE emerged already at the end of the first year of reading instruction in normal beginning readers. Further training mainly reduces the time the child needs to extract information from print. However, contrary to adult readers, performance of beginning readers was significantly affected by word length.

Poor beginning readers could be classified into two groups. One group showed a dramatic drop of performance whenever regions other than the word center were fixated, indicating a reduced adaptability of their perceptual span to the stimulus. A second group of poor beginning readers showed no VPE, indicating that recognition was based on identification of 'salient features'.

The results suggest that the basics of reading skills as measured by the present technique, is normally acquired very early during acquisition. These skills consist essentially in the rapid and efficient intake of visual information available from *all* letters of a word during a fixation. Deviant reading behavior, testifying the malfunctioning of the developing reading system, may have a variety of different causes.

Lexicalized Phonological Recoding at the Commencement of the Acquisition of Reading Skill

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There is a tradition of theoretical accounts which consider phonological recoding, from nonlexical sources, to be critical to the commencement of successful acquisition of reading skill. In these accounts, lexical orthographic storage and lexicalized phonological recoding are acquired subsequently (Share, 1995). In an alternative account, it has been proposed that the acquisition of reading can commence with lexical orthographic storage and lexicalized phonological recoding (Thompson, 1996, in press a, b). Experiments are reported which test this alternative account. English-speaking children of 5 years, who had no instruction about the sounds of individual letters, attempted to give such responses to letters. The results showed that their responses derived from lexicalized phonological recoding, as well as attempts to use their letter-name knowledge (Experiment 1). Their knowledge from lexicalized recoding was predominant in responses to pseudowords but not in responses to individual letters (Experiment 2). Another alternative explanation based on the children's spelling experience was examined but not supported (Experiment 3).

Use of temporal organization of knowledge on sentence and text comprehension dependent on age

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The main question of our recent investigations concerns the assumption of a preferred activation of knowledge in accordance with the natural time order of events. Hypotheses are derived from models of Klix (1992), Kintsch (1992) and Friedman (1990). In order to test the assumptions specific word recognition and relation identification paradigms were applied in four experiments. The subjects had to read a sentence and afterwards a test word in both conditions. In the first case the subjects were required to decide, whether or not the test word had been part of the sentence, in the second case, whether or not there exists a semantic relation between the sentence and the test word. We varied the type of temporal relation between sentence and test word (prospective vs. retrospective). The data, especially these of the relation identification experiment, support the assumption of a preferred activation of prospective orientated knowledge. We found longer rejection times on the recognition task for negative test words, which have a prospective semantic relation to the sentence, and shorter identification times on the relation verification paradigm if there exists a prospective relation between the sentence and the test word.

The main point of our next experiment is to prove the influence of aging on process of knowledge integration mentioned above. We compare the results with regard to the two paradigms mentioned above (recognition and relation identification) between a subject group of young (25 years) and old adults (75 years). The experimental data support a slow down for primarily sensorical and motorical components in higher age but they do not confirm a deficit in the critical process of knowledge integration. On the contrary we found cues for a higher extent of knowledge integration on old adults. We notice an increase of the time order effect especially in the relation verification task on old age subjects. We interpret this higher degree of knowledge oriented processing as a strategy to compensate deficits on working memory capacity.

Updating processes and reading comprehension ability

It has been shown that reading comprehension ability is related to the ability of remembering selected information, as it is required by the listening and reading span tests (Daneman & Carpenter, 1980). In these tests subjects have to verify series of sentences and to remember the last word of each sentence. Recently De Beni, Palladino, Pazzaglia and Cornoldi (in press) found that the success in active span tasks is related to the ability of recalling target information and, at the same time, of avoiding memory of intrusive information (e.g. words in the sentences which were not in the last position). They argued that success in comprehension requires a similar ability of concentrating on relevant information and avoiding the overcharge of the irrelevant. However, not always, during the elaboration of a text, can information be immediately recognized for its importance and maintain its relevance through the whole passage. For this reason it is necessary for the reader to update the activation in memory of relevant information, by suppressing or at least reducing the activation of information no longer relevant.

The present study considers this aspect, by examining the relationship between reading comprehension ability and the success in working memory updating tasks. In a series of four Experiments, groups of students, matched for sex, sociocultural level, intelligence, and different in reading comprehension ability were administered various updating tasks. In a first Experiment, undergraduate students were given the Morris and Jones (1990) updating task. In this task, subjects are presented with lists of words whose length (ranging between 4 and 10) is not known in advance. They are required to remember the last four words of each series, but, as they do not know -when a word appears- if the word will be in the group of last words, they must maintain it until the other four subsequent words will eventually appear. In this task, we found a decrease of performance related to longer series and to poor reading ability. However poor comprehenders did not make more intrusion errors than good comprehenders. This result could be due to the fact that subjects used a variety of strategies some of them did not include a selection process. In a second Experiment, we changed the procedure by presenting lists of names of objects of different size. The subject's task was to remember a limited number of the largest objects presented. The task had also the advantage of more directly similarity to the selection and updating of relevant information which occurs in the on-line comprehension process. We found that poor comprehenders not only had a poorer memory than good comprehenders but they also made a higher number of intrusion errors. In the third and fourth Experiments we used the same methodology as in Experiment 2 and we manipulated the memory load (number of items which had to be selected) and the inhibition request (number of items potentially relevant, i.e. which entered in the group of selected items but had then to be eliminated). We found that poor comprehenders met particular difficulty when the task request was increased. Furthermore their difficulty was present also in a text memory task requiring the recall only of the most relevant information.

Altogether the data show that working memory abilities, based on selection and updating of relevant information and avoidance of intrusion errors, are related to reading comprehension.

Sequence learning: The importance of spatial structures

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Sequence learning in serial reaction time (SRT) tasks is indicated when responses to a structured sequence become faster with practice than responses to a random sequence. Although this effect is clear evidence of sequence learning, it is debatable whether learning is due to the structure of the stimulus sequence or the response sequence. The evidence pertaining to this question is ambiguous, indicating effects of the structure of the stimulus sequence, the structure of the response sequence, or both. However, at least a good part of this debate might be attributable to the fact that there has not been paid enough attention to specific features of the „structures“ used in stimulus and response sequences.

In almost all studies on sequence learning, key-presses have been used for the responses. Structures in the key-press sequence result in redundancies in the sequence of the locations of keys to be pressed. As stimuli, most frequently asterisks have been presented on one of several horizontally aligned positions on the computer screen. Accordingly, structures in the stimulus sequence are realized in a sequence of locations, too. However, instead of the locations of the asterisk, in some studies letters, digits, tones, or colors have also been used as stimuli. Thus, the effect of the structure of the stimulus and response sequences has been unsystematically confounded with locational redundancies either in stimulus or response sequences.

In order to isolate the effect of locational sequences on learning in SRT tasks, experiments were conducted in which the structures of the stimulus and response sequences have been orthogonally varied with the occurrence of locational sequences. The results of four experiments provide strong evidence that the amount of learning in the SRT task is primarily affected by structures in the sequence of locations. This indicates that most if not all sequence learning in SRT tasks is primarily based on a mechanism that serves the anticipation either of the locations of forthcoming stimuli or the locations of the response-keys to be pressed next.

A conditioning model of preparation during the foreperiod

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The foreperiod (FP) is the interval between a warning signal and an imperative signal. It is a classical finding of cognitive science that both FP-duration and the variability of FP-duration across trials have considerable effects on reaction time (e.g., Woodrow, 1914). These effects are thought to reflect the state of preparedness of the participant at the moment the imperative stimulus is presented. Following a proposal by Los (1996), Van den Heuvel & Los (submitted) have supported the view that fluctuations in the state of preparedness derive from the principles of classical (trace) conditioning. According to this view, the warning signal acts as an unconditional stimulus, which entails a conditioned tendency to respond. In this presentation we would like to discuss the prospects of a formal conditioning model (Machado, 1997), on the basis of recent simulations carried out at our laboratory.

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Strategy shifts in Cognitive Skill Acquisition

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Our results on information reduction in cognitive skill acquisition have shown that with practice subjects learn to differentiate between task-relevant and task-redundant information and to limit their processing on only the task-relevant information (Haider & Frensch, 1996). Moreover, results suggest that information reduction is based on an active selection of task-relevant information (Haider & Frensch, submitted). The question addressed in the reported experiments was whether information reduction is based on a gradual and continuous learning process, as is e.g. suggested by Palmeri (1997), or whether it occurs suddenly as an abrupt, qualitative strategy shift. For this purpose, we (a) ran 6 single-case studies in which participants were trained over 30 practice blocks. The learning curves of all six participants were discontinuous, suggesting a strategy shift. (b) An additional re-analysis of existing experimental data brought up evidence that discontinuities in the learning curves predict degree of information reduction. (c) We, therefore, conducted an experiment in which participants were trained over maximally 8 practice blocks. During training phase it was examined, if a participant would show an abrupt decrease in reaction time (greater than 1500 ms). In this case, participants received one additional block followed by a transfer block in which the former redundant information became relevant in order to test for information reduction. Participants who did not show such an abrupt decrease, received the transfer block after having finished the eighth training block. Results again confirm that participants with discontinuous learning curves show higher amount of information reduction.

Taken together, our results contradict the wide-held power law of practice (Newell & Rosenbloom, 1981) and suggest that during training a new, and more efficient strategy is generated.

Interindividual Differences in Implicit Learning: Evidence from a Twin Study
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The study of implicit and explicit learning is among the central themes in current cognitive psychology. Whereas explicit learning refers to conscious abstraction of rule-governed relations, implicit learning is viewed as a more passive, or even unconscious process of knowledge acquisition. Although there are many studies showing that explicit and implicit learning differ in their information processing characteristics, there are only a few studies on the developmental course of these two types of learning, and practically no studies on interindividual differences. Results of a large twin study will be presented in which about 300 monozygotic and dizygotic twins between the ages of 65 and 85 years participated. The focus of the presentation will be the results of a serial reaction time task in which participants tracked a sequence of positions that followed a complex rule (second-order conditional). Implicit learning (reaction times) as well as explicit learning (prediction task) was measured. The study allows us to trace the developmental course of implicit and explicit learning in elderly people, to analyze interindividual differences in implicit and explicit learning, and, most importantly, estimate the contribution of genetic and environmental factors to interindividual differences (heritability analysis).

Automatic comparisons of artificial digits never compared
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participants were trained to perform magnitude decisions (i.e., deciding which of the two meaningless figures in a pair represented a larger magnitude). The figures corresponded to locations on an implicit linear scale. Thus they maybe referred to as artificial digit. The training resulted in a size congruity effect when the participants had to decide which symbol in a pair was physically larger; i.e., the RTs were shorter when the figures corresponding to the smaller magnitude on the implicit scale was physically larger. This effect, showing automatization of the processing of magnitude relations, was also obtained for pairs never encountered during practice. The results imply that training humans on a subset of all possible pairs corresponding to locations on an implicit scale results in a representations of the magnitude relations between all possible pairs. They also show that automatic comparisons of magnitudes cannot be fully explained by assuming retrieval of previously encountered examples from memory.

Influence of semantic information on the attentional blink in a RSVP paradigm on pictures.

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The attentional blink effect is characterized by a failure to detect a target (T2) following the identification of a previous target (T1) in a RSVP stream (Shapiro et al., 1992). The effect lasts about 450 msec on letters as stimuli. It is explained either by a difficulty to disengage attention from T1 or by a temporary suppression of the processing of items in the sequence while attention is focused on T1. The function of this suppression is to reduce interference during identification of T1. With letters and digits as stimuli, Raymond et al. (1995) have shown that the attentional blink is reduced by a featural dissimilarity between T1 and the first distractor following T1 whilst categorical similarity does not seem to affect the magnitude of the attentional blink effect. We examined the categorical effect in manipulating visual and semantic similarity between the target (T1) and the distractors. This was done with pictures as stimuli. 240 RSVP sequences containing 15 colored pictures each were used as stimuli. The first target (T1) was defined by the color of the background (blue) in a sequence of pictures displayed on a gray background. The second target (T2) was a neutral item (a globe). Performance was compared in two conditions: (1) subjects were instructed to identify the target in a blue background and to detect the presence of the globe and (2) in a control condition subjects were instructed to detect the globe and to ignore the picture in a blue background. The globe was present in 50% of the sequences. It appeared randomly at position 2, 4, 6, 8, or 10 following T1. T1 appeared randomly at position 2, 3 or 4 from the beginning of the sequence. For one group of 10 subjects sequences contained only objects from the same semantic category (including T1). For a second group of 10 subjects the sequence contained objects from different semantic categories. We found that the magnitude of attentional blink was affected by semantic information. It was larger when all items were from the same category. This result is consistent with an account of the attentional blink effect in terms of active suppression to reduce interference during target identification.

Time course of warning effect in detection task

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Warning effect is known as non-specific transient attentional component that commonly considering as the precondition for effective and stable performance. However, the wide range of intervals between warning signal and a target as well as different modalities of the signal are used in experimental procedures without any reference to possible interaction with the main task. To clarify the point this study examines the time course of warning effect in simple RT task. Small black point at dark gray background was used as the target and appeared in the same central place of the screen. Warning signal continued to be presented until the reaction came on; thus, only onset warning feature had been effective. The most pronounced benefit in RT was shown for sound warning signal, in compare with visual ones. In visual domain flash of the large box (10°), surrounding the target's position, was a little less effective then the small box (1°). Irrespective on the warning type, the time course of the effect was almost the same: RT decreased smoothly with target's delay up to 600-800 msec and kept this ceiling value during the rest tested interval (1600 msec). The findings revealed unexpectedly strong range effect among 3 adjacent delays randomly presented in one block of trials. The certain delay provided fastest RT when it occupied the longest position in the block delay's range (500 msec) and slowest RT when the position was shortest. The strength of warning effect depended also on inter-trial interval, showing increasing with its duration. Interpretation of the results bases on low-level spatio-temporal attentional strategies.

ATTENTION, INTENTION AND ACTION

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Research about the intentional shift of task set considers the cost of task shifting is only partly an index of a control operation: part of the cost is due to proactive interference from the previous mental set (task set inertia, Allport et al., 1994) but the rest of the effect suggests an endogenous and anticipatory reconfiguration process of the new task preparation (Rogers & Monsell, 1994). We look for new evidence about endogenous components in the cost of shift of mental set.

Simon effect interacts with spatial attention effects (Milan, 1996): the spotlight position (Posner, 1980) in the visual field determines right and left codes for motor programming (Stoffler & Umiltà, 1996). Possamai (1993) showed that finger and hand Simon effects are additive. In our experiments subjects alternate between a colour discrimination task (red or yellow) and a letter discrimination task (X or O). The target can appear left or right from fixation point. The response set consists of four keys, two per hand (or task). A central arrow gives preknowledge about target position with a 200 msec SOA. We explore the interactions between the cost of mental shift, endogenous spatial attention benefits and finger and hand Simon effects. Our results show that only the interaction between cost of the shift and endogenous spatial attention is significant.

These results are discussed in the context of the existence of endogenous components in the cost of shift of mental set, and the possible different origin of different attentional effects, in relation to mind control theories (Posner & Raichle, 1994; Allport, 1993) and in particular related to the premotor theory (Rizzolatti et al., 1987; 1997).

Bilingual Lexical Access in Speech Production: Do words from the non-response language compete during lexical selection?

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Lexical selection in speech production is the stage where speakers decide which is the lexical item to use in expressing the concept they want to communicate. It is commonly assumed that there is "competition" among the lexical nodes that are activated during lexical selection (i.g. Levelt, 1989). Is there also competition between words that belong to the different languages of a bilingual speaker? Does the activation of words in the language not being spoken compete with words in the response language during lexical selection?

One way to approach the processes involved in lexical access is to study the types of interference obtained with Stroop-like tasks such as the picture-word paradigm. In this task, subjects are required to name a picture (target) while a word (distractor) is also presented. The effects of the distractor on subjects' naming latencies depend on the relationship between the distractor and the picture. For instance, semantically related distractors produce slower naming latencies than unrelated distractors, and phonologically/orthographically distractors produce faster naming latencies than unrelated distractors.

We ran a series of experiments using the picture-word interference paradigm with highly fluent Catalan-Spanish bilinguals, bilinguals who learned Spanish before the age of 5. Subjects named the picture always in Catalan and the distractors were printed either in Catalan (within-language condition) or in Spanish (between-language condition). The major results were the following: 1) Comparable semantic interference effects were obtained in the within and between-language conditions; 2) Subjects were faster in naming the picture when the same word or its translation was the distractors, but there was greater facilitation in the within-language condition; 3) symmetrical phonological/orthographic facilitation was obtained between and within-languages.

We interpret these results as evidence that lexical entries in the non-response lexicon, although activated, do not compete during lexical selection. The result that the identity effect between-languages is facilitatory rather than inhibitory supports this conclusion. We also argue that the semantic interference effect between-languages may reflect competition inside the response language lexicon, rather than competition between lexicons. We think that the phonological/orthographic effect reflects the activation of sublexical units which might also explain the asymmetry between the identity effect within and between languages.

Morphological relations and lexical organization in the bilingual subject

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The issue of the psychological reality of morphological relations has been focus of interest in recent investigations. There is evidence from monolingual priming studies which suggests that these relations can be considered more than just a by-product of form and meaning similarity (e.g., Frost and Katz, 1992; Feldman, 1995), supporting the view that they could serve as a criterion to model lexical organization. The experiment reported in this paper attempts to determine to what extent morphology could also provide the basis for lexical organization in the bilingual subject. Previous findings from several priming studies with Spanish-English and Catalan-Spanish bilinguals, have consistently shown that only cognate words produce facilitation effects, and that these effects, similarly to the reported morphological priming effects, cannot be reduced to mere form or meaning facilitation (García-Albea, Sánchez-Casas, and Igoa, 1997; Sánchez-Casas, Davis and García-Albea, 1992). On the basis of these findings, our experiment with Catalan-Spanish bilinguals compares directly within- and between-language morphological priming effects, and translation effects in cognate and noncognate words, using a lexical decision task and the masked priming technique. The results show significant within-language morphological effects for cognate and noncognate words. However, translation and cross-language morphological effects were only found to be significant for cognate words, being both effects comparable in size.

Knowing APPLE affects seeing APPEL: On the influence of foreign language knowledge on native language performance.

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Does foreign language knowledge influence performance in the native language, and to what extent does proficiency in the foreign language play a role? These questions were examined in two experiments using Dutch-English-French trilinguals. The trilinguals were native speakers of Dutch, with English as their second and French as their third, and weakest, language.

In Experiment 1 lexical decision performance in the native language Dutch was studied. The cognate status of words was manipulated (a cognate is a word that looks and/or sounds like its translation in another language). One fourth of the Dutch words were cognates with English (e.g. 'appel'), one fourth were cognates with French (e.g., 'citroen'), and the remaining words were noncognates (e.g., 'tuin', meaning 'garden' in English and 'jardin' in French). Dutch words that were cognates with English ('appel') were recognized faster than Dutch noncognates ('tuin'). Lexical decision times to Dutch words that were cognates with French ('citroen'), however, were equal to those of the Dutch noncognates ('tuin'). In Experiment 2 the same stimuli were presented in a word association task, using a new group of Dutch-English-French trilinguals. As in Experiment 1, trilinguals were faster in retrieving an associate to Dutch words that were cognates with English ('appel') than to the Dutch noncognates ('tuin'). Again, no difference in association times was observed between the Dutch words that were cognates with French ('citroen') and the Dutch noncognates ('tuin'). These results suggest that word recognition and word association in the native language is influenced (i.e., facilitated) by knowledge of a foreign language, but only when proficiency in this foreign language is sufficiently high.

**How do you reed errur and ermor?
Bilingual proofreading**

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Experienced readers performing a laboratory reading task in their native language show reliable phonologic effects. For example, in proofreading English native speakers consistently miss more pseudohomophone misspellings (a misspelled letter string that sounds like a word, i.e., ERRUR) than control misspellings (a misspelled letter string that does not sound like a word, i.e., ERMOR). Similar phonologic effects have been found in Dutch beginning readers proofreading a Dutch text. These effects emphasize the fundamental role of phonology in reading in the native language.

In our present study, we examined the role of phonology in reading in a non-native language. Dutch-English bilinguals (Dutch being the first language and English the second) proofread a text and a list written in English. The results indicate that non-native reading performance of bilinguals is also affected by phonology. Interesting findings of two task aspects, i.e., the context (text or list) containing the misspellings, and the order in which the two types of contexts were presented, will also be discussed. We present an preliminary attempt to describe second-language reading performance in terms of the Phonologic Coherence Model. This model, proposed by Van Orden and his colleagues, already presents an adequate and useful description of effects found in first-language reading tasks.

Switch costs can reflect the cognitive expenditure of free will

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A part of intentional set switch costs (Allport, Styles & Hsieh, 1994) is the expenditure of willful decisions. This is revealed by an experiment with switch or non-switch between different decisions. This experiment varies whether decision-makers perform their 'will' before the beginning of a series of trials ('before'), don't need to make any willful decisions at all but choices based on a given rule ('null'), or decide willfully within every trial ('within'). Free will is meant in the sense that the decisions are underdetermined: A superordinate goal given to the decision-maker requires a decision between subgoals. For that decision he or she has no rule. The subject can't predict the decision, because for him or her at least one antecedence for the prediction is missing: the process of the decision-making itself (Planck, 1937; Ryle, 1949; MacKay, 1967). Therefore decisions for the subject are under-determined, hence free. The investigation method leaves those decisions spontaneous. That is, the autonomous decision-maker derives the decision only from him- or herself. The decisions are also conscious because of the always renewed requirement to decide. Hereby, a commonly accepted definition of free will (Augustinus, 388) is met. But how can a decision be free that is produced in an experiment? This problem doesn't exist if the perspective of subject and observer are distinguished as Planck demands. Free will can be investigated experimentally from the perspective of the observer. From that point of view, the amount of time taken for the subjectively missing antecedence of the decision is measured: its determining process as seen from the perspective of the observer. Switch costs are high if the free will occurs within a trial (722 ms), and substantially lower under null-conditions (406 ms). Thus, in this experiment the missing antecedence that makes decisions free for the subject requires approx. 316 ms. The costs are lowest, if s's make their willful decisions before they start (191 ms; $F(8,2)=12.504$; $p = .003$). Apparently, an already made decision reduces information load because determination leads to selective information intake.

MENTAL REPRESENTATION AND IMAGERY IN PROGRAM UNDERSTANDING

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The goal of this work is to study the role of imagery in the process of program understanding. Studies from the Psychology of Programming assume that the effect of providing visual information is to improve a subject's mental representation of the program. But little systematic research has been conducted to prove this assumption. Research in the area of image processing has shown that pictures allow access more quickly to semantic information (Bajo, 1988; Glaser & Glaser, 1989; Puerta & Bajo, 1998). This result agrees with the conclusions of several studies of visual aids in Text Comprehension (Mayer, 1990) and graphical interfaces in Human Computer Interaction (HCI) (Kieras, 1992), which have proved that an image's effects depend on the semantic information depicted by it. To explain Visual Programming Language comprehension, this study links the research about image processing with the theories of mental models about procedural programming languages (Pennington, 1987; Detienne, 1996). Based on these program understanding theories we predicted that: IF the role of imagery is to aid in the access of semantic information (data flow, functional information), THEN programming languages with visual layouts (e.g. Spreadsheets) should allow easier and quicker access to data flow information than textual languages (e.g. C), even when performing a simple understanding task (Green and Navarro, 1995; Saraluoma and Sajaniemi, 1994).

To test this hypothesis we conducted an experiment in which C and Spreadsheet programmers were assessed on their mental representations of programs under different comprehension conditions. There were two tasks designed to measure the programmer mental models. The first was a primed recognition task, where the primes could be: data follow related, control flow related, non related or not from the program. In the second task, the programmers were asked to group lines of the original program, which they thought were related (Grouping Task). The results gave evidence to support the author's hypothesis that spreadsheets, with their visual characteristics, helped programmers to develop a representation based on the program's data-flow structure. The data from the grouping task showed that the mental structure of the spreadsheet programmers has information about both control and data flows of the program. On the other hand, C programmers seemed to have better mental representations of the control flow information. With regard to the Primed Recognition task, C programmers seemed to be more influenced by the control-flow primes, so their representations were more strongly based in control-flow information. Primed Recognition by spreadsheet programmers was more strongly influenced by data-flow primes.

These results are important for two reasons: First, they propose a new explanation for the effect of imagery in programming learning, and HCI in general. Second, they show the usefulness of primed recognition methodology and knowledge elicitation techniques to measure the mental representation in a complex task, like programming understanding.

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Order Effects and Frequency Learning in Belief Updating

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ABSTRACT: Beliefs are updated and judgments are revised as new information becomes available. If a piece of new information is not neutral or irrelevant, it can either strengthen or weaken the current belief. Both the content of new information items and the order by which they arrive have an impact on how people update their current belief.

Hogarth and Einhorn (1992) proposed an anchoring-and-adjustment model to describe the process of belief updating. The model makes different predictions about order effects depending on the task characteristics and the mechanisms of information processing involved in belief updating.

The current work investigates the predictions of anchoring-and-adjustment model in four experiments using both behavioral data and rating data. We focus on situations where information are encoded as positive or negative with regard to a current hypothesis (evaluation task) and where these information are processed sequentially.

We presented the subjects with either a sequence of consistent information items or one with inconsistent information. The model predicts a recency effect for series of inconsistent information and no order effect for consistent information. A classification task was used to examine these predictions: In each experiment the subjects completed about 100 practice trials where they were presented with two pieces of information about an object and then had to decide to which categories the object belong. Afterwards they were asked to rate how strongly they believe in a specific hypothesis given the information.

For practice trial data a recency effect was found with inconsistent information of equal diagnostic value. We demonstrated that the recency effect is not due to the design chosen or an incomplete learning of the probability distributions.

For rating data we found a recency effect for inconsistent data only if the subjects had to rate the probability of an object belonging to a certain category. If they had to rate their belief in terms of absolute frequencies or belief strength the data showed no recency effect. There was no order effect for consistent information both for the behavioral data of the practice phase and for the rating data.

Although the results of our experiments are largely consistent with the predictions of the anchoring-and-adjustment model, it cannot explain the different findings between the behavioral and the rating data.

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Johnson-Laird's mental models theory claims that reasoning is a semantic process of construction and manipulation of models in working memory of limited capacity. Accordingly, both a deduction and a given interpretation of a premise would be all the harder the higher the number of models they require. The purpose of this presentation is twofold. First, it aimed to demonstrate that the interpretation of *if...then* conditional sentences in children (third, sixth, and ninth graders) evolves as a function of the number of models the children can produce. We hypothesized a developmental trend of three successive levels of interpretations underlain by one, two, and then three models, i.e., conjunctive, biconditional, and conditional respectively. Such a developmental trend is shown in tree tasks: (a) recognition of the impermissible instances of an *if p then q* statement (b) recognition of the permissible instances, and (c) production of conditional inferences. Second, we aimed to show that these different levels correlate with working memory capacities: the higher the working memory span, the higher the number of models underlying the conditional interpretation. These two hypotheses were verified, supporting the mental models theory. The results are compared with the rival theory of mental logic.

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PROCESSING COORDINATION IN CONTEXT

Readers develop sentence-level representations of the incoming string of words incrementally, as they recognize each individual word. Temporary ambiguities, however, are frequent and the language processing system must therefore have some way of handling ambiguity. Look for example at sentence 1a.

- 1a. The actress cursed the director and the producer threw his cigar on the floor.
- 1b. The actress cursed [the director and the producer] ...
- 1c. [The actress cursed the director] and [the producer threw his cigar on the floor.]

Only when the word *threw* is encountered, it becomes clear that *the producer* is not the object of *cursed* (as in 1b), but instead the subject of a new, conjoined, sentence (1c).

According to Minimal Attachment theory (Frazier, 1987) readers will prefer NP-coordination over S-coordination, and therefore run into trouble upon encountering *threw*. In a number of experiments (selfpaced reading and eye tracking) it will be shown that this is indeed the case.

While this finding would seem to corroborate Frazier's model of sentence processing, we will also show that in sentences like 2, the selection restrictions of the verb *sanded* can be strong enough to prevent gardenpaths altogether.

- 2. The apprentice *sanded* the board and the carpenter scratched the paint from the doors.

Although these findings cast serious doubt on the validity of the Minimal Attachment strategy, they do not rule out autonomous syntactic processing completely: one could still argue that selection restriction information of verbs is incorporated into the syntax module.

What cannot be part of this module, however, is the information contained in the context of an utterance. In our next experiment we manipulated the context of target sentences like 1a in such a way that both actors (e.g., *the actress* as well as *the producer*) become the topics of a story. Our results showed no trace of gardenpathing following such a context, while the effect was clearly present in a control condition with neutral contexts. This finding establishes discourse structure as a very important aspect of incremental sentence processing.

Object Attraction in Subject-Verb Agreement Construction

by

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Two experiments in which errors of subject-verb agreement were elicited in spoken language production assessed the effects of syntactic function and grammatical category of the constituent appearing immediately before the verb. Participants were requested to repeat and complete sentence fragments. In order to produce a correct sentence, a verb had to be inflected for number and the number of erroneously inflected verbs constituted the dependent variable. Bock and Miller (1991) have shown that constituents modifying the subject exert an "attraction effect", an increased error rate when that constituent had a grammatical number different from that of the subject head noun. The present experiments, conducted in Dutch, showed that such an attraction effect is not restricted to sentences in which the number mismatching information is embedded within the subject: Direct-object noun phrases exert an attraction effect as well, although a smaller one than subject modifier noun phrases. The second experiment showed that direct-object *pronouns* exert an attraction effect about as strong as observed with nouns, unless the pronoun is explicitly case-marked. In such circumstances no attraction effect obtains. These results are interpreted within the recently proposed hypothesis that the number of phrasal nodes intervening between "attractor" and subject head noun determines the strength of attraction effects. The results further support the hypothesis that the mechanism constructing agreement is sensitive to explicit marking of syntactic function.

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Phonological and syntactic representations in sentence recall

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The fact that sentence recall is much better than recall of unrelated words is usually explained by the assumption that sentences provide better conceptual encoding than word lists. Following Potter and Lombardi's (1990) *conceptual regeneration hypothesis* the surface representation of sentences is not crucial for performance in sentence recall. In a series of experiments, they showed that the additional presentation of unrelated words impaired sentence recall when one of the words was synonymous to a content word of the sentence. Although the experiments of Potter and Lombardi (1990) clearly show that conceptual short-term information plays an important role in sentence recall they do not verify that surface representations are negligible for sentence recall. This objection is confirmed by neuropsychological data reported by Martin (1993). E.A., a patient with an impairment of the phonological short-term memory, was able to understand sentences with complex syntax, but she was unable to recall the surface information of these sentences.

In order to investigate the role of surface information in sentence recall of unimpaired subjects, we conducted a series of immediate sentence recall experiments in which we directly manipulated *syntactic* and *phonological* aspects of the sentences. German temporal and causal sentences were auditorily presented and subjects had to immediately recall them orally. To avoid ceiling effects, each trial contained two sentences. Two factors were varied according to a 2 x 2 (within group) design: *syntactic structure* (subordinate vs. co-ordinate relationship) and length of nouns (monosyllabic vs. three-syllabic nouns). Neither the total number of syllables nor the semantic information was influenced by the syntax variation. The following sentences illustrate the experimental conditions (three-syllabic versions in round brackets; English translation in square brackets).

Subordinate temporal construction: *Nachdem er das Pferd (den Kakadu) pflegte / las er das Buch (den Katalog).* [After he looked after the horse (cockatoo) / he read the book (catalogue).]

Co-ordinate temporal construction: *Erst pflegte er das Pferd (den Kakadu) / dann las er das Buch (Katalog).* [First he looked after the horse (cockatoo) / then he read the book (catalogue).]

We found main effects for word length and syntax, but no significant interaction between the two factors. Performance for sentences with monosyllabic nouns was better than for sentences with three-syllabic nouns and performance for subordinate structures was superior than for co-ordinate sentences. One possible interpretation of the latter finding is that subordinate sentences differ with respect to prosodic aspects. We hypothesise that subordinate structures consist in one prosodic chunk whereas co-ordinate structures consist in two prosodic chunks. In a further experiment, we tested this hypothesis. We assumed that visual word-by-word-presentation of the sentences should prevent subjects from generating different prosodic structures and thus decrease the syntax effect. The word length effect should not be affected by this manipulation. As predicted we found a main effect of word length but no significant effect of syntax.

We will conclude by discussing the theoretical implications of these findings for the architecture of verbal working memory.

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Agree or Crash: The Brain Reacts

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Conscious judgments as to the subject of an infinitival complement can normally be made simply by considering the matrix verb. The language processor, in order to correctly coindex the implicit subject with its antecedent, must likewise access and use information specific to the verb's lexical entry. Yet techniques normally employed to reflect antecedent assignment have yielded only weak, if any, evidence for such assignment to this implicit subject. We report here the successful employment of event-related brain potentials (ERPs) to provide indirect evidence of antecedent assignment. In two experiments, ERPs were recorded during language comprehension of spoken Spanish. The critical sentences contained a predicate adjective in a controlled complement clause. Spanish grammar requires that an adjective agree in number and gender with the NP it modifies. By manipulating the gender of the appropriate antecedent (i.e. the controller) of the implicit subject while holding constant the gender of the adjective, pairs of grammatical (1a) and ungrammatical (1b) sentences were created. (The examples are shown here translated for ease of exposition.):

- (1) a. Pedro-masc wants to be rich-masc in the near future
- b. *María-fem wants to be rich-masc in the near future

The detection of such a gender agreement violation would indicate that the parser had established the coreference relation between the null subject and its antecedent. The results showed a complex biphasic ERP (i.e. an early negativity with prominence at left anterior sites, followed by a centroparietal positivity) in the violating conditions as compared to the non-violating conditions. The paradigm was applied in a second experiment in which subject and object control verbs were directly compared, as exemplified in (2) and (3):

- (2) a. Pedro-masc has promised María-fem to be strict-masc with the students
- b. *María-fem has promised Pedro-masc to be strict-masc with the students
- (3) a. Pedro-masc has advised María-fem to be polite-fem with the people
- b. *María-fem has advised Pedro-masc to be polite-fem with the people

Ungrammatical sentences elicited a clear early negativity followed by a posterior positivity. These studies demonstrate the rapid deployment of gender agreement information by the brain. Manipulation of agreement morphology thus affords us another way to reflect coindexing of sentential elements.

Varieties of Visual Search

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Varieties of visual search are described in terms of a computational theory of visual attention. The basic theory (TVA) is outlined and applied to a case of fast feature search (*one-view search*). An account of spatial focusing and groupwise processing is added and applied to cases of slow feature search and conjunction search (*many-view search*). The extended theory explains the predominance of essentially linear search reaction time functions with a wide range of slopes but positive-to-negative slope ratios of 1:2.

Computational Modelling of Attention and Disorders in the Human Visual System

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We recently provided preliminary simulation results from a computational model, SAIM (Selective Attention Identification Model), which is capable of simulating known attentional effects in normal subjects and subjects with visual disorders in brain lesioned patients including visual neglect and extinction (Humphreys & Heinke 1998; Heinke & Humphreys 1997). Here, we report that the same model cannot only reproduce known findings in normal subjects and patients, but can also make novel verifiable predictions in both domains.

SAIM aims to achieve a translation-invariant object recognition by mapping inputs from their location on the retina to a translation-invariant "focus of attention". Inputs are competitively identified by matching to stored templates. When there are multiple items in the field, there is also competition between the items to win the mapping process.

With these mechanisms, SAIM can reproduce qualitatively the results of (1) the Eriksen "flanker" experiment, where RTs increase when a target is flanked by distractors of the opposite response category; and (2) the Posner spatial cueing paradigm, where RTs increase, when the locations of cues do not match the locations of targets. In the cueing paradigm SAIM also predicts that on invalid trials the target is perceived as being shifted more into the periphery (overshoot effect). We have confirmed this prediction experimentally. In SAIM, attentional effects are emergent properties of the competition for limited resources that needed to achieve a translation invariant object recognition. In humans, there may be no need to posit an explicit attentional system to account for emergent "attentional" effects on behaviour.

In our framework, visual disorders such as extinction and neglect are explained as an impairment in forming a correct translation invariant representation for all objects in the environment. With this impairment to the model, the effect of distortion of size perception in patients is reproduced as well. SAIM predicts that under certain display conditions this distortion is resolved. This prediction was confirmed by a single case-study in our lab.

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Attention Capture and Automaticity

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Shiffrin and Schneider (1977, Exp. 4d) reported that after consistent training in search for particular alphanumeric characters, presentation of one of these characters as a distractor strongly impeded detection of simultaneously presented targets. Even if presented in an irrelevant display location, the previous target appeared to attract attention.

We report a closer investigation of the conditions for the development of automatic attention attraction. The effect is shown to depend on both perceptual and memory load. Implications for theories of visual attention are discussed.

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ATTENTION, WORKING MEMORY AND AROUSAL

The paper presents a theoretical model, which assumes that the systems of attention and working memory depend on the transitory states of arousal. According to the model, the momentary storage capacity of working memory decreases with arousal, whereas the amount of attentional resources that are available at the moment increases with arousal. These assumptions have been adopted according to the Humpherys and Revelle (1984) theory of the relationships between arousal and cognitive performance. The first part of the paper concentrates on the theoretical details of the model, and its adequacy as possible starting point for the prospective theory of individual differences in cognition. It is claimed that human intelligence is well described in terms of the relationships between basic cognitive mechanisms of attention and working memory, on the one hand, and the transient noncognitive factors associated with the current state of arousal, on the other hand. The second part of the paper includes the empirical data gathered in order to verify the model and its implications for the cognitive theory of intelligence. Four experiments are described, and the results – which partly confirm the model and partly do not – are interpreted in several alternative ways. The initially outlined „processual” model of intelligence, as depending on the interaction between cognition and arousal, is modified in order to take into account different kinds of arousal (e.g., energetic or tense arousal), which seem to affect cognition differently.

POSTER PRESENTATIONS

Auditory Interference for Color Naming: Properties of the Cross-Modal Stroop Effect

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The Visual Stroop Effect (VSE) is used to demonstrate that a written word is read automatically, meaning that the process happens in an autonomous way even when it is not part of the task demands. In the Stroop task the stimulus is a color word (or "XXXX") written in color and the subject is asked to name the color of the stimulus and ignore the written word. The typical finding is that RTs are shortest for congruent stimuli (i.e., RED written in red) and longest for incongruent stimuli (i.e., BLUE written in red).

We ran an Auditory Stroop task in which a colored square was accompanied by an auditory word. The subject was asked to name the color of the visual stimulus and to ignore the auditory word. The RTs were shortest in the congruent condition (i.e., a red square accompanied by the word "red") and longest in the incongruent condition (i.e., a red square accompanied by the word "blue"). This Auditory-Verbal Stroop Effect (AVSE) while significant, was not additive with VSE. Thus, when a color word written in a colored ink was accompanied by an auditory color name, the obtained interference was not larger than for visual Stroop interference. The importance of these findings is discussed.

The examination of the time course of word processing and color processing and the interactions between them in a flanker task

Sharon Zamir and Avishai Henik

We employed a flanker-Stroop paradigm to study interactions between color and word. In this paradigm subjects were asked to respond to a central color patch (or a central word) and ignore a flanking Stroop stimulus which appeared either on the right or on the left of the central target. This paradigm enables one to look both at inter-dimensional (word-color) and intra-dimensional (color-color) effects. Previous results showed that the two flanker dimensions (color and word) interfered with responses to the target. However, their influences were always additive and never interactive. In order to examine these findings in greater detail, we manipulated the time interval between the flanker and the central target. The flanker could appear before or after the target (between -300 ms and +300 ms flanker-target SOA, respectively). The first experiment employed a central color patch and manual responding. We found that intra-dimensional effects (effects of flanker color on responding to color target) were larger than inter-dimensional effects (effects of flanker word on responding to color target). Moreover, the intra-dimensional effects appeared not only when the flanker preceded the target but also when it followed the target. In contrast, the inter-dimensional effects appeared only when the flanker preceded the target. These results suggest that susceptibility to interference from the same dimension is qualitatively different than susceptibility to interference from a different dimension. In addition, these results imply some constraints on the automatic nature of word processing. Additional experiments are under way to further investigate these issues.

**Is Blue Really Blue? Automatic Word Processing in the Stroop Task;
Using Voice Recognition in the Hebrew language.**

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In this work we use a voice pattern analysis to investigate the mechanisms involved in automatic word reading. The main question in this study is; does automatic processing occur during an early stage or a later stage of stimulus processing? Subjects were asked to respond to Stroop color word stimuli. They were asked to respond as fast as possible to the ink color of the word and ignore its content. Their responses were recorded and analyzed by a Hidden Markov Model of voice recognition. This model is based upon the probability of belonging to a certain group, i.e, the different Stroop conditions. The results show that the model succeeds in sorting the different words into the different conditions (i.e, congruent, neutral and incongruent) with a 63% to 96% accuracy, depending upon the ink color. Hence, a different voice pattern characterizes a vocal response "BLUE" when the written word is blue than when the written word is red. These results suggest that processing of an irrelevant word is not completely suppressed at early stages of processing, rather, the irrelevant word affects late stages of operation.

A paradoxical exposure-duration effect in the Stroop task

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Neumann (1986) and La Heij et al. (1995) reported the paradoxical finding that Stroop and Stroop-like interference diminished when the presentation duration of the target color was reduced to approximately 150 ms whereas the distractor (presented at a different position) remained on the screen until response.

Neumann (1986) advanced two possible accounts for his finding: (a) the offset of the target color may attract attention away from the position of the interfering word or (b) when the color is removed, the word no longer profits from the attention directed to the color. In four experiments we replicated this finding and tested Neumann's accounts.

In Experiment 1, in which the color and word were spatially separated, Stroop interference was reduced when the color was removed after 120 ms or changed into the neutral color white after 120 ms.

Experiment 2, in which integral color-word combinations were used, showed that this reduction of Stroop interference was not due to the fact that the offset of the color attracted attention away from the distractor.

Experiment 3 replicated the results of Experiment 2 under mixed-presentation conditions, indicating that the effect is not due to strategic factors. On the basis of these results we hypothesized that the difference in the temporal characteristics of the relevant and irrelevant stimulus elements provided an additional selection cue.

This was tested in Experiment 4 in which integral color-word combinations were presented in three display conditions: (a) the complete Stroop stimulus was presented until response, (b) the complete Stroop stimulus was presented for only 120 ms and (c) the complete Stroop stimulus was presented for 120 ms after which the target color changed into white. We predicted a smaller Stroop interference effect in condition (c) than in condition (b).

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The Stroop effect: The role of dimensional correlation

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In the current study, I demonstrate how the failure of selective attention in the Stroop task is rooted in the experimental correlation between the stimulus dimensions. In five experiments I manipulated the degree of correlation between Stroop-like dimensions (countries and cities; and picture-word compounds). Subjects named the relevant dimension in four different conditions: (1) No correlation between dimensional values, in which there was a truly random allocation of values to the experimental stimuli. (2) Positive correlation between dimensional values, in which the conditional probability of a city given its home country was greater than that of other cities. (3) Negative correlation between dimensional values, in which the conditional probability of a city given its home country was smaller than that of other cities. (4) Baseline condition, in which there was an irrelevant variation along the unattended dimension. Selective attention was gauged by Stroop and Garner effects: Stroop congruity was measured within each of the four conditions and Garner interference was also assessed. Selective attention was influenced by dimensional correlation: It failed in the case of correlation between dimensional values; it was perfect when there was no correlation between dimensional values. The last effect is striking: Stroop and Garner effects were completely eliminated when I allocated values in a completely random fashion. The demonstrated malleability of the Stroop effect is incompatible with claims of strong automaticity in processing written material.

Title: Influence of spatial attention on word and pseudoword identification.

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We studied the role of visual attention and its interaction with the recognition processes involved in reading. In the present experiments, we use the cueing paradigm developed in reading by Siéoff and Posner (1988). In this procedure, a spatial precue (presented during 83 ms) indicates the beginning or the end of a foveal letter string that subjects were instructed to read aloud. Siéoff and Posner have shown that letter processing were influenced by the cue side but this effect depends on the familiarity of the letter string: letters located near the cued side were better identified than letters on the uncued side for pseudowords but not for words. These results suggested that attention affects less word identification than pseudoword identification. However, in this research the exposure duration was longer for pseudowords (200 ms) than for words (33 ms), thus subject had time to make eye movement only in the case of pseudowords. So, a possibility is that eye movement could explained the cueing effect obtained with pseudoword. We tested this explanation in a first experiment. Words and pseudowords of different length (6 or 8 letters) were presented with the same exposure duration (33 ms). Results still indicated a cueing effect with pseudoword (whatever their length) and not for word, whatever their length. These results showed that the differential cueing effect with pseudoword and word can not be explained only by saccadic movement. In a second experiment we reduced the word exposure duration in order to determine if it is possible to obtain a cueing effect with a word when performance is reduced. We used only 6 and 8-letter words with two exposure duration: 17 or 33 ms. We obtained no cueing effect for 6-letter words whatever their exposure duration. An effect emerge with 8-letter words with a 17 ms duration time but disappeared at 33 ms. The results of these two experiments show that spatial attention enhance visual letter processing for both familiar (word) and unfamiliar letter string (pseudowords). However, results showed a stronger attentional involvement in pseudoword identification than in word identification and are in favor of familiarity-sensitive models of attention.

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Recent findings concerning the influence of manipulating visual attention on length judgments, suggested a new model for the mechanism of visual attention (Tsal & Shalev, 1996). In this model, the visual field is composed of a grid of attentional units (namely: the Attentional Receptive Fields). These units function according to an "all or none" rule: a unit signals the existence of a stimulus within its boundaries, but there is no differentiation within this unit. The model distinguishes between two situations, Attended and unattended. The major difference between those two is that the latter consists of larger ARFs than the former, thus, the system achieves different levels of "resolution" while performing judgments.

Our work was aimed to further explore the nature of the ARFs. We used a version of Posner's Cost-Benefit paradigm to manipulate attention in a task of points segregation (two points vs. one). Our findings suggest that: (a) The ARF model can account for results obtained from different type of stimuli and tasks (Experiment 1); (b) It seems that in a certain condition of attention the ARFs increase gradually, so that the units are smallest at the more attended area of the field and become larger as attention defuses (Experiment 1 and 2); We then, further explore several conditions, which influence the size of the ARFs, their architecture and organization (Experiment 3 and 4). The implication and conclusions are further discussed.

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The present study focused on individual differences in the ability to allocate processing resources among competing tasks and on the relationship between this ability and a general cognitive ability. Data were obtained from 50 participants who performed four single tasks and two types of dual tasks comprised of pairs of the single tasks. Two single tasks and one dual task were repeated three times. The scores on Psychometric Entrance Test (PET) were used as measures of general cognitive ability.

The results revealed satisfactory levels of test-retest reliabilities for the dual tasks performance. In addition, performance on the dual tasks could not be completely accounted for by performance on the single tasks. The individual differences on the dual tasks that were not explained by the single tasks were stable and consistent, indicating that the ability to allocate resources is a distinctive ability. Finally, individual differences on the dual tasks were significantly correlated with the measure of general cognitive ability. By contrast, performance on single tasks was not correlated with the general ability.

Time course of a blindness to response-compatible stimuli

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Participants are worse in identifying left- or right-pointing arrows while performing a compatible response. This "blindness to response-compatible stimuli" has been explained with a brief refractoriness of cognitive codes during response execution. By varying the time interval between stimulus presentation and response execution, we found the blindness effect to occur in a considerable long interval before response onset, too. This finding points to an (structural?) interference between perception and response-planning mechanisms.

Repetition deafness under low memory load: Effect of ISI and Attention.

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The notion of a common, modality independent basis for the visual repetition blindness and the auditory repetition deafness phenomena is supported by the results of three experiments. Previous studies on this issue present contradictory conclusions (i.e.; Kanwisher & Potter, 1989; Miller & MacKay, 1994), although in both studies the effects due to memory interference have not been minimized. We present three experiments in which the chance of memory overload has been reduced to a minimum.

Using dichotic presentation of lists of compressed syllables (2 to 3 elements in 200 msec.), we consistently obtain reduced recall accuracy levels for pairs of repeated elements with respect to their non repeated controls. In the Experiment 1, we show that the auditory repetition effect is larger for across ear presentations as well as for the longer lists. An analysis of the intrusions in the responses shows that non-repeated pairs have not been differentially favored by response biases. Experiment 2 shows that this effect is inversely related to the temporal separation of the two elements (ISI=0msec; vs. ISI=60msec.), supporting the idea that the time available for processing each event is critical. In Experiment 3, we ask the subjects to attend and recall the materials presented to one ear, while ignoring the materials presented to the opposite side. In this manipulation, when the first instance of the repetition has to be reported but the second is ignored, we obtain no differences between the recall accuracy of repeated and non-repeated elements. However, when the second instance has to be reported, but the first is presented to the unattended ear, the repeated elements are more frequently omitted than are their controls.

We consider that these results support the notion of a generalized difficulty in processing redundant information under temporal pressure. The repetition blindness and the repetition deafness effects would be particular instances of this difficulty, modulated in part by modality specific factors, and in part by more central aspects. This is, in principle, more consistent with the class of hypotheses that are compatible with the proposal that repetition blindness occurs at a modality independent level of processing (i.e.; Luo and Caramazza, 1996; Miller and MacKay, 1994).

Automatic task cueing

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When people frequently shift between two or more tasks, performance is known to be worse in switch trials than in no-switch trials, even if the new task is cued in advance. These task-shift costs are supposed to reflect extra processing demands on executive functions to prepare the cognitive system for the new task. However, several authors found only minor costs that were eliminated through practice. A possible explanation for this elimination of switching costs may be that during practice, associations between cue and task set are built up. If the associative strength is sufficient, the presentation of the cue might activate the task set, leading to the direct initiation of the task and thereby to the elimination of task shift costs.

In our study we investigated whether, or under which conditions, task cues can automatically activate task sets. In the first (mixed) block of our experiments subjects responded to the shape (Task A) or the color (Task B) of a colored letter, as indicated by a task cue preceding the letter. In the following (pure) block they responded to only one of the two dimensions of the target stimulus, such as color. As there was just a single task in the pure block, the task cue now became completely irrelevant and was to be ignored. Nevertheless, according to the cue-task association hypothesis, the irrelevant task cue may help solving the task whenever it is compatible (i.e., if it signals the current task) as compared to incompatible cues (i.e., if it signals the other task). Our results show at least some support for this assumption.

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HEMISPHERIC SPECIALIZATION AND MEMORIZATION OF WORDS : An approach in dichotic listening

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Simultaneous presentation of two words, one in each ear, induce usually a right ear advantage which results in a restitution of a greater number of words presented to the right ear, reflecting the privileged processing of linguistic indices by the left hemisphere (Ely, Graves et Potter, 1989 ; Mondor and Bryden, 1992 ; Murray, 1983).

Our study is interested mainly in the processing by the cerebral hemispheres, during the dichotic listening of a list of stimuli, in right-handers adults. The items of the list are listened, memorized, and restituted according to 3 modes of examination of the retention : a free recall task and two recognition tests (visual recognition and auditive recognition among a list of 60 stimuli).

Two experiments were performed, one using monaural presentation of 20 dissyllabic substantives, the other in binaural presentation of words and pseudo-words.

With the monaural presentation, the results of the free recall task shows the awaited right ear advantage, compared to the left ear, during the presentation of the verbal material, assumption largely shown by many authors. But the results of the recognition tasks of the same verbal material indicates a superiority of the left ear compared to the right ear, superiority more marked in auditive than in the visual modality, as shown previously using a tachistoscopic divided hemifield method (Juan de Mendoza, 1988 ; Juan de Mendoza and Grosso, 1980).

At the contrary, the binaural presentation of words in the free recall task does not show a right ear advantage. However, the left ear advantage is not found in visual recognition task and auditive recognition task. Furthermore, in the binaural presentation of pseudo-words, the results of visual recognition show a right ear advantage, whereas a significative difference does not exist between the two sides of presentation in the free recall and the auditive recognition. Finally, the noises do not show any ear advantage, but the interaction of sex, exam and ear is significative.

In conclusion, it seems that the right hemisphere would treat during the memorization a low level perceptual index which could correspond to an "auditive form" of the stimuli. Studies performed with verbal and non-verbal materials (pseudo-words and noises) are attempted to bring answers with regard to the role of cerebral hemispheres in the memorization of a listened material.

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Scanning direction and line bisection in French and Israeli normal subjects and unilateral neglect patients.

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The use of bisection protocol with normal subjects has demonstrated an asymmetric perception of space in the form of a left bias when the subject is asked to estimate the centre of a line or a rod. This phenomenon was called "pseudo-neglect" because the direction is opposite to that presented by left unilateral neglect patients. Using the same protocol, such patients place the subjective middle far to the right of the objective centre.

In previous research among normal right-handed adults and children differing by their reading habits: French subjects (reading from left-to-right) and Israeli subjects (reading from right-to-left), opposite patterns of deviation were found in line bisection (Chokron and Imbert, 1993, Chokron and de Agostini, 1995). French subjects transected the line significantly to the left of the objective middle, while Israeli subjects made a significant rightward deviation. We hypothesized that these results have to be linked to the opposite scanning direction relative to opposite reading habits.

In order to confirm this effect of scanning direction on performance, sixty normal dextrals (30 French left-to-right readers and 30 Israeli right-to-left readers) and two left unilateral neglect patients with opposite reading habits performed here a passive visual line bisection task. The subjects had to stop a mark moving on the to-be-bisected line, either from the left to the right or in the opposite direction.

Results showed that the position of the subjective middle was dependent upon the scanning direction of the line for all subjects. A leftward deviation appeared for the left to right scanning, whereas a rightward shift occurred when the mark moved from the right to the left. While the deviation was small but significant for normal French and Israeli subjects, the patients' deviation is about ten times larger than the one of normal subjects in the right-to-left direction, but the interesting point is that this pattern occurred toward the left when scanning from left-to-right.

These findings confirm previous results and emphasize the role of exploratory strategies in space organization not only in normal subjects but also in neglect patients. When the motor component is minimized in line bisection, the position of the subjective middle seems to be dependent upon the scanning direction of the line for both normal subjects and neglect patients.

The scanning direction in line bisection might interact with overt and/or covert orienting of attention which are able to act upon space organization. This effect is discussed with respect to the explanatory hypotheses of unilateral neglect.

DISSOCIATION OF SEMANTIC AND ASSOCIATIVE PRIMING IN PICTURE NAMING

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We present the results of two picture naming experiments in which the pictures were preceded by visually presented word primes. The primes could either be semantically related to the picture (e.g., "boat" - TRAIN : competitor pairs) or associatively related (e.g., "nest" - BIRD : associated pairs). Performance on those conditions was always compared to unrelated conditions (e.g., "flower" - CAT). In order to clearly distinguish the first two kinds of primes, we choose our materials so that (a) the words in the competitor pairs were not verbally associated, and (b) the associate pairs did not share semantic features. Results show that our two related conditions behaved in different ways depending on how long the primes were presented. When presented for a short time (100 ms, Experiment 1), the competitor primes produced an interference effect, but the associated primes did not differ from the unrelated primes. Conversely, when the word primes were presented for 220 ms (Experiment 2) the competitor primes produced no effect whereas a facilitation effect was observed for associated primes. This difference is interpreted in the context of current models of speech production as an argument for the existence, at an automatic processing level, of two distinguishable kinds of meaning relatedness.

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Prime processing in orthographical and phonological priming: When the mask doesn't mask the prime but the target does

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Using Ferrand, Grainger and Segui's (1994, Experiment 2, *Memory and Cognition*, 22, 431-441) masked priming procedure, the present study aimed at assessing the nature of the prime information that is available to consciousness (Experiment 1) and at determining whether the masking stimulus is the mask... or the target (Experiment 2). Each trial comprised the following events: a forward mask for 500 ms; a pseudoword prime (non related, orthographically related, or orthographically plus phonologically related to the target) for 33 ms, a backward mask for 17 ms, and a word target until response. A first experimental block served to assess target priming in a target naming task and a second block served to test prime visibility through three direct tasks on the prime (detection, same/different relative to the target, or identification).

Results showed that the detection of the prime was quasi-perfect (94% CR) and the mean performance for the same/different task was well above the chance level (70% CR). The identification performance was low: 32% of letters/prime were identified and 3% of the pseudoword primes were entirely reported. Priming effects were both proactive (the prime primed the target) and retroactive (the target primed the prime). In Experiment 2, the second block was a prime identification task where the masks were replaced by a blank for half of the subjects or the target was removed for the other half. The masks were found to have no masking effect: when removed, the prime identification performance did not increase whereas when the target instead of the masks was removed, prime identification increased up to 97% of letters/prime and up to 87% of entire primes. These findings show that in a condition of focal attention, some information of the prime is consciously identified and that, consistently with the effect of structural similarity on visual masking, the main part of masking is provided by the target. Inhibitory and facilitatory prime/target interactions are discussed.

**Pre- and post-lexical phonological effects
in cross-modal repetition priming using lexical decision**

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The effects of pre- and post-lexical phonology were explored in a cross-modal, visual-auditory, repetition priming lexical decision task. Seventy-two right-handed, French undergraduates participated in the experiment: Twenty-four were tested in a word-prime condition (WORD), 24 in a word-prime and articulatory-suppression condition (SUPPRESS) and 24 in a pseudo-word prime condition (PS-WORD). In the SUPPRESS condition, subjects were required to count loudly as fast as possible, from the onset of a fixation point that announced the beginning of a new trial until they heard the target. Word primes (or pseudo-word primes in the PS-WORD condition) were phonologically paired with a word target (e.g., vedette/dette), or a pseudo-word target (e.g., banane/nane). The same word, or pseudo-word primes were also paired with non phonologically related word (e.g., vedette/chat) or pseudo-word targets (e.g., banane/repe). In addition, the same targets were used in phonologically related pairs and in phonologically unrelated pairs. The same stimuli were presented in the WORD and in the SUPPRESS conditions. In the PS-WORD condition, we transformed word primes into pseudo-words without changing the last syllable.

Results showed that lexical decision was faster for word than pseudo-word targets in all three conditions. Phonologically related pairs yielded faster response times than unrelated ones in the WORD and the SUPPRESS conditions but not in the PS-WORD condition. Priming was observed for word targets in all conditions, whereas priming was observed for pseudo-word targets in the WORD condition only. In addition, results revealed more priming in the WORD than in the SUPPRESS and the PS-WORD conditions.

Taken together, these results suggest strong lexical effects on phonological priming via a post-lexical phonological process (since pseudo-word targets produced priming in the WORD condition, whereas they did not in the SUPPRESS condition) and via the spreading of activation in the lexicon (since word targets produced priming both in the WORD and the SUPPRESS conditions). The pre-lexical phonological effects were difficult to demonstrate even in the PS-WORD condition where the use of pseudo-word primes did not produce significant effects on the processing of pseudo-word targets.

**ON THE ROLE OF SUBSYLLABIC COMPONENTS IN VISUAL
WORD RECOGNITION: A PHONEME EFFECT**

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In alphabetic writing systems like English or French, a large number of words is composed of more letters than phonemes (e.g., BEACH is composed of five letters and three phonemes, i.e., /biJ/). This is due to the presence of higher order graphemes, that is, groups of letters that map into a single phoneme (e.g., EA and CH in BEACH map into the single phonemes /i/ and /J/, respectively). The present study investigated the potential role of these subsyllabic components for visual word recognition in a perceptual identification task. In Experiment 1, we manipulated the number of phonemes for English monosyllabic low-frequency five-letter words. We found that identification times were longer for words having a smaller number of phonemes. In Experiment 2, this « phoneme effect » was replicated in French for monosyllabic low-frequency words but not for high-frequency words. These results suggest that subsyllabic components, also referred to as functional orthographic units, play a crucial role as the elementary building blocks of visual word recognition.

**SUPPRESSION AND LEXICAL ACCESS IN COMPREHENDING TEXT
BY PROFESSIONAL INTERPRETERS**

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Recently, cognitive psychologists have started to show interest for the processes involved in language translation and interpretation (Danks, Shreve, Fontan and McBeath, 1996). This interest comes from the especially difficult condition in which comprehension and production processes occur in these tasks. Language has to be comprehended and produced in a simultaneous manner, in different linguistic codes and under time pressure. Thus, the interpreter should attend and understand a part of a sentence in a given language (L1) at the same time that translates and produces another linguistic chunk in a different language (L2). To perform the task, the interpreter should be able to (1) hold a chunk in his/her working memory; (2) access the meaning of the words and sentences; (3) connect this new information with previous information; and (4) translate this chunk to a new linguistic code at the same time that produces the translated version of a previous chunk. Theories from the field of Interpretation have emphasised the need for an efficient use of working memory and of comprehension processes in order to produce interpretation of quality (Gile, 1995). For this reason, our research has focused on different aspects involved in language understanding and their relation to working memory. In our experiments, professional interpreters, students of interpretation and control subjects performed a series of tasks involving working memory, comprehension, lexical and semantic access under different conditions of simultaneity. Our first experimental series tried to determine the role of different components of working memory on the efficacy of the interpreters' memory processes. Thus, we compare the phrase span of our different groups as well as their memory abilities when they are performed simultaneously to visual processing, phonological production, or semantic access. The second experimental series tried to determine the language comprehension abilities of our subjects as well as different aspects related with it (suppression of irrelevant meaning, lexical activation and semantic activation). The results are discussed in the context of a preliminary theory of language interpretation.

Title:

Effects of distractor location on negative priming in a letter-matching task.

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Abstract

We report three experiments examining the role of the spatial location of distractors on negative priming in a letter matching task. Each display was composed of an array of 5 letters arranged horizontally. Participants had to indicate whether two target letters were the same or not. In Experiment 1 target letters occupied the positions 2 and 4. The peripheral distractors (occupying the position 1 and 5 in the array) were the same letter, but they differed from the central distractor occupying the position 3. In the critical conditions, distractor letters in primes (either the peripheral ones or the central one) were repeated as target letters in probes, the typical ignored repetition condition. The results showed only positive priming when the central distractor letter in primes concurred as the target letters in probes. No priming occurred when the peripheral distractor letters repeated as target letters. In Experiment 2 target letters occupied the positions 1 and 5. As in Experiment 1, the central distractor letter (in position 3) differed from the distractor letters occupying now the positions 2 and 4. These latter distractors were the same letter. Contrary to Experiment 1, results showed negative priming only when the central distractor letter in primes concurred as the target letters in probes. In Experiment 3 we combined target letter positions of the previous experiments. In one condition target letters occupied the positions 2 and 4, and in other condition they occupied the positions 1 and 5. All distractors now were the same letter. The results showed negative priming from previous distractors when target letters occupied the positions 2 and 4, and positive priming when they occupied the positions 1 and 5. This change in priming as a function of spatial location of target and distractors is not predicted by the episodic retrieval model of negative priming. However, these results can be easily explained by activation-inhibition models of negative priming.

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THE INFLUENCE OF PRIMING ON THE PROCESS OF CATEGORIZATION

The study is devoted to the problem of whether the process of categorization may be affected by primes presented prior to the notions that are to be categorized. Subjects were shown with 275 pairs of words belonging to one of four categories: fruits, vehicles, sciences, and feelings. The words constituting each pair might belong to the same category (e.g., plum – peach) or to different categories (e.g., plum – bicycle). The task was to decide if the two words belonged to the same category or not. Primes were divided into subliminal (200 ms) and supraliminal (1000 ms). They were presented shortly before the first element of the pair of words. There were two types of primes: prototypes of the given category (e.g., apple) and category names (e.g., fruits). Five experimental conditions were presented: no prime, subliminal prototype priming, subliminal category priming, supraliminal prototype priming, and supraliminal category priming. Twenty subjects participating in the study obtained the longest mean reaction time in the control (i.e., no prime) condition. Subliminal priming conditions brought about slightly shorter mean RT, whereas supraliminal priming resulted in the shortest mean RT. No effect of the type of priming (prototype versus category) was observed. It also appeared that the abstract pairs of words (sciences and feelings) required more time for the decision than the less abstract pairs of words (fruits and vehicles). It may therefore be concluded that the duration of priming is a significant factor influencing the speed of categorization, whereas the type of priming does not matter at all. The results are discussed in terms of their implications for different models of semantic memory organization.

Triggering temporal integration processes in vision: the role of off-responses to a following stimulus.

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Successive presentation of dot patterns was used to investigate temporal integration as a function of duration of relative intensification of a leading edge of a long-lasting following stimulus (T_i). With very brief stimulus-onset-asynchrony performance was found to be inversely related to T_i , with the effect not being due to variations in brightness of T_i . Further studies showed that integration performance is inversely related to the duration of T_i of constant intensity. These findings question the role of visible persistence in the mediation of temporal integration, and indicate that successive stimuli are coded as unified or separate depending on temporal proximity of On- and Off-responses in the visual system.

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The location of the initial fixation in a word during normal reading, called the preferred landing position (PLP), is somewhat regular in that readers tend to fixate about halfway between the beginning and the middle of words (McConkie et al., 1988; Vitu et al., 1990). The purpose of the present experiments was to investigate the factors that determine landing position, i.e. the role of visual and linguistic factors in saccade computation. One way of showing this was to compare the oculomotor behavior of readers scanning linguistic and non-linguistic materials. The two eye-movement experiments were carried out with what we called "a bisection task", where subjects were required to "move their eyes" to the location they estimated to be the center of the stimuli. Linguistic (words and non-words) vs non-linguistic (strings of sharps and segments) stimuli were presented either right or left of the screen. First, the results confirm the existence of the PLP phenomenon for both linguistic and non-linguistic stimuli. In addition, the data indicated the same landing position distributions for words, non-words and strings of sharps, in contrast to the segment distribution. This supports the idea that the discreteness vs. continuity of information in saccade computation is important. More importantly, the data revealed differences between how stimuli (discrete vs. continuous) are scanned. The data indicated that the left/right distribution of the landing position was asymmetrical for discrete stimuli and symmetrical for continuous stimuli. This is consistent with the idea of a left/right attentional scanning strategy for discrete stimuli. In this view, subjects take the direction of visual scanning into account and try to land near the beginning of the stimulus when scanning from left to right. In contrast, for continuous stimuli, they do not appear to take direction into account. One interpretation of this observed asymmetry is in terms of attentional factors governed by reading habits. This suggests that a comparison of languages that are read from left-to-right vs right to left can provide one clear means of testing the different explanations of the preferred landing position.

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Are Interhemispheric Transfer Times Longer for 7-Year-Olds than for Adults? A Failure to Replicate.

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In their study with the Poffenberger paradigm, Brizzolara et al. (1996) reported longer interhemispheric transfer times (IHTT) for children aged 7 years than for adults. They interpreted this finding as evidence for incomplete functional maturity of the corpus callosum in young children. Our study investigated IHTT in children by comparing crossed and uncrossed responses (CUD's) of sixty 7- and 11- year old boys. There was no significant difference in CUD between 7- and 11-yr-old subjects, and both values were similar to those reported for adults which means that the age effect reported by Brizzolara et al. was not replicated. A closer look at the study of Brizzolara revealed that merely 80 observations per child had been collected, which makes it probable that the larger IHTTs in 7yr olds were caused by stimulus-response compatibility rather than by lower efficiency of the corpus callosum during childhood years.

The role of the left hemisphere in the processing of coordinate spatial relations

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Kosslyn (1987) hypothesized that coordinate and categorical visual spatial relations are computed by distinct subsystems. This hypothesis was confirmed in several studies revealing a left-hemisphere advantage (LH-A) for the processing of categorical spatial relations and a right-hemisphere advantage (RH-A) for the processing of coordinate spatial relations. Kosslyn et al. (1989) and Koenig et al. (1997) observed that the RH-A for the processing of coordinate spatial relations disappeared with practice. The authors suggested that this disappearance may be due to the development of new categorical spatial representations in the coordinate task that are processed by the LH. The present study was aimed to further address this issue.

In a first experiment, twenty-four right-handed males were submitted to a visual half-field, coordinate experiment in which they had to decide whether a dot was within 3, 6, or 9 mm of a line. Subjects were presented with three blocks of a given distance, followed by three blocks of another distance, and three blocks of a third distance, in order to maintain the RH-A. The different distances were presented according to a latin square design in three groups of subjects. Results revealed that subjects responded faster when stimuli were presented to the RH, but only for the first trial block (whatever the distance). Although we changed the critical distance within the task, the RH-A did not reappear. These results suggest that rather to develop new categories, the LH becomes more capable of performing coordinate tasks with practice.

To test this hypothesis, forty-eight right-handed males were submitted to a second experiment in which six critical distances were used that changed after each block. Subjects were divided into six groups with a different distance order for each group. This experiment was aimed to make it very unlikely that subjects could develop specific categorical representations of the stimuli. Again, results revealed that subjects responded faster when stimuli were sent to the RH on the first block only. These results are in accordance with the hypothesis that the RH-A disappears with practice in coordinate tasks because of a progressive increase of the LH ability to compute coordinate spatial relation representations.

The role of expectancies about a duration -triggered by structure- on the estimation of short time intervals.

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According to Boltz (e.g. 1993), expectancies about the duration of an event which are confirmed, facilitate the time estimation and hence this estimation will be more accurate. Also, violated expectancies - which arise when the actual duration is larger or smaller than expected- create a biased duration estimation (respectively an over- or underestimation). One way of triggering an expectancy about the future course and about the upcoming end of an event is by using coherent structure or periodicity (Boltz, 1991, 1992; Macar, 1996). In two experiments, this role of structure on expectancies and hence on time estimations was replicated and investigated. In a first experiment, the regularity or periodicity in which a sequence of words occurred one after another on a screen, was manipulated. The duration of that sequence had to be estimated, within a prospective paradigm. Although the obtained accuracy's lied in the expected direction (one's time estimation was less accurate when an irregular structure was offered), there was no significant difference in accuracy between regular and irregular structured intervals, as e.g. Boltz (1993) and Macar (1996) previously found. Neither was there a significantly biased estimation when the duration was other than expected (violated). Since the maximal interval used in the first experiment, was less than 10 seconds and Boltz (1993) and Macar (1996) obtained their findings with intervals of at least 18 seconds, a second experiment was conducted. In this experiment, the actual duration and the amount of units presented during that interval, were manipulated. The impact of the actual length of an interval on the role of structure and expectancies, is discussed and some ideas for further research are suggested.

Motor preparation during the foreperiod*

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Motor preparation is assumed to build up during the foreperiod (FP), that is during the interval between a warning signal and the imperative stimulus (IS). Both the FP duration and the variability of different FPs across trials affect reaction time (RT). The most important determinant of preparation, and therefore RT, is considered expectancy of IS presentation (Niemi & Näätänen, 1981). When different FPs are presented randomly within a block of trials, expectancy increases as time passes without an IS presentation, which explains why mean RT is usually longest at the shortest FP and decreases as a negatively accelerating function of FP. The amount of activation in the motor system is expected to fluctuate with variations in preparation. According to Näätänen and Merisalo (1977), increasing expectancy brings the activation of the motor system closer to what they termed the motor action limit.

To explore this view, we recorded EMG activity of the forearm flexor and extensor muscles during a line drawing task on a digitizer, under constant and variable FP presentations. It is expected that the amount of motor activation will vary with expectancy. However, when expectancy is varied, our preliminary data reveal no differential effect on average EMG amplitude, suggesting that expectancy does not change the amount of activity in the motor system. In this presentation, we would like to discuss what particular aspect of motor preparation, as reflected in EMG, can be taken to account for effects of FP on RT.

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Do children with autism see the trees but not the forest?

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Children with autism often show well-developed spatial skills. They may have little difficulty in identifying visual details within complex configurations and such ability has motivated recent cognitive models of autism. According to Frith (1989), persons with autism have a peculiar deficit in the 'drive for central coherence', which makes them relatively insensitive to contextual and structured information.

One testable prediction derived from such model is that children with autism should pay relatively less attention to configurational information than to lower level information about the details of visual stimuli. We tested this prediction in a similarity judgement task. Subjects were presented with a deck of cards similar to those used by Kimchi (1990). Each card depicted one 'standard figure' and two 'target figures'. All figures were characterised by an overall squared or triangular shape made of smaller squares or triangles. One of the targets preserved the overall shape of the standard figure but was made of different elements, the other target presented the same elements of the standard figure, but had a different overall shape. Children were asked which target figure was more similar to the standard. We compared a group of children with autism (mean age: 10 years 11 months) with a group of persons with Down syndrome matched on Verbal Mental Age) Test for the Reception of Grammar (and two groups of normally developing children, one matched on VMA (mean age: 4 years 9 months) and the other one matched on non Verbal IQ (Raven Matrices; mean age: 10 years 5 months).

Children with autism showed a bias toward the local information and such bias was equivalent to the bias observed in normal VMA controls. By contrast, children with Down syndrome and normal ten-years-olds showed the opposite bias toward the configurational information. This pattern of results is discussed with reference to Frith's model and to competing theoretical proposals about the core psychological deficits in autism.

DIFFERENT NEURAL ACTIVITIES FOR IMPLICIT AND EXPLICIT FACE GENDER PROCESSING IN HUMANS

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According to the cognitive model proposed by Bruce and Young (1986)¹, human faces can be processed at different levels through separate and independent functional modules. This study was aimed at: (1) examining the cognitive and neurophysiological processes underlying gender perception of human faces, and studying their relationships with the *structural encoding* processes, (2) testing whether gender processing is specific and automatically triggered for faces compared to other stimuli as hands. Event-related potentials (ERPs) were recorded in sixteen normal subjects while they performed a series of "oddball counting" tasks on target (20%) stimuli. There were three separate experimental conditions, in which attention to gender was manipulated: (1) *No-gender* discrimination (targets: male faces with eyeglasses among male faces without glasses, or female faces with glasses among female faces without glasses), (2) *Implicit-gender* discrimination (targets: male and female faces with glasses among male and female faces without glasses), and (3) *Explicit-gender* discrimination (male faces among female faces, or female faces among male faces). In a control similar session, the face stimuli were replaced by hand and torso stimuli. The results showed that ERPs to non-target faces and hands differed according to the gender discrimination tasks already around 50-80 ms over midparietal regions. Both for faces and hands, N50-80 amplitude was reduced in the implicit-gender task, but did not differ between the no-gender and the explicit-gender tasks. Gender processing had no effect on the occipito-temporal N170 component, generally assumed to be related to the structural encoding of facial features. Instead, a later component (P220), maximum over the right occipito-parietal regions for faces and on the same regions bilaterally for hands, differed according to the gender discrimination tasks: both for faces and hands, P220 amplitude was reduced in the explicit-gender task, but did not differ between the no-gender and the implicit-gender tasks. This effect lasted between 250 and 350 ms for hands, but not for faces. Thus, the present data suggest that (1) gender information can be automatically, or precounsciously, processed at early stages of sensory analysis (50-80 ms latency range) both for faces and hands, (2) implicit and explicit gender processing, and structural feature encoding are subserved by distinct functional modules mediated by temporally and topographically different neurophysiological activities, and (3) explicit gender processing mechanisms are activated more briefly for faces than for hands.

¹ Bruce, V., & Young, A. (1986). Understanding face recognition. *British Journal of Psychology*, 77, 305-327.

Exploring the function of the face structural encoding mechanism: ERP responses to faces and schematic faces

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Evidence from neuropsychology, electrophysiology and neuroimaging suggests that a specialized visual brain mechanism underlies face processing in the human brain. A recent study by Bentin et al. (1996) found a marked association between a negative ERP component (N170) recorded at the human scalp and the processing of human faces. The N170 was maximal at the posterior temporal sites and had a mean peak latency of 172ms. The N170 did not seem to be affected by spatial decomposition of components, face inversion or face familiarity, and was therefore proposed as a neural analogue to the "structural encoder" suggested by Bruce and Young (1986). The ecological importance of processing face-related information (e.g., face-recognition, expression analysis, etc.) may account for the emergence of a specialized mechanism for face processing. However, it has not yet been determined what the minimal figural requirements for eliciting the N170 would be. Would a schematic face drawing be enough or is the mechanism narrowly tuned to detect natural images of faces? Assuming that the above working hypothesis is correct, these minimal requirements should also be the minimal requirements for the perceptual system to determine that a face exists in the visual field. In the present study, we addressed this question by recording ERPs elicited by four categories of faces: photographs, realistic paintings, sketches and schematic drawings. It was found that even highly schematic faces are sufficient to activate a response similar to the one elicited by photographs of faces. Unlike natural stimuli, however, schematic face-parts do not elicit the N170 when displayed out of the schematic face context (e.g., two short horizontal lines denoting the eyes). The results suggest that while the detection of photographs of faces is mediated by both a whole-face and a face-part processing mechanism, schematic faces are detected by the holistic component alone. This conclusion is supported by the finding that in contrast to natural faces, inversion of schematic faces significantly reduces the N170.

Repetition Priming for Unfamiliar Faces Using a Gender-Decision Task:

Evidence for a common route for gender and identity processing

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The necessary and sufficient conditions for obtaining repetition priming for unfamiliar faces are described. In all experiments, participants' judged the apparent intelligence of faces during study, and categorized faces according to gender during test. In experiment 1, gender decisions made to complete faces (that included hair) did not yield repetition effects. In Experiment 2, participants made gender decisions to stimuli for which the internal facial features were deleted, leaving over only the hair and overall face structure. The accurate performance to these hair-only stimuli suggests that gender decisions to complete faces may be made by applying a easy-to-use 'hair-heuristic' based only on external facial features, thus masking the possible effects of repetition. Indeed, when application of the postulated hair heuristic was blocked by presenting filtered faces, for which the hair was deleted, robust repetition effects emerged (Experiment 3). In Experiments 4 and 5, format of presentation (complete faces, filtered faces) was crossed between study and test. Repetition effects emerged only when filtered faces were presented at test, even when complete faces were presented for study. We argue that these findings are contrary to the predictions of standard face-recognition models, and suggest that decisions regarding gender may be made by the very same systems equipped to identify faces.

Spatial Situation Models and Story Actions

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Abstract

Only under rather contrived experimental conditions have readers been shown to build spatial situation models. Reading normal texts, and given normal reading instructions, readers do not form spatial mental models of the described scene (Zwaan & van Oostendorp, 1993; Zwaan & van Oostendorp, 1994; Zwaan, Radvansky, Hilliard, & Curiel, in press). Zwaan and van Oostendorp (1993, 1994) have suggested that when spatial information is related to one of the other dimensions of the situation described in the text, such as the causal or motivational dimensions, then it is more likely to be encoded in the situation model. This appears to be the case: Zwaan, van den Broek, Truitt, and Sundermeier (1996) looked at how the causal relatedness of spatial information affected the spatial situation model. They found that readers are more likely to encode spatial information in their situation models if this information is potentially causally relevant. A further reason that detailed spatial information might be encoded in a spatial situation model is that it is related to an action in the text. This is slightly different than being related to one of the other dimensions of a situation, because the action in the text that the spatial information is related to might not have any causal, motivational, or protagonist relevance, however it can still influence the likelihood that the information is encoded into a spatial situation model. For example, a piece of spatial information in a story such as the fact that the recycle bin was located next to the door might have no causal or motivational relevance. However, if it is mentioned in the story that a character threw a ball of paper across the room but it missed the recycle bin and landed on the other side of the door, then this spatial information suddenly becomes functionally meaningful, because of the action. The paper would not land on the other side of the door if the bin was not somewhat close to the door. The question addressed in this research was: how do actions in the text influence memory for spatial information?

The experiment examined memory for spatial information related to actions in the text. Participants read two short (5 page) narrative texts. In these stories, spatial environments were briefly described as the scene in which a series of actions took place. Some versions of the stories contained only descriptive, scene-setting spatial information. Other versions of the stories contained spatial information specified within statements of actions and events taking place. Spatial information given as part of actions described in the story was either stated explicitly or had to be inferred. Several different kinds of actions were described, and were carried out by different characters in the texts. After reading both stories, participants were asked comprehension questions, including questions regarding specific actions. After answering the comprehension questions, participants drew top-down views of the environments described in the stories. Results indicate that spatial information associated with actions in the text is generally better remembered. However, this is influenced by the type of action and also in part by which character (protagonist vs. other) carries out the action.

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Coordinate and categorical spatial relations in size processing

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The tasks that have been used to investigate the hemispheric asymmetry for the processing of spatial relations typically required the computation of the relative location of two stimuli (categorical task : left hemisphere advantage, LH-A) or the computation of the distance between two stimuli (coordinate task : right hemisphere advantage, RH-A). The present study focused on the spatial representations involved in *size* processing assuming that size computation entails either a categorical or a coordinate processing, depending both on the precision of the size computation required by the task and on the difficulty of the size computation: a categorical process for crude size encoding or for easier discriminable sizes and a coordinate one for precise size encoding or for less discriminable sizes.

The divided visual field paradigm was used in two experiments where the height of a displayed bar (from 1.7   up to 3.9  ) had to be compared to the height of a standard bar (2.8  ) presented during the instructions. Subjects (26 right handed males for each experiment) were required to indicate whether the displayed bar was smaller or larger than the standard bar (the small/large task) or whether the height difference between the displayed bar and the standard bar was more or less than one centimetre (the more/less task). In the small/large task, a LH-A restricted to the bar size very close to the standard bar was found. In the more/less task, a RH-A was found for the less discriminable bar sizes. The estimation of the size of an object seems thus to involve principally the LH or the RH depending on the precision requested, which extends to size processing what has been observed elsewhere for other spatial processes. Moreover, the interaction between the bar size and the hemisphere found in the two tasks showed that the hemispheric asymmetries could be modulated by the difficulty of size computation.

Motor and kinesthetic components of motor imagery:

The influence of intense competitive sport activity

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Motor imagery is the ability to imagine oneself performing an action without motor output. We assumed that three critical cognitive components are involved in motor imagery: A visual, a kinesthetic and a motor component. In order to reveal the kinesthetic and the motor component, we used a dual task paradigm aimed to creating an interference that appears if one or several subsystems are shared in both tasks.

The first experiment presented here was designed to reveal the existence of the motor component in motor imagery. Thirty-six right-handed students (18 females and 18 males) participated in four experimental conditions. In one condition, subjects were instructed to imagine an action. Half of the actions involved the hands, the other half the legs, and half of the actions involved the left hemibody, the other half the right hemibody. In other conditions, subjects were presented with the same motor imagery task along with a passive movement task, a simple, active movement task, and a difficult, active movement task performed with the right hand. The mental movement time (MMT) was recorded. The MMT was higher in the active movement condition than in the passive one, which was interpreted as revealing the involvement of the motor component. In addition, subjects took more time to imagine an action that involved the left hemibody than the right hemibody, which tends to prove that subjects did perform the imagery tasks.

The second experiment was designed to assess the role of an intense sport activity in the involvement of the motor component in motor imagery. Twelve right-handed professional hockey players and twelve right-handed male students who described themselves as performing no sport participated in the four conditions of Experiment 1. Results revealed all the above-mentioned effects. In addition, the interference on the MMT from the difficult active motor task was lower in hockey players. However, this effect only occurred when subjects had to imagine themselves performing an action that involved the legs. These results are interpreted in terms of more differentiated motor representations in sportsmen than in non sportsmen.

Enhancement of self-paced motor tasks by the implementation of cognitive strategies:
Awareness vs nonawareness approaches

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Research in cognitive sport psychology and motor learning has shown that cognitive (learning) strategies, i.e., forms of guidance for individuals about not only what to learn and perform, but how to learn and perform, enhance learning and performance of self-paced motor tasks. Strategy research has typically been conducted under laboratory conditions in which artificial self-paced tasks were executed under well-controlled conditions. The purpose of this study was to examine the effectiveness of three cognitive strategies in real-life learning situations. Fifty-six female participants (mean age = 12.5 yrs.) were randomly assigned to four learning conditions in which different strategies were taught: (a) the Five-Step Approach (5-SA) (readying, imaging, focusing-attention, executing and evaluating), (b) a nonawareness strategy (preplanning the action and performing the task without conscious attention to it), (c) an awareness strategy (using kinesthetic cues, being aware of the task, and thinking about the act), and (d) a control (non-strategy). The participants performed free-throw basketball shots in 5 sessions in which the strategies were presented during sessions 2, 3, and 4 (20 trials each). Sessions 1 (20 trials) and 5 (30 trials) served as pre-test and transfer phases, respectively. Accuracy of performance and preparation times were the dependent variables. Analyses of variance with repeated measures on the trial block factor were used separately for each dependent variable. The data analyses revealed that the Strategy \times Trial Block interaction for the accuracy data $F(30, 520) = 7.29, p < 0.001$, and the Strategy \times Trial Block interaction for the preparation time data, $F(30, 520) = 6.84, p < 0.001$, were significant. The Tukey's follow-up procedure indicated that the 5-SA and the nonawareness participants performed more accurately than the awareness and the control participants. In addition, the strategy participants increased their preparation intervals compared with the control participants. It is concluded that: (a) cognitive strategies can facilitate accuracy performance under real-life conditions, and (b) young learners can benefit by being exposed to not only physical but also cognitive practice.

Working Memory Usage in One-Dimensional Spatial and Temporal Reasoning Problems.

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Based on an extensive review of the literature, Evans, Newstead and Byrne (1993) argued that linear syllogisms are mostly solved by constructing an integrated spatial representation of the premise information. However, in all studies reviewed, the information in the premises (i.e. both terms and their relation), is presented simultaneously. The spatial representation could therefore be an artifact due to the simultaneous presentation. The present study aims to test this artifact explanation by presenting the individual terms of the premises either simultaneously, or sequentially. The spatial or temporal nature of the syllogisms was determined in the instructions; by indicating that the relationship was to be understood as 'to the left of' or 'before', respectively. In two experiments two types of reasoning problems (one-model and two-model problems with a valid conclusion) were displayed and subjects were asked to judge the correctness of a relation between two terms. Experiment 1 revealed no differences in performance between the spatial and the temporal reasoning problems. There was however an effect of presentation mode: Syllogisms with simultaneously presented terms were solved somewhat more accurately but more slowly than syllogisms with sequentially presented terms. It was also found that in order to attain the same level of accuracy in one- and two-model problems, the third premise required longer processing. Experiment 2 examined the involvement of three components of the working memory system: the central executive, the visuo-spatial sketch pad and the phonological loop, by means of a dual-task procedure. The purpose of this experiment was to replicate the main findings of Experiment 1 with respect to spatial and temporal reasoning problems. Furthermore, in line with previous dual-task research (Vandierendonck & De Vooght, 1997) the pattern of interference due to the dual-tasks was used to clarify the resources involved in solving such reasoning problems. The results are discussed in relation to the mental models account.

THE EFFECTS OF ARTICULATORY SUPPRESSION ON SHORT-TERM RETENTION OF MUSICAL AND VERBAL STIMULI.

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Two experiments are reported examining the effects of articulatory suppression on short-term retention of musical and verbal stimuli. In the first study, 8 and 9 year old children were presented with pairs of melodies which they had to judge as 'same' or 'different'. Pairs were presented under 3 types of condition: silence, saying the word 'the' in the interval between the two melodies and tapping in the interval between the melodies. The children were divided into two groups: musically experienced and musically inexperienced. The results indicated that articulatory suppression lead to a decrease in performance under conditions of articulatory suppression compared with the silent and tapping conditions. In the second experiment, in addition to being presented with melodies under these three conditions, children were also presented with pairs of letter sequences under conditions of silence, articulatory suppression and tapping. The results indicated that articulatory suppression lead to a decrease in performance for both musical and verbal stimuli. Implications of these results for the notion of a specialized short-term store for music are discussed.

Event-related brain potentials reflect processing of abstract features of auditory stimuli at the sensory-memory level

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Recent event-related brain-potential (ERP) data suggest that the physical features of auditory stimuli (e.g., frequency, intensity, duration) are automatically (independently of attention) analyzed and stored in short-duration sensory-memory traces, located in the auditory cortex. This is revealed by studies of the so-called *mismatch-negativity* (MMN) component of the ERP. When a physically constant "standard" stimulus is repeatedly presented with short inter-stimulus intervals to the subject, its features are encoded into a short-duration sensory-memory trace. If an occasional physically deviant stimulus (e.g., a tone of different frequency) is presented during the span of the trace, the MMN is elicited, indicating a "mismatch" between the new input and the present contents of the auditory sensory memory.

Several previous studies have suggested that this auditory analysis is not restricted solely to simple physical stimulus features but also some more "abstract" features of auditory stimuli are automatically extracted and encoded in the memory traces reflected by MMN. In the present data, subjects were presented with stimulus blocks composed of pairs of two closely spaced tone pips. Frequent standard pairs and infrequent deviant pairs were presented in a random order. Both types of pairs varied randomly over a wide tonal frequency range, there being no physically identical standard stimulus. Instead, the constant feature of the standard pairs was the *direction* of the stimulus pair (ascending, i.e., the second tone was higher in frequency than the first tone) or the tonal *interval* (frequency ratio) between the two tones. The deviant pairs violated these rules, being either descending in direction or having a different intra-pair frequency ratio. During the experiment the subjects were watching a silent video, ignoring the auditory stimulation. The deviant pairs elicited the MMN, suggesting that the brain can automatically form a sensory-memory representation for a common invariant "rule" derived from a set of varying physical auditory events, and detect violations against it.

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Natural conversation and research interview: The influence of gender on interactional style and on memory for content

Three dialogic models of interaction have been considered in order to examine their similarities and differences: natural conversation, research interview, and clinical interview. Natural conversation, in particular different conversational styles, selection of content and memory for dialogues, depending on subjects' gender had already been investigated in previous research (Baroni & Nicolini, 1995). In the present study conversational style and memory for one's own and interlocutor's interventions have been considered for what refers to research interview. Eighty subjects, half males and half females acted in 40 research interviews, in which 40 of them were interviewers and 40 were interviewees. Data on quantitative and qualitative indexes both of dialogue performance and of memory for dialogues, tested after a week delay, were collected. Results showed that gender differences in style are lower in research interview if compared with natural conversation. Some differences have still been observed in memory performance, reproducing the same situation already detected for natural conversations, that is males appear to be less involved in the relation, and less interested in their interlocutors' interventions.

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**The Subjective Organization of
Input and Output Events in memory**

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Abstract

In order to study the organization of memory for self-performed actions, 80 participants were presented with 20 action phrases for ten consecutive study-test cycles. Enactment was manipulated both at the input phase and at the output phase by having participants say or enact the phrases during encoding and/or during testing. Enactment at input or output generally enhanced both the quantity and the accuracy of recall, and also improved output monitoring. Importantly, subjective organization, as indexed by the tendency to recall the same two phrases successively across repeated recall tests, was significant for all conditions even on the first pair of trials and increased systematically with repeated study-test cycles. Enactment neither impaired nor enhanced amount of organization, and in all conditions a positive correlation was obtained between recall and subjective organization. Some commonalities in the nature of memory organization were found across all conditions. The results suggest that enactment may lead to more differentiated memory traces, resulting in a more accurate recall. Although subjective organization was clearly observed when enactment was involved, its contribution to the enhancement of recall deserves further examination.

Title: Path Length Effect and recall probability

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Roulin and Loisy (in revision) proposed that the functionality of the visuospatial refreshing mechanism postulated within Baddeley's (1991) working memory model is ascribed by the Path Length Effect (PLE). The PLE corresponds to the fact that locations span performances in a same space of reference (i.e., a 6*6 square matrix) are greater when the to-be-remembered locations are neighbour than when distant. The span performances were a linear function of the Path Length (PL) of the items. The PL is the sum of the distances between target cases in their presentation order. Roulin and Loisy put forward the proposition that the PLE results from the more frequent refreshing of neighbour locations (compared to the refreshing of distant locations).

We suggest an alternative explanation of this effect, namely the PLE could only result from recall probability. Even if the reference spaces are identical for long and short PL items, it is obvious that within the general space of reference (6*6 matrix), the minimal rectangular matrix incorporating all the presented targets is smaller for the short PL items. If we suppose that the subjects are able to identify this smaller matrix, then the PLE becomes only the reflect of the greater probability to give 6 correct responses from x possibilities than from y possibilities when x is smaller than y.

We propose an experiment where three types of items were compared: (1) long PL items, (2) short PL items equated on the minimal rectangular matrix size with the previous, and (3) short PL items with smaller minimal rectangular matrix size than the two precedents. If the PLE is due to the PL, then we can expect greater performances levels for the third and second items type compared to the first types, and no performances differences between the second and the third item type.

The results show: (i) no performances differences between the first and the second items type and, (ii) greater performances levels for the third item type compared to the two others. That suggests that the PL is not the critical variable which subtend the PLE. Therefore Roulin & Loisy's explanation has to be revised.

Is recency in immediate free recall affected by lexical and semantic variables?

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Eight lists of twelve words varying in frequency (high vs. low) and imagery (high vs. low) were administered to 48 young subjects (mean age 24.5) and 48 elderly (mean age 68.4). The results showed no influence of frequency on recall, and an overall effect of imagery influencing all serial positions. Furthermore the analysis of errors showed that semantic and phonological errors involved items occupying all positions in the presentation list. These findings were interpreted against the hypothesis that recency effect reflects the contents of a phonological short term store. Elderly showed the same effects as young subjects, but presented a reduction of recency effect. The results are discussed in the light of recent theories on serial position effects and of resource reduction in ageing.

Processing difficulty modulates the role of semantic information in sentence recall

Ralf Rummer¹ and Lars Konieczny²

This paper aims at clarifying the function of phonological and semantic representations in the recall and comprehension of sentences. To demonstrate the task specific storage and use of information, each subject had to perform both (1) an immediate serial recall task (ISR) and then (2) to answer a comprehension questions. It was assumed that the first test primarily depends on phonological representations whereas the second test primarily depends on semantic representations.

Subjects were auditorily presented with (German) embedded subject and object wh-questions varying in processing difficulty and length of nouns indicating the use of phonological memory. Processing difficulty was varied by means of local ambiguity (early vs. late disambiguation). The ambiguous versions (1) were only disambiguated by the number of the auxiliary verb at the end of the clause. The unambiguous versions (2) were realised by changing the number and gender of the nouns.

- (1) ambiguous versions:
Kurt fragte Hans / welche (Aerztinnen/Verkaeuerinnen) die (Frau/Sekretaerin) auf die Party eingeladen / {a. hatten/b. hatte}.
Kurt asked Hans / which (doctors/shop-assistents) the (woman/secretary) to the party invited / {a. had[pl]/b. had[sng]}.
- (2) unambiguous versions:
Kurt fragte Hans / welche(a. n/b. r) (Arzt/Verkaeuer) die (Frauen/Sekretaerinnen) auf die Party eingeladen / {a. hatten/b. hatte}.
Kurt asked Hans / which (doctors/shop-assistents) the (women/secretaries) to the party invited / {a. had[pl]/b. had[sng]}.

The experiment was based on a 2 x 2 design: (f1) number of syllables within the ambiguous region (short nouns vs. long nouns) and (f2) ambiguity (ambiguous vs. unambiguous subordinate clauses). All factors were varied within subjects.

We recorded (a) correctness of recall, (b) accuracy of the answer, and (c) speed of the answer. In order to obtain information on whether sentence recall was supported by semantic representations we recorded (d) the thematic structure of the orally recalled sentences.

As expected, the word length variation mainly influenced the performance in sentence recall (a), whereas the ambiguity factor was crucial for performing the comprehension question (b and c). Besides, we expected a very low correspondence between the thematic structure of the recalled sentences and the correctness of answers (which also referred to the thematic structure of the presented sentences). The correspondence of (b) and (d) should be lower for ambiguous than for unambiguous sentences. The results confirmed these assumptions to a large extent.

It can be concluded that semantic representations do not play an important role in recall of difficult sentences. In sum, these findings provide strong evidence for an adaptive multimodal approach of sentence processing.

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Misremembering self-generated material

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In this study we assessed whether after a subtle suggestion subjects could be led to falsely remember that they had experienced certain items on a key list, when actually those items were taken from stories they had generated. In three experiments subjects created a story either about themselves or about their partner. In session 1 they wrote the story and were presented with a list of words. In session 2 they received a subtle suggestion that some story words were on the presented list. In session 3 they had a recognition task where list words were mixed with story words; they tried to recognize the list words and for each recognized word they gave a Remember/Know judgment. In all three experiments when subjects incorrectly recognized their story words as being list words, they also assigned to such errors a Remember judgment. Such results show that also false memories can have a recollective quality, as indicated by the Remember judgment. In addition, results strongly suggest that self-generation and self-reference are crucial factors in modifying the quality of false memories.

The Effects of Divided Attention on Encoding and Retrieval Processes in Human Memory: Further Support for an Asymmetry and a Componential Analysis

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Abstract

Although a tradition in cognitive psychology views encoding and retrieval processes in human memory as being similar, we have recently shown (Craig, Govoni, Naveh-Benjamin, & Anderson, 1996; Naveh-Benjamin, Craig, Guez, & Dori-Ron, 1998) that notable differences exist between the two. Specifically, divided attention at encoding was demonstrated to significantly reduce memory performance and was dependent on participants' resource allocation. By contrast, divided attention at retrieval affected memory performance only minimally, but was accompanied by a significant increase in secondary-task cost. In the reported work we further examined this asymmetry in two experiments by using a secondary-task methodology which allows a micro-level analysis of the costs associated with encoding and retrieval. The results indicated different loci of attention demands at encoding and retrieval. Several retrieval processes, varying in their attentional requirements, were identified. We contend that unlike encoding processes, which are controlled, certain retrieval processes are obligatory or protected, but do require attentional resources for their execution.

IMPLICIT MEMORY IN ALZHEIMER DISEASE

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The purpose of the present study was to examine the effects of ageing and dementia of Alzheimer type (DAT) on implicit memory. Three groups of subjects participated in this study: Alzheimer group (N= 24, with a mean age of 76 years, M.M.S.E.= 20), Elderly Control group (N= 32, with a mean age of 76, M.M.S.E.= 28) and University students (N=72, with a mean age of 19 years). The two Elderly subjects were matched in years of education. The three groups carried out two tasks: the stem completion and the category exemplar generation. In the stem completion task, University group showed a greater priming than Elderly and Alzheimer groups, and no significant differences were found between Elderly and Alzheimer groups. However, in the category exemplar generation task, there were no significant differences between Elderly and University groups, although these two showed a better priming than the Alzheimer group. The results indicated that the stem completion and the category exemplar generation tasks implied different aspects of implicit memory: while the mechanisms of perceptual priming (assessed by the stem completion task) seem to be preserved in DAT, those of conceptual priming (assessed by the category exemplar generation task) seem to be impaired in these patients. That is, conceptual priming could be a more sensitive indicator of impairment in the early stages of DAT than perceptual priming.

**Adult-Age Differences in Memory Performance: Further Support for an
Associative Deficit Framework**

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Abstract

An experiment was run to further test the associative framework proposed to explain and predict older adults' deficient explicit episodic memory performance. The framework attributes a substantial part of older adults' deficient memory performance to their difficulty in associating different unrelated aspects of an episode into a cohesive unit. Young and old participants studied pairs of items, either related or unrelated semantically. At test, distractors were either semantically related or unrelated to the targets. Whereas there was only minimal effects of both manipulations on item recognition, associative recognition tests revealed, as predicted by the associative deficit framework, substantial age differences. Moreover, whereas relatedness at study seemed to help older adults more than the young, relatedness at retrieval detracted much more older than younger participants' performance. These results are interpreted as suggesting that older adults' episodic memory deficiency is due to their reduced ability to encode new associative information as well as to their failure to inhibit previously-learned associative information.

**The Basis of Feeling of Knowing:
Interactive Influence of Cue-familiarity and Accessibility**

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When a person fails to retrieve a solicited target from memory, he can still provide a judgment of his feeling-of-knowing (FOK) about the target's availability in memory. What determines the feeling of knowing?

It is proposed that in an initial phase FOK is determined mainly by the feeling of familiarity aroused by the question or the cue. In a later phase FOK is determined by the accessibility of partial information pertaining the answer, but the effects of accessibility occur only when familiarity is high. The level of familiarity of the question and the extent of accessibility it arouses were orthogonally manipulated on the basis of prior judgments collected in Experiment 1. In Experiments 2 and 3 the hypothesised interaction between familiarity and accessibility was found: both familiarity and accessibility enhanced FOK judgments, but the effects of accessibility were found only or mainly when familiarity was high. Experiment 3 tested the additional hypothesis that the interaction between familiarity and accessibility will be found only when FOK is delayed, thus allowing for the effects of accessibility to express themselves, whereas immediate FOK will indicate only familiarity effects. This hypothesis was not supported.

**The on-line extraction of sentential structure during reading:
Evidence from the function-disadvantage effect in German**

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Letters are more difficult to detect in function than in content words. According to the structural account of reading, the processing of structure precedes and paves the way for the analysis of meaning. So function words are used as cues for structure and recede to the background as the focus of processing shifts from structure to meaning. The Missing Letter Effect has been previously demonstrated for English, Hebrew and French, and the present study exploited some of the unique properties of German to further clarify the on-line extraction of sentential structure during reading.

Experiment 1 replicated the function-disadvantage effect for the 3 forms of the nominative definite article, *der*, *die*, and *das*. In Experiment 2 this effect was also shown for the accusative, genitive, and dative cases, but it was stronger when the definite article was embedded in a nominative noun phrase than in an object noun phrase. Comparing the typical subject-predicate-object format, with the reverse object-predicate-subject format, Experiment 3 yielded a stronger function disadvantage for the former format for both the nominative and accusative cases. In Experiment 4, definite articles yielded more omission errors when they could unequivocally specify the case of the initial phrase of a sentence than when they were ambiguous about it. These results suggest that the function-disadvantage effect increases with the ease with which an effective structural frame is established on-line in reading, and this structural frame is finely tuned not only to the organization of the individual phrases but also to the organization of the sentence as a whole.

**ON THE ROLE OF LEXICAL STRESS
IN**

VISUAL WORD RECOGNITION

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Visual word recognition has been traditionally related to the use of both orthographic and phonological information (e.g. Coltheart, Davelaar, Jonasson, & Besner, 1977; Coltheart, Besner, Jonasson, and Davelaar, 1979; Seidenberg, Waters, Barnes, and Tanenhaus, 1984; Seidenberg, 1985). This research investigates the use of phonological codes during lexical access in reading. We focus on lexical stress because lexical stress distinguishes between different meanings of some Spanish words (e.g. a name 'CLAvO' {NAIL} versus a verb 'claVÓ' {NAILED}).

If lexical stress is relevant to lexical access, then differences should be found between words with different stress patterns. In the visual word recognition model of Black and Byng (1986) lexical search is guided by the most frequent lexical stress pattern according to the number of syllables of words. In Spanish this representation corresponds always to words with stress on the penultimate syllable. Therefore, these words should be read faster than words with stress in other positions. This should be specially true for low frequency words, which are closely related to the use of phonological information.

In order to test this hypothesis, we compared bisyllable words stressed on the first or second syllable. Results showed that words with penultimate stress have shorter reaction times and/or higher accuracy rates than words stressed on the last syllable. Moreover, it was found that lexical stress location interacts with word frequency. The effect of stress location is obtained more clearly for low frequency words than for high frequency words.

These data suggest that lexical stress should be taken into account as a lexical access code during visual word processing. We discuss our results within the double route framework following the visual word recognition model proposed by Black and Byng (1986).

Frequency and neighborhood size effects as a function of the neighborhood characteristics of the fillers added to the lexical decision task

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Visual word recognition studies have demonstrated that word processing depends on its neighborhood characteristics. Nevertheless, in the Lexical Decision Task (LDT), some researches have shown that the presence of neighbors either facilitates or inhibits the recognition of Low Frequency (LF) words. Regarding these conflicting results, Snodgrass and Mintzer (1993) and Grainger and Jacobs (1996) have suggested that the effect of the Number of neighbors (N) on words depends on the discrimination degree between words and nonwords. In this research, we have varied the N (none versus at least three neighbors) for words and nonwords and the word frequency (high versus low frequency). We have added filler stimuli to the experimental set and manipulated their neighborhood characteristics in order to vary the discrimination degree between words and nonwords. In a first context, filler words had no neighbor and filler nonwords had many neighbors. So the subjects were presented 33% of words having at least three neighbors and 66% of nonwords having this neighborhood characteristic. In a second context, half of words and half of nonwords had at least three neighbors. Thus, filler stimuli had the same neighborhood characteristics as target stimuli. Then, in a third context, 66% of words having many neighbors and 33% of nonwords having this neighborhood characteristic were presented to the subjects. The former context (33/66 condition) is assumed to generate a lower discrimination degree than the 50/50 condition and the latter context (66/33 condition), an higher discrimination degree. Accordingly, the N effect for the LF words and the nonwords should vary with the discrimination context. The results revealed an inhibitory N effect on the LF words which significantly decreased when the discrimination degree increased and became no significant in the 66/33 condition. This pattern of results was accompanied by a significant increase of the inhibitory N effect on nonwords when the discrimination degree increased. These data agree with the assumption that the level of processing in the LDT varies according to the discrimination degree between words and nonwords and are discussed according to the visual word recognition model proposed by Grainger and Jacobs (1996).

SEQUENTIAL EFFECTS IN THE LEXICAL DECISION TASK: THE ROLE OF THE ITEM FREQUENCY OF THE PREVIOUS TRAIL

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Two lexical decision experiments were conducted to determine whether there is a localized influence between consecutive trials (i.e., first-order sequential effects) when the trials are not related to each other. Gordon (1983) suggested that criterion settings in the lexical decision task might be quite flexible and then they could vary on a trial-on-trial basis. That is, reaction times would depend on the characteristics of the preceding item (e.g., the frequency of the precursor item and/or the lexical status of the precursor item). We manipulated not only the lexical status of the previous item but also the frequency of the previous item. In this way, the target word (or the target nonword) could be preceded either by a high-frequency word, a low-frequency word, or a nonword. Experiment 1 showed that high-frequency target words showed little sensitivity to the frequency of the precursor word, although they showed a nonword inhibition effect (i.e., both word and nonword responses were significantly slower when the previous trial involved a nonword than when it involved a word). In contrast, participants were more slowly (and made more errors) to low-frequency target words preceded by a high-frequency word than to low-frequency target words preceded by a low-frequency word (Experiment 2). The implications of the results for the models of visual word recognition are discussed.

Lexical stress effects in reading Croatian words

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In spite of its well-known spelling-sound transparency, the Croatian writing system is opaque at the supra-segmental level. That is, stress is not marked in the orthography and must be lexically derived in polysyllabic words. According to distributional statistics, stress predominantly falls on the first syllable; there is a significant number of words, however, where stress falls on the second syllable. The effect of regular vs. irregular stress in reading Croatian words was investigated in two written word naming experiments. The results showed large effects of stress regularity, word frequency, and an interaction between frequency and regularity, paralleling the results of similar studies on Italian (Colombo, 1992; Colombo & Tabossi, 1992). Notably, the effect of frequency was reliable for regular as well as irregular words. It is suggested that these findings question the view that reading aloud in Croatian is largely based on phonological assembly (Katz & Feldman, 1983; Turvey et al., 1984), and are more compatible with two-process models of reading (Coltheart et al., 1993; Zorzi et al., 1998).

Interference between surface form and abstract representation in spoken word perception

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This study tested the influence of abstract representations of words --namely, orthographic and morphophonological representations-- on perception of the component sounds in French words. For this purpose, we used words whose surface phonology was non-congruent with both their morphophonological code and their orthographic code.

In the first situation examined, the incongruence resulted from voicing assimilation, which is frequent in spoken French, though not explicitly taught: Words such as "absurde" are pronounced /apsyrd/ but have an underlying phonological representation /absyrd/, which derives from the morphemic composition {ab-} + {surd} and is reflected in the spelling with the letter 'b'. (The canonical French pronunciation of 'b' is /b/.) Phoneme monitoring experiments revealed that French listeners detect /b/ rather than /p/ in "absurde", almost as often as they detect /p/ in control words such as "epsilon" (for which surface and underlying codes are congruent), but reaction time to such /b/s is slowed by 100 ms. Detection is thus largely based on an abstract phonemic code, and is slowed by the conflict with a discrepant surface code. Phonemic gating experiments showed that the [p] sound in "absurde" was correctly heard as /p/ when the preceding phonetic context was not presented. However, when the context was presented, listeners reported hearing /p/ rather than /b/ only for the early gates but shifted gradually to reporting /b/ as more input was presented. The gating data thus provide a snapshot of the relative activations of the abstract and surface codes. Taken together, the results can be viewed as reflecting top-down activation from the abstract to the surface code. In other words, listeners eventually hear what they think they should hear.

A second situation was designed to test the role of orthography alone. In words such as "asile" (/azil/), the letter 's' --whose canonical rendition is /s/-- is pronounced /z/. This reflects grapheme-to-phoneme correspondence rules, explicitly learned at school, not an underlying morphophonological code that would include /z/. Listeners tended to hear /s/ or to miss /z/ in "asile" more often than in control words such as "azur" (/azyr/), in which orthography and surface phonology match exactly. The effect, however, was quite modest compared to that obtained in the first situation. Still, orthographic interference with phonetic perception of spoken words was rather unexpected.

These data are interpreted in the framework of an interactive model of speech perception where abstract and surface representations of words interfere. Morphophonological representations seem to play a predominant role, perhaps because they become intimately associated with linguistic knowledge even before acquisition of literacy.

Authors: Chavand, H., & Bedoin, N.

Title: Phonetic features activation in visual word recognition: The role of place and manner of articulation.

Many studies suggested the involvement of a phonological code during the early stages of visual word recognition. It was suggested that the nature of this early phonological code was impoverished, coarse-grained and underspecified (Grunao & Frost, 1997; Frost, 1998). But, the issue of the nature and structure of this code is not yet totally resolved. Therefore, the present study aims to assess the involvement of an early phonological code, fine enough to be described in terms of phonetic distinctions.

To investigate the role of phonetic features (sub-phonemic units) during printed word recognition, we conducted in French two visual priming lexical decision tasks. The procedure we used was based on a manipulation of the degree of phonetic similarity between the first phoneme (consonant) of a pseudoword prime and of a target word in lexical decision task, as well as the number and the nature of the common features (*voicing, manner and place of articulation*, described as separate feature tiers by Clements, 1985).

In experiment 1, targets were preceded by three kinds of briefly presented primes (66 msec SOA):

- V-primes differed from the target only by voicing of the initial consonant (e.g. BOINT-point);
- VP-primes differed on voicing and place of articulation (e.g. DOINT-point);
- VM-primes differed on voicing and manner of articulation (e.g. VOINT-point).

Data showed greater latencies in V-prime condition than in VP-prime condition, but no difference was observed between V-prime and VM-prime conditions.

In experiment 2, targets were preceded by P-primes differing in place of articulation, or by M-primes differing in manner of articulation, or by PM-primes differing in place and manner of articulation. Response times were longer in P-prime condition than in PM-prime condition, but no difference was observed between M-prime and PM-prime conditions.

These results point out the role played by phonetic features in silent reading and can be interpreted in terms of lateral inhibition between phonemic units. The magnitude of this inhibition would increase with the number of phonetic features shared by phonemes. Contrasted effects of place and manner of articulation in Experiment 1 and 2 are discussed in terms of qualitative properties of feature tiers.

Same words but different neighbourhoods: An influence of typography and neighbourhood consistency in French word recognition

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Since the studies of Grainger, O'Reagan, Jacobs and Segui (1989), and Andrews (1989), a growing set of researches suggests the influence of orthographic neighbourhood on visual word recognition. Words that are differing from a stimulus by a single letter, that is its orthographic neighbours, are generally considered as potential candidates for the stimulus recognition. However, the way they play a role on visual word recognition processes is not so clear as facilitatory and inhibitory neighbourhood effects have been reported in the literature. This may question the reality of neighbourhood effects. As suggested by Forster and Shen (1996), an explanation of such effects may simply be found in the materials: different words are used in different experimental conditions. A property of the French language, the diacritic marks, provides a way to test this hypothesis. Assuming that letters with different accents are different characters (e.g. "e", "é", "ê", "è", "ë"), the orthographic neighbourhood of the same French words can vary or not according to typography. On the one hand the word "défi" has no neighbours when it is presented in lower case letters, whereas the same word "DEFI" has one higher frequency neighbour ("DEMI"), when it is presented in upper case letters. Its neighbourhood is referred as to "inconsistent". On the other hand, the word "étui" has no neighbour when it is presented in lower case letters and in uppercase letters ("ETUI"). Its neighbourhood is referred as to "consistent". Such words have been proposed in two lexical decision tasks, in lower case versus upper case letters. The interaction we found between typography and neighbourhood consistency reveals a neighbourhood frequency effect, which corroborates Grainger et al.'s (1989) findings. When varying the typography, no difference was observed between words with a consistent neighbourhood, whereas words with inconsistent neighbourhood were significantly longer to respond than words with consistent neighbourhood. This neighbourhood frequency effect does not seem attributable to some properties of the materials making the experimental condition. The data are explained in an interactive activation framework (McClelland and Rumelhart, 1981) that we have adapted to the French language.

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'Effects of stress, linear word position, and consonant-vowel transition on stuttering'

Many studies on stuttering suggest that dysfluencies most often occur on stressed and sentence-initial words. However, in spontaneous speech, stress and linear position are often confounded with each other, as well as with other variables that affect the amount of stuttering, such as word class. The first aim of the present experiment was to examine the pure effects of stress and linear word position on stuttering. We ruled out the possible influence of other variables by creating sentences in which the target words varied only with respect to the orthogonally manipulated variables. The second aim was to explore the effect of different types of first consonant to vowel transition on stuttering frequency. It was hypothesised that stutterers have more difficulty with words in which the first consonant and the following vowel differ in the place of articulation than with words in which they have the same place of articulation.

Twelve stuttering subjects participated in a 'delayed reading task'. Ss. first read a question-answer pair, then the experimenter read the question aloud, after which the subject produced the answer sentence from memory. The question sentences were formulated in a way to elicit the intended sentence accent. The syllable which was supposed to bear the sentence accent was capitalised. The 40 target words all consisted of three syllables. One half of the words was stressed on the first syllable, the other half was stressed on the second syllable. For each target word, four sentences were created, crossing the variables sentence position (initial, non-initial), and accented vs. non-accented.

All target words were scored as stuttered or not stuttered. The results indicate that accent-bearing words were stuttered far more often than words without a sentence accent. In addition, target words in sentence-initial position were stuttered more often than target words in non-initial positions. Word stress did not have an effect. There was no effect of type of CV-transition on the amount of stuttering.

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Abstract Title: PROSODIC AND ORTHOGRAPHIC SIMILARITY IN VISUAL WORD RECOGNITION

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ABSTRACT

Lexical prosody in Spanish is, in some cases, the only clue that allows one to accede the correct word meaning. The words *ánimo* (courage), *ánimo* (I stimulate), *animar* (he stimulated) differ only in the presence (or absence) and different situation of the written accent ('). Reading a word, therefore, should require the previous consideration of the syllable that receives the accent. Two masked priming experiments were carried out where a target word such as *mimo* (mime), with the accent in the first syllable, was preceded by a prime word such as *MIM*: (he spoiled), with the accent in the second syllable. The priming result was compared with two other types of pairs: the identity condition *MIMO-mimo* and the unrelated condition (*LACA-mimo*). A facilitation effect was obtained for the identity pairs with regard to the unrelated pairs and a null effect for the different accent condition, despite total orthographic overlapping between prime and target. We suspected that this null effect was a consequence of a balance between the inhibition produced by the different accent pattern in prime and target and the facilitation induced by the orthographic similarity. A second experiment tried to test this possibility. In this experiment the different accent condition (*MIM:-mimo*) was compared with two unrelated conditions: an orthographically and stress unrelated condition (*CAS -mimo*) and an orthographically unrelated but stress related condition (*LACA-mimo*). The results confirmed our prediction because the accent related condition produced a facilitation on the totally unrelated pairs (accent and orthography: i.e. *CAS -mimo*), but produced no effect on the accent related, orthographically unrelated pairs (*LACA-mimo*). These results seem to support a two steps model of lexical access: the first to select the set of lexical forms that match the input prosody and the second to allocate the adequate orthographic form.

Does orthographic distinctiveness play a role in same-script languages?: data from Catalan and Spanish

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Recent bilingual studies with different-script languages have reported masked priming effects with both cognate and noncognate words (Gollan, Forster, and Frost, 1997; Jiang, 1995; Davis and Schocknecht, 1996), contrasting with previous studies, using same-script languages, where only cognate words produced significant facilitation effects (e.g., De Groot and Nas, 1991; García-Albea, Sánchez-Casas, and Igoa, 1997; Sánchez-Casas, Davis and García-Albea, 1997). One possible explanation for these findings has been suggested by Gollan et al. (1997). According to these authors, differences in script could provide a cue to direct lexical search, allowing rapid access to the masked cross-language prime, and thus increasing the chance of noncognate priming to emerge. The masked priming experiment presented in this poster was designed to determine whether orthographic distinctiveness also plays a role in same-script languages. With this aim, we selected prime-target cognate and noncognate word pairs, where the prime was in Catalan and the target in Spanish, and tested bilingual subjects in a lexical decision task. For both word pairs, the primes could contained either two-letter sequences which are orthographically legal in Catalan, but not in Spanish (e.g., bassa/BALSA; rossa/RUBIA), or letter sequences which are legal in both languages (e.g., tarda/TARDE; sorra/ARENA). The results show that our orthographic manipulation did not affect the pattern of priming found in previous studies. That is, only facilitation with cognates, but not with noncognates.

List context effects, neighborhood size effects, and base-word frequency effects in pseudohomophone naming and phonological lexical decision

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A series of experiments were run to test whether the naming of nonwords that are homophones of words (pseudohomophones) is similarly influenced by the base-word frequency, and whether this effect is modulated by neighborhood size, the presence or not of non-homophone nonwords in the list, and the task (naming vs. phonological lexical decision). In a preliminary experiment, we ensured that the base-word stimuli themselves were able to elicit a frequency effect on naming latency. In Experiment 1 of the present series, we found a base-word frequency effect for pseudohomophones when they were presented in a pure list of pseudohomophones. We also found a neighborhood size effect restricted to low-frequency words. In Experiment 2, pseudohomophones were mixed with orthographic control nonwords (50% of pseudohomophones, 50% of orthographic controls). Pseudohomophones yielded faster naming latencies than orthographic controls, and high-N stimuli yielded faster naming latencies than low-N stimuli, but the base-word frequency effect completely disappeared. In Experiment 3, pseudohomophone performance was examined in the context of a phonological lexical decision task (does this letter string sound like a French word?). In contrast to Experiment 2 (naming), performance to the same pseudohomophone targets was sensitive to base-word frequency in the phonological lexical decision task. It is argued that base-word frequency effects in pseudohomophone naming only arise when the task and/or the list context encourages response read-out from whole-word representations.

Processing of Verbal Morphology in the Spanish Lexicon

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Previous studies of English have caused a debate regarding the generation of verbal morphology. Connectionist models (i.e. Plunkett and Marchman 1993) support a single-mechanism system which accounts for regular and irregular morphology. Dual-system models claim that regular verbs are generated by rules, while irregulars are produced by an associative net (Prasada and Pinker 1991). However, research using Italian (Orsolini and Marslen-Wilson 1997) suggests that languages richer in morphology may have three levels of verbal productivity: default, productive, and idiosyncratic.

Using a cross-modal lexical decision task, we tested this hypothesis with Spanish. Verbal irregularity in Spanish emerges mostly as vowel changes in the stem of different tenses (i.e. *colg-ar/cuelg-an*). The first experiment contained four experimental conditions comparing the infinitive form as a prime with the imperfect and present tenses in both regular and "semi-irregular" (Orsolini's "productive") verbs as targets: *TOC-AR/toc-ában* and *TOC-AR/tóc-an* versus *COLG-AR/colg-ában* and *COLG-AR/cuélg-an*. The results showed priming for all conditions; however, present tense regular verbs showed significantly less priming than the other conditions. Since the stem in the present differs from the imperfect only in that it has a change in stress location compared to the infinitive, we designed Experiment 2 to test the effects of variable stress location.

Experiment 2 consisted of 3 experimental conditions using only regular verbs. Again, the infinitive was used as the prime with targets being imperfect (*TOC-AR/toc-ában*), present (*TOC-AR/tóc-an*), and preterit indefinite tenses (*TOC-AR/toc-ó*). While the preterit indefinite has an unstressed stem as does the infinitive, it has final stress (which is marked in Spanish). Results again showed priming in all conditions, but significantly less priming for the present tense.

These results suggest an interaction between morphological and phonological processing in the lexical entry. To access the lexicon, a lexical entry may have more than one stem representation. For regular verbs where there is only one stem, phonological interference occurs when the stress of the stem does not match across the prime and target. For the semi-irregulars, however, the existence of two stems prevents this phonological confusion. These results are compatible with Orsolini's three levels of productivity, but more research is needed to answer whether dual-system or connectionist models best explain these data.

GRAPHEMES ARE READING UNITS IN ENGLISH AND FRENCH

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Graphemes are currently defined as the written representation of phonemes. For example, the word "BEACH" is composed of three phonemes (i.e., /b/, /i/, and /ʃ/) and thus, three graphemes (i.e., "B", "EA", and "CH"). In the present study, we investigated the hypothesis that graphemes are functional reading units. We assumed that if the reading system processes graphemes as units, then detecting a letter in a word should be harder when the letter is embedded in a multi-letter grapheme than when it corresponds to a grapheme itself. In Experiment 1, done in English, participants were longer to detect a letter in a target word, when the letter was embedded in multi-letter grapheme (i.e., "A" in the grapheme "EA" like in "BEACH") than when it corresponded to a grapheme itself (i.e., "A" in "GRASS"). In experiment 2, this effect was replicated in French. Together, these results support the view according to which graphemes are perceptual reading units in alphabetic writing systems like English or French.

ARE SYLLABLES 'FRAMES' OR 'CHUNKS' IN SPANISH?

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This research focus on the phonological encoding component of speech production. More specifically, we investigated the role of the syllable as a representational unit used by the processes of language production. In order to gather empirical evidence about this topic we analyzed the slips that speakers produce in spontaneous speech situations, and more specifically we focused on 'blends' or 'fusions' (e.g. *'skirt'* and *'scarf'* into *'skirf'*).

The position of the 'break' or 'juncture' (Mackay, 1972, 1973) between the two words involved in the blend was analyzed. The juncture is the point of the blend where the initial word finishes and where the final word starts. For example, in the 'blend' *'skirf'*, the 'break' of the initial word *'skirt'* (first word in the blend) is located between the 'r' and the 't', while the break for the final word *'scarf'* (second word in the blend) is located between the 'r' and the 'f'.

The psychological reality of a unit is supported if the break tends to be located outside of this unit and not inside of it. We analyzed a corpus of blends taken from a corpus of Spanish speech errors collected by Palma, Gutiérrez and Santiago (1997). It was found that the break is located between syllables with a probability greater than chance. These results can be seen as evidence that supports the idea that the syllable is a representational unit in speech production (e.g. Dell, 1986; Levelt, 1989; MacKay, 1987). However, it could also be argued that breaks preserve syllable integrity to preserve the integrity of the syllabic frame. Therefore, we analyzed a subset of blends where the blend and the initial and final words had the same syllabic structure and number of syllables. Under these conditions syllabic frame integrity is guaranteed whether the break is located between or within syllables. Results again showed that the break is located between syllables with a probability greater than chance. We discuss these results as supporting the view of the syllables as 'chunks' in Spanish.

The role of phonological loop in mental multi-digit addition.

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The link between the short-term memory and complex calculation has been hypothesized by Hitch in 1978. Since then, studies were carried out to determine the components of short-term memory that are involved and at which stage of the process of resolution they intervene. The theoretical framework most frequently used is the well-known Baddeley's model. From this point of view, the central executive as well as the two slave systems (phonological loop and visual sketchpad) are implied in the resolution of multi-digit calculation. The studies having already been carried out mainly used a paradigm of double task. The results provided by this type of paradigm must be compared to those obtained without concurrent tasks. We thus propose a more chronometrical approach. In a first series of studies we used one of the most known and robust effects of the short-term memory, namely the phonological length effect. We supposed that the phonological loop is used in the maintenance of operants and of intermediate results in the resolution of multi-digit calculation. If this is the case, the comparison of phonologically short and long additions should show differences on reaction times as well as of accuracy. The results of our study support this hypothesis.

Sublexical activation in the non-employed language: a bilingual study

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Two contrasting accounts of the time course of lexical access in language production are considered. Discrete 2-stage theories postulate phonological activation is restricted to the selected lexical item in lemma level. Activation-spreading models, however, claim that all lexical candidates are phonologically activated to some extent.

Two experiments were conducted in order to investigate whether the sublexical level of the second language (L2) is activated while talkers are employing their dominant language. Both tested Catalan/Spanish highly proficient bilinguals, always working with Catalan words.

In experiment 1, bilingual subjects performed a phoneme monitoring task on words "self-elicited" from pictures. Phonemes in negative conditions were either non-related or present in L2 translations. Thus, for example, for the picture corresponding to "taula" (table), the negative conditions could be either "M", which is the first onset of the Spanish translation (mesa) or "F", which is neither related to the Catalan nor to the Spanish word.

Results showed significantly longer reaction times were needed to reject first consonants of translations than control phonemes. This difference was not significant for second syllable onsets.

In experiment 2 the results were replicated for first syllable onset position, both for items and subjects.

Results are regarded as supporting activation-spreading theories. Previous phonological activation of L2 translations must be inhibited before subjects are able to reject the phoneme as not belonging to the examined word. This step requires additional processing, leading to an increase in the reaction time.

**Language representation in bilingual brain:
Evidence from masked phonological priming**

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Bilingual language representation was examined with the use of the masked phonological priming paradigm. Earlier research of Brysbaert et al. (1997, in press) showed that by using pseudohomophonic and control primes bilinguals Dutch-French show exactly the same pattern of results as native French speakers. Phonological and orthographic priming effects were the same for first and second language processing. In a second part of his study it was shown that for bilinguals, it was possible to prime a target word of the second language with a homophonic word of the first language. The phonological priming effect was of the same size as the one found with the non-word primes.

In this study bilinguals French-Dutch were examined. Main question was to see whether it is possible to prime a target word in the first language with a pseudohomophone in the second language. We indeed found a phonological priming effect. Implications for theories of bilingual language representation are discussed.

BILINGUAL ORGANIZATION OF SPOKEN AND LITERARY ARABIC IN NATIVE ARABIC SPEAKERS: TWO LANGUAGES OR ONE?

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The mother tongue of the absolute majority of native Arabic speakers is spoken Arabic, which is always a local dialect without a written form. For reading and writing, as well as for formal communication literary Arabic is used. This language, which is universally used in the Arab world, is phonetically and phonologically different from the spoken dialect. Usually, it is first studied at school, in parallel to the acquisition of reading skills. Obviously for the literate Arabs, these two languages are extensively inter-twined in every day life. Consequently, it is possible that, despite the difference between them, literary Arabic is not processed like a regular second language by the cognitive system of the native Arabic speakers but rather as an enhancement of the spoken lexicon. In the present study we examined this possibility comparing semantic priming and repetition effects in auditory lexical decision within L1 (Spoken Arabic) with the effects found when the primes were either in literary Arabic or in Hebrew (L2) and the targets were in Spoken Arabic and vice-versa. The semantic priming effect was 3 times as large within L1 than between languages and there was no difference between Hebrew and literary Arabic. Large repetition effects at relatively long lags were found within L1 but were absent when the repetition involved translation equivalents either using Hebrew or literary Arabic. Comparing repetition effects between translation equivalents that were cognates, we found a closer relationship between the two kinds of Arabic than between Hebrew and literary Arabic. We conclude that, despite the intensive daily use and psychological proximity, Spoken and literary Arabic entertain two different lexica in the cognitive system of the native Arabic speaker. Yet, the connections between translation equivalents are stronger for the two kinds of Arabic than for Hebrew and Arabic, that despite equal knowledge of the two languages.

PROSODIC EXPRESSIONS OF TEXT STRUCTURE

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When understanding a text the understander has to construct the linear and/or hierarchical structure of the text. Written text contains at the perceptual levels indications for this structure. The question addressed in this paper is whether there is in oral text an analogue to the visual structuring of the text. Candidates for this signaling function may be prosodic characteristics, such as pauses and pitch. To investigate prosody as marker of text structure, we used a reading aloud task in this study. From a prosodic point of view the reading aloud task is not the most interesting task. Prosody has a clear function in the spontaneous production of speech; for example, pause duration serves the planning of the speech. Reading aloud abstracts away from this function, since the input is already given. Consequently, if reading aloud shows nevertheless a correspondence between text structure and prosodic characteristics, one may assume that these characteristics play a role in expressing the structure of the information and in packaging the information in meaningful units.

Research on the role of text structure in reading aloud has concentrated on the text structure as described in terms of surface characteristics such as the linear position of the sentences within paragraphs. Since we are interested in the conceptual structure of the text, we had subjects read texts that had no structure in their lay-out.

The structures of the texts were described by the Rhetorical Structure Theory (RST) and a Story Grammar (SG). Both theories segment a text into units and arrange these segments in a hierarchical structure. Eight subjects read two different texts: a news text and a story.

It is expected that the pause duration and pitch of a segment correspond to the height of a segment in the structure of the texts as described by RST and SG: the pause before a segment is longer and the pitch of a segment is higher, the higher the boundary that precedes the segment. The comparisons between segments were made in two different ways: either all segments were compared to each other (absolute method), or only those segments that were sub-superordinates of each other (relative method).

For both texts, analysed both by RST and SG, there was a strong linear relationship between pause duration and pitch on the one hand and level in the hierarchy on the other hand, as indicated by linear trend analyses and correlation analyses. So, prosodic characteristics indeed reflect the hierarchical structure of the text. An exploratory analysis of the same materials indicated that the prosodic characteristics also depend on the nature of the relation, as defined in RST.

This research suggests that prosodic characteristics are not only the result of planning processes but that they also play a role in expressing the structure of the information and in packaging the information in meaningful units. This may facilitate the understanding by the listener.

Processing of procedural texts and text format

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The purpose of this experiment was to evaluate the influence of the visual structure of procedural texts during reading. Text understanding requires from the reader to build a coherent mental representation of text content which is progressively updated during reading. Some informations are stored (activated), others suppressed (inhibited) according to their importance for the coherence of the text (Gernsbacher, 1988, Kintsch, 1988). We have shown that text format provides spatial reference marks which allows an early processing of coherence disruption. The organisation of informations in a text by physical marks or classifications facilitates memorisation (Lorch, 1995). The updating process has been shown by on-line studies showing more processing times on this kind of sentences. In the present paper, we are interested in reader's behaviour when he must apply rules of game using a mental model about a succession of actions. We hypothesised that the help brought by text format induced an early processing of procedural informations during reading rules and a better memorisation. In first step, we have analysed reading time of procedural texts (splitted into segments) with or without text format. A recall task analysis complete these data showing links between reading time and recall. First results show longer reading times when the procedural text is formatted than without any spatial marks (justified left and right) on certain parts of the texts. Moreover, recall of these parts of text is better. A second experiment with eye movements analysis (progressive and regressive fixations duration) would provide precise informations about readers' behaviour on these procedural texts.

Key words: text comprehension, procedural text, text format, eye movements

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Local and Global Semantic Processing in Text Reading: Context Effects Depend on Subject's Reading Strategies.

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Abstract

Semantic processing in text reading depends on both local and global sources of context (Schwanenflugel & White, 1991; Sharkey & Sharkey, 1992). The purpose of the present study was to analyze combined context effects of a text and of a particular sentence, in order to investigate local and global sources of context on word processing. The experiment consisted of recording subjects' eye movements during reading. Several primes were presented in a text, preceding one prime in a sentence including the target word. The text-primes and the sentence-prime were either related or unrelated to the target word, and the lexical distance between the primes and the target was important enough to allow both facilitatory and slow inhibitory effects of unrelated primes to arise (Neely, 1977, 1991).

The results, obtained on fixation durations on the target word, show context effects of both the text-primes and the sentence-prime, suggesting that both local and global contexts influence the semantic processing of words (Schwanenflugel & White, 1991). The effects of the text-primes and of the sentence-prime each arise whatever the relatedness of the other source of context. This suggests that a single unrelated sentence-prime can not cancel the effect of several text-primes in the same way an unrelated interposed word can inhibit the effect of a single related prime (Lavigne & Vitu, 1997; Sharkey & Sharkey, 1992; see Neely 1991).

Furthermore, different subjects process differently the target within the context of the text-primes or of the sentence-prime. This suggests that processing strategies are involved by subjects to semantically process the target either globally or locally. Indeed, results show two different types of reading strategies when analyzed as a function of the probability to refixate the target word, which determine the reading rate. Fast-reading subjects, less refixating and processing more quickly the target word, show only a local context effect of the sentence-prime. Slow reading subjects, more refixating and processing the target word longer, show both local and global context effects of the sentence-prime and of the text-primes. A specific word is then processed in a local context when subjects read faster, and in both local and global contexts when subjects read slower. Then subjects can use different strategies which determine the type of local or global semantic processing involved in text reading.

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From Print to Prosody:

The Extraction of Structure during Reading

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Abstract

According to the structural approach to reading, the extraction of structure precedes and paves the way for the analysis of meaning. This study examined the proposition that the on-line production of prosody in reading reflects the early extraction of structure. In Experiment 1 readers were successful in assigning a natural prosody to unfamiliar text upon its first reading. Experiment 2 showed that the prosodic patterns applied are tuned to the structure of the sentence and are largely indifferent to the content of the sentence or to its semantic coherence. The results join with other findings in speech production and comprehension in supporting the precedence of structure to meaning, and testify to the usefulness of prosody as a vehicle for studying the early analysis of structure in reading.

Time course of processing semantic features of verbs :
A case study of durativity and resultativity in French.

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The goal of the present study was to examine memory representations for semantic features of verbs, such as durativity and resultativity. Durativity of a verb refers to the fact that a verb expresses an action or a state that lasts for awhile. So-called durative verbs (e.g., *détester* --to detest--, *raconter* --to tell--) refer to situations that last, whereas non-durative verbs (e.g., *libérer* --to free--, *éclater* --to burst--) refer to situations that do not last. Resultativity of a verb characterizes whether a verb describes a situation with a result. Resultative verbs refer to situations that express a change in states of affair (e.g., *libérer* --to free--, *éclater* --to burst--), whereas non-resultative verbs refer to situations that have no result (e.g., *détester* --to detest--, *raconter* --to tell--). In this experiment, we investigated the possibility that semantic features (such as durative and non-durative features, or resultative and non-resultative features) would either facilitate or inhibit each other.

In two experiments, subjects were first presented with a prime that could be either a verb or a neutral stimulus, then with a target that could be a verb or not. Subjects had to decide whether the target was a verb or not as quickly and accurately as possible. All verbs contained three syllables, were made of 7, 8, or 9 letters, and were regular verbs of high frequency. There were two categories of prime verbs and target verbs : (1) verbs expressing durative and non-resultative processes (i.e., situations with a duration but without a result, e.g., *détester* --to detest--, *raconter* --to tell--); (2) verbs expressing non-durative and resultative processes (i.e., instantaneous situations, with a result, e.g., *libérer* --to free--, *éclater* --to burst--). Finally, we manipulated the prime-target SOA, and primes were presented 150, 500, or 750 ms before targets.

Results showed main and interaction effects of prime, target, and SOA. These findings reveal interesting patterns of activation and inhibition between semantic features of verbs as a function of SOAs. These results speak to theories of verb processing in particular and semantic processing in general.

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Implicit causality in vision verbs: A crosslinguistic comparison between English and Italian speakers.

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Studies on various languages (Fiedler & Semin, 1988; Franco & Arcuri, 1990) have shown that semantic representation of interpersonal verbs includes implicit causal schemas which bias the attribution of the causal source of the verb action or state towards the sentence Subject or Object of the sentence, depending on the semantic structure of the verb. In the case of Action verbs (Paul helps John), the cause is attributed to the agent, while in the case of State verbs (Paul admires John), the cause of the state is attributed to the stimulus of the experience (Brown & Fish, 1983).

The present study tested the hypothesis that an similar causal structure can be identified also for the class of verbs which describes visual perception: Some vision verbs are characterised by intentionality (ex. Spy) and their causal structure could be similar to the Action verbs, whereas other verbs describe the stimulus popping out from the field or imply cognition (ex. contemplate), and are therefore similar to Experience verbs.

Two experiments were carried out with Italian and English participants who were presented with 20 vision verbs embedded in causal sentences (SVO, because...) to complete (Brown & Fish, 1983). The participants were randomly assigned to one of two conditions: a) the object of the sentence was animate (Paul recognises John); b) the object of the sentence was inanimate (Paul recognises the house).

An interaction between type of verb and condition emerged:

1. In the animate condition, vision verbs reveal an implicit causal schema biasing towards the sentence Subject or Object depending on whether they describe actions or experiences.
2. In the inanimate condition the source of the perceptual act was consistently attributed to the sentence Subject.
3. These effects were reliably found in both languages.

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THE ROLE OF CONCEPTUAL INFORMATION IN THE
ENCODING OF NUMBER AGREEMENT

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Studies are reported in which adult participants were orally presented with French sentences each followed by a series of unrelated words. The participants were asked to write down or typewrite the sentence and as many of the words as possible. The sentences were of the type N1 of N2 + V and contained lexical verbs where the singular/plural forms differed in writing but not in pronunciation. In half the sentences, both N1 and N2 constituted a plausible subject for the verb following [e.g., La caravane des voisins arrive (The caravan of the neighbors arrives)], while in the other half, N2 constituted an implausible subject for the verb following [e.g., La caravane des voisins rouille (The caravan of the neighbors rusts)]. On the other hand, N1 and N2 were either animate or inanimate nouns. Results showed that: (a) Erroneous proximity agreements with N2 occurred even when N2 did not constitute a plausible subject for the verb, but (b) Number agreement was more likely to be erroneous when N2 constituted a plausible subject, and (c) Erroneous agreement was more likely to be elicited by an animate than an inanimate N2, but only when N2 constituted a plausible subject. In contrast with assumptions of previous research, these findings indicate that at least some erroneous verb agreements in writing are due to spurious identification resulting from an early misassignment of the subject role.

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LEXICAL INFORMATION INFLUENCES EARLY COMPONENTS OF EYES-
MOVEMENTS

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The purpose of the two experiments reported here was to provide further evidence of lexical influence on eye-movement control during the reading of compound words, and to comment on possible mechanisms by which lexical access processes influence within-word eye movements. Eye-movements were recorded during the reading of compound words which were displayed with or without the hyphen (e.g.: «rond point»; «bloc-note»). Specific inspection patterns were found in the no-hyphen condition where two perceptual units (separated by a blank) must be grouped together in order to access the compound-word lexical entry. In order to assess the potential influence of pre-established inspection strategies, the composition of the experimental list was varied. In the «single-word» condition, filler items were long (seven-character) words, while in the «two-word» condition, they were pairs of short words (three to four characters each). This manipulation did influence the oculo-motor behaviour (interaction with the hyphen vs. no-hyphen factor), suggesting that eye movement control in reading is submitted to high-level strategic effects. The aim of a second experiment was to determine whether a pair of words like «ami aux» is likely to activate the high-frequency word «amicaux», whose first three and last three letters correspond to the first and second words in the pair, respectively. Such «pseudo-compound» stimuli were compared to sequences such as «but vin» for which no single lexical entry can be found. Again, inspection strategies were found to depend on the processes developed at the lexical level.

THE EFFECTS OF RULE CLARIFICATION AND ATTENTIONAL FACTORS ON WASON'S ABSTRACT SELECTION TASK

Many explanations have been considered to account the difficulty of Peter Wason's selection task, specifically with the standard abstract form of the task (if "A" then "7", i.e.). Among them, the theory of mental models assumes that people code the information explicitly included on their representations, but they leave other possibilities implicit. So, on the standard abstract form of the task the subjects elaborate an explicit model of the card that includes the named elements for the rule ("A" and "7") maintaining the possible alternatives in an implicit representation. Reasoners can't easily accede to the alternative representations (required to solve the task). Our goal is to facilitate the access to implicit representations. To do this we manipulated (1) the effect of rule clarification (if "A" then "7" doesn't suppose if "7" then "A") with the objective of precluding the biconditional interpretation and (2) the effect of forcing the participants, after been shown the four cards, to think about the relevance of one or the other of the following two cards: "2" (not-q) or "7" (q). This was done in order to center their attention on those cards and to facilitate the understanding of the importance of the "2" card (not-q) and the irrelevance of the "7" card (q). In study 1 the participants that received both aids (1 and 2) increased the average of the selections "A" and "2" (p and not-q) up to 26,67% when they were focused on "2" (not-q) and up to 12% when they were focused on "7" (q). However, with only the aid 1, blocking the biconditional, the improvement was the 4,89%. In study 2 designed to analyze the effect of the attentional focalization alone (factor 2) the selection "p" and "not-q" didn't improve, meanwhile the pattern of selection was considerably altered: when the participants were focused on "not-q" the selections of the relevant "not-q" card improved and when they were focused on "q" card the selections of the irrelevant "q" card decreased. Those results will be considered in relation with reasoning theories.

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Experts and Novices' Cognitive Flexibility in Complex Problem Solving

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The research that will be presented is aimed to find an explanation for some contradictory predictions and findings concerning whether domain knowledge, especially for highly automated skills in complex problem solving tasks, leads to more flexible or more rigid problem solving behaviour. According to Spiro's Cognitive flexibility Theory (Spiro et al, 1991), experts have a multifaceted knowledge representation which enhances transfer between different contexts. Charness and Bjeman-Copland (1992) found that experts developed multiple representations for a problem which allowed them to find a new solution for a new context. However, Frensch and Sternberg (1989) had found in their experiments that highly trained subjects were more affected by structural modifications than were novices. Experts who had proceduralized their knowledge reacted less flexibly and were more affected by changes of the general principles necessary for solving the task.

A possible reason for these contradictory results could be found in whether experts and novices learn the task explicitly or implicitly. Experts' knowledge is acquired implicitly both explicitly and implicitly. Explicit knowledge could be proceduralized and automated (Anderson, 1983). Although proceduralized knowledge does not require attentional resources it could become conscious when required and, therefore it is possible to modify it. However, Lee and Vakhoch (1996) have demonstrated that implicitly learned rules are difficult to verbalise and show negative transfer. It is possible that they are also more difficult to modify than explicitly learned rules when changes in the task context require it.

This question is addressed in a series of experiments using the Fire Chief Programme (Ormerod and Wearing, 1993). Groups of subjects learn the task to reach several levels of expertise. Changes in the context stimuli are introduced to assess how subjects adjust to these changes. In some conditions subjects get explanations about the task conditions to facilitate the acquisition of explicit knowledge. Performance of these subjects are compared with that of subjects that do not have those explanations.

Knowledge representation: A study in a natural setting comparing multidimensional and pathfinder scaling techniques.

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The study of knowledge representation is a main concern of the modern experimental psychology. One aspect of this study is the comparison of the knowledge structures associated with the expert versus the nonexpert. It is a well known fact that both structures differ not only in the amount of specific and strategic knowledge but in the manner in which this knowledge is structured. In the case of the formal training in Psychology, there are certain type of knowledge which is instrumental to Psychology. That is the case of Statistics in relation to Psychology. When a researcher reads a scientific paper, he or she has to assess the design and results of the experiments as a function of psychological and statistical principles. This is a field then where we can study the integration of both types of knowledge, and the comparison between the structure of the expert and nonexpert in relation to it. We present a study carried out with university students in a course in experimental design in which we investigate the structure that the students develop as a function of the type of training. Although the theoretical aspect of the experimental design course was common to all groups, in the laboratory (fundamentally a class of problems in which the students assess published research) they were divided in three according to the type of induced training they received. Condition 1 could be called memoristic. In this condition the students were required to solve rutinary statistical problems. In condition 2 the students had to solve also statistical problems but they were of a relational nature. Finally, in condition 3, the students had to do the same problems but with a real Psychology paper. We analyze a series of dependent variables with multidimensional and pathfinder scaling procedures, including the expert answers to a series of problems formulated on the basis of a Psychology paper that everybody has to evaluate.

Thought errors in practical economic life: Some early findings

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By a thought error we mean here a problem solving or decision making process which do not end up to the kind of outcome people had hoped. The research into these errors has mostly taken place in laboratories. Assuming that the laboratory research has any connection with real-life information processing it is natural to think that thought errors should have an important role in practical economic life. Also, it seems quite evident that thinking in economic life should provide us with a very natural domain of applying laboratory knowledge from thought research. Solving problems of economic character have a substantial role to play among all human activities, and hence, these problems should be investigated by using the methods of concurrent psychology of thinking and cognitive psychology in general.

In order to understand the needs of practical economy and companies, we have began a systematic research into all types of thought-related problems in practical economy. As a part of this research we have made is systematic inquiry among top-industrial managers as well as among medium-level leadership and among workers. Our intention was to get information about the views and experiences of these people with respect to thinking and thought errors. The results of this questionnaire gave a rather worrying picture about the frequency of thought errors. It seemed to be the case that some 20% of the decisions were noticed afterwards to lead to a disappointing outcome. In terms of national economy this kind of result seems to require very strong actions in decreasing the number of thought errors, since the losses in money as well as in the number of injuries and losses of lives are quite large. A relatively large number of improvements were suggested by the interviewed people.

Development and changes in the ability to reason

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Following the tenets of Mental Model Theory, Bara, Bucciarelli and Lombardo (1998) have proposed a unified computational model of deductive reasoning. The computer model simulates different sorts of deductive reasoning through essentially the same machinery, that constitutes the core of the deductive competence. The computer model realizes four main processes: construction, integration, falsification of mental models, and drawing conclusions consistent with such models. The computer performances have been tested against the performances of human subjects in three reasoning domains: syllogistic, propositional, and relational. In particular, the program reproduces the performances of subjects of different ages by varying constraints on both the working memory capacity and the ability to falsify putative conclusions.

We present an experiment whose aim is twofold. First, we validate the predictions derived by the computer model. Second, we tune the model on the experimental data concerning the basic abilities involved in deduction. Eighty subjects, twenty per age group (7-8, 11-12, 14-15, over 21 years old) took part in the experiment. They were invited to solve syllogistic, relational and propositional problems. Further, they were presented with a series of tasks, each measuring a basic ability. These results were then used to carry out correlation with the performances in the deductive problems.

The comparison between the participants' performances and those of the artificial subjects in the deductive problems is satisfactory, and confirms the validity of the computer program. Moreover, we have found that the ability to solve deductive problems correlates with the working memory capacity, the ability to falsify putative conclusions, the knowledge of the meaning of the connectives, and the ability to link series of pictures through their common features. Although the computer program already incorporates the constraints at the w.m. capacity and the ability to falsify levels, the results of the correlation suggest that, to finesse the simulation of the reasoners' actual performances, two further constraints are relevant: the knowledge of the meaning of the connectives (construction phase of propositional reasoning), and the ability to form links (integration phase of any sort of deductive reasoning). The methodological issue that arises from this study is that the component skills of deductive reasoning can help us to better understand the origins of the ability to reason deductively.

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WHAT KIND OF INFORMATION IS ELICITED BY GOAL DERIVED CATEGORIES?

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In a functional perspective (Malt, 1995), Barsalou (1983; 1985; 1991) has suggested that Goal Derived categories, such as 'items needed to play tennis' differ from Taxonomic categories, such as 'apple'. Two experiments were devised to compare the specific kind of information elicited by Goal Derived categories with that elicited by other categories (i.e. nominal kind, natural kind and artifact categories), this last being already assessed in two previous studies on both children and adults.

While the members of taxonomic categories, at basic level, share a physical similarity, those of Goal Derived categories share a particular goal pursued by the categorizing subject. Due to their contingent and conventional character, Goal Derived categories do not reflect the correlational structure of the environment (Billman, 1989) while taxonomic categories, at basic level, do. Furthermore, while taxonomic categories, at basic level, are learned by induction, Goal Derived categories are produced by combining pre-stored information. Finally, Goal Derived categories produce more specific and personal memories than taxonomic categories, at basic level, these last evoking more general events (Conway, 1990).

Our hypothesis is that Goal Derived categories elicit the same kind of relations as superordinate level taxonomic categories. They both are characterized by 'plural force' (Markman, 1989; MacNamara, 1982), in fact the members of Goal Derived categories share a common subject's goal and those of superordinate level taxonomic categories share a common organizing principle. Furthermore, as Goal Derived categories are independent from the correlational structure of the environment, they yield taxonomic and thematic information about their individual members as it was found to be the case in superordinate level taxonomic categories.

This hypothesis was tested on both adults and children.

200 adult subjects participated to the first experiment. Following the methodology used in the previous research, subjects were asked to write down what the names of 3 Goal Derived categories, presented one at the time, made them think of in 5 minutes. The associations produced by subjects were coded according to the kinds of relation elicited by the given Goal Derived categories: taxonomic, thematic (spatial, action and temporal), partonomic, property, matter, ego-involvement relations were considered.

On the frequencies of the different kinds of the produced relations several correspondence analyses were performed in order to compare the data of Goal Derived categories with those obtained in the previous study on the other kinds of categories.

The same procedure was used in the second experiment in which 120 children (40 aged 5, 40 aged 8, and 40 aged 10) participated. Following the procedure of the study on the other categories, the new code 'events' was added to be used when children reported an event, a story or a situation related to the stimulus category.

Our hypothesis was verified in both the conditions: Goal Derived categories elicit mainly taxonomic relations as superordinate level taxonomic categories do and the pattern of associations produced by Goal Derived categories does not change consistently with age.

Judging randomness in 2D distributions

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Judging a situation as more or less random is often the key to important cognitions and behaviors. Perceiving a situation as nonchance calls for explanation, and it marks the onset of inductive inference (Lopes, 1982). Psychologists have been carrying out, since the early 1950s, extensive research on people's subjective sense of randomness. This research uses our knowledge of the sampling distributions of several statistical parameters as normative criteria, against which we compare people judgements. Virtually all of the existing literature deals with binary sequences, and involves generating or judging such series. The main findings in this literature are that people identify randomness with an excess of alternations between symbol types, and that, correspondingly, they tend to generate series with an excess of short strings.

In our study, a family of two-dimensional stimulus was defined (scattergraphs). The graphs in a first experiment were generated by the superposition of two distributions, a uniform distribution ("random") and a 2D Gaussian distribution ("cluster"). Subjects were asked to judge for each graph whether a non-random cluster was present. The study investigates the functions linking the various parameters manipulated (total number of points in the graph, proportion of points in the cluster, and SD of the cluster) with the decision that a stimulus is or is not wholly random.

These first experiments should ultimately lead to a better understanding of the perceptual and cognitive processes responsible for picking non-randomness from noise.

How to assess strategic aspects of human cognition? The example of arithmetic strategies.

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A very striking feature of human cognition is that people use multiple strategies to accomplish most cognitive tasks. One explanation for people's use of multiple strategies is that they may be invoked flexibly, depending on the inherent characteristics of the task, such as problem difficulty, or to transitory situational demands, such as the need to answer quickly or accurately in particular contexts.

In the present work, we use a theoretical framework originally proposed by Lemaire and Siegler(1995) to analyze several aspects of strategy use. Within this framework, a distinction is made between (a) which strategies people use in a given cognitive task, (b) when each strategy is used (i.e., on what type of problems), (c) how each strategy is executed (i.e., speed, accuracy), and (d) how are strategies chosen among. This framework was devised to account for strategy use in tasks that are accomplished fairly slowly (i.e., over 2 or 3 sec.). In the present work, we investigate the usefulness of this framework in tasks that are accomplished faster (i.e., less than 2 or 1 sec.). The particular example we focus on is arithmetic problem verification.

Two experiments were carried out. Participants were asked to verify arithmetic problems that violated (e.g., $5 \times 42 = 217$) or respected (e.g., $5 \times 83 = 210$) the five rule (i.e., $N \times 5 =$ product with a unit digit equal to 0 or 5). Data showed (a) variation in which strategies were used: performance was better with problems violating the rule than respecting it. People used a short-cut five-rule checking strategy with the former and a calculation strategy with the later. (b) variation in when each strategy was used: Five-rule checking strategy was used with the most difficult problems only. (c) Differential execution of strategies: Five-rule checking strategies became faster as it was used more often in the course of experiment. (d) strategy adaptivity: People used the five-rule checking strategy more often and more efficiently when task environment supported it. Finally, (e) there were individual differences in each of these strategic aspect related to arithmetic skills. The results have important implications for assessing and understanding strategic behaviors in human cognition as well as in arithmetic processing. We shall discuss these implications in this paper.

Phasic arousal affects the residual task switching cost

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Phasic arousal involves a momentary change in the internal state that follows the presentation of a warning signal (WS), which tells that a target will occur but provides no information about the character of the target or the required reaction. In the task switching paradigm, subjects rapidly shift between two reaction time tasks preceded by instructional cues, that informed which (randomly selected) task to execute. Switching tasks is associated with an RT cost that decreases, but is not eliminated, as a result of preparation (Cue-Target Interval). The aspect of the task switching cost that remains is called "residual component". In order to isolate the effect of phasic arousal on cue processing and target processing we conducted two experiments. In Experiment 1, an WS preceded the presentation of the instructional cue, and the WS-Cue interval and Cue-Target Interval were combined factorially. In Experiment 2, the instructional cue preceded the WS, and there were two very long Cue-Target Intervals. The results indicate that increased phasic arousal reduces the size of the residual task switching cost.

Is there a true limitation on the ability to prepare for Task Switching

It is an empirical well established finding that when subjects are switching between tasks, they show a large increment in RT's, which is generally referred to as Task Switching cost. It is also known that given enough time to prepare subjects dramatically decrease this Task Switching cost. However even when this preparation time is practically unlimited, the Task Switching cost can not be fully eliminated and therefore it is termed as the Residual Task Switch Cost. Among the few explanations suggested for this Residual cost DeJong's (1996) hypothesis puts the source of the Residual Task Switch Cost in subject's lack of motivation to mentally prepare for switching in some of the trials. According to this approach there is no cognitive limitation on human ability to prepare for task switching. In this work we used the cueing paradigm in which a visual cue informed the subjects of the next task, thus giving them time to prepare for it. In the crucial condition subjects were forced to process the cue in advance, by obscuring the instructional cue prior to the appearance of the task stimulus. Hence subjects would not have been able to correctly execute the task unless they processed, at least to some extent, the instructional cue. The first experiment used the manipulation between subjects and the results showed no significant difference in the Residual Task Switch Cost between the forced preparation group and the control group (for whom the cue stayed until the response). Since the forced preparation manipulation was apparently confounded with greater load on working memory, in the second experiment the manipulation was used within subjects applying it randomly in only half the trials. Again no difference in the Residual Task Switch Cost was found. The conclusion of this work is that there is a genuine cognitive limitation on the ability to prepare for task switching.

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The components of 'after learning' performance in the ALG paradigm under various condition of implicitness.

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In the artificial grammar learning paradigm, the learning phase is frequently followed by a legality decision task. In this task, the participants are presented with new strings, not included in the learning phase, and they have to decide which of them are legal. In our experiment, the old strings included in the learning phase were also included in the test phase. The addition of the learned strings to the test phase made it possible to describe the performance in the test phase by three parameters, B – the bias to judge a string as old, M – the probability to base the response on familiarity with an old string, and P – the probability of responding by "computing" legality.

In the experiments the participants learned to associate (legal) strings with Hebrew words. We manipulated the implicitness of learning. While the estimated parameters interacted with the implicitness, the average values across implicitness were 0.53, 0.28 and 0.53 for P, M and B respectively. Furthermore, as could be expected, the use of memory was positively correlated with implicitness, while there was a negative correlation between computing legality and implicitness.

AGE EFFECTS IN IMPLICIT SEQUENCE LEARNING

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The aim of the present study was to determine whether age affects the degree of implicit learning. Previous studies found no or mild age effects in sequence learning when populations were matched for education, occupation and verbal ability. In most implicit sequence learning tasks, subjects are presented a repeating patterned stimulus sequence and they respond to the location of a stimulus. When random stimulus sequences are introduced after practice with the patterned sequence, reaction time (RT) increases, which indicates implicit learning of the pattern. Previous sequence learning studies with young adults, pointed out that implicit learning is of an automatic nature. When response-to-stimulus interval (RSI) was short, an automatic mechanism caused the sequential RT effects, and the largest learning effect was obtained. At long RSI, however, a strategic mechanism caused the sequential RT effects and implicit learning was almost absent. Ageing studies on sequential effects in tasks with random sequences, indicated that the automatic mechanism at short RSI became stronger with increasing age, whereas the strategic mechanism at long RSI was unaffected by age. On the basis of the above mentioned studies, we expect the largest learning effect to occur in the short RSI condition which should not differ between age groups. With respect to the mechanisms underlying sequential effects, we expect no age effect in the long RSI condition. In the short RSI condition, however, a stronger automatic mechanism in elderly may be found. The present experiment, had a compatible four-stimulus, left/right-response mapping. RSI was either 50ms or 500ms. In agreement with our research on young adults, an automatic mechanism underlies implicit sequence learning because for both age groups, the largest learning effect was found in the short RSI condition. In contrast to our expectations, preliminary analysis of the sequential effects showed no age effect on the automatic mechanism in the short RSI condition. In the long RSI condition, unexpected age effects on sequential effects occurred. The mechanism underlying these effects was less clear. Results of the analysis that is in progress, will be discussed in relation to age dependent processes.

Does the level of arousal explain intraindividual changes in cognitive task performance?

Abstract

This research aims to explain the intraindividual variation of intelligence, which is understood as a process, not as a trait. The formal theory of intellect (Nęcka, 1997) provides the theoretical basis for the study. This theory postulates two basic cognitive mechanisms that underlie intelligent behaviour: attentional resources and working memory capacity. A third construct (arousal) accounts for the dynamic character of intellectual processes. According to Nęcka, the process of intelligence is influenced by the levels of arousal oscillating within a range that is typical for a particular individual. Both very high and very low levels of arousal deteriorate the momentary availability of attentional resources and the capacity of working memory. However, a person with a greater amount of resources is less dependent on momentary changes of arousal as compared to a person with fewer resources. A computerized task (MEMREM) allowing simultaneous measurement of the attentional resources and the capacity of working memory was used. The level of subjects' arousal was manipulated by changing the time of day of the experiment. The efficiency of the manipulation was examined by the Thayer's Adjective Check List. Intelligence was measured with the Raven's Progressive Matrices. The obtained relationships between the IQ, MEMREM, and arousal measurement as well as their significance for the formal theory of intellect are presented. The utility of the construct of arousal for processual approaches to understanding of intelligence is discussed.

LATENT INHIBITION AND ELECTRODERMAL CONDITIONING

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Latent inhibition (LI) refers to the retardation of conditioning as a result of exposure to the to-be-conditioned stimulus (to-be-CS) prior to pairings of the conditioned stimulus (CS) and unconditioned stimulus (US). The development of LI is considered to reflect decreased associability of stimuli that predict no significant outcome. It is a robust phenomenon that has been demonstrated in a variety of classical and instrumental conditioning procedures and in many mammalian species, including humans. However, in research of human Pavlovian conditioning, only a few studies of latent inhibition have been performed. This is surprising because there are good reasons to believe that latent inhibition might be an appropriate paradigm with which to assess attentional deficits in schizophrenics and 'psychotic-prone' normals. Thus there are theories that attempt to relate LI deficits to attentional dysfunction in schizophrenia. Those theories assume that the attentional defect affects the processing of the preexposed stimulus.

The aim of the present study was to investigate the development of latent inhibition on human Pavlovian conditioning, by using two different experimental procedures.

In experiment 1, forty-nine students served as subjects. They were submitted to an aversive classical conditioning procedure. The CS was a visual stimulus presented through a computer and the US was a burst of noise presented through headphones. The 'latent inhibition' group received several preexposure trials involving the presentation of the to-be-CS. As a dependent variable, the electrodermal response to the CS was recorded.

In experiment 2, twenty-four students were used. They were submitted to a Pavlovian conditioning procedure which involved the acquisition of new associations between stimuli. Subjects had to learn to associate a figure (presented through a computer) with a number (that was also presented through the computer). The 'latent inhibition' group was preexposed to the to-be-CS stimulus embedded in a visual masking task whereas the conditioning group was only preexposed to the masking task. The dependent variable was the number of trials to learn the association.

As a second purpose of the present study was to investigate the putative relationship between psychoticism and attentional deficits, subjects scores on the Psychoticism-scale of the Revised Eysenck Personality Questionnaire (EPQ-R) were correlated with their latent inhibition measures.

The overall results have shown a decrease of conditioning as a result of CS preexposure, which is clearer in experiment 1 than in experiment 2. Moreover in experiment 1 the development of LI has been attenuated in subjects displaying high scores on psychoticism scale. Those results are in agreement with theories that attempt to relate deficits to ignore irrelevant stimulus with attentional dysfunction in schizophrenia.

INTERFERENCE AND INTEGRATION IN MEMORY: A DEVELOPMENTAL STUDY

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Many developmental studies have shown differences in the type of memory strategies used by children of different ages (rehearsal, organization, elaboration...) and in the efficiency with which they use these strategies. However, very little research has focused in the developmental course of interference effects or in the development of integration processes as a way of eliminating them. In this sense, the purpose of these experiments is to explore the role of using an elaboration strategy in children ranging from 8 to 13. In our experiments, subjects have to recognize whether they have studied subject-verb-complement sentences. The number of facts (1 to 3) studies about a same subject was varied. The increase in reaction times as the number of associated facts increases has been referred to as the fan effect (Anderson, 1974; 1983). This effect is normally discussed in terms of spreading activation so that competing association interferes with each other and reduces the amount of activation converging in the memory trace. Although this effect has been well documented in adult subjects, it has never been shown in children. So our first aim was to explore whether effects of equal magnitude would show in children of different ages.

In addition, several adult studies (e.g. Smith et al., 1978) have found that if the to-be-remembered sentences are thematically related so that they can be integrated in meaningful wholes, the delay in response time with number of facts is eliminated. Thus, the use of elaboration processes seems to overcome the interference from competing facts. In our study, we asked subjects of 20, 12-13 and 8-9 years of age to learn 18 sentences that defined 3 fan conditions (1, 2 and 3). In the first experiment, the subjects learned difficult-to-elaborate sentences and the fan effect was found in all groups of age. In the second experiment, the to-be-remembered sentences were thematically related ones. In this case, only the children showed the interference. Finally, in the third experiment we asked children to use an elaboration strategy so that could integrate the sentences about a same grammatical subject. The absence of interference in this condition would indicate the effective use of the strategy. Results showed that only the older children integrated the information when instructed. These results are discussed in terms of an utilization deficiency (Bjorklund, 1995) in children strategies and the possible role of their knowledge base.

CHANGES IN CATEGORIZATION AS A FUNCTION OF EXPERTISE AND CONTEXT IN ELEMENTARY MECHANICS

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Categorisation processes play a central role in reasoning and problem solving. Empirical data in the domain of physics suggest that the nature of categorisation might be crucial in determining the procedures and operators used. Differences in the way that problems are classified are correlated with the procedures used in producing a solution. Recent theories on knowledge acquisition on physics have specially emphasised categorisation processes and have attributed conceptual change to reorganisation of knowledge at a categorical level (Chi, 1993). Different methodological approaches have been followed to assess different aspects of categorisations. Many studies have focused on the mental representation underlying problem classification. Others have used responses to problems and verbal protocols to assess the category and properties assigned to concepts. In the present studies we tried to combine these approaches to assess conceptual structure in the domain of elementary mechanics. Experts and novices classified simple mechanics problems and judged similarities among mechanic concepts as a way of capturing changes in conceptual organisation as a function of learning. Results showed differences in the way in which experts and novices structured the domain especially regarding concepts such as acceleration, mass and weight. Experts categorisations were based on more sophisticated relations among concepts with special emphasis on dynamic aspects and energy states whereas students organised the concepts around simpler kinematics principles and relations.

In a second study we tried to show that conceptual organisation is flexible and dependent on the context in which categorisation is performed. In our study after categorising problems and concepts, subjects solved problems that induced dynamic analyses of the concepts. Problem solving had the effect of changing students categorisation. After solving problems students were similar to the experts in the relatively more importance they assigned to dynamic principles in categorisation. Our results suggest that both experts and novices conceptual knowledge base is flexible in nature. Kinematics and dynamic principles as well as analysis in terms of energy states seem to be implicit in both experts and novices conceptual structures. However, sophisticated analysis and principles seem to be easily activated by experts, whereas they need to be stressed by the context to get activated by students.

MODELS OF AFFECTIVE EXPERIENCE OF THE ENVIRONMENT: SOME EXPERIMENTAL EVIDENCE

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Predictions derived from two models of the relations between cognitive processing of and affective reactions to the environment have been contrasted in an experiment. Twelve scene types ranging from inner city to the large scale landscape found both in the Sydney region in Australia and in the Padua region in Italy were identified. Participants from both locations made preference, familiarity and typicality judgements of all scenes. Results showed that the major determinants of preference was scene type. Evidence was found in favour of the "discrepancies from existing mental representations" model rather than a "preferences need no inferences" model. Furthermore, the experimental design clarified the relations between "objective" and "subjective" familiarity and their relations to typicality.

SOME COGNITIVE FACTORS INFLUENCING TEACHERS' SCORING

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Two experiments investigate the influence of previous information about students on their performance. In experiment I 124 middle school teachers had to judge a videotaped performance of students reading a piece of prose and then apparently summarizing it, while in fact students were reading the same summary from an out of sight poster. Male professors gave better marks to male students, the same being true for female professors judging female students. In experiment II 78 middle school teachers judged only two of the previously used videotapes: one of a male and one of a female student. Teachers were first given an alleged written synthetic school evaluation of the student, which was either very good, or just at pass level, or very negative. The results showed a very strong effect due to the content of the school evaluation: the higher the evaluation, the higher the teachers' judgement. For both experiments a "control" group of teachers informed of the experimental trick was also used.

**Impairments in communication and
neuropsychological correlates in schizophrenia**

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Abstract

We are interested in the pragmatics of human communication. In particular we analyze the cognitive abilities that communication requires. Our hypothesis is that to communicate you need to infer the other's mental state, this ability is related to so-called 'theory of mind' that permits the inferential process. In the absence of the inferential process we will have a problem in communication. We will analyze a particular case: schizophrenics patients in which the problem of communication is very important.

Results : We would like to draw the reader's attention on four points. The first is that some schizophrenic patients exhibit severe problems in handling *theory of mind*. The second point relates to pragmatic competence. Our results with schizophrenics, in this task, can clearly explain their problem with comprehending and producing many types of speech acts; in particular, their deficit is exalted with indirect speech acts. In other words, the patients mostly failed in situations that required the sort of inference we have called nonstandard, namely, irony and deceit. Our theory considers these sorts of speech acts more difficult than standard ones, because in order to understanding them it is necessary to use a defeasible inferential path. The third point concerns the neuropsychological impairments, that are more severe in this group of patients, but not as important as to justify the strong deficit in communication exhibited by these patients. Although the patients' performance is inferior to that of the control group, it remains within the range of normality.

The most important results concerned communication. Schizophrenic patients show a severe deficit in pragmatics ability. This deficit is more visible in the situations which are too hard to handle with routine answering processes. This ability is correlated to other abilities: in particular, with the ability to consider the broader context of the interaction, and the ability to infer a partner's mental states.

References

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TOURS

PRE CONGRESS TOURS

All tours are based on a minimum of 15 participants

TOUR A:

One day tour of Nazareth, Tiberias and Capernaum

Saturday, September 12, 1998

Travel to Nazareth the sacred Galilean town where Jesus grew up, visit the Church of Annunciation and Mary's well. Continue to Tiberias to enjoy a cruise on the tranquil Sea of Galilee. Proceed to Capernaum to see the ancient 5th century synagogue. Visit Tabgha the site where Jesus performed the miracle of the multiplication of Loaves and Fish. Return to Tel Aviv.

Rate: per person \$65

Rate covers full-day tour in a luxurious air-conditioned bus with an English speaking guide, and entrance fees to all sites

TOUR B:

Full day tour of Massada, Dead Sea

Saturday, September 12, 1998

Travel through the Judean Desert to the shores of the Dead Sea - the lowest point on earth. Ascend by cable car to Massada, the remains of the Herodian Fortress that was the last stronghold of the Jewish Zealots in their struggle against the Roman. Besieged by the Romans and loosing all hope, they chose death rather than surrender. Continue to the oasis of Ein Gedi, the caves to which David fled from the wrath of Saul. Continue for an "unsinkable" swim in the Dead Sea. Return to Tel Aviv/Jerusalem via the Qumran Caves, the site where the Dead Sea Scrolls were found.

Rate: per person \$ 70.

Rate covers full-day sightseeing tour in a luxurious air-conditioned bus with an English speaking guide, and entrance fees to all sites.

TOUR C:

Full day tour of Jerusalem Old & New

Sunday, September 13, 1998

A walk along the Haas promenade for a breathtaking view of ancient Jerusalem. Continue to Jaffa Gate, one of Jerusalem's Gate from the Ottoman period. Walk through the Arabic Bazaar to the rooftops of the Old City for a view of the Christian, Jewish, Moslem and Armenian Quarters.

Drive to Bethlehem to visit Rachel's Tomb and the Church of the Nativity, where Mary gave birth to Jesus. Visit Yad Vashem, the Holocaust Memorial Museum, the Knesset, Israel's Parliament, and conclude the tour at the famous "Menorah".

Return to your hotels

Rate: Per person \$ 60

Rate covers full-day sightseeing tour in a luxurious air-conditioned bus with an English speaking guide, and entrance fees to all sites.

POST CONGRESS TOURS

All tours are based on minimum 15 participants

TOUR D:

3 day tour to Galilee and Golan Heights

Friday September 18 - Sunday September 20, 1998

Friday, September 18, 1998

Travel via the Jordan Valley to Beit She'an to visit the excavations of the Roman/Byzantine city. Continue to Tiberias to enjoy a cruise on the tranquil Sea of Galilee. Proceed to Capernaum to see the ancient 5th century synagogue. Visit Tabgha the site where Jesus performed the miracle of the multiplication of Loaves and Fish. Drive to the Golan Heights and visit the town and winery of Katzrin. Dinner and overnight at Kibbutz Guest House.

Saturday, September 19, 1998

Travel to Nazareth the sacred Galilean town where Jesus grew up, visit the Church of Annunciation, Mary's well and the bazzars. Continue to Acre, a crusader fortress on the sea. On to Haifa for a visit to the Bahai Shrine and the beautiful Persian Gardens. Follow the coastal road to the scenic Caesarea with its famous Roman Harbor, Amphitheatre and Crusader Fortress. Proceed to Tel Aviv for dinner and overnight.

Sunday, September 20, 1998

After breakfast departure for homebound flights.

Rate: \$285 per person in double room

\$365 per person in single room

Rate covers 2 days of sightseeing in a luxury, air-conditioned bus with an English speaking guide. Entrance to all sites. 2 nights accommodation with breakfast and dinner daily.

TOUR E:

5 day tour to Eilat and Jordan

Friday September 18 – Tuesday September 22, 1998

Friday, September 18, 1998

Depart Jerusalem and drive via the Arava Road to Eilat.
Overnight at Red Sea Paradise Hotel, Eilat.

Saturday, September 19, 1998

Morning visit to the Underwater Observatory to see the exotic flora and fauna so unique to the Red Sea. Continue to the Timna Cooper Mines and King Solomon's Pillars with its multicolored rock formations. Overnight: Red Sea Paradise Hotel, Eilat.

Sunday, September 20, 1998

Early morning departure from your hotel. We enter Jordan at the Arava border crossing. Drive for a guided tour of the modern city of Aquaba and the ancient Mameluke fort. Continue to Petra, enter the narrow canyon that leads to the Red Rock. Visit the Treasury (Khazneh), the Roman Theatre and the caves in the rock among dozens of imposing monuments. Dinner and overnight at Taybet Zaman Hotel, Petra.

Monday, September 21, 1998

Drive via the Kings Road visiting Kerak and the Christian Village of Madaba. Continue to Mount. Nebo from where Moses viewed the Promised Land. Dinner and overnight at Raddison Hotel Amman.

Tuesday, September 22, 1998

After breakfast, enjoy a panoramic tour of Amman. Continue to Jerash one of the world's best preserved Greco-Roman cities with its colonnaed Cardo, Theatre, and Churches. Continue to Ajlun for a visit at the Crusader Castle. Drive to Allenby Bridge for re-entry to Israel. Transfer to your hotel in Jerusalem.

Rate: \$645 per person in double room

\$865 per person in single room

Rate covers 5 days of sightseeing in a luxury, air-conditioned bus with an English speaking guide. Entrance to all sites. 2 nights accommodation in Eilat with breakfast. 1 night accommodation with dinner and breakfast in Petra. 1 night accommodation with dinner and breakfast in Amman, 3 lunches in Jordan. Rate does not include Visa expenses, border taxes and tips

IMPORTANT NOTE:

A valid entry visa to Jordan should be obtained at the Jordanian Embassy / Consulate in your home country prior to arrival in Israel. It is your responsibility to obtain the Jordanian visa.

ACCOMPANYING PERSONS OPTIONAL TOURS

Tour to Tel Marisha and Kibbutz Beit Guvrin

Monday, September 14, 1998

Combine two of Israel's most exciting experiences: a chance to participate in a hands-on archaeological excavation and a visit to a Kibbutz, the uniquely Israeli communal living style.

Depart from hotel for an unforgettable visit to the excavations at Tel Marisha, the ancestral home of King Herod's family. Vast underground labyrinths of man-made rooms are being systematically cleaned and give evidence of industrial complexes dating from the Hellenistic period. Explore the site of 5000 man-made cave complex. Continue to kibbutz Beit Guvrin where a Kibbutz member will explain the unique lifestyle. Return to Tel Aviv.

Rate: \$45 per person

Rate covers full-day tour in a luxurious air-conditioned bus with an English speaking guide, and entrance fees to all sites.

Tour of Tel Aviv and Jaffa

Wednesday, September 16, 1998

Depart Hotel for a full day tour of cosmopolitan Tel Aviv and old Jaffa. Sightseeing drive through the City. Visit Independence Hall, where Israel's independence was declared in 1948. Continue to newly named Rabin Square, dedicated to the late Prime Minister. Discover newly chic Neve Tzedek and on to 4000 year old Jaffa including the flea market, Artists' Colony and Galleries. Opportunity will be given for afternoon shopping.

Rate: \$50

Rate covers full-day sightseeing tour in a luxurious air-conditioned bus with an English speaking guide, and entrance fees to all sites.

CONGRESS TOUR

Tour of Jerusalem

Tuesday September 15, 1998

Travel along the ancient walls of the Old City. Enter from the historic Dung Gate. Walk to the Western wall, and the Cardo a main street of 6th century Byzantine Jerusalem. Continue along the Via Dolorosa to the Church of the Holy Sepulchre. Proceed to a night tour of Jerusalem. Continue for a memorable guided tour of the treasures of the Israel Museum with its Shrine of the Books housing the Dead Sea Scrolls. Return to your hotels.

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