

PROCEEDINGS
FOR THE
14TH BI-ANNUAL MEETING
OF THE
EUROPEAN SOCIETY FOR COGNITIVE PSYCHOLOGY

AUGUST 31 – SEPTEMBER 3, 2005
LEIDEN, THE NETHERLANDS

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WELCOME

We warmly welcome you to the 14th conference of the European Society for Cognitive Psychology in Leiden, The Netherlands! The organizing committee is happy to welcome around 700 visitors to a meeting with almost 600 contributions on a wide variety of current issues in cognitive psychology. We wish everyone an interesting conference and a pleasant stay in Leiden.

The organizing committee,

Bernhard Hommel (chair)	Wido La Heij
Simone Akerboom	Hanneke van Oers
Guido Band	Albertine Olthoff
Sacha Bem	Gezinus Wolters

LOCATION

The conference will be held in the Gorlaeus Building, with three exceptions. The Broadbent Lecture, the reception, and the conference dinner will take place in St Pieter's Church, which is situated in the center of Leiden.

THE PROGRAM – SPECIAL EVENTS

We would like to draw your attention to the following events:

Day	Time	Event
Wednesday	6:00-7:15	Broadbent Lecture (Daniel L. Schacter)
Wednesday	7:15	Reception
Thursday	6:00-7:00	NVP Lecture (Phil Zelazo)
Friday	6:00-7:00	Keynote Lecture (Victor A.F. Lamme)
Saturday	4:00	Business Meeting ESCoP
Saturday	7:00	Goodbye Dinner

ORAL PRESENTATIONS

All oral presentations are meant to last 15 minutes. Chairs and speakers are strongly urged to stick to the time schedule. The oral presentations will take place in Room 1 to 7 of the Gorlaeus Building. All rooms are equipped with microphones, PCs, PC projectors, and overhead projectors. It is possible to give the presentation making use of your own laptop computer. Each set-up has a switch board for PC-projector connections. Therefore, multiples computers can be fully prepared prior to the session.

To limit the loss of time between presentations, please test your presentation on one of the PCs in test room 008 on the ground floor, which have the same configuration as the PCs in the presentation rooms. After checking your presentation it can be stored on a server, which is accessible from each of the presentation rooms.

POSTER SESSIONS

There will be three poster sessions, on Thursday, Friday, and Saturday. Each will consist of approximately 80 posters, organized by theme. Poster presentations will take place in the circular aisle of the Gorlaeus building.

The presenting author has to be present during the poster session. Please mount your poster in the morning of your presentation so that people can look at it before the session. Make sure you remove the poster at the end of the day program in Gorlaeus, so that it does not get lost. Remember to bring your own pins for attaching the poster.

Abstract numbers assigned to posters are not in sequence with the numbers assigned to the oral presentations. Rather, each poster is assigned a four digit abstract number. The first digit codes the session to which the poster has been assigned; the last 3 digits code the location of the poster within its session (i.e., 2067 would be Poster Session II, Poster 67).

SPECIAL THANKS

We are indebted to the following organizations that supported us in the organization of this conference:

Leids Universitair Fonds
Nederlandse Vereniging voor Psychonomie
Leiden University Board
Municipality of Leiden

Furthermore, we are very grateful to Marilou Vandierendonck, Maaïke Weidema and Jasper Tiemersma for their invaluable contribution to the preparation of this conference.

EDITORIAL COMMENT

All abstracts have been evaluated for scientific quality.

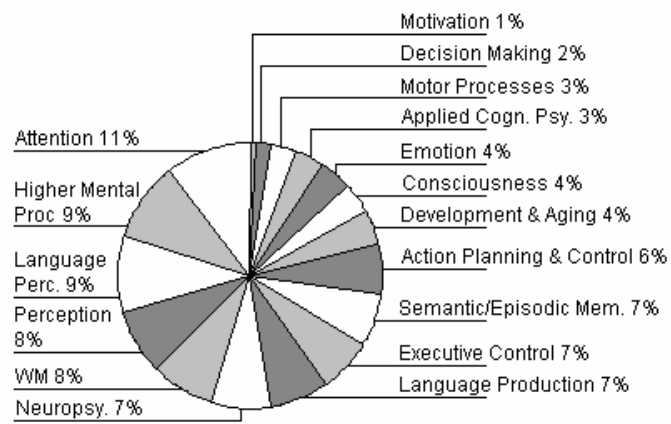
The oral presentations have been selected on the basis of following criteria:

- Not more than one contribution by the same presenting author
- Priority to ESCoP members
- Priority to people who have not presented on the previous meeting(s)

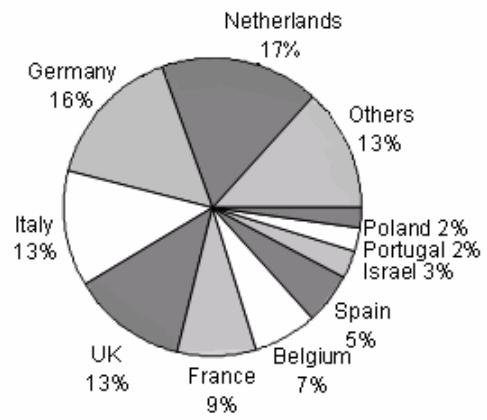
The scientific committee,
Bernhard Hommel
Wido La Heij
Guido Band
Gezinus Wolters

STATISTICS

Research fields of contributions



Nationalities of corresponding authors



ESCoP HISTORY

The European Society for Cognitive Psychology was founded in 1985 by the so called “gang of five”

Alan Baddeley (1st President)
Paul Bertelson (2nd President)
Janet Jackson (1st Secretary)
Wolfgang Prinz (1st treasurer)
John Michon

The first conference took place in The Netherlands, in Nijmegen from 9 - 12 September 1985, and was on invitation only. “Psychological Research” published some of the papers of this Inaugural Meeting of ESCoP, in a special volume nr 49, 1987.

The second Conference, the first officially open meeting, was held in Madrid in 1987, and was organized by Maria Victoria Sebastian.

Following conferences and their organizers:

- III - 1988 Cambridge (John Richardson)
- IV - 1990 Como (Carlo Umiltà & Giovanni Flores d’Arcais)
- V - 1992 Paris (Michel Denis)
- VI - 1993 Elsinore (Claus Bundesen)
- VII - 1994 Lissabon (Amancio Da Costa Pinto)
- VIII - 1995 Rome (Marta Olivetti Belardinelli)
- IX - 1996 Würzburg (Joachim Hoffmann)
- X - 1998 Jerusalem (Shomo Bentin)
- XI - 1999 Gent (André Vandierendonck)
- XII - 2001 Edinburgh (Vicki Bruce & Robert Logie)
- XIII - 2003 Granada (Teresa Bajo)

This year, with its 14th conference, ESCoP is back where it all started for its 20th anniversary.

ESCoP: SOCIETY AND COMMITTEE

Today, ESCoP is a large Society with over 500 members, across a range of European countries and beyond. ESCoP's mission is "the furtherance of scientific enquiry within the field of Cognitive Psychology and related subjects, particularly with respect to collaboration and exchange of information between researchers in different European countries".

The Society encourages scientific research through the publication of the European Journal of Cognitive Psychology (current editor André Vandierendonck). Other forms of communication include less formal newsletters sent to all members, a website, and an electronic mailing list. The

Society also promotes research through its regular conference meetings, and has a highly successful program of summer schools. It has recently initiated research workshops to act as a catalyst for the establishment and networking of research groups in emerging areas of cognitive psychology.

Society Committee:

Maria Teresa Bajo (Granada), President
Cesare Cornoldi (Padova), Vice-President
Bernhard Hommel (Leiden), Treasurer
Patrick Bonin (Clermont-Ferrand), Secretary
Claus Bundesen (Copenhagen), Member
Maria A. Brandimonte (Naples), Member
Geoffrey Underwood (Nottingham) Member
Markus Knauff (Freiburg), Member
Axel Cleeremans (Bruxelles), Member

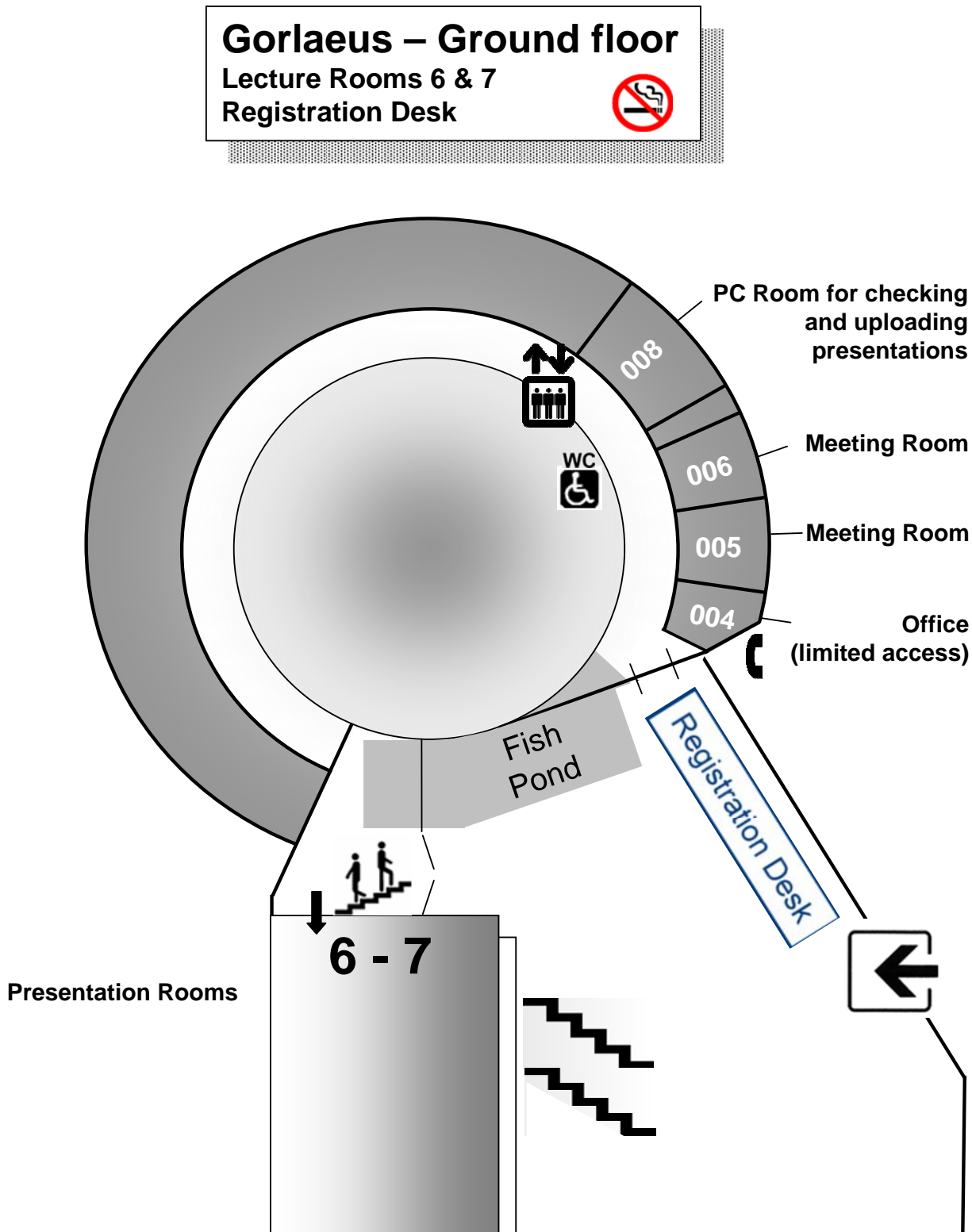
ESCoP MEMBERSHIP

ESCoP is a large and growing organisation with a healthy membership base in most European countries. There are also members who live beyond the European area. The Society produces a paper-based directory with a listing of current members and their research interests. Membership has many benefits, including a free subscription to EJCP, the European Journal of Cognitive Psychology.

Full membership is open to persons whose primary affiliation is in Europe, or in neighbouring countries which have close scientific links with Europe (or those with an ongoing interest in European cognitive psychology), and who are active and established researchers in some area of Cognitive Psychology. Such persons would normally have a Ph.D. or equivalent, several years' postdoctoral experience, and recent publications in refereed journals of psychology and cognate subjects.

Associate membership is open to persons in the initial stages of their research careers, whose primary affiliation is in one of the countries described above, and who are active researchers in some area of Cognitive Psychology. Such persons would normally be working on, or have recently completed, their Ph.D. (or equivalent). Associate membership would normally be limited to a maximum of five years.

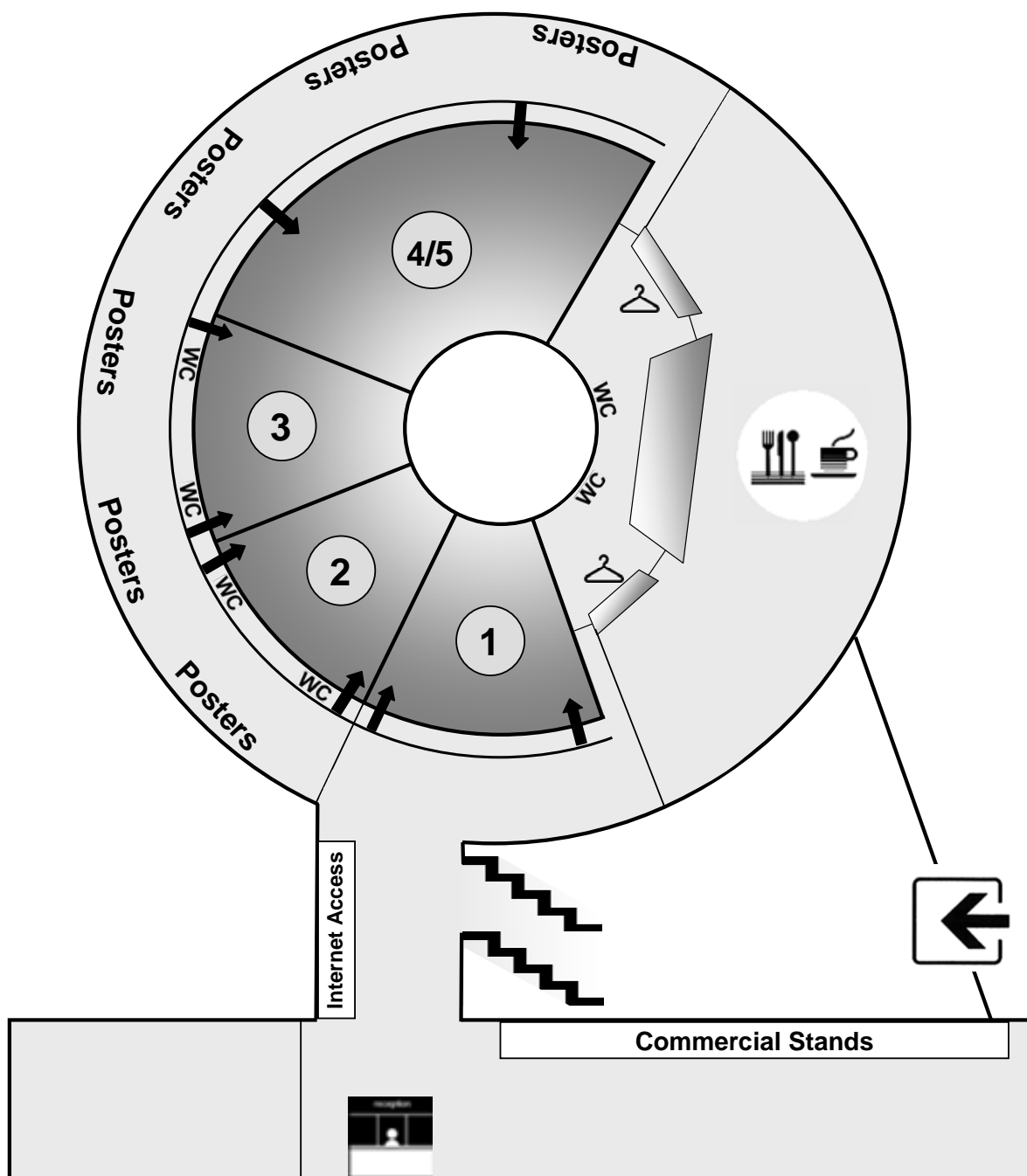
The membership fee amounts to about €60 for full and affiliate members and to about €40 for associate members. It includes a subscription to the European Journal of Cognitive Psychology. For more information about becoming a member of ESCoP, please refer to the society's website at <http://www.escop.org>.



Gorlaeus – First floor

Lecture Rooms 1, 2, 3, 4/5

Poster Area



CONDENSED SCHEDULE

		St Pieter's Church	Gorlaeus Building Central Hall	Gorlaeus Building Room 1	Gorlaeus Building Room 2
Wednesday Afternoon	1:00 - 2:40			SYMPOSIUM: Integration in Perception and Action	SYMPOSIUM: The Role of Time in Working Memory
	3:00 - 4:40			SYMPOSIUM: Binding in Working Memory and the Episodic Buffer 3:00-4:00	Multi-Modal Perception
	6:00 - 7:15	Broadbent Lecture (Daniel L. Schacter) and Reception			
Thursday Morning	9:00 - 10:40			Attention and Action	SYMPOSIUM: Synaesthesia
	11:00 - 12:40			Attention and Orienting	SYMPOSIUM: Synaesthesia
Thursday Afternoon	2:00 - 4:00			SYMPOSIUM: Interaction of Visual Attention and Visual Working Memory	SYMPOSIUM: Grammar Induction 2:00-3:40
	4:00 - 6:00		Poster Session I		
	6:00 - 7:00				
Friday Morning	9:00 - 10:40			Visual Attention I	SYMPOSIUM: Visuo-spatial Working Memory
	11:00 - 12:40			Visual Attention II	SYMPOSIUM: Trauma and Memory
Friday Afternoon	2:00 - 4:00			Temporal Visual Attention	SYMPOSIUM: Memory and Metamemory in Psychopathology
	4:00 - 6:00		Poster Session II		
	6:00 - 7:00				
Saturday Morning	9:00 - 10:40			SYMPOSIUM: Perception and Imagery: New Insights from Congenital Blindness 9:00-10:20	SYMPOSIUM: Neurocognitive Aspects of Binding in Episodic Memory 9:00-11:00
	11:00 - 12:40			Attention and Grouping 11:00-12:20	Memory
Saturday Afternoon	12:40 - 2:40		Poster Session III		
	2:40 - 4:00			Working Memory and Emotion	Priming
	4:00				
Saturday Evening	7:00	Goodbye Dinner			

PROGRAM SCHEDULE

Gorlaeus Building Room 3	Gorlaeus Building Room 4/5	Gorlaeus Building Room 6	Gorlaeus Building Room 7
Applied Cognitive Psychology	Language Perception I	Implicit Cognition	Language Production I
Attention	SYMPOSIUM: Orthographic Processing in Printed Word Perception II	Implicit Learning	Language Production II
Executive Control	SYMPOSIUM: Semantic Context Effects in Naming	Higher Mental Processes	Episodic Memory I
Executive Control and Age	Language Perception II	SYMPOSIUM: From Action Perception to Action Simulation	Episodic Memory II
SYMPOSIUM: Neurodevelopmental Changes in Cognitive Control	Dyslexia	SYMPOSIUM: Action-based Memory	Bilingualism
NVP Lecture (Phil Zelazo)			
SYMPOSIUM: Neuropsychological and Neuroendocrinological Correlates of the Approach-Avoidance Systems	SYMPOSIUM: Language, Reading and Brain	Action Planning and Control I	Language Perception III
SYMPOSIUM: Bilingualism and Cognitive Control 11:00-1:00	SYMPOSIUM: Language, Reading and Brain	Action Planning and Control II	Working Memory I 11:20-12:40
Task-switching	Language Perception IV	Action Planning and Control III	SYMPOSIUM: Do Numbers Have Special Representation in the Human Brain?
Keynote Lecture (Victor A.F. Lamme)			
SYMPOSIUM: Emotional Modulation of Cognitive Control	Language Production III	Higher Mental Processes II	Working Memory II
Face Recognition Processes	Language Production IV	Higher Mental Processes III	Working Memory III
Face Recognition and Change Blindness	Language Production and Perception	Higher Mental Processes IV	Numerical Cognition
Business Meeting			

WEDNESDAY AFTERNOON, 1:00 – 4:40

Gorlaeus Building

SYMPOSIUM: Integration in Perception and Action (1-5), Room 1

- 1:00-1:20 Colzato, Raffone, & Hommel (1)
- 1:20-1:40 Kessler (2)
- 1:40-2:00 Raffone, & Wolters (3)
- 2:00-2:20 Shapiro (4)
- 2:20-2:40 Roelfsema (5)

SYMPOSIUM: The Role of Time in Working Memory (6-10), Room 2

- 1:00-1:20 Lewandowsky, Brown, & Nimmo (6)
- 1:20-1:40 Hudjetz, & Oberauer (7)
- 1:40-2:00 Farrell (8)
- 2:00-2:20 Barrouillet, & Camos (9)
- 2:20-2:40 Page (10)

Applied Cognitive Psychology (11-15), Room 3

- 1:00-1:20 Levén, Danielsson, Andersson, Rönnerberg, & Lyxell (11)
- 1:20-1:40 Smith-Spark, Glasspool, Oettinger, Yule, & Fox (12)
- 1:40-2:00 Blavier, & Nyssen (13)
- 2:00-2:20 Underwood, Dillon, Ault, & Farnsworth (14)
- 2:20-2:40 Stephanou (15)

Language Perception I (16-20), Room 4/5

- 1:00-1:20 Jacquier, Hoen, Pellegrino, & Meunier (16)
- 1:20-1:40 Grataloup, Hoen, Meunier, Pellegrino, Veuliet, & Collet (17)
- 1:40-2:00 Ernestus, Lahey, Verhees, & Baayen (18)
- 2:00-2:20 Tagliapietra, & Tabossi (19)
- 2:20-2:40 Ventura, Kolinsky, Fernandes, Querido, & Morais (20)

Implicit Cognition (21-25), Room 6

- 1:00-1:20 Gaillard, Vandenberghe, Destrebecqz, & Cleeremans (21)
- 1:20-1:40 Tzelgov, & Perlman (22)
- 1:40-2:00 Zondervan, Van Rijn, & Hendrickx (23)
- 2:00-2:20 Norman, Price, & Mentzoni (24)
- 2:20-2:40 Vandenberghe, Gaillard, Destrebecqz, Fery, & Cleeremans (25)

Language Production I (26-30), Room 7

- 1:00-1:20 Schweppe, & Rummer (26)
- 1:20-1:40 Vorweg (27)
- 1:40-2:00 Cacciari, Corradini, & Padovani (28)
- 2:00-2:20 Lefebvre (29)
- 2:20-2:40 Alves, Castro, Olive, & Granjon (30)

SYMPOSIUM: Binding in Working Memory and the Episodic Buffer (31-33), Room 1

- 3:00-3:20 Allen, Baddeley, & Karlsen (31)
- 3:20-3:40 Wolters, Raffone, & Murre (32)
- 3:40-4:00 Alloway (33)

- 4:00-4:20 Schwager, & Hagendorf (34)
- 4:20-4:40 Jolicoeur, Leblanc, & Prime (35)

Multi-Modal Perception (36-40), Room 2

- 3:00-3:20 Ben-Artzi (36)
- 3:20-3:40 Afonso, Katz, Blum, & Denis (37)
- 3:40-4:00 Elkin (38)
- 4:00-4:20 Barnett, Finucane, Corvin, Mitchell, & Newell (39)
- 4:20-4:40 Price, Mentzoni, & Norman (40)

Attention (41-45), Room 3

- 3:00-3:20 Crump, Gong, & Millikien (41)
- 3:20-3:40 Akkermans, & Soetens (42)
- 3:40-4:00 Meeter, & Olivers (43)
- 4:00-4:20 Frings, & Wentura (44)
- 4:20-4:40 Nuku, Lindemann, & Bekkering (45)

SYMPOSIUM: Orthographic Processing in Printed Word Perception II (46-50), Room 4/5

- 3:00-3:20 Davis, & Bowers (46)
- 3:20-3:40 Grainger, Van Assche, Granier, & Van Heuven (47)
- 3:40-4:00 Carreiras, Perea, & Laseka (48)
- 4:00-4:20 Lupker, Perry, & Davis (49)
- 4:20-4:40 Holcomb, & Grainger (50)

Implicit Learning (51-55), Room 6

- 3:00-3:20 Verwey, & Ter Schegget (51)
- 3:20-3:40 Berner, & Hoffman (52)
- 3:40-4:00 Deroost, & Soetens (53)
- 4:00-4:20 Goujon (54)
- 4:20-4:40 Wierzbichon, Sterczynski, Piotrowski, & Zyla (55)

Language Production II (56-60), Room 7

- 3:00-3:20 Wagensveld, Zwitserlood, & Van Turenout (56)
- 3:20-3:40 Pluymaekers, Ernestus, & Baayen (57)
- 3:40-4:00 Meyer, & Damian (58)
- 4:00-4:20 Sprenger, & Van Rijn (59)
- 4:20-4:40 Wheeldon, & Meyer (60)

THURSDAY MORNING, 9:00 – 12:40**Gorlaeus Building****Attention and Action (61-65), Room 1**

- 9:00-9:20 Theeuwes, Olivers, & Chizk (61)
 9:20-9:40 Van der Stigchel, & Theeuwes (62)
 9:40-10:00 Zwickel, Grosjean, & Prinz (63)
 10:00-10:20 Lindemann, & Bekkering (64)
 10:20-10:40 Fagioli, Hommel, & Schubotz (65)

SYMPOSIUM: Synaesthesia: Recent Findings and Future Directions (66-70), Room 2

- 9:00-9:20 Smilek, Dixon, & Merikle (66)
 9:20-9:40 Sagiv, Amin, Lafe, & Ward (67)
 9:40-10:00 Simner, Ward, Mulvenna, Sagiv, Witherby, Fraser, Scott, & Tsakanikos (68)
 10:00-10:20 Ward (69)
 10:20-10:40 Spence (70)

Executive Control (71-75), Room 3

- 9:00-9:20 Szmalec, Verbruggen, De Baene, & Vandierendonck (71)
 9:20-9:40 Koch, Philipp, & Gade (72)
 9:40-10:00 Poljac, & Bekkering (73)
 10:00-10:20 Deschuyteneer, Vandierendonck, & Coeman (74)
 10:20-10:40 Jaeggi, Meier, & Buschkuhl (75)

SYMPOSIUM: The Polarity of Semantic Context Effects in Naming Tasks: Implications for Models of Lexical Access in Language Production (76-80), Room 4/5

- 9:00-9:20 Hantsch, Jescheniak, & Schriefers (76)
 9:20-9:40 Schriefers, Jescheniak, & Hantsch (77)
 9:40-10:00 Kuipers, & La Heij (78)
 10:00-10:20 Costa, Alario, & Caramazza (79)
 10:20-10:40 Zwitserlood (80)

Higher Mental Processes (81-85), Room 6

- 9:00-9:20 Perales, Shanks, & Catena (81)
 9:20-9:40 Waldmann, Meder, & Hagmayer (82)
 9:40-10:00 Walsh, & Sloman (83)
 10:00-10:20 Frosch, & Byrne (84)
 10:20-10:40 Commandeur, Noordman, & Westerbos (85)

Episodic Memory I (86-90), Room 7

- 9:00-9:20 Racsmány, Conway, & Tislar (86)
 9:20-9:40 Gómez-Ariza, Fernández, Bajo, & Marful (87)
 9:40-10:00 Zellner, & Bäuml (88)
 10:00-10:20 Aslan, & Bäuml (89)
 10:20-10:40 Pansky (90)

Attention and Orienting (91-95), Room 1

- 11:00-11:20 Adam, & Davelaar (91)
 11:20-11:40 Espeseth, Reinvang, Greenwood, & Parasuraman (92)
 11:40-12:00 McGeown, Shanks, Forbes-McKay, & Venneri (93)
 12:00-12:20 Olivetti Belardinelli, & Santangelo (94)
 12:20-12:40 Brunetti, Belardinelli, Del Gratta, Pizzella, Della Penna, Ferretti, Sperduti, Fava, Romani, & Olivetti Belardinelli (95)

SYMPOSIUM: Synaesthesia: Recent Findings and Future Directions (96-100), Room 2

- 11:00-11:20 Henik, Cohen Kadosh, & Tadir (96)
 11:20-11:40 Mohr, Knoch, Gianotti, & Brugger (97)
 11:40-12:00 Callejas, & Lupiáñez (98)
 12:00-12:20 Weiss, Zilles, & Fink (99)
 12:20-12:40 Hubbard (100)

Executive Control and Age (101-105), Room 3

- 11:00-11:20 Huizinga, Visser, Hamaker, & Van der Molen (101)
 11:20-11:40 Somsen (102)
 11:40-12:00 Goethe, Oberauer, & Kliegl (103)
 12:00-12:20 Sebastian, Elosua, De la Torre, & Ortega (104)
 12:20-12:40 Van Gerven, Meijer, Prickaerts, & Van der Veen (105)

Language Perception II (106-110), Room 4/5

- 11:00-11:20 Giraudo (106)
 11:20-11:40 Smolka, Rösler, & Zwitserlood (107)
 11:40-12:00 Maionchi-Pino, Magnan, & Ecalle (108)
 12:00-12:20 Mathey, Zagar, Doignon, & Alix (109)
 12:20-12:40 Hoeks, Stowe, & Pijnacker (110)

SYMPOSIUM: From Action Perception to Action Simulation (111-115), Room 6

- 11:00-11:20 Brass, Derrfuss, & Von Cramon (111)
 11:20-11:40 Fischer, & Prinz (113)
 11:40-12:00 Graf, Giese, Casile, & Prinz (114)
 12:00-12:20 Rapinett, Knoblich, & Prinz (115)
 12:20-12:40 Discussion

Episodic Memory II (116-120), Room 7

- 11:00-11:20 Geraerts, Jelicic, & Merckelbach (116)
 11:20-11:40 Smeets, Jelicic, & Merckelbach (117)
 11:40-12:00 Garfinkel, Dienes, & Duka (118)
 12:00-12:20 Tekman (119)
 12:20-12:40 Besken, & Gulgoz (120)

THURSDAY AFTERNOON, 2:00 - 4:00

Gorlaeus Building

SYMPOSIUM: Interaction of Visual Attention and Visual Working Memory (121-125), Room 1

- 2:00-2:20 Kyllingsbæk, & Bundesen (121)
 2:20-2:40 Krummenacher, & Müller (122)
 2:40-3:00 Niedeggen, & Küper (123)
 3:00-3:20 Von Mühlenen, Geyer, & Mahn (124)
 3:20-3:40 Wesenick, Gramann, & Deubel (125)
 3:40-4:00 Guhn, & Gadermann (126)

SYMPOSIUM: Grammar Induction (127-131), Room 2

- 2:00-2:20 Cleeremans, Onnis, Destrebecqz, Christiansen, & Chater (127)
 2:20-2:40 Van den Bos, & Poletiek (128)
 2:40-3:00 Monaghan, Onnis, Christiansen, & Chater (129)
 3:00-3:20 Visser, Tagaro, & Huizinga (130)
 3:20-3:40 Poletiek (131)
 3:40-4:00 Nemeth, Gonci, Aczél, Háden, & Ambrus (132)

SYMPOSIUM: Neurodevelopmental Changes in Cognitive Control (133-137), Room 3

- 2:00-2:20 Klingberg (133)
 2:20-2:40 Rubia (134)
 2:40-3:00 Elsner (135)
 3:00-3:20 van Meel (136)
 3:20-3:40 Schroeter, Zysset, Wahl, & Von Cramon (137)
 3:40-4:00 Discussion (Zelazo)

Dyslexia (138-143), Room 4/5

- 2:00-2:20 Thomson (138)
 2:20-2:40 Soetaert (139)
 2:40-3:00 Boets, Wouters, Van Wieringen, & Ghesquière (140)
 3:00-3:20 Castel, Ziegler, & Alario (141)
 3:20-3:40 Bosman, & Vonk (142)
 3:40-4:00 Stenneken, Van Eimeren, Jacobs, Keller, & Kerkhoff (143)

SYMPOSIUM: Action-based Memory: Theoretical and Applied Issues Emerging from SPT Research (144-149), Room 6

- 2:00-2:20 Rusted (144)
 2:20-2:40 Kormi-Nouri (145)
 2:40-3:00 Zimmer (146)
 3:00-3:20 Von Essen (147)
 3:20-3:40 Mack, Russ, & Knopf (148)
 3:40-4:00 Rapinett, & Rusted (149)

Bilingualism (150-155), Room 7

- 2:00-2:20 Polonyi (150)
 2:20-2:40 Ugen, Leybaert, & Bodé (151)
 2:40-3:00 Voga, & Grainger (152)
 3:00-3:20 Athanasopoulos, Sasaki, & Cook (153)
 3:20-3:40 Sánchez-Casas, Ferré, Guasch, García-Albea, Demestre, & García Chico (154)
 3:40-4:00 Wodniecka, Bobb, Kroll, & Green (155)

THURSDAY AFTERNOON, 4:00 - 6:00**POSTER SESSION I (1001-1078), Gorlaeus Building Central Hall****PERCEPTION I**

- (1001) Låg
- (1002) Juttner & Rentschler
- (1003) Raijmakers
- (1004) Delord, Ducatto, Thimel, Pins, Thomas & Boucart
- (1005) Roberson, Davidoff, Davies & Shapiro
- (1007) Kozak, Neuenschwander, Lima, Muckli & Castelo-Branco

ATTENTION I

- (1008) Keïta, Bedoin, Merigot & Herbillon
- (1009) Gamboz, Zamarian & Cavallero
- (1010) Sturzenegger, Eckstein & Perrig
- (1011) Funes, Serrano, Callejas, Defior & Lupiañez
- (1012) Als, Yeomans & Rusted
- (1013) Citeroni, Couyoumdjian & Di Pace
- (1014) Gabai & Henik
- (1015) Stegt, Massen, Cüpper & Ostapczuk
- (1016) Placé & Boujon
- (1017) Akurek & Hommel

PERCEPTION AND ACTION I

- (1018) Eenshuistra, Weidema & Hommel
- (1019) Lemercier
- (1020) Aarts, Lamers, Verhoef & Roelofs
- (1021) Låg, Laeng & Brennen
- (1022) Cohen & Meiran
- (1023) Pellicano, Vu, Proctor, Nicoletti & Umiltà
- (1024) Ashkenazi, Rubinsten & Henik

PSYCHOLOGICAL REFRACTORY PERIOD DUAL TASK

- (1025) Pannebakker, Band & Ridderinkhof
- (1026) Liepelt, Schubert & Frensch
- (1027) Band & Camfferman
- (1028) Ellenbogen, Luria & Meiran
- (1029) Zordan & Logan
- (1030) Paulewicz & Blaut
- (1031) Cortese, Lucidi, Cestari & Rossi-Arnaud

TASK SWITCHING

- (1032) Christiaens & Vandierendonck
- (1033) Fux, Luria & Meiran
- (1034) Papin, Boujon & Lemercier
- (1035) Kuhns, Lien & Ruthruff
- (1036) Smigasiewicz, Szymura & Slabosz
- (1037) Smigasiewicz, Slabosz & Szymura
- (1038) Szymura, Slabosz & Smigasiewicz
- (1039) Liefoghe, Verbruggen, Vandierendonck & Fias

LANGUAGE PRODUCTION/ PERCEPTION I

- (1040) Foulon & Mathey
- (1041) Pagliuca, Arduino, Barca & Burani
- (1042) De Martino, Shimron, Bracco & Laudanna
- (1043) Shelton, Gerfen & Gutiérrez Palma
- (1044) Mitterer
- (1045) Voga & Giraudo
- (1046) Delattre, Bonin & Barry
- (1047) Perez, Rodriguez-Esteban & Meyer
- (1048) Duyck, Desmet, Verbeke & Brysbaert

LANGUAGE PRODUCTION: BILINGUALISM

- (1049) Bernolet, Hartsuiker & Pickering
- (1050) Ruiz, Bajo & Kroll
- (1051) Duyck
- (1052) Cholin, Dell & Levelt

LANGUAGE PERCEPTION: PRIMING

- (1053) Pearson, Van Gompel & Arai
- (1054) Santiago, Gutiérrez, Ouelette, Bouachra, Rodríguez & Román
- (1055) Barca, De Luca, Di Filippo, Zoccolotti & Burani
- (1056) Casalis & Leuwers
- (1057) Marcolini, Luci, Zoccolotti & Burani
- (1058) Demestre & García-Albea
- (1059) Van Heuven & Dijkstra
- (1060) Gutiérrez-Palma
- (1061) Robert & Mathey
- (1062) Fabre
- (1063) Bonnotte & Casalis
- (1064) Perret, Bonin & Méot

SKILL ACQUISITION AND IMPLICIT LEARNING

- (1065) Van Schijndel & Poletiek
- (1066) Herrera & Maldonado
- (1067) Gonzalvo, Padilla & Castro
- (1068) Gaschler & Frensch
- (1069) Bordignon
- (1070) Boyer & Kolinsky
- (1071) Algeri, Paolieri, Treccani & Cubelli

HIGHER MENTAL PROCESSES

- (1072) Barahmand & Jahanmohammadi
- (1073) Meo, Roberts & Marucci
- (1074) Bosbach, Cole, Prinz, Paillard & Knoblich
- (1075) Baumann & Krems
- (1076) Hoffman & Tzelgov
- (1077) Van Opstal, Verguts & Fias
- (1078) Gerner & Meiran

FRIDAY MORNING, 9:00 - 12:40

Gorlaeus Building

Visual Attention I (156-160), Room 1

- 9:00-9:20 Henderickx, & Soetens (156)
 9:20-9:40 Mortier, Van Zoest, Meeter, & Theeuwes (157)
 9:40-10:00 Agter, & Donk (158)
 10:00-10:20 Belke, Humphreys, Watson, & Meyer (159)
 10:20-10:40 Underwood (160)

SYMPOSIUM: Visuo-spatial Working Memory (161-165), Room 2

- 9:00-9:20 Cornoldi, & Mammarella (161)
 9:20-9:40 Vandierendonck, Depoorter, & Senna (162)
 9:40-10:00 Jouffray, Lecerf, & De Ribaupierre (163)
 10:00-10:20 Quinn (164)
 10:20-10:40 Roulin (165)

SYMPOSIUM: Neuropsychological and Neuroendocrinological Correlates of the Approach-Avoidance Systems (166-170), Room 3

- 9:00-9:20 Lavender, & Hommel (166)
 9:20-9:40 Rotteveel, & Phaf (167)
 9:40-10:00 Roelofs, Elzinga, & Rotteveel (168)
 10:00-10:20 Hermans, Putman, & Van Honk (169)
 10:20-10:40 Tops (170)

SYMPOSIUM: Language, Reading and Brain (171-175), Room 4/5

- 9:00-9:20 Ellis (171)
 9:20-9:40 Knecht (172)
 9:40-10:00 Dijkstra, Van Hell, & Brenders (173)
 10:00-10:20 Monaghan, Brigstocke, & Hulme (174)
 10:20-10:40 Burani (175)

Action Planning and Control I (176-180), Room 6

- 9:00-9:20 Wenke, Nattkemper, & Gaschler (176)
 9:20-9:40 Waszak, & Prinz (177)
 9:40-10:00 Los, & Schut (178)
 10:00-10:20 Moresi, & Adam (179)
 10:20-10:40 Rieger (180)

Language Perception III (181-185), Room 7

- 9:00-9:20 Frost, & Tzur (181)
 9:20-9:40 Léwy, & Grosjean (182)
 9:40-10:00 Diependaele, Grainger, & Sandra (183)
 10:00-10:20 Moscoso Del Prado Martín (184)
 10:20-10:40 Raczaszek - Leonardi (185)

Visual Attention II (186-190), Room 1

- 11:00-11:20 Bundesen, Habekost, & Kyllingsbæk (186)
 11:20-11:40 Habekost, & Rostrup (187)
 11:40-12:00 Boloix, Bastien, & El Ahmadi (188)
 12:00-12:20 Magen, & Cohen (189)
 12:20-12:40 Della Libera, & Chelazzi (190)

SYMPOSIUM: Trauma and Memory (191-195), Room 2

- 11:00-11:20 Candel, Sanders, Schelberg, & Merckelbach (191)
 11:20-11:40 Jelacic (192)
 11:40-12:00 Brennen, Dybdahl, & Kapidzic (193)
 12:00-12:20 Melinder, Endestad, & Lindgren (194)
 12:20-12:40 Endestad, Melinder, & Lindgren (195)

SYMPOSIUM: Bilingualism and Cognitive Control (196-201), Room 3

- 11:00-11:20 Gerfen, Jacobs, & Kroll (196)
 11:20-11:40 Santesteban, & Costa (197)
 11:40-12:00 Van Hell, Brenders, & Dijkstra (198)
 12:00-12:20 Bajo, Macizo, Ruiz, Paredes, & Ibáñez (199)
 12:20-12:40 Bialystok, Craik, & Ryan (200)
 12:40-1:00 Dussias, & Piñar (201)

SYMPOSIUM: Language, Reading and Brain (202-206), Room 4/5

- 11:00-11:20 Shillcock (202)
 11:20-11:40 Ellis (203)
 11:40-12:00 Lavidor, & Skarratt (204)
 12:00-12:20 Nazir, Martin, Cai, & Paulignan (205)
 12:20-12:40 Venneri, Forbes-McKay, O'Brien, & Ellis (206)

Action Planning and Control II (207-211), Room 6

- 11:00-11:20 Roelofs (207)
 11:20-11:40 Notebaert, Gevers, & Fias (208)
 11:40-12:00 Wuehr (209)
 12:00-12:20 Soetens, Notebaert, & Maetens (210)
 12:20-12:40 Maetens, & Soetens (211)

Working Memory I (213-216), Room 7

- 11:20-11:40 Brown, Forbes, & McConnell (213)
 11:40-12:00 Larsen (214)
 12:00-12:20 Lehnert, & Zimmer (215)
 12:20-12:40 Balas, Stettner, Orzechowski, & Piotrowski (216)

FRIDAY AFTERNOON, 2:00 - 4:00

Gorlaeus Building

Temporal Visual Attention (217-222), Room 1

- 2:00-2:20 Correa, Sanabria, Spence, Tudela, & Lupiáñez (217)
 2:20-2:40 Wagener, Gaul, Kiesel, Kunde, & Hoffmann (218)
 3:00-3:20 Martens, Munneke, Smid, & Johnson (220)
 3:20-3:40 Ferlazzo, Fagioli, & Sdoia (221)
 3:40-4:00 Olivers, & Van der Stigchel (222)

SYMPOSIUM: Memory and Metamemory in Psychopathology: Empirical Data on Theoretical Controversies (223-228), Room 2

- 2:00-2:20 Van den Hout, & Kindt (223)
 2:20-2:40 Kindt (224)
 2:40-3:00 Wessel (225)
 3:00-3:20 Engelhard (226)
 3:20-3:40 Van Oorsouw, & Merckelbach (227)
 3:40-4:00 Huntjens, & Postma (228)

Task-Switching (229-234), Room 3

- 2:00-2:20 Philipp, & Koch (229)
 2:20-2:40 Bialkova, & Schriefers (230)
 2:40-3:00 Sdoia, & Ferlazzo (231)
 3:00-3:20 Gade, & Koch (232)
 3:20-3:40 Polunin (233)
 3:40-4:00 Monsell, & Mizon (234)

Language Perception IV (235-240), Room 4/5

- 2:00-2:20 Duncan, Seymour, Genard, Leybaert, Lund, Sigurðsson, Sucena, Castro, Serrano, & Defior (235)
 2:20-2:40 Frank, Koppen, Noordman, & Vonk (236)
 2:40-3:00 Konieczny (237)
 3:00-3:20 Erdozia, Rodriguez-Fornells, Mestres, & Laka (238)
 3:20-3:40 Kerkhofs, Vonk, Schriefers, & Chwilla (239)
 3:40-4:00 Weiss (240)

Action Planning and Control (241-246), Room 6

- 2:00-2:20 Tessari, & Rumati (241)
 2:20-2:40 Häberle, Laboissere, & Prinz (242)
 2:40-3:00 Engbert, & Wohlschläger (243)
 3:00-3:20 Paelecke, & Kunde (244)
 3:20-3:40 Nattkemper, Ziessler, & Frensch (245)
 3:40-4:00 Massen, & Prinz (246)

SYMPOSIUM: Do Numbers Have Special Representation in the Human Brain? (247-252), Room 7

- 2:00-2:20 Walsh (247)
 2:20-2:40 Fias, Caessens, & Orban (248)
 2:40-3:00 Izard, Pica, Lemer, & Dehaene (249)
 3:00-3:20 Göbel, & Rushworth (250)
 3:20-3:40 Cohen Kadosh, Linden, Cohen Kadosh, & Henik (251)
 3:40-4:00 Zorzi (252)

FRIDAY AFTERNOON, 4:00 - 6:00

POSTER SESSION II (2001-2082), Gorlaeus Building Central Hall

PERCEPTION II

- (2001) Koyasu & Tatsuwa
- (2002) Sofroniou & Avraamides
- (2003) Ioannidou & Avraamides
- (2004) Presselin & Champelovier
- (2005) Sestieri, Ferretti, Del Gratta, Di Matteo, Caulo, Tartaro, Romani & Olivetti Belardinelli
- (2006) Sanabria, Soto-Faraco & Spence
- (2007) Fernandez & Van Mier

ATTENTION II

- (2008) Van der Voort van der Kleij & Van der Velde
- (2009) Roberts, Hall & Summerfield
- (2010) Dalton, Lavie & Spence
- (2011) Santangelo, Van der Lubbe, Olivetti Belardinelli & Postma
- (2012) Verstijnen
- (2013) Chica, Funes & Lupiáñez
- (2014) Trincas, Couyoumdjian & Del Miglio
- (2015) Müsseler, Brinkmeier & Stork
- (2016) Lange
- (2017) Pinto
- (2018) Wykowska & Schubö

PERCEPTION AND ACTION II

- (2019) Eder & Klauer
- (2020) Ansorge
- (2021) Wendt & Goschke
- (2022) Koyuncu, Amado & Ýilikçi
- (2023) Reynvoet, Caessens & Gevers
- (2024) Kunde, Pohl & Kiesel
- (2025) Daini, Arduino, Menza, Vallar & Silveri
- (2026) Weigelt, Rieger & Prinz
- (2027) Brunetti, Cupellini & Olivetti Belardinelli
- (2028) Basso, Akiva Kabiri, Baschenis, Boggiani, Vecchi & Bisiacchi
- (2029) Basso, Saracini, Lotze, Olivetti Belardinelli & Birbaumer

DECISION MAKING I

- (2030) Basso, Lucci, Rea, Olivetti Belardinelli & Gentilomo
- (2031) Cowley & Byrne
- (2032) Payton & Vallee-Tourangeau
- (2033) Garcia-Retamero & Hoffrage
- (2034) Mata
- (2035) McCloy, Beaman, Morgan & Speed
- (2036) Kiewiet & Jorna

LANGUAGE PRODUCTION/ PERCEPTION II

- (2037) Peressotti & Mulatti
- (2038) Lamers
- (2039) Job, Delogu & Mulatti
- (2040) De Vincenzi, Fairfield & Mammarella
- (2041) Di Matteo, Perfetti, Di Domenico, Fairfield, Onofri & De Vincenzi

- (2042) Arciuli & Slowiaczek
- (2043) Karlsen, Imenes, Johannessen, Endestad & Lian

LANGUAGE PRODUCTION: DYSLEXIA

- (2044) Colé, Leuwers & Sprenger-Charolles
- (2045) Grieve & Duncan
- (2046) Krifi, Bedoin & Herbillon
- (2047) Bedoin, Levy-Sebbag & Keita
- (2048) Colin, Magnan, Leybaert & Ecalle
- (2049) Bara, Gentaz & Colé
- (2050) Rosazza, Appollonio, Isella & Shallice

FACE AND EMOTION RECOGNITION

- (2051) Magnee, Stekelenburg, Van Engeland, Kemner & Gelder
- (2052) Meeren, Van Heijnsbergen & De Gelder
- (2053) Meinel, O'Malley, Ledgeway & Walker
- (2054) Bednarek
- (2055) Parente & Albuquerque
- (2056) Balconi
- (2057) Devue & Brédart
- (2058) Sæther & Laeng
- (2059) Balconi

WORKING MEMORY

- (2060) Orzechowski & Balas
- (2061) Pardo-Vazquez & Fernandez-Rey
- (2062) Chuderski
- (2063) Fernandez-Rey & Pardo-Vazquez
- (2064) Carretti, Cornoldi & Pelegrina
- (2065) Van der Meulen, Logie & Della Sala
- (2066) Imbo & Vandierendonck
- (2067) Cattaneo, Postma & Vecchi
- (2068) Lesk & Womble

HIGHER MENTAL PROCESSING AND NUMERICAL JUDGMENT

- (2069) Verguts, Van Opstal & Fias
- (2070) Mark-Zigdon, Rubinsten & Henik
- (2071) Perrone, De Hevia, Bricolo & Girelli
- (2072) Pinhas & Tzelgov
- (2073) De Brauwier & Fias
- (2074) Flannery, Hutton, Trivedi & Rusted

LONG TERM MEMORY: FALSE RECALL/ INDUCED FORGETTING/ CONSISTENCY TRAUMATIC MEMORY

- (2075) Migueles & García-Bajos
- (2076) Pelegrina Lopez, Lechuga Garcia, Gomez-Ariza, Suárez Carrasco & Bajo
- (2077) Menor, Paz-Caballero & Jimenez
- (2078) Sattler & Meiser
- (2079) Carneiro, Albuquerque, Fernandez & Esteves
- (2080) Er, Alpar & Uçar
- (2081) Er
- (2082) Coluccia, Bianco & Brandimonte

SATURDAY MORNING, 9:00 - 12:40**Gorlaeus Building****SYMPOSIUM: The Relationship between Perception and Imagery: New Insights from Congenital Blindness (253-256), Room 1**

- 9:00-9:20 Postma, Noordzij, & Zuidhoek (253)
 9:20-9:40 Vecchi, Monegato, & Zanaletti (254)
 9:40-10:00 Ernst (255)
 10:00-10:20 Pietrini (256)

10:20-10:40 Knauff, & May (257)

SYMPOSIUM: Neurocognitive Aspects of Binding in Episodic Memory (258-263), Room 2

- 9:00-9:20 Brehmer, Li, Müller, Von Oertzen, & Lindenberger (258)
 9:20-9:40 Spitzer, & Bäuml (259)
 9:40-10:00 Groh-Bordin, & Zimmer (260)
 10:00-10:20 Johansson, Mecklinger, & Treese (261)
 10:20-10:40 Ecker, & Zimmer (262)
 10:40-11:00 Danielsson, Rönnerberg, Andersson, & Levén (263)

SYMPOSIUM: Emotional Modulation of Cognitive Control (264-268), Room 3

- 9:00-9:20 Goschke, & Dreisbach (264)
 9:20-9:40 Mayer, & Goschke (265)
 9:40-10:00 Dshemuchadse, & Goschke (266)
 10:00-10:20 Reimann, & Goschke (267)
 10:20-10:40 Bolte, & Goschke (268)

Language Production III (269-273), Room 4/5

- 9:00-9:20 Mortensen, Meyer, & Humphreys (269)
 9:20-9:40 Bölte, Jorschick, & Zwitterlood (270)
 9:40-10:00 Schiller, Groten, & Christoffels (271)
 10:00-10:20 Bien, Baayen, & Levelt (272)
 10:20-10:40 Chevaux, & Meunier-Hoen (273)

Higher Mental Processes II (274-278), Room 6

- 9:00-9:20 Luwel, Siegler, & Verschaffel (274)
 9:20-9:40 Gandini, Lemaire, & Dufau (275)
 9:40-10:00 Cazares (276)
 10:00-10:20 Verbrugge, Dieussaert, Schaeken, & Van Belle (277)
 10:20-10:40 Cozijn, Vonk, Noordman, Commandeur, & Coppens (278)

Working Memory II (279-283), Room 7

- 9:00-9:20 Wahrlich, & Hamm-Eder (279)
 9:20-9:40 Buchner, Mehl, Rothermund, & Wentura (280)
 9:40-10:00 Rummer, & Schweppe (281)
 10:00-10:20 Delogu, & Olivetti Belardinelli (282)
 10:20-10:40 Ferrari, & Palladino (283)

Attention and Grouping (284-287), Room 1

- 11:00-11:20 Crundall (284)
 11:20-11:40 Albert, & Ripoll (285)
 11:40-12:00 Couyoumdjian, Tricas, & Di Pace (286)
 12:00-12:20 Rivenez, Darwin, & Guillaume (287)
 12:20-12:40 Saariluoma, & Helfenstein (288)

Memory (289-293), Room 2

- 11:00-11:20 Schooler, & Hertwig (289)
 11:20-11:40 Shapiro, Hansen, & Polage (290)
 11:40-12:00 Janssen, Chessa, & Murre (291)
 12:00-12:20 Zeeuws, & Soetens (292)
 12:20-12:40 Kallioinen, & Sikström (293)

Face Recognition Processes (294-298), Room 3

- 11:00-11:20 Righart, & De Gelder (294)
 11:20-11:40 Balconi (295)
 11:40-12:00 Van den Stock, Meeren, De Diego Balaguer, Bachoud-Levi, & De Gelder (296)
 12:00-12:20 Lander, & Chuang (297)
 12:20-12:40 Damjanovic, & Hanley (298)

Language Production IV (299-303), Room 4/5

- 11:00-11:20 Finocchiaro, Mahon, & Caramazza (299)
 11:20-11:40 Alario (300)
 11:40-12:00 Vaknin, & Shimron (301)
 12:00-12:20 Tabak, Schreuder, & Baayen (302)
 12:20-12:40 Horemans, & Schiller (303)

Higher Mental Processes III (304-308), Room 6

- 11:00-11:20 Jones (304)
 11:20-11:40 Öllinger, & Knoblich (305)
 11:40-12:00 Elqayam, Handley, & Evans (306)
 12:00-12:20 Dieussaert, Vansteenwegen, & Van Assche (307)
 12:20-12:40 Van der Linden, Murre, & Van Turenout (308)

Working Memory III (309-313), Room 7

- 11:00-11:20 Buschkuehl, & Jaeggi (309)
 11:20-11:40 Kessler, & Meiran (310)
 11:40-12:00 Meneghetti, Pazzaglia, De Beni, & Gyselinck (311)
 12:00-12:20 Gavault, Ben Abbes, & Ripoll (312)
 12:20-12:40 Thevenot, & Oakhill (313)

SATURDAY AFTERNOON, 12:40 - 2:40

POSTER SESSION III (3001-3081), Gorlaeus Building Central Hall

**LONG TERM MEMORY/ SHORT TERM MEMORY IN
ADHD AND SCHIZOPHRENIA**

- (3001) Pinho & Mário
- (3002) Van Rijn & Flobbe
- (3003) Soriano, Roman, Jimenez & Bajo
- (3004) Söderlund & Sikström
- (3005) Sampaio, Prieto, Gonçalves, Henriques, Sousa,
Lima, Fuster & Carracedo

**LONG TERM MEMORY: KNOWLEDGE
REPRESENTATION**

- (3006) Mastroberardino, Natali & Marucci
- (3007) Caeyenberghs, De Bruycker, Helsen & D'Ydewalle
- (3008) Pieroni, Mastroberardino, Secchi & Costanzi
- (3009) Badard, Labeye, Oker & Versace
- (3010) Duscherer & Mounoud
- (3011) Sim, Liebich, Tanaka & Kiefer

PERCEPTION AND ACTION III

- (3012) Ziessler, Nattkemper & Vogt
- (3013) D'Olimpio, Giannini & Ferlazzo
- (3014) Hannus, Cornelissen & Bekkering
- (3015) Treccani, Cubelli, Della Sala & Umiltà
- (3016) Ottoboni, Cubelli & Umiltà
- (3017) Colzato, Van Wouwe, Lavender & Hommel
- (3018) Riggio, Lupiáñez, Gherri & Rodà
- (3019) Schmidt, Niehaus & Nagel

DECISION MAKING II

- (3020) Giorgetta & D'Olimpio
- (3021) Topsever, Ranyard, Amado & Teközel
- (3022) Slifierz
- (3023) Igesias-Parro, Lechuga Garcia & Gomez-Ariza
- (3024) Garcia-Retamero & Hoffrage
- (3025) Hoeks & Hendriks
- (3026) Cutini, Basso, Di Ferdinando, Bisiacchi & Zorzi

LANGUAGE PRODUCTION/ PERCEPTION III

- (3027) Londei, Basso, D'Ausilio & Olivetti Belardinelli
- (3028) Kempe, Biersack & Potts
- (3029) Hoffman, Nemeth & Kálmán
- (3030) Buccino, Riggio, Sato, Mengarelli & Gallese
- (3031) Duncan, Colé & Casalis
- (3032) Collina, Tabossi & Zanussi
- (3033) Ratinckx, Brysbaert & Fias
- (3034) Pearson, Pickering, Branigan, McLean, Nass & Hu

**LANGUAGE PERCEPTION: PICTURE-WORD
RELATIONS**

- (3035) Rodríguez-Santos, Torres, García-Orza, Iza &
Calleja
- (3036) Dohmes, Zwitserlood & Boelte
- (3037) Jescheniak, Oppermann, Hantsch, Wagner &
Schriefers
- (3038) Lucci, Rosmarino, Iaconelli & Gentilomo
- (3039) Haecker, Meyer, Belke, Holzgrefe & Mortensen

- (3040) Paolieri, Lotto, Cubelli & Job
- (3041) Haun & Call

EMOTION

- (3042) Martinez & Koenig
- (3043) Dmitrieva & Gelman
- (3044) Esteves, Miguel & Flykt
- (3045) Pérez Dueñas, Acosta & Lupiáñez
- (3046) Blaut & Paulewicz
- (3047) Rose, Versace, Jacquet & Vioux

LONG TERM MEMORY

- (3048) Albuquerque, Pandeirada & Sousa
- (3049) Pimentel & Albuquerque
- (3050) Øvervoll, Laeng & Steinsvik
- (3051) Mammarella, Fairfield & Cornoldi
- (3052) Sousa & Albuquerque
- (3053) García-Bajos & Migueles
- (3054) Pandeirada & Albuquerque
- (3055) Olszewska
- (3056) Verwoerd & Wessel
- (3057) Cüpper & Undorf
- (3058) Willander & Larsson
- (3059) Vasconcelos & Albuquerque
- (3060) Legrand-Lestremau & Postal

WORKING MEMORY: SPATIAL LOCATIONS

- (3061) Castellanos & Tudela
- (3062) Nemeth, Ivady, Mihaltz & Pléh
- (3063) Román, Soriano, Ibáñez & Bajo
- (3064) Hurts
- (3065) Fastame & Hitch

WORKING MEMORY: AGING EFFECTS

- (3066) Gavens & Barrouillet
- (3067) Borella, De Beni & Carretti
- (3068) Ludwig, Borella, Fagot & De Ribaupierre
- (3069) Baudouin, Vanneste & Isingrini
- (3070) Fabre & Lemaire
- (3071) Ottem, Lian & Karlsen

WORKING MEMORY: NEURAL SUBSTRATES

- (3072) Crone, Van Leijenhorst, Wendelken, Donohue &
Bunge
- (3073) Romero Lauro, Papagno & Walsh
- (3074) Simões Mário, Salomé Pinho
- (3075) Schiffer
- (3076) Van Wouwe, Ridderinkhof & Band
- (3077) Gardini, Cornoldi, De Beni & Venneri
- (3078) Janzen, Haun & Levinson
- (3079) Van Leijenhorst, Crone, Honomichl, Wendelken,
Christoff & Bunge
- (3080) Willems, Özyürek & Hagoort
- (3081) Mayer, Bittner, Nikolić & Linden

SATURDAY AFTERNOON, 2:40 - 4:00
Gorlaeus Building**Working Memory and Emotion (314-317), Room 1**

2:40-3:00	Gaspar (314)
3:00-3:20	Stocco, & Fum (315)
3:20-3:40	Kleinsorge (316)
3:40-4:00	Sikström, & Söderlund (317)

Priming (318-321), Room 2

2:40-3:00	Eckstein, & Perrig (318)
3:00-3:20	Kinoshita (319)
3:20-3:40	Perrig, Sturzenegger, & Eckstein (320)
3:40-4:00	Gellatly, Pilling, & Cole (321)

Face Recognition and Change Blindness (322-325), Room 3

2:40-3:00	Yang, & Shyi (322)
3:00-3:20	Hoffmann, & Sebald (323)
3:20-3:40	Laloyaux, Destrebecqz, & Cleeremans (324)
3:40-4:00	Di Nocera, Terenzi, & Ferlazzo (325)

Language Production and Perception (326-329), Room 4/5

2:40-3:00	Ganushchak, & Schiller (326)
3:00-3:20	Kopenhagen, & Schiller (327)
3:20-3:40	Oezdemir, Roelofs, & Levelt (328)
3:40-4:00	Christoffels, Formisano, & Schiller (329)

Higher Mental Processes IV (330-333), Room 6

2:40-3:00	Theofilou, & Cleeremans (330)
3:00-3:20	Setti, & Caramelli (331)
3:20-3:40	Green, & Wright (332)
3:40-4:00	Schmittmann, Raijmakers, & Visser (333)

Numerical Cognition (334-337), Room 7

2:40-3:00	García-Orza, & Damas (334)
3:00-3:20	Jost, & Rösler (335)
3:20-3:40	Krajcsi, Vidnyánszky, Kovács, & Palatinus (336)
3:40-4:00	Camos, & Tillmann (337)

BROADBENT LECTURE

Wednesday, 6:15-7:15, St Pieter's Church

The Cognitive Neuroscience of Memory Distortion.

DANIEL L. SCHACTER

Department of Psychology, Harvard University

—Memory is often reliable, but is also subject to various kinds of errors and distortions. This lecture will consider how a cognitive neuroscience approach, involving both neuropsychological analyses of patients with memory disorders and neuroimaging studies of normal memory, can help to illuminate the nature of false or inaccurate memories. Neuropsychological analyses of amnesia and dementia highlight the role of medial temporal lobe structures in certain kinds of false recognition, and also point toward possible differences in semantically-based and perceptually-based memory distortion. Functional neuroimaging studies provide insight into the nature of a sensory signature that distinguishes true and false memories by illuminating the contributions of explicit versus implicit retrieval to accurate and inaccurate memories.

NVP LECTURE

Thursday, 6:00-7:00, Gorlaeus Building Room 4/5

Mechanisms Underlying the Development of Hot and Cool Executive Function in Early Childhood and Adolescence.

PHIL ZELAZO

Professor of Psychology and Canada Research Chair in Developmental Neuroscience

Departments of Psychology and Psychiatry, University of Toronto

—Executive function (EF) - the conscious control of thought, action, and emotion - emerges early in development and improves considerably in early childhood; the differences between an infant and a preschooler are enormous. But preschoolers' EF is still severely limited, and quite often their knowledge about what they *should* do surpasses their ability actually to do it. In one recent study (Prencipe & Zelazo, 2005), for example, 3-year-old children were asked to help an experimenter decide: Should she have one candy now or several candies when it was time to go home? Children typically told the experimenter that she should wait, and take the larger reward. But when children themselves were presented with the same options (one now vs. more later), they almost always took the immediate reward. Of course, dissociations between knowledge and action are hardly restricted to the preschool period: the abilities underlying EF follow an extremely protracted developmental course that extends well into adolescence and probably into early adulthood, corresponding to the slow development of prefrontal cortex (PFC; e.g., Gogtay et al., 2004).

This talk will review research on the cognitive and neural mechanisms underlying the development of EF, including both the more cognitive, “cool” aspects of EF operative in abstract reasoning and problem solving - aspects associated mainly with dorsolateral PFC - and the more affective, “hot” aspects operative in motivationally significant situations and associated mainly with ventral and medial regions of PFC (Zelazo & Müller, 2002). A central claim will be that age-related increases in both hot and cool EF depend on age-related increases in the highest “level of consciousness” that children are able to muster, and that these increases in level of consciousness are brought about by the reprocessing of information via neural circuits in PFC.

KEYNOTE LECTURE

Friday, 6:00-7:00, Gorlaeus Building Room 4/5

Solving the Mind-Brain Relation for Conscious Vision.

VICTOR A.F. LAMME

Cognitive Neuroscience Group, Department of Psychology, University of Amsterdam

—It has been proposed that a key step in understanding consciousness will be to find its neural correlate. However, when trying to find the Neural Correlate of Consciousness (the NCC) we have to rely on so called heterophenomenological observations, i.e. a subject reporting in one way or another about his conscious experience. This results in the confusion of conscious experience with the cognitive processes enabling the report, such as action, language, attention, or memory. I will illustrate that in this way, finding the NCC is an ill-posed problem, and we run into unsolvable problems when trying to prove that something is or is not part of the NCC. I therefore propose to attack the problem from the other end: Let's identify more or less fundamental aspects of neural processing, and identify the Mental Correlates (MC) that go along with these. Defining the MC's of two aspects of cortical processing results in separate definitions of attention and consciousness, and at the same time argues for the existence of (at least) two different types of conscious visual experience. One of these is loosely linked to our intuitive 1st and 3rd person notion of consciousness (Access-consciousness), while the other is more elusive and can be seen as independent of introspection or reportability (Phenomenal consciousness). This shows that we can get a grip on the mind-brain relation and may close the explanatory gap, not by bridging it, but by moving our notion of mind towards that of brain.

SYMPOSIUM: Integration in Perception and Action.

Gorlaeus Building Room 1,
Wednesday Afternoon, 1:00-2:40

*Organized and chaired by Lorenza S. Colzato, Leiden University;
Discussant: Bernhard Hommel, Leiden University*

1:00-1:20 (1)

What Do We Learn from Binding Features? Evidence for Multilevel Feature Integration. LORENZA S. COLZATO, *Leiden University*, ANTONINO RAFFONE, *University of Sunderland*, & BERNHARD HOMMEL, *Leiden University*

—Four experiments were conducted to investigate the relationship between the binding of visual features (as measured by their after-effects on subsequent binding) and the learning of feature-conjunction probabilities. Both binding and learning effects were obtained but they did not interact. Interestingly, (shape-color) binding effects disappeared with increasing practice, presumably due to the fact that only one of the features involved was task-relevant. However, this instability was only observed for arbitrary combinations of simple geometric features but not for real objects (colored pictures of a banana and strawberry), where binding effects were strong and practice-resistant. Findings are interpreted in a neurocognitive framework that makes a distinction between integration at low-level feature maps, short-term acquisition of frequency-based expectations, and Hebbian learning of objects representations.

1:20-1:40 (2)

The Integration of Perception and Action in the Human Mirror Neuron (MNS) During Imitation of Biological and Non-Biological Movements. KLAUS KESSLER, *Heinrich-Heine University, Düsseldorf*

—When executing a body movement, humans are faster at imitating a real movement than at performing a movement that is instructed by other visual cues. In an MEG study we replicated this effect and identified an oscillatory network in the lower alpha-band. Our results challenge previous fMRI findings regarding the prominent role of the Broca area by evidencing the involvement of premotor, temporal, and parietal areas in the perception-to-action mapping of biological movements. In a series of behavioural experiments we also found a transient 'anti-mirror' priming effect in the MNS: while investigating priming of finger versus dot movement observation (stimulus 1) on imitation of a subsequent congruent or incongruent finger movement (stimulus 2) we observed a response time advantage for the imitation of incongruent as compared to congruent finger movements. Concluding, our results shed light on the architecture and the dynamics of the human MNS.

1:40-2:00 (3)

Binding in Visual Working Memory: A Simple Neural Model. ANTONINO RAFFONE, *University of Sunderland*, & GEZINUS WOLTERS, *Leiden University*

—Various behavioural studies suggest that the units of representation in visual working memory (VWM) are integrated objects. Other studies, though, show counteracting evidence. Then, what are the units of representation in VWM? In order to shed light on the role of binding in VWM, with reference to experimental data, computational investigations were conducted. The limited capacity of VWM is modelled in terms of competition between self-sustained neural oscillations representing different objects. As in a limited length tape, only if oscillatory activation cycles are within a given time-window, they can be maintained against mutual interference and neural noise. Features of the same object are encoded in synchronous oscillation cycles, with amplitude and frequency of feature-coding oscillations modulated by attentional

salience and sensory evidence. The degree of synchrony encodes for the representational integration of objects. Metaphorically, more integrated objects occupy a shorter tape length. The feature integration gain is variable, depending on the task, bottom-up and top-down factors. In our model, the units of representation in VWM are elastic and adaptive codes for objects. Binding is elastic and adaptive.

2:00-2:20 (4)

The Functional Architecture of Visual Attention. KIMRON L. SHAPIRO, *University of Wales, Bangor*

—When we identify a visual object such as a word or letter our ability to detect a second object is impaired if it appears within 400 ms of the first. This phenomenon has been termed the attentional blink (AB) or dwell time and has been the topic of many research reports since 1992 when the first AB paper was published. During the first decade of research on this topic, the focus has been on 'behavioural' approaches to understanding the AB phenomenon, with manipulations made on the stimulus parameters (e.g., type and spatial distribution), nature of the stimuli (uni-modal or cross-modal), and importantly the role of masking. More recently, researchers have begun to focus on neurophysiological underpinnings of the AB – studying patients with focal lesions and using approaches such as ERP, TMS, fMRI, and MEG. My talk will focus on the results of a number of such neurophysiological techniques, suggesting that localisation, in combination with activation and synchronisation methods have begun to unravel a dynamic temporo-parietal frontal network of structures involved in the attentional phenomenon known as the 'attentional blink'.

2:20-2:40 (5)

How Attention Integrates Separate Contour Segments into Coherent Object Representations. PIETER R. ROELFSEMA, *The Netherlands Ophthalmic Research Institute*

—Visual scenes that are encountered in everyday life are crowded with information. Attention is employed to isolate a subset of this information. It is essential that visual attention can be directed to a single object, even when it is large and overlaps with other image components. We studied the physiological and psychophysical correlates of "object-based" attention by using a task in which subjects have to trace a curve mentally, i.e. without making eye movements. In macaque monkeys, mental tracing is associated with an enhancement of neural responses that are evoked by all segments of the traced curve. This response enhancement occurs in area V1, the earliest hierarchical level of the visual cortex, but also in the frontal eye fields, which is at a much higher hierarchical level. An analysis of errors during curve tracing indicates that the response enhancement is not determined by stimulus properties. The response modulations rather appear to reflect the monkey's interpretation. Psychophysically, attention is directed to the traced curve. Attention appears to spread over all segments of such a curve, presumably because these segments are collinear and connected to each other. Taken together, the results indicate that spatially separate segments of an elongated curve are attentively bound into a coherent representation.

SYMPOSIUM: The Role of Time in Working Memory.

Gorlaeus Building Room 2,
Wednesday Afternoon, 1:00-2:40

*Organized by Klaus Oberauer, University of Potsdam, &
Stephan Lewandowsky, University of Western Australia;*

*Chaired by Klaus Oberauer, University of Potsdam;
Discussant: Gordon D.A. Brown, University of Warwick*

1:00-1:20 (6)

Encoding Time and Short-Term Serial Recall. STEPHAN

LEWANDOWSKY, *University of Western Australia*, GORDON D.A. BROWN, *University of Warwick*, & LISA M. NIMMO, *University of Western Australia*

—According to temporal distinctiveness theories, items that are temporally isolated from their neighbors during list presentation are more distinct and thus should be recalled better. Event-based theories, which deny that elapsed time plays a role at encoding, can handle isolation effects by assuming that temporal isolation provides extra time for encoding. The two classes of theories can be differentiated by examining the symmetry of isolation effects: Event-based accounts predict that performance should be affected only by pauses following item presentation (because the pause allows time for greater encoding strength), whereas distinctiveness predicts that items should also benefit from preceding pauses. We present numerous experiments in which the time intervals between list items were unpredictable and varied considerably. In all cases, irrespective of whether people used serial recall, serial reconstruction, or probed recall, performance was completely unaffected by temporal separation. The pattern of results remained unchanged when people engaged in articulatory suppression during study. We suggest that these data provide further evidence against a causal role of chronological time in short-term memory.

1:20-1:40 (7)

Forgetting in Working Memory – The Roles of Processing Time, Amount of Processing, and Processing Rate. ANNEKATRIN HUDJETZ, & KLAUS OBERAUER, *University of Potsdam*

—We evaluated two models of forgetting in working memory with a reading span paradigm. The time-based resource sharing model (Barrouillet et al., 2004) postulates that forgetting depends on cognitive load, defined as the ratio of processing amount to processing time. The theory of representational interference (Saito & Miyake, 2004) emphasizes the amount of processing, independent of time. We varied presentation time for segments of sentences to be read aloud. The amount of processing was held constant. To investigate whether normal reading allows intermittent rehearsal we contrasted it with a condition of continuous reading to block articulation pauses. The results favour the model of time-based resource sharing: shorter processing times led to worse recall than longer durations. This challenges the interference hypothesis. The advantage of longer presentation times held independent of reading conditions. This implies that rehearsal was performed simultaneous with overt articulation in both reading conditions.

1:40-2:00 (8)

Similarity and Temporal Organisation in Short-Term Memory. SIMON FARRELL, *University of Bristol*

—Recent work has shown that the representation of the order of items is affected by their phonological similarity (Farrell & Lewandowsky, 2003). The work presented here considers whether similarity might also play a role in higher-level organisation by determining the spontaneous grouping of items often observed in serial recall experiments. The results of several experiments suggest that any such effects are mediated by other factors in the tasks under consideration, and provide insight into the nature of grouping processes in short-term memory

2:00-2:20 (9)

Do Working Memory Spans Depend Only on Time? PIERRE BARROUILLET, & VALERIE CAMOS, *Université de Bourgogne*

—Our model, the Time-Based Resource-Sharing model is a new model that accounts for working memory spans in adults and more generally for working memory functioning. It assumes that memory traces decay as soon as attention is switched away. Thus, the

proportion of time during which the processing component of any working memory span task captures attention determines its cognitive load and thus spans. An open question is to determine whether the spans are only a mere function of time or depend also on the nature of the processing component that captures attention. In a series of experiments, we investigated this question by comparing the effect on spans of different activities (selection of response, retrieval from memory) while time is held constant.

2:20-2:40 (10)

Time and Decay in the Immediate Serial Recall of Verbal Material: The Return of the Jedi. MIKE P.A. PAGE, *University of Hertfordshire*

—Several recent papers have claimed that the idea of time-based decay in short-term memory has had its day. In this talk I will critically review this position with reference to the immediate serial recall of verbal materials, and will show how it based on a rather slanted view of the available data. I will discuss some recently collected data of our own and will relate it to the primacy model, a computational model of immediate serial recall. I will conclude that rumours of the death of decay-based models are greatly exaggerated and, indeed, that they currently offer the best account of a wide variety of data.

Applied Cognitive Psychology.

Gorlaeus Building Room 3,
Wednesday Afternoon, 1:00-2:40

Chaired by Jean D.M. Underwood, Nottingham Trent University

1:00-1:20 (11)

The Relationship between Prospective Memory, Working Memory and Subjective Memory Rating in Individuals with and without Intellectual Disability. ANNA LEVÉN, HENRIK DANIELSSON, *Swedish Institute for Disability Research*, JAN ANDERSSON, *The Swedish National Defence Research Agency*, JERKER RÖNNBERG, & BJÖRN LYXELL, *Swedish Institute for Disability Research*

—The relationship between prospective memory, working memory and subjective memory rating performance was studied in individuals with and without intellectual disability. Overall, the results demonstrate inter- and intra-individual differences in memory performance that are especially prominent for individuals with intellectual disability. Further analysis of the results revealed that one subgroup of individuals with intellectual disability performed on a par with the individuals without intellectual disability on a prospective memory task, whereas working memory and long term episodic memory performance were lower than the performance of individuals without intellectual disability. The results are interpreted as indicating that adequate prospective memory performance can be achieved despite minor limitations in working memory and long term memory function, given a prospective memory task with a low level of complexity. Performance on the subjective memory rating task did not differ between the groups, although there were significant differences in performance on the other memory tasks.

1:20-1:40 (12)

Planning, Working Memory, and Interface Support in a Medical Domain. JAMES H. SMITH-SPARK, DAVID W. GLASSPOOL, AYELET OETTINGER, *Cancer Research United Kingdom*, PETE YULE, *Edinburgh University*, & JOHN FOX, *Cancer Research United Kingdom*

—Planning places heavy demands on working memory. Its contribution to planning has been well documented using the Tower of London task, but its involvement in solving less abstract problems is under-investigated. Medical planning is one area in

which a greater understanding of planning processes will be highly beneficial. In this experiment, participants were asked to generate plans to reduce the risk of a patient contracting a hypothetical disease. External representations play a significant role in reducing cognitive load, with a well-designed interface removing much of the burden on memory and freeing capacity for planning itself. Levels of feedback concerning the effectiveness of plans were therefore manipulated within a graphical user interface. Problems varied in memory load, introducing different levels of constraints, dependencies, and interactions. Interrelationships between working memory, external representation, and measures of planning are discussed.

1:40-2:00 (13)

Influence of Depth Perception on Performance and Time Evaluation in Minimal Access Surgery. ADÉLAIDE BLAVIER, & ANNE-SOPHIE NYSSSEN, *University of Liège, Fonds National de La Recherche Scientifique*

—This study aimed to evaluate the impact of depth perception on surgical tasks performance and time evaluation. 98 novice subjects performed a fine surgical task with a new laparoscopic technology (da Vinci robotic system). They were divided in two groups, one using 3D view option and another using 2D view option. We measured time performance and asked subjects to evaluate their time performance. Our results showed subjects performed significantly quicker with robotic system in 3D than with robotic system in 2D. We obtained a significant interaction between time performance and time evaluation: in 2D condition, subjects accurately evaluated their time performance while in 3D condition, subjects evaluated their time performance as being longer than their real performance and even than real or evaluated performances of subjects in 2D condition. Our findings emphasize the role of 3D in improving performance and the contradictory feeling about time evaluation in 2D and 3D.

2:00-2:20 (14)

Developmental Trends in the Perception of Road Risk. JEAN D.M. UNDERWOOD, GAYLE DILLON, ALISON AULT, & BILL FARNSWORTH, *Nottingham Trent University*

—In 2002, more than 4,500 children were killed or injured on UK roads, with boys twice as likely to be injured as girls. Road users' behaviour is partially a function of their cognitive schemata or their perceptions and categorisation of a road scene. This study asked are there discernable developmental trends and sex differences in the perception of road risk? The between subjects design incorporated three independent variables: Age (8; 10 and 12 year olds; undergraduates); Sex (Male: Female) and Task (Task 1: Task 2). One hundred and sixty participants in four groups of forty with roughly equal sex distribution were tested. Participants conducted a free sort of twenty photographs of road scenes (Task1) followed by a directed safety-focus sort (Task 2). Factor analyses of these categorisations confirmed both developmental trends and sex differences in road risk perception. These findings have implications for road safety training.

2:20-2:40 (15)

Relations of Cognitive Style with Academic Emotions and Preferred Teacher Characteristics in Early Childhood Education. GEORGIA STEPHANOU, *University of West Macedonia*

—Although field dependence / field independence is an integral element of students' personality and has educational consequences, little research has examined the association of students' FDI with their both preference for teaching style and academic emotions. This study investigated the effects of five-year-old kindergarten pupils (n = 95, both gender)' cognitive style on preferred teacher characteristics and their academic emotions. Cognitive style and

preferences for FDI teacher characteristics was assessed via the Preschool Embedded Figures Test and Field Dependence Independence Characteristics Scale, respectively. Emotions scale was developed by the researcher. The results from Manova, followed by Anovas, showed that (a) kindergarten pupils preferred the teachers with FD characteristics rather than the teachers with FI characteristics, (b) pupils' FDI was positively associated with teachers' characteristics, and (c) the FD pupils, not the FI pupils, experienced positive academic emotions of high intensity. Discussion focuses on the implication of the findings into education.

Language Perception I.

Gorlaeus Building Room 4/5,
Wednesday Afternoon, 1:00-2:40

Chaired by Mirjam Ernestus, Max Planck Institute for Psycholinguistics & Radboud University Nijmegen

1:00-1:20 (16)

Relative Roles of Time-Compressed Formant Transition and Voice Onset Time on Non Words Intelligibility. CAROLINE JACQUIER, *Université Lumière Lyon 2*, MICHEL HOEN, *Neurosciences & Systèmes Sensoriels CNRS UMR 5020*, FRANÇOIS PELLEGRINO, & FANNY MEUNIER, *Laboratoire Dynamique Du Langage, CNRS UMR 5596*

—We studied temporal encoding of acoustic cues during natural speech perception. We focused on two important parameters of speech: formant transition and voice onset time (VOT). Various studies have established that children with language impairment like dyslexia exhibit deficits perceiving acoustically speech sounds. The precise relationship between their impairment and the speech deficit is still discussed. However, regardless of pathologic cases, the importance of specific phonetic and acoustic features in speech comprehension is still unclear. In our experiments, stop consonants (voiced: /b/, /d/ and unvoiced: /p/, /t/) with two vowels (/a/ and /i/) were used to construct bisyllabic CVCV non words. Using an identification task, time-compressed conditions were tested on each cue separately and on both of them at the same time. We will conclude by showing how specific acoustic/phonetic features in regard to their properties are indeed critical for speech comprehension.

1:20-1:40 (17)

Cognitive Restoration of Degraded Speech: Implication of both Descending Auditory Pathways and Lexical Strategies. CLAIRE GRATALOUP, *Université Lyon 2*, MICHEL HOEN, FANNY MEUNIER, FRANÇOIS PELLEGRINO, *Laboratoire Dynamique Du Langage, CNRS UMR 5596*, EVELYNE VEUILLET, & LIONEL COLLET, *Neurosciences & Systèmes Sensoriels, CNRS UMR 5020*

—In the present study we explored high and low-level mechanisms implicated in degraded speech comprehension in normal hearing subjects. We compared the loss of intelligibility due to the presence of increasing degraded (time-reversed) speech segments in words and pseudowords. Results showed that words were better reconstructed than pseudowords, evidencing a lexical benefit for words in degraded speech restoration. We also observed an important interindividual variability only in pseudowords reconstruction performances. These behavioural performances correlated strongly with the subjects' medial olivocochlear bundle (MOCB) functionality. These results highlighted the importance of low-level auditory mechanisms on degraded speech restoration. Concerning words reconstruction we found an effect of both the number of phonological neighbours and nouns frequency. These results confirm that lexical strategies were activated to compensate for the lack of information. Overall these experiments suggest that

high-level information -such as lexical ones- can to some extent compensate for poor functionality of the MOCB.

1:40-2:00 (18)

Lexical Frequency and Voice Assimilation. MIRJAM ERNESTUS, MYBETH LAHEY, FEMKE VERHEES, *Max Planck Institute for Psycholinguistics & Radboud University Nijmegen*, & HARALD BAAYEN, *Radboud University Nijmegen & Max Planck Institute for Psycholinguistics*

—Words with higher token frequencies tend to have more reduced acoustic realizations than lower frequency words. This study is the first to document frequency effects for voice assimilation. We took our data from a corpus of read-aloud Dutch. Acoustic measurements from 483 obstruent clusters showed that clusters in high frequency words tend to be realized with less articulatory effort. As a consequence, some cues to voicing signal more voicing while others show less voicing for clusters in high frequency words. The net effect, as also shown by the voicing ratings of three trained transcribers, is that especially words of a low frequency show little assimilation, while regressive assimilation is favoured in words of medium frequency, and progressive assimilation is common among high frequency words. The frequency effects challenge full decomposition models of speech production. The patterns of assimilation show that voicing is a cue to morphological decomposition in word comprehension.

2:00-2:20 (19)

Form and Meaning of Italian Verbs. LARA TAGLIAPIETRA, & PATRIZIA TABOSSI, *University of Trieste*

—According to many authors, listeners of free-stress languages rely on lexical stress information during spoken word recognition. Research on this topic had primarily concerned the recognition of morphological unrelated nouns. In most Romance languages, however, nominal and verbal stress differs considerably (Roca, 1999). In Italian, for example, verbal lexical stress position changes with tense and person of the inflected form. In this study three cross-modal priming experiments investigated the role of lexical stress in the recognition of inflected verbs in Italian. Experiment 1 and 2 directly compared the role of lexical stress and segmental information in the recognition of inflected forms (firmo, [I] sign, versus firmò, [s/he] signed, versus firmi, [you] sign). In Experiment 3 we used the associative priming to investigate the extent to which differently stressed inflected forms (firmo, [I] sign, versus firmò, [s/he] signed) activate verb semantics. Implications for models of spoken word recognition are discussed.

2:20-2:40 (20)

Phonemic Representations in Illiterates Lexicon and Their Use in Spoken Word Production. PAULO VENTURA, *University of Lisboa*, RÉGINE KOLINSKY, *Université Libre de Bruxelles*, SANDRA FERNANDES, JOSÉ-LUÍS QUERIDO, *University of Lisboa*, & JOSÉ MORAIS, *Université Libre de Bruxelles*

—Results of two investigations with Portuguese illiterates and literates will be presented. In the first study, the structure of lexical representation of spoken words was evaluated using a gating task. Both populations showed evidence of phonemic representations. Thus, a population that lacks phoneme awareness – illiterates (e.g., Morais et al., 1979) – has, nevertheless, a fine-grained representation of words. We may conclude that lexical restructuring towards increasingly fine-grained representations is not a sufficient condition for the emergence of phoneme awareness. The second study examined phonemic priming in spoken word production, using a cross-modal picture-word interference task. All participants named pictures faster with phonologically (initial consonant) related- than with unrelated-distractors. The phonemic priming effect was observed at a later SOA for illiterates, which might be attributed to differences in

speed of picture identification. Thus, phoneme representations intervene in phonological output processes for a population that has no conscious access to phonemes.

Implicit Cognition.

Gorlaeus Building Room 6,
Wednesday Afternoon, 1:00-2:40

Chaired by Karin Zondervan, *University of Groningen*

1:00-1:20 (21)

Consciousness, Control and Ageing: A Graded Relationship? VINCIANE GAILLARD, MURIEL B. VANDENBERGHE, *Université Libre de Bruxelles*, ARNAUD DESTREBECQZ, *Université de Bourgogne*, & AXEL CLEEREMANS, *Université Libre de Bruxelles*

—Control and consciousness seem to be intimately related: Explicit cognition is described as conscious, controlled and intentional, whereas implicit cognition is taken to be unconscious, automatic or incidental. Tzelgov (1997), however, pointed out that these relationships do not always hold: Automatic behavior can be conscious; control can occur without consciousness. In this paper, we explored the relationship between consciousness and control through an investigation of how cognitive ageing and practice (Yonelinas, 2002) influence performance in a serial reaction time task. Three groups of participants (20-30 years old, 40-50 and >60) were trained for a short or a long period. Unknown to participants, the material contained sequential structure. To assess cognitive control, subjects were subsequently asked to perform a sequence generation task under either inclusion or exclusion instructions. To assess conscious recollection, subjects also performed a recognition task. Results will be presented at the meeting.

1:20-1:40 (22)

A Framework for Analyzing Sequence Learning. JOSEPH TZELGOV, & AMOTZ PERLMAN, *Ben Gurion University*

—We propose to characterize sequence learning in terms of automatic versus non automatic processing and to apply this contrast independently to knowledge acquisition and knowledge retrieval. In several experiments of sequence learning, automaticity of the acquisition and automaticity of retrieval of the acquired knowledge were independently assessed. It was found that the sequence learning order can be acquired under all combinations of knowledge acquisition and knowledge retrieval. In particular at least in the case of the simple sequences we employed this applies when both the acquisition and the retrieval of knowledge are strictly automatic—that is, when neither of them is not part of the task requirement—nor is it beneficial to deliberate behavior. The proposed framework has implications for the notion of sequence learning and for the investigation of learning in general.

1:40-2:00 (23)

The Route to Verbal Report of Implicitly Learned Representations: An Interaction Between Implicit and Explicit Knowledge. KARIN ZONDERVAN, HEDDERIK VAN RIJN, & SUSANNE HENDRICKX, *University of Groningen*

—Previous research in implicit learning has found that some participants can verbalize their incidentally learned knowledge, while others cannot (e.g., Frensch et al., 2003). We propose that an interaction between implicit and explicit knowledge is required to generate verbalizable representations. We have investigated this in a new experimental set-up in which sets of abstract shapes are classified. This research extends earlier research on the route to verbal report in implicit learning by also investigating the classification task after the participants were prompted to verbalize the regularity. Similar set-ups are used to study the verbal overshadowing effect (VOE, e.g., Melcher & Schooler, 2004). The

results show discontinuities in performance and reaction times before and after verbalization. However, the effect of verbalization on performance is positive, in contrary to what would be predicted from the VOE. We argue that this is caused by a strategy-shift from implicit to explicit knowledge usage.

2:00-2:20 (24)

An Empirical Exploration of Graded Awareness in Sequence Learning. ELISABETH NORMAN, MARK C. PRICE, & RUNE A. MENTZONI, *University of Bergen*

—Conscious awareness of a learned sequence regularity in the serial reaction time (SRT) task has been shown to depend on the length of the response stimulus interval (RSI) between individual stimulus presentations (Destrebecqz & Cleeremans, 2001, 2003). This has been taken by some to suggest gradations of awareness between the extremes of fully explicit and fully implicit learning. We describe data from SRT experiments using a battery of objective and subjective measures of awareness, in which gradations from “fringe awareness” to full awareness also seem to be related to individual difference variables. These variables target people’s sensitivity to intuitive feelings that may play an important role in guiding performance in so-called implicit learning tasks, and provide further evidence against a strict dichotomy between implicit and explicit learning.

2:20-2:40 (25)

The Role of Time in Learning Processes without Awareness: Comparison between Amnesic and Healthy Participants. MURIEL B. VANDENBERGHE, VINCIANE GAILLARD, *Université Libre de Bruxelles*, ARNAUD DESTREBECQZ, *Université de Bourgogne*, PATRICK FERY, & AXEL CLEEREMANS, *Université Libre de Bruxelles*

—Can associative learning take place without awareness? Using eyeblink conditioning, Clark et al. (2002) showed that hippocampal amnesics could only learn associations between two stimuli when they overlap in time. Sequence learning studies also suggest that manipulating the delay between successive events profoundly change the degree to which subjects become aware of the sequential regularities. Here, we explored these issues with both amnesic and normal participants, who first performed a choice reaction task. Unknown to them, successive stimuli occurred in a sequence. We manipulated the response-to-stimulus interval (RSI = 0 vs. 1000 msec). After training, participants performed a sequence generation task under inclusion and exclusion instructions, and a recognition task. We expect opposite results with amnesic and normal participants: based on earlier studies, the presence of an RSI should impair learning in amnesics but improve conscious learning in healthy volunteers. Results will be reported at the meeting.

Language Production I.

Gorlaeus Building Room 7,
Wednesday Afternoon, 1:00-2:40

Chaired by Linda Wheeldon, *University of Birmingham*

1:00-1:20 (26)

Shared Representations in Language Processing and Verbal Short-Term Memory: The Case of Grammatical Gender. JUDITH SCHWEPPE, & RALF RUMMER, *Saarland University*

—The general idea of language-related accounts on working memory is that representations generated during language processing are the basis of verbal short-term memory. We address the question whether in addition to phonological, conceptual, and lexico-semantic representations morpho-syntactic information (here: grammatical gender, in German) contributes to short-term sentence recall. Using a modified version of Potter and Lombardi’s

(1990, JML) intrusion paradigm, we tested whether the presentation of nouns similar in meaning to a noun included in a sentence leads to more intrusions in sentence recall if the related nouns have the same grammatical gender as compared to different gender. Morpho-syntactic constraints should lead to weaker intrusion effects for gender-incongruent than for gender-congruent intruders, which has been confirmed experimentally. That this is not due to a mere influence of a phonological representation of the target determiner is supported by the fact that the gender effect did not interact with phonological effects. Thus, morpho-syntactic information extracted during sentence processing influences verbatim recall.

1:20-1:40 (27)

Resolving Inconsistencies between Visual and Verbal Information. CONSTANCE C. VORWERG, *University of Bielefeld*

—In order to be able to understand expressions referring to seen objects, the listener has to relate visual and verbal information. Empirical data suggest that visual context influences speech understanding even during early stages of language processing (Tanenhaus et al., 1995). The experimental study presented here examines mechanisms of cognitive robustness that enable the listener to understand even incongruent utterances, i.e. to compensate for deficient language input, such as speech errors. Basic level labels, semantic and phonological word substitutions (with rhyme overlap) as well as unrelated nouns were used in a picture choice task. Frequency and reaction time results show that the identification of the intended object depends on the relation between target and substitute. Semantic relations can be used more easily than phonological relations for resolving inconsistencies between channels, but this effect is modulated by the quality of the relationship. Results are related to priming and inference processes.

1:40-2:00 (28)

The Effect of Speed of Processing on Spoken Idiom Comprehension: Why Are We So Slow? CRISTINA CACCIARI, PAOLA CORRADINI, & ROBERTO PADOVANI, *Dipartimento di Scienze Biomediche, Modena*

—Using a cross-modal lexical decision paradigm, we investigated the way in which an individual characteristic such as speed of processing (SOP) affected spoken language comprehension processes in normal, language unimpaired participants when the sentence contained a semantically ambiguous idiom (e.g., “break the ice”). In order to differentiate among sensorimotor speed components, cognitive speed components and personality-based components, we investigated the main sensorimotor, cognitive and personality factors accounting for the processing differences found in the experiments on idiom activation. Hence participants were submitted with a battery of tests respectively assessing: a) the extent to which SPO reflected a constant average rate of processing independent from linguistic tasks; b) their ability to inhibit irrelevant information in non-linguistic tasks; c) verbal working memory components; d) word recognition, lexical access and reading abilities; e) non verbal intelligence; f) personality structure and anxiety level.

2:00-2:20 (29)

Is It Possible to Develop Brain Structures Underlying Language Abilities? LAURENT LEFEBVRE, *University of Mons*

—Previous results have shown that the use of some devices provided with technical constraints can help patients to reactivate some of the language abilities they lost after a brain lesion. It is hypothesized that manipulations of these devices favour some kind of cerebral reorganisation and the emergence of new neuronal networks associated to language comprehension and/or production, by a specific training on the ability to detect the environmental

regularities. In order to test this hypothesis, methods of functional neuroimaging have been used to analyze neuroplastic changes responsible for the reorganisation of neuronal circuits disturbed by lesions. We show a greater activation in subcortical structures (in basal ganglia), particularly in the anterior part of the caudate nucleus. The general aim of this study is thus the elaboration of a new non-verbal approach to revalidate language troubles associated to cerebral lesions

2:20-2:40 (30)

Which Processes Are Activated During Pause-Execution Cycles in Writing? RUI A. ALVES, SÃO LUÍS CASTRO, *Universidade do Porto*, THIERRY OLIVE, & LIONEL GRANJON, *University of Poitiers*

—At the behavioral level, the activity of a writer can be described as periods of typing interspersed by pauses, hereafter pause-execution cycles. Which writing processes are activated during these cycles? We addressed this issue using a directed verbalization task (Olive, Kellogg, & Piolat, 2001). Before writing a narrative, 34 participants (mean age = 19.4 years) learnt to categorize examples of introspective thoughts as different types of activities related to writing (planning, translating, or revising). Then, while writing, they were randomly asked to report their activity according to the learned categories. Convergent with previous findings, and with current cognitive models of written composition, translating was most often reported, and revising and planning had fewer occurrences. More interesting, translating was mostly activated during execution, whereas revising and planning were mainly activated during pauses. This last result brings new insights into the dynamics of writing, and will be discussed in this framework.

SYMPOSIUM: Binding in Working Memory and the Episodic Buffer.

Gorlaeus Building Room 1,
Wednesday Afternoon, 3:00-4:00

*Organized by Antonino Raffone, University of Sunderland;
Chaired by Gezinus Wolters, Leiden University*

3:00-3:20 (31)

Visual Feature Binding in Working Memory. RICHARD J. ALLEN, ALAN D. BADDELEY, *University of York*, & PAUL J. KARLSEN, *University of Oslo*

—A series of experiments are reported examining the processes underlying the encoding and retention of visual feature bindings in working memory. Memory for shapes or colours was compared with memory for combinations of these features. When demanding concurrent verbal tasks were used to disrupt executive resources, the effects were no greater for memory for feature combinations than for the features themselves. A comparison of simultaneous and sequential item presentations revealed the combination condition to be significantly worse in the latter, especially for items earlier in the sequence. The findings are interpreted as evidence of a relatively automatic but fragile visual feature binding mechanism in working memory, capable of functioning without placing additional demands on the central executive, while being particularly susceptible to interference. Finally, a comparison of the binding of unitted features and visually separated feature pairs will also be considered.

3:20-3:40 (32)

A Computational Model for Maintenance, Control and Integration in Working Memory. GEZINUS WOLTERS, *Leiden University*, ANTONINO RAFFONE, *University of Sunderland*, & JAAP M.J. MURRE, *University of Amsterdam*

—The three main functions of working memory, implemented in

prefrontal cortex, are maintenance, control of top-down selective attention and integration of information over time. We propose a working memory model consisting of semi-hierarchically ordered and mutually interconnected modules. Lower level modules maintain long-term memory codes in a recurrent loop. Higher level modules implement an episodic buffer integrating multi-modal information from lower levels modules over time. Feed-back connections from these higher level modules control top-down selective attention, retrieval from LTM and what is maintained in lower level recurrent loops. At each level coherent patterns develop and are maintained by temporarily binding the contributing activation patterns through mutual synchronization of firing rates. Simulations show that a network model with spiking neurons and physiologically plausible parameters is capable, at least in principle, to implement each of the three supposed functions.

3:40-4:00 (33)

Sentence Recall and the Episodic Buffer in Children. TRACY P. ALLOWAY, *University of Durham*

—In order to understand the binding of information from short-term and long-term memory in sentence recall, a task associated with the episodic buffer, findings from two studies will be presented. In the first study, differences in errors in immediate sentence recall were compared for children with relatively good and poor phonological short-term memory skills, matched on general nonverbal ability. Although the frequency of the different types of errors differed significantly between the groups, both groups were more likely to substitute target words with synonyms rather than unrelated words, a finding suggesting that semantic information from long-term memory is important in sentence recall performance. The second study explores the relationship between sentence recall and reading and language skills in children with learning difficulties. Sentence recall was uniquely associated with both reading and language skills, indicating that resources in long-term memory play an important diagnostic role in these scholastic abilities.

4:00-4:20 (34)

Task-Dependent Access to Objects and Features from Verbal Working Memory: Attention Selects Between and Within Mental Objects. SABINE SCHWAGER, & HERBERT HAGENDORF, *Humboldt-University Berlin*

—Currently it is assumed that the focus of attention in working memory contains the mental object selected for processing, and that this object can be subjected to any upcoming mental operation (Oberauer, 2002). We extend this view by postulating task-dependency of the focus: the mental object is selected for a certain (not any) operation. Outside of the focus only phonological information can be maintained. Consequently there are different processes necessary when changing mental objects: (1) object selection within the memory set, (2) feature retrieval if the task requires more than phonological information, and (3) selection of task-relevant features within the object. Two experiments with word lists support the assumptions by showing higher object switching cost with (1) phonologically similar word lists, (2) when the upcoming task requires semantic rather than superficial information, and (3) a cost of changing the relevant features within an already selected object.

4:20-4:40 (35)

Attentional Capture Modulates Brain Activity: Evidence from Human Electrophysiology. PIERRE JOLICOEUR, EMILIE LEBLANC, & DAVID PRIME, *Université de Montreal*

—We used the N2pc as a moment-to-moment index of the deployment of visual spatial attention in a contingent capture task. Observers attempted to maintain their attention focused on a central RSVP stream of alphanumeric characters that contained a

target defined by colour. Immediately prior to the presentation of the target we also presented two distractors, one to the left and one to the right of fixation. When one of these distractors matched the target colour, accuracy of report for the target was reduced, suggesting attentional capture by that distractor. In addition to the behavioural capture effect, we observed an N2pc - that is, a greater negativity at electrodes contralateral to the distractor, in the N2 time window - for distractors that matched the target colour. By contrast, no N2pc was observed for an equally salient distractor that did not match the target selection cue. Although the observed capture effect could take place at several different levels of information processing, the electrophysiological results provide evidence for capture at the level of visual-spatial attention.

Multi-Modal Perception.

Gorlaeus Building Room 2,
Wednesday Afternoon, 3:00-4:40

Chaired by Elisheva Ben-Artzi, Bar-Ilan University

3:00-3:20 (36)

Cross-Modal Correspondences between Weight, Pressure, Brightness, and Spatial Position: Support for an Ecological Account. ELISHEVA BEN-ARTZI, *Bar-Ilan University*

—A series of experiments examined the ecological account for typical cross-modal correspondences using weight, pressure, brightness, and spatial position. In experiments 1-4, participants made similarity judgments of pairs of stimuli differing in weight or pressure and in brightness or spatial position. In experiments 5-8, participants gave magnitude estimates of weight or pressure with varying levels of contextual brightness or spatial position. The different experiments used different pairs of dimensions. Results indicated (a) consistent congruence relationships among all dimensions, such that heavier objects and higher pressures were perceived as more similar to dark surfaces and low positions, and (b) varying the contextual brightness and spatial position affected the magnitude estimates of both weight and pressure. Findings indicate a consistency in the directions of correspondences across dimensions and tasks, and provide support for the ecological account for cross-modal correspondences.

3:20-3:40 (37)

Spatial Knowledge without Vision in an Auditory VR Environment. AMANDINE AFONSO, BRIAN F.G. KATZ, ALAN BLUM, & MICHEL DENIS, *Université de Paris-Sud* (read by Michel Denis)

—How do blind and blindfolded sighted people learn the spatial structure of an environment that only comes to their knowledge as a set of sound sources? We used an audio immersive virtual environment to address this question. We compared two modes of learning, which involved either navigational experience or the processing of a verbal description of the positions of the sounds. Behavioral measures included repositioning of the sound sources via a tracked pointer as well as mental imagery tasks (mental scanning and mental comparison of distances). The results presently available show that measures of angular and radial error in repositioning did not vary between the participants in the two learning conditions, but that absolute distance error was smaller for the people who were given the chance to move through the environment. Congenitally blind participants were less accurate in the reconstruction of angular information as compared to the late blind and sighted participants. We discuss the results in the context of the theory according to which sensori-motor contingencies form the basis of the acquisition of spatial knowledge.

3:40-4:00 (38)

The Representation of Pitch in Auditory Imagery and

Perception of Pure Tones. JENNIFER G. ELKIN, *University of Glasgow*

—A series of six experiments explored the nature of the representation constructed during imagination of sound. We designed a novel pitch comparison task to eliminate the influence of non-auditory information and to minimise use of cognitive strategies in auditory imagery. A visual cue indicated the pitch of an imagined tone, which must be compared with a subsequent comparison tone (sinusoidal tone of 1,000, 1,500, or 2,000 Hz). The overall high response speed indicated that complex cognitive strategies did not determine performance. As in previous imagery studies match responses were faster than mismatch responses (validity effect.) Judgements of tones closer in pitch yielded longer reaction time and higher error rates than distant tones (distance effect). Moreover, results indicated that a horizontally oriented spatial representation is used in representation of pitch of imagined tones, which contrasted with findings in perceptual control experiments. Additional experiments validated the current approach in studying auditory imagery.

4:00-4:20 (39)

Synaesthesia in the Irish Population: Characteristics and Familiarity. KYLIE J. BARNETT, CIARA FINUCANE, AIDEN CORVIN, KEVIN J. MITCHELL, & FIONA N. NEWELL, *Trinity College Dublin*

—The aim of our study was to assess the familial and phenotypic characteristics of synaesthesia in the Irish population. Questionnaire data was collected as part of an ongoing study into the phenotypic and neurobiological characteristics of synaesthesia. We present findings based on individual and familial data from 52 individuals with synaesthesia. Respondents were predominantly female with a gender bias of 6:1. 56% of individuals report a positive family history of synaesthesia. Data was collected on age, gender, handedness, medical history, memory abilities, types of synaesthesia, co-existence of more than one type of synaesthesia, unidirectionality; trends in letter, colour and number associations and the relationship between inducers and concurrents. The most common forms of synaesthesia reported were colour-phoneme synaesthesia and colour-grapheme. Less common forms included coloured-taste, coloured-pain and coloured-personalities. The majority of individuals in this study recall the experience of synaesthesia from early childhood, suggesting a neurodevelopmental basis. Our data are consistent with dominant inheritance of synaesthesia, either autosomal or X-linked, but we provide evidence against the model of synaesthesia as an X-linked dominant trait that has a high lethality rate in utero for males.

4:20-4:40 (40)

Behavioural Tests with “Sequence Form” Synaesthetes. MARK C. PRICE, RUNE A. MENTZONI, & ELISABETH NORMAN, *University of Bergen*

—A small but significant minority of people report that certain types of sequence information, such as numbers, days of the week, calendar months etc., are vividly and involuntarily experienced as taking on very consistent, detailed and sometimes elaborate spatially extended shapes in their “mind’s eye”; e.g. the 12 months might be experienced in an elliptical arrangement. These synaesthetic experiences of spatial forms are induced by thinking about, seeing or hearing members of the sequence. However, despite growing literature on the behavioural correlates of more established classes of synaesthesia, and on indirect behavioural measures of the overlap between spatial representation and sequence representation in normals (e.g. the SNARC effect), there has been little formal study of the behavioural correlates of explicitly experienced spatial forms. We report data from a series of RT tasks that begin to explore the functional significance of these spatial forms.

Attention.

Gorlaeus Building Room 3,
Wednesday Afternoon, 3:00-4:40

Chaired by Martijn Meeter, Vrije Universiteit Amsterdam

3:00-3:20 (41)

Location as a Contextual Cue for the Item-Specific Proportion Congruent Stroop Effect: Evidence for Stimulus-Driven Control? MATTHEW J.C. CRUMP, ZHIYU GONG, & BRUCE MILLIKEN, *McMaster University*

—One problem faced by researchers of selective attention is to understand how relevant information can be successfully selected during the concurrent integration of irrelevant information. Conventionally, researchers have assumed that selection can be accomplished via voluntary control processes that narrow the focus attention. For example, Stroop interference has been shown to depend on the proportion of congruent trials mixed within a block. This effect is commonly attributed to experiment-wide word-reading strategies that can be prepared in advance of a trial. However, Jacoby, Lindsay, & Hessels (2003) have demonstrated item-specific proportion congruent effects that cannot be explained by word-reading strategies. We extend this important finding by demonstrating that incidental contextual cues (e.g., location), correlated with the proportion of congruent items, can modulate Stroop interference for specific items. Our results demonstrate that Stroop interference can be modulated in a stimulus-driven fashion, and challenge conventional assumptions about the nature of cognitive control.

3:20-3:40 (42)

The Influence of Repeating Flanker Colour on the Presence of Response Flanker Congruency Effects. LARS E.M. AKKERMAN, & ERIC L.L. SOETENS, *Vrije Universiteit Brussel*

—When subjects have to respond to the identity of a central stimulus, reaction times are faster when they are flanked by congruent compared to incongruent flankers. When left or right pointing arrows are used, these congruency effects disappear when flanker orientation is repeated using short response-stimulus intervals (RSI = 50ms). This effect was not found when squares of two different colours were used: congruency effects persisted when flanker colour was repeated. An explanation could be found in the properties of visual flanker tasks: perceptual (stimulus-stimulus) congruency effects could interfere with response flanker congruency effects (stimulus-response). A four to two response mapping was used to isolate response flanker congruency effects. Participants reacted by pressing one of two keys, each corresponding to two possible colours of a central stimulus. Preliminary results indicate that response congruency effects can be found and that these effects disappears when flanker colour is repeated using short RSI.

3:40-4:00 (43)

Intertrial Priming Stemming from Task Ambiguity: A New Account of Priming in Visual Search. MARTIJN MEETER, & CHRIS N.L. OLIVERS, *Vrije Universiteit Amsterdam*

—Sequential effects are ubiquitous in experimental psychology. Within visual search, performance is speeded when participants search for the same target twice in a row, as opposed to two different targets. Here, we investigate several theories of such intertrial priming. Two experiments show that factors influencing search processes affect the presence and size of intertrial priming: it is larger when there are few elements in the visual display than when there are more, and larger when there is a salient distractor than when the target is the only salient element in the display. These findings, it is argued, are inconsistent with theories that

explain intertrial priming as resulting from either only faster visual selection, or from episodic retrieval of responses. Instead, we propose that task ambiguity may underlie whether intertrial priming is found or not.

4:00-4:20 (44)

Negative Priming Is Stronger for Task Relevant Dimensions: Evidence of Flexibility in the Selective Ignoring of Distractor Information. CHRISTIAN FRINGS, & DIRK WENTURA, *Saarland University*

—The finding that in selective attention tasks responses to previously ignored stimuli are usually retarded is known as Negative Priming (NP). In previous studies it has been suggested that NP can depend on behavioural goals, that is, NP was observed only for task relevant object dimensions. We extend these findings with two experiments (N = 33, N = 26) demonstrating that stronger NP can be observed for task relevant dimensions than for task irrelevant dimensions (a) even if participants' tasks vary block-wise within an experiment and (b) if behavioural goals vary from trial to trial. These results suggest that selective NP is a much more flexible process than previously assumed.

4:20-4:40 (45)

Joint Attention in Action Observation and Action Execution. PINES NUKU, OLIVER LINDEMANN, & HAROLD BEKKERING, *Radboud University Nijmegen (NICI)*

—Joint attention refers to changes in one's own action potentials after observing somebody else's actions. Evidence that gazing (Friesen & Kingstone, 1998; Langton & Bruce, 1999; Ristic Friesen & Kingstone, 2002), grasping (Fadiga et al., 1995; Craighero et al., 2002) and pointing (Fischer 2004) conveying another's intention, have prompted us in assessing the difference between "to-be-performed" and "already-performed" actions in joint attention. Does the intention of another's pointing (to-be-performed) and grasping (already-performed) postures trigger others' attention? Does inferential processes influence motor priming? Can we dissociate between (observed) intended and non-intended actions? We showed that when presented with a grasping cue participants were inhibited in their responses as when presented with a pointing posture. However by creating a perceived sensory consequence between posture and target (i.e., the hand moving the cup) we invalidated the earlier differences, showing that it's the causal relationship between postures and targets what conveying another's intention. To end with we tried to assess the role of hand postures (alone) as the basic prerequisite for the action cueing. In conclusion we give an alternative interpretation to the posture "intention" effect, and show that perceived sensory consequences between postures and targets is what conveys another's intention and leads to attention shifts. Posture properties and target vicinity are central in understanding the attentional benefits from the intention of another's action.

SYMPOSIUM: Orthographic Processing in Printed Word Perception II.

Gorlaeus Building Room 4/5,
Wednesday Afternoon, 3:00-4:40

Organized by Jonathan Grainger, CNRS & University of Provence, & Colin J. Davis, University of Bristol;

Chaired by Colin J. Davis, University of Bristol

3:00-3:20 (46)

How is Letter Position Coded?: Further Evidence for a Spatial Coding Model. COLIN J. DAVIS, & JEFFREY S. BOWERS, *University of Bristol*

—A critical problem for models of visual word recognition is the specification of an orthographic input coding scheme. Previously,

most models have assumed some form of position-specific ("slot") coding, according to which there are separate sets of letter units for each possible letter position. However, there is now ample evidence falsifying this form of input coding. More recently, interest has moved to schemes in which letter position is coded relatively flexibly. We will discuss two such schemes – spatial coding and open-bigram coding. According to spatial coding, letter position is coded dynamically, by temporarily assigning position codes to letter units that are structurally position and context independent. By contrast, open bigram coding schemes assume that letter position is coded in a structural fashion, by means of nodes that represent local context. We will present data from lexical decision and perceptual identification paradigms that favour the spatial coding scheme.

3:20-3:40 (47)

Using Masked Priming to Crack the Orthographic Code. JONATHAN GRAINGER, *CNRS & University of Provence*, EVA VAN ASSCHE, *Ghent University*, JEAN-PIERRE GRANIER, *University of Provence*, & WALTER J. B. VAN HEUVEN, *University of Nottingham*

—Different coding schemes for letter position will be presented and tested with data obtained using the masked priming paradigm. One key phenomenon, relative-position priming, will help constrain the theoretical possibilities. Relative-position priming refers to a performance advantage for orthographically related primes (primes that share letters with target stimuli) as long as the order of letters is respected in prime and target, independently of absolute, length-dependent position. Relative-position priming is obtained when primes are formed of a subset of the target's letters (e.g., arict-apricot), and with superset primes containing irrelevant letters (e.g., aprlgicot-apricot). We present data obtained in a series of experiments testing subset and superset primes. These priming effects speak to the key issue of how letter contiguity influences orthographic processing, and help determine to what extent non-contiguous letter sequences are part of the orthographic code.

3:40-4:00 (48)

The Role of Phonology and Morphology in Transposed-Letter Similarity. MANUEL CARREIRAS, *Universidad de La Laguna*, MANUEL PEREA, *Universitat de València*, & EDURNE LASEKA, *Universidad de La Laguna*

—We examined whether transposed-letter similarity effects may have a phonological/ morphological component. Specifically, we examined TL-similarity effects for nonwords created by transposing two nonadjacent letters (e.g., relovución-REVOLUCIÓN) in a masked form priming experiment using the lexical decision task (Experiment 1). The controls were i) a pseudohomophone of the TL prime (relobución-REVOLUCIÓN; B and V are pronounced as /b/ in Spanish) or ii) an orthographic control (relodución-REVOLUCIÓN). Results showed a similar advantage of the TL-nonword condition over the phonological and the control conditions. Experiment 2 showed a masked phonological priming effect when the letter positions in the prime were in the right order. In a third experiment we examined whether TL similarity effects had a morphological component. The primes were created by transposing two nonadjacent letters that crossed the morphological boundaries (e.g., bizedabal-BIDEZABAL vs binetabal-BIDEZABAL) or not (bebirila-BERIBILA vs bedinila-BERIBILA). We examine the implications of these results for the models of visual-word recognition.

4:00-4:20 (49)

Masked Priming Effects as a Function of Prime and Target Neighbourhoods: An Evaluation of the IA Model. STEPHEN J. LUPKER, JASON R. PERRY, *University of Western Ontario*, &

COLIN J. DAVIS, *University of Bristol*

—A series of predictions for neighbour priming effects from the Interactive-Activation model (McClelland & Rumelhart, 1981) were evaluated. A modified version of the model was successful at predicting effects of prime lexicality and number of prime-target neighbours in masked priming, lexical decision experiments. In further experiments, the effect of shared neighbours was investigated by using nonword primes with missing letters (e.g., ma#or). Related targets were either the only neighbour of the prime (i.e., the prime s#gar has only one neighbour, SUGAR – "unambiguous primes") or one of a number of neighbours (e.g., the prime ma#or has both MANOR and MAYOR as neighbours – "ambiguous primes"). Although all versions of the model could account for priming effects from ambiguous primes as a function of target neighbourhood size and nonword difficulty, they were somewhat less successful explaining priming effects from unambiguous primes. Possible fixes for the model will be discussed.

4:20-4:40 (50)

What Can ERP Measures Tell Us about Early Orthographic Processing? PHILLIP J. HOLCOMB, *Tufts University*, & JONATHAN GRAINGER, *CNRS & University of Provence*

—In a number of recent experiments we have begun to use event-related brain potentials (ERPs) to probe early aspects of visual word processing. The paradigm we have been using is masked repetition priming. Like semantic priming, repetition priming modulates the N400 component, which we and others have argued reflects differences the semantic overlap between prime and target words. Interestingly, even when primes are masked we continue to see reliable N400 repetition effects. More recently we have observed two earlier ERP effects in the masked repetition paradigm. One, a modulation of a very early posterior positivity (P150), we will argue reflects sensory/feature overlap between the prime and target, while a second, an intermediate latency negativity (N250), we will argue reflects orthographic overlap between prime and target words. Implications for models of letter and word processing will be discussed.

Implicit Learning.

Gorlaeus Building Room 6,
Wednesday Afternoon, 3:00-4:40

Chaired by Karin Zondervan, *University of Groningen*

3:00-3:20 (51)

Effects of Response Stimulus Intervals and Target Size in an Aiming Movement Version of the Serial RT Task. WILLEM B. VERWEY, & INGE S. TER SCHEGGET, *University of Twente* (read by Inge S. Ter Schegget)

—Participants practiced a serial RT task in which they repeatedly executed a sequence of 12 aiming movements. Each movement involved tapping one of six alternative targets located on the perimeter of an imaginary circle on a touch sensitive screen. The response to stimulus interval (RSI) amounted to 200 ms. Half the participants tapped 9 mm targets and the other half tapped 24 mm targets. A subsequent test phase examined performance with the familiar and a random sequence; with blocked RSIs of 0, 200 and 400 ms. The results demonstrate that implicit and explicit sequence knowledge develop and are used. Although movement time was longer with small targets, these longer movement times did not affect the development and expression of implicit and explicit knowledge. Detailed analyses suggest that implicit knowledge had its effect during the preceding movement, whereas explicit knowledge was used primarily after the preceding movement had been completed.

3:20-3:40 (52)

Effector-Specific Sequence Learning in a Bimanual-Biserial Serial Reaction Time Task. MICHAEL P. BERNER, & JOACHIM HOFFMAN, *University of Würzburg*

—Three experiments were conducted in order to investigate the influence of stimulus-stimulus, response-response, and response-effect learning on whether two uncorrelated key-press sequences performed simultaneously with the left and right hand are learned independently of one another or in an integrated fashion. Participants responded to position-based imperative stimuli. In Experiments 1 and 2 two stimuli appeared on each trial. The two sequences were learned independently and intermanual transfer occurred. Following extended practice in Experiment 2, a purely motor component of sequence learning was also apparent. In Experiment 3 only one stimulus appeared on each trial specifying the responses for both hands. Thus, there was no basis for separate stimulus-stimulus or separate response-effect learning. Again, hand-specific sequence learning was evident, but there was no intermanual transfer. These results indicate the existence of two mechanisms of sequence learning, one hand-specific stimulus-based and the other motor-based, with only the former allowing for intermanual transfer.

3:40-4:00 (53)

The Role of Spatial Processing in Perceptual Sequence Learning. NATACHA DEROST, & ERIC L.L. SOETENS, *Vrije Universiteit Brussel*

—We investigated whether processing relevant spatial information improves perceptual learning of an independent spatial sequence structure. Using the serial reaction time paradigm of Remillard (2003), we demonstrated spatial perceptual learning when responses were made to paired targets, consisting of the same pair of stimuli, but in a reversed order. On the contrary, with single targets, no learning took place. The difference in spatial perceptual learning between paired and single targets can be explained by the inherent spatial attribute of the pairs. Unlike single targets, pairs allow responses to be determined by the left-right location of one element of the pair, relative to the other. Consequently, responses to paired targets can be based on stimulus locations, suggesting that spatial processing of relevant information facilitates spatial perceptual learning. Possibly, more attentional resources are allocated to the spatial characteristics of the task, hereby enhancing spatial perceptual sequence learning.

4:00-4:20 (54)

Contextual Cueing Based on Semantic-Category Membership of the Environment. ANNABELLE GOUJON, *LPC-CNRS & INRETS & Université de Provence*

—During the analysis of a visual scene, top-down processing is constantly directing the subject's attention to the zones of interest in the scene. The contextual cueing paradigm developed by Chun and Jiang (1998) shows how contextual regularities can facilitate the search for a particular element via implicit learning mechanisms. In the proposed study, contextual cueing task with lexical displays was used. The semantic-category membership of the contextual words predicted the location of the target (e.g. when the context was composed of mammalian words, the target was located in a particular area of the display). The results showed that contextual cueing effects can be obtained when there are regularities in the semantic properties of the context. Furthermore, contextual cueing effects were obtained implicitly. This study suggests that in target-detection tasks, implicit learning can be based on the semantic-category membership of the contextual constituents.

4:20-4:40 (55)

Can the Affect Influence Implicit Learning? MICHALWIERZCHON, *Jagiellonian University*, RADOSLA STERCZYNSKI, *University of Gdansk*, KRZYSZTOF T. PIOTROWSKI, & KATARZYNA ZYLA, *Jagiellonian University*

—Since Manza and Bornstein (1995) applied mere exposure paradigm to implicit learning studies, the possibility of connections between affective evaluation and implicit learning measures have been noticed. The aim of the presentation is to explore this relation and investigate if the affect influence implicit learning. All the experiments were conducted in artificial grammar learning paradigm. The first experiment was a replication of Manza and Bornstein results. In the second experiment, to examine the influence of affective priming on implicit learning, affective stimuli were used during the standard memorization phase. The results showed that affective priming did not influence the overall performance of the artificial grammar learning task. Moreover, more detailed analysis suggests that affective primes influence the acquired knowledge. The third experiment was the extended replication of the previous study. The Conclusions of implicit learning measures and the role of affect in implicit learning process will be discussed.

Language Production II.Gorlaeus Building Room 7,
Wednesday Afternoon, 3:00-4:40Chaired by Linda Wheeldon, *University of Birmingham*

3:00-3:20 (56)

Experience-Dependent Representations of Phonological Codes During Speaking: An fMRI Study. BARBARA WAGENSVELD, *F. C. Donders Centre, Nijmegen*, PIENIE ZWITSERLOOT, *University of Münster*, & MIRANDA VAN TURENOUT, *F.C. Donders Centre, Nijmegen*

—In speaking, sequences of sounds are pronounced fast and without many errors. Overlearned sequences, such as high frequency syllables, might therefore form a stored representation in the cortex. The present study investigates the formation of these units as a function of experience. Subjects repeatedly named five pseudowords, each consisting of two pseudosyllables, during four weeks. To measure syllable-specific learning effects, fMRI images of the whole brain were collected while subjects named recombinations of the trained syllables during three stages of training. Imaging data showed decreased activity for recombined as compared to novel pseudowords in the temporal, precentral, left inferior frontal, and left supramarginal gyri. Concurrent with this, activity increased in the posterior superior temporal gyrus. These results suggest a shift in activity from areas involved in the generation of a phonological sequence to a more automatic retrieval of a newly stored phonological code in the posterior superior temporal gyrus.

3:20-3:40 (57)

Lexical Frequency and Affix Reduction in Conversational and Laboratory Speech. MARK PLUYMAEKERS, *Radboud University Nijmegen*, MIRIAM ERNESTUS, *Max Planck Institute For Psycholinguistics*, & HARALD BAAYEN, *Radboud University Nijmegen*

—This study investigated the effects of word frequency on the acousticrealizations of four Dutch affixes. A corpus survey of spontaneous conversations (828 tokens) showed that three of the four affixes had shorterrealizations if the token frequency of the carrier word was higher. In a follow-up naming experiment, 21 subjects were presented with 240 target words divided among three presentation rates. Frequency effects on durations were found for the same three affixes, regardless of rate. Furthermore, a higher frequency led to more voicing in prefix-initial fricatives. The presence of frequency effects in both natural speech and under

laboratory conditions at high speech rates shows that frequency is a robust predictor of articulatory reduction in complex words. These findings challenge models of speech production assuming the syllable as basic unit of articulation, since the detailed acoustic realization of syllabic affixes is overtly affected by word-specific frequency information.

3:40-4:00 (58)

Conditions for the Activation of the Names of Distracter Objects in the Picture-Picture Interference Paradigm. ANTJE S. MEYER, *University of Birmingham*, & MARKUS DAMIAN, *University of Bristol*

—Using a picture-picture interference paradigm Morsella and Miozzo (JEP:LCP, 2002) obtained evidence for the activation of the phonological forms of the names of distracter pictures. In three experiments we failed to replicate this effect with the original or new materials or to obtain evidence for activation of the semantic representations of the distracters. In subsequent experiments the targets also served as distracters on different trials and vice versa. Here we obtained a significant phonological effect but no semantic effect. Thus, contrary to the predictions of serial models of lexical access, the names of distracter objects can become activated provided that the distracters are part of the response set. Subsequent analyses suggested that the phonological effect did not arise because of inter-trial priming of object names but because the participants were less likely to attend exclusively to the targets than they were when the distracters were not targets for naming.

4:00-4:20 (59)

Clock Time Naming: Complexities of a Simple Task. SIMONE A. SPRENGER, *Max Planck Institute For Psycholinguistics*, & HEDDERIK VAN RIJN, *University of Groningen*

—Relative clock time naming (e.g., pronouncing 3:50 as 'ten to four') allows to study the production of complex utterances without extensive pre-experimental training or instruction. Performance in

relative clock time naming has been described as depending on three factors: reference hour determination, minute transformation, and an additional distance component (Meeuwissen, Roelofs & Levelt, 2003). However, this model does not specify the cognitive operations that are responsible for the distance effect. We present three more refined hypotheses about the factors that determine clock time naming latencies: physical distance, arithmetics, and frequency of the expression. Three experiments and a corpus analysis that test these hypotheses are presented. Regression models of speech onset latencies for an extended set of clock times show clear contributions of all three factors and explain most of the variance associated with this task.

4:20-4:40 (60)

Planning Sentence Structure: Speech Latency and Gaze Patterns During the Production of Word Lists and Sentences. LINDA R. WHEELDON, & ANTJE S. MEYER, *University of Birmingham*

—The processing costs associated with sentence planning were investigated in two experiments which compared the production of word lists and sentences. A novel paradigm was used, which involved tracing the speakers' eye movements while they were describing moving objects. In Experiment 1, they named the objects from left to right (e.g., "apple, fork, cow"), whereas in Experiment 2, they described the movement patterns (e.g., "The apple and the fork move up and the cow moves down"). Sentence production latencies and eye-movements were recorded. As in earlier studies (Smith & Wheeldon, 1999, 2000), the sentence production latencies in Experiment 2 depended on the size of the sentence-initial phrase. The position and duration of the first fixation and the subsequent eye movements differed systematically between the experiments and, in the second experiment, also depended on the structure of the first phrase. The methodological and theoretical implications of these findings will be discussed.

Attention and Action.

Gorlaeus Building Room 1,
Thursday Morning, 9:00-10:40

Chaired by Jan Theeuwes, Vrije Universiteit Amsterdam

9:00-9:20 (61)

Remembering a Location Makes the Eyes Curve Away. JAN THEEUWES, CHRISTIAN N.L. OLIVERS, & CHRISTOPHER L. CHIZK, *Vrije Universiteit Amsterdam*

—Working memory is a system that keeps limited information on-line for immediate access by cognitive processes. This type of active maintenance is important for every-day life activities. The present study shows that maintaining a location in spatial working memory affects saccadic eye movement trajectories towards a visual target, as the eyes deviate away from the remembered location. This provides direct evidence for a strong overlap between spatial working memory and the eye movement system. We argue that curvature is the result of the need to inhibit memory-based eye movement activity in the superior colliculus (SC), in order to allow an accurate saccade to the visual target. Where previous research has shown that the eyes may deviate away from visually presented stimuli, we show that the eyes also curve away from remembered stimuli.

9:20-9:40 (62)

Our Eyes Move Away from Things We Expect: On the Role of Expectancy in Saccades. STEFAN VAN DER STIGCHEL, & JAN THEEUWES, *Vrije Universiteit Amsterdam*

—Previous research has shown that in order to make an accurate saccade to a target object, nearby distractor objects need to be inhibited. The extent to which saccades deviate away from a distractor is often considered to be an index of the strength of inhibition. The present study shows that that mere expectation that a distractor will appear at a specific location is enough to generate saccade deviations away from this location. This suggests that higher order cognitive processes such as top-down expectancy interact with low level structures involved in eye movement control. These results have important implications for current theories of target selection and provide insights in the interactions between the neural structures involved in eye movement control.

9:40-10:00 (63)

Repulsion of Perceived Motion Direction by Produced Movement Direction. JAN ZWICKEL, MARC GROSJEAN, & WOLFGANG PRINZ, *Max-Planck-Institute for Human Cognitive and Brain Sciences*

—According to common coding theory (e.g., Prinz, 1997), actions and perceptions interact with each other by way of common representations. In the current study, the influence of the direction of a produced movement on the perception of motion was investigated. Participants were asked to produce movements on a graphics tablet while concurrently monitoring point-light motions on a screen. Following the movement phase, they were asked to indicate where the perceived motion on the screen had been. Upward movements on the graphics tablet resulted in a downward shift of perceived motion direction compared to downward movements. Different measurements of this contrast effect converged on similar effect sizes which points to the robustness of the effect. The findings are consistent with predictions that can be derived from the common coding framework.

10:00-10:20 (64)

End-Posture Effects in Action Planning. OLIVER LINDEMANN, & HAROLD BEKKERING, *Radboud University Nijmegen*

—In four experiments, we investigated the effects of action

planning on visual perception. Participants prepared to grasp an x-shaped object along one of the two diagonals. Action initiation was triggered by a visual go-signal, which was either a dot or a bar in the same orientation as the to-be-grasped diagonal (grip consistent) or orthogonal to it (grip inconsistent). We found shorter response latencies for grip consistent stimuli. In subsequent experiments, the prepared action was to grasp and turn the object. Initiation was triggered by a stable or rotating stimulus. Now, go-signals were consistent with the initial grip, the action end-posture or the rotation direction. Interestingly, the processing of end-posture consistent stimuli and rotation consistent stimuli was facilitated as well as the processing of grip consistent stimuli. These findings emphasize the role of action goals and the anticipation of sensory consequences in action planning and their effects on visual perception.

10:20-10:40 (65)

Intentional Control of Attention: Action Planning Primes Action-Related Stimulus Dimensions. SABRINA FAGIOLI, *University of Rome "la Sapienza"*, BERNHARD HOMMEL, *University of Leiden*, & RICARDA I. SCHUBOTZ, *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig*

—In two experiments, we investigated how planning a manual action affects (primes) visual attention. Participants prepared for a reaching or a grasping action and, before carrying it out, were presented with a location- or size-defined probe stimulus. As expected, planning a reaching action facilitated detecting location probes, whereas planning a grasping action facilitated detecting size probes. Apparently, preparing for an action sensitizes the perceptual system to action-relevant feature dimensions. This supports the Theory of Event Coding (TEC), which claims a close interaction between perception, attention, and action plans. Findings also support the idea that actions and their expected consequences are integrated into a kind of habitual pragmatic body map, which may represent (a part of) the medium for the 'common coding' of perceptual events and action plans as claimed by TEC.

SYMPOSIUM: Synaesthesia:**Recent Findings and Future Directions.**

Gorlaeus Building Room 2,
Thursday Morning, 9:00-10:40

*Organized by Alicia Callejas, University of Granada,
Noam Sagiv, University College London,
& Juan Lupiáñez, University of Granada*

9:00-9:20 (66)

Surrounded by Time: Space-Time Relationships in Synaesthesia. DANIEL SMILEK, MIKE J. DIXON, & PHILIP MERIKLE, *University of Waterloo* (read by Philip Merikle)

—Synaesthetes frequently report that they experience units of time (e.g., years, months, days) as occupying space outside of their bodies. The time units may be experienced as being arranged in an oval, an oblong, or a circle surrounding their bodies or projected in front of them. The time units are typically experienced as being ordered and occupying fixed positions. In addition, the time units may be associated with specific colours. For example, January may always be experienced as being at 12 o'clock with a green tinge, whereas June may always be experienced as being at 5 o'clock in bright pink. We studied four synaesthetes who report such experiences for the months of the year. We found that their experiences were both consistent and automatic. In addition, we found that their experiences can direct spatial attention in a reflexive manner. The overall findings generalize across the four synaesthetes. But there were also individual differences in the way that these experiences of time direct attention.

9:20-9:40 (67)

Beyond Colour: Further Varieties of Synaesthetic Experience. NOAM SAGIV, MAINA AMIN, FEMI LAKE, & JAMIE WARD, *University College London*

—Narrowly defined, synaesthesia is a condition in which stimulation in one sensory modality also gives rise to perceptual experiences in another modality. Much of the research into synaesthesia focused on common synaesthetic experiences of colour. While studies of other senses are beginning to emerge, the spectrum of synaesthetic experiences is even broader and not strictly limited to simple sensory experiences. We will discuss two phenomena that received little attention in the present literature. The first involves space: at least 1 in 10 individuals think about certain concepts (e.g., time or numbers) in a concrete spatial sense, not necessarily coupled with visual imagery. The second, less common and perhaps more intriguing variant of synaesthesia involves personification of letters and numbers. We will describe some examples of these phenomena, novel paradigms used in our laboratory to objectively verify the subjective reports, and what these phenomena might tell us about human cognition.

9:40-10:00 (68)

The Prevalence and Female:Male Distribution of Synaesthesia. JULIA SIMNER, *University of Edinburgh*, JAMIE WARD, CATHERINE MULVENNA, NOAM SAGIV, SARAH A. WITHERBY, *University College London*, CHRISTINE FRASER, KIRSTEN SCOTT, *University of Edinburgh*, & ELIAS TSAKANIKOS, *Institute of Psychiatry, London*

—Estimates of the prevalence of synaesthesia have varied widely. The most widely cited estimate of “at least 1 in 2000” (with a female:male ratio of 6:1) was based on the number of respondents to two newspaper advertisements, together with the newspapers’ circulation figures. However, this study relies on self-referral and so no conclusions can be drawn about non-responders, except the very conservative claim that they were not synaesthetes. Our study individually assessed a large number of people (n=1690), and verified their reports with objective tests of genuineness. Our results show that (a) the prevalence of synaesthesia is 4.6%, 92 times higher than the most commonly cited figure, (b) the most common variant is coloured days, (c) the most studied variant, and previously assumed to be most common (grapheme-colour) is prevalent at around 1%, and (d) synaesthesia is equally distributed between the sexes, suggesting that prior female biases may have arisen from sex differences in self-disclosure.

10:00-10:20 (69)

Does Synaesthesia Utilise Mechanisms of ‘Normal’ Cross-Modal Perception? JAMIE WARD, *University College London*

—Many forms of synaesthesia are – by definition – examples of cross-modal perception (e.g. sounds trigger visual sensations). However, it is an unanswered question whether these experiences are produced via mechanisms that are specific to synaesthetes and are not found in other members of the population, or whether they exploit mechanisms of cross-modal perception generally available to us all (e.g. when lip-reading, when touch is both seen and felt). A number of lines of evidence are presented that are compatible with this latter view. Both synaesthetes and non-synaesthetes map different aspects of auditory tones to colour in identical ways (e.g. high pitch is light, pure tones less chromatic). A case of mirror-touch synaesthesia is also noted in which touch sensations seen on another person’s body are perceived as felt touch on ones own body. fMRI shows hyper-activity in essentially the same parieto-frontal network as controls viewing touch of human bodies relative to an object baseline.

10:20-10:40 (70)

Can Flavour Perception Be Considered As An Ubiquitous

Form of Synaesthetic Experience? CHARLES SPENCE, *University of Oxford*

—Researchers in the food science community (e.g., Stevenson & Boakes, 2004) have recently started to argue that the multisensory perception of flavour (in particular, multisensory interactions between olfaction and taste) can be considered as an everyday example of synaesthetic experience. In my talk, I will evaluate the appropriateness of such claims, as well as reviewing the various other kinds of empirical evidence that have been taken to show synaesthesia-like phenomena in normal (i.e., non-synaesthetic) individuals (e.g., Gallace & Spence, submitted).

Executive Control.

Gorlaeus Building Room 3,
Thursday Morning, 9:00-10:40

*Chaired by Iring Koch, Max Planck Institute
for Human Cognitive and Brain Sciences*

9:00-9:20 (71)

The Amount of Executive Control Involved in a Choice RT Task as a Function of Response Conflict. ARNAUD SZMALEC, FREDERICK VERBRUGGEN, *Ghent University*, WOUTER DE BAENE, *University of Leuven*, & ANDRÉ VANDIERENDONCK, *Ghent University*

—An increasing number of studies demonstrated that executive control is involved in a choice RT task. Based on the perceptual overlap/response conflict hypothesis put forward by Nieuwenhuis, Yeung and Cohen (2004), the present event-related brain potential (ERP) study used the N2 as an electrophysiological marker of executive control in order to test the assumption that the amount of executive control involved in a choice RT task is a function of the degree of response conflict, as induced by the level of perceptual overlap among the stimuli. To this end, an experiment was designed in which 13 participants performed a simple and a choice RT task under three different levels of stimulus discriminability. The data revealed that the N2 observed in the ERPs associated with the choice RT task was amplified with increasing perceptual overlap, while no N2 component was observed in the simple RT task conditions. It is concluded that the executive demands of a choice RT task depend on the level of response conflict which is determined by the perceptual overlap between stimuli. In the discussion, the present conclusion is integrated into current theoretical accounts of executive involvement in choice reaction.

9:20-9:40 (72)

Chunking in Task Sequences Modulates Task Inhibition. IRING KOCH, ANDREA M. PHILIPP, & MIRIAM GADE, *Max Planck Institute for Human Cognitive and Brain Sciences*

—To study interactions of learning and inhibition in task sequences, subjects first performed predictable sequences (e.g., ABACBC) and were then transferred to random sequences. The predictable sequence was explicitly instructed for half of the subjects, whereas the other subjects did not receive learning instructions. Task sequence learning was inferred from shorter reaction times (RTs) in predictable relative to random sequences. Persisting inhibition of competing tasks was indicated by increased RTs in ABA-sequences (task alternations) compared to CBA-sequences. The results indicate task sequence learning for both groups, but instructed learning led to reduced task inhibition effects in predictable sequences. In contrast, sequence learning and task inhibition was independent in the non-instructed group. We suggest that instructions led to chunking of the task sequence, with task alternations as chunk points (ABA-CBC), so that chunk retrieval time and within-chunk facilitation modulate the inhibition effect. Chunking of tasks requires hierarchic sequence representations.

9:40-10:00 (73)

Visual and Temporal Task Interruptions. EDITA POLJAC, & HAROLD BEKKERING, *Radboud University Nijmegen*

—In three experiments, we investigated whether the interruption of a task requires additional cognitive processes necessary to resume this task. The interruption of color and shape matching tasks was induced explicitly (by visual cues) in Experiment 1 and implicitly (by temporal separations) in Experiment 2. Experiment 3 tested the influence of task predictability on resumption performance of the ongoing task. The experiments yield similar patterns in RTs and error rates. First, a consistent restart cost was observed after both visual and temporal task interruptions and for both predictable and unpredictable task resumptions. Second, resuming the task repeatedly did not reduce the restart costs. Finally, task predictability did not improve the resumption performance. Altogether, our data show that any kind of task interruption seems to produce significant performance costs. This finding supports the notion that task interruptions require additional cognitive processes that allow for the resumption of an interrupted task.

10:00-10:20 (74)

Exploring the Role of Different Executive Processes in Solving Simple Mental Arithmetical Subtractions and Divisions. MAUD DESCHUYTENEER, ANDRÉ VANDIEREN-DONCK, & PIETER COEMAN, *Ghent University*

—In four dual-task experiments the role of the processes of input monitoring, response selection and memory updating was investigated in solving simple arithmetic subtractions and divisions. The role of input monitoring was studied by comparing performance on the arithmetic task under dual-task conditions with either a reaction time task with fixed pacing or a reaction time task with random pacing as the secondary task. The role of response selection was tested by comparing dual-task conditions with as secondary tasks a simple reaction time task and a two-choice reaction time task. Finally, the role of memory updating was investigated by comparing dual-task conditions by comparison of a two-choice reaction time task and a delayed two-choice reaction time task as the secondary task. The results indicate an involvement of the processes of response selection and memory updating for both operations. Moreover, the data suggest that for the calculation of such simple subtractions and divisions also the process of input monitoring might play a role.

10:20-10:40 (75)

On the Relationship between Different Working Memory Measures. SUSANNE M. JAEGLI, BEAT MEIER, & MARTIN BUSCHKUEHL, *University of Bern*

—Based on previous data (Jaeggi, Meier, Buschkuhl & Perrig, 2004) in which low correlations between various measures of working memory (WM) were observed, we conducted a further study with a student sample of 144 participants correlating selected WM measures. We used a new version of an N-back task with concrete verbal material (visually or orally presented), as well as a reading span task, the digit span task (forward and backwards), task switching, a self ordered pointing task (SOPT), and a prospective memory task. Consistent with our previous findings, very low correlations were found between these tasks. These results challenge the view of an unitary concept of WM or 'executive functions' and underline the need for a further refinement of these constructs.

SYMPOSIUM: The Polarity of Semantic Context Effects in Naming Tasks: Implications for Models of Lexical Access in Language Production.

Gorlaeus Building Room 4/5,
Thursday Morning, 9:00-10:40

*Organized by Ansgar Hantsch, University of Leipzig,
& Wido La Heij, Leiden University;
Chaired by Ansgar Hantsch, University of Leipzig*

9:00-9:20 (76)

Semantic Competition between Hierarchically Related Words during Speech Planning. ANSGAR HANTSCH, JÖRG D. JESCHENIAK, *University of Leipzig*, HERBERT SCHRIEFERS, *Radboud University, Nijmegen*

—There is overwhelming evidence that, during speech planning, semantically related words become lexically activated and compete for selection with the to-be-produced target word. The vast majority of this evidence stems from studies using the picture-word task in which a distractor word drawn from the same semantic category as the target (e.g., target: fish, distractor: bird) was shown to inhibit the picture naming response more strongly than an unrelated distractor word. By contrast, corresponding evidence from distractor words bearing a hierarchical relation to the target (e.g., target: fish, distractor: carp) is sparse and inconclusive. The present study investigated effects from subordinate-level distractors during basic-level naming and effects from basic-level distractors during subordinate-level naming. Hierarchically related distractors were found to inhibit the naming response in both situations. This pattern of results did not depend on whether the pictures were preferably named at the basic level or at the subordinate level. The results suggest that hierarchically related name alternatives compete for selection.

9:20-9:40 (77)

Context Effects on Lexical Choice and Lexical Activation. HERBERT SCHRIEFERS, *Radboud University, Nijmegen*, JÖRG D. JESCHENIAK, & ANSGAR HANTSCH, *University of Leipzig*

—Speakers are regularly confronted with the choice among lexical alternatives when referring to objects, including basic-level names (e.g., car) and subordinate-level names (e.g., Beetle). Which of these names is eventually selected often depends on contextual factors. The present paper reports a series of picture-word experiments that explored how the specificity of the selected target name (basic-level vs. subordinate-level) and the contextual appropriateness of the alternative name (appropriate vs. inappropriate) affect lexical activation and lexical choice. The experimental data demonstrate clear context effects on the eventual lexical choice. However, they also show that alternative non-selected object names are lexically activated, regardless of the chosen specificity of the target name. Furthermore, the contextual appropriateness of the non-selected alternative name does not affect the degree to which it is activated. These results are discussed in the context of recent models of lexical access in speech production.

9:40-10:00 (78)

When a Goldfish Helps to Say Pet: Message Congruency Effects in Speech Production. JAN-ROUKE KUIPERS, & WIDO LA HEIJ, *Leiden University*

—La Heij, Kuipers & Costa (2005) reported four experiments investigating the change of semantic interference into semantic facilitation following a change in task: basic-level picture naming to category-level picture naming while using the same materials (eg. Glaser & Dungelhoff, 1984, Costa, Mahon, Savova & Caramazza, 2003). La Heij et al. found that when the context leads to the same response as the target, facilitation can be observed compared to a response-incongruent context. They proposed that response congruency of the context is an important factor involved in the change in polarity of the semantic effect. In this talk the response congruency proposal is tested with a paradigm designed to estimate the magnitude of the response congruency effect. Four

experiments are reported that estimated the relative contribution of response congruency in backward translation, categorization and function naming tasks. The results show a consistent and strong response congruency effect in these tasks. The consequences and possible adaptations for models of speech production are discussed.

10:00-10:20 (79)

Is Semantic Facilitation in the Picture-Word Interference Paradigm Restricted to the Categorization Task? ALBERT COSTA, *Universitat de Barcelona*, F.-XAVIER ALARIO, *CNRS & Université de Provence*, & ALFONSO CARAMAZZA, *Harvard University*

—We report experiments assessing to what extent semantic facilitation in the picture-word interference task is restricted to categorization tasks. Up to now, the striking change in the polarity of the semantic context effect has always involved (at least in the simultaneous presentation of both stimuli) a change in task (basic-level naming vs. categorization). In our experiments, distractor words were semantically related to the target picture and could or could not be co-ordinates. When the distractors were semantically related but did not belong to the same semantic category (e.g., bumper for car), semantic facilitation was observed. In contrast, when they were semantically and categorically related the classical semantic interference was observed (e.g., boat for car). These results indicate that a semantic relationship between picture and distractor does not necessarily lead to interference but rather to facilitation. The implications of these results for the assumption that semantic interference arises as a consequence of lexical competition are discussed.

10:20-10:40 (80)

Deciding What to Say: What Helps, What Hinders? PIENIE ZWITSERLOOD, *University of Münster*

—Until recently, lexical selection in speaking was almost exclusively studied with the picture-word interference paradigm. Picture naming in this paradigm is hampered by the presence of distractors from the same semantic category. Evidence is now accumulating that such distractors can help instead of hinder selection when responses other than mere object naming are considered. We investigated the impact of distractor words in two tasks: feature naming (saying “sour” to the picture of a lemon) and picture naming (saying “lemon”). Depending on what the response is, we observe a dissociation of effects of distractors that either specify another feature of the depicted object (yellow) and those that belong to the same category (mango). Together with preliminary data from studies in which participants have to switch tasks, the picture which emerges is that the view on lexical selection in speech production which has been the standard view for a long time (cf. Levelt, Roelofs, & Meyer, 1999) is too simple. The data fit well with the Conceptual Selection Model by Bloem, van den Boogaard & La Heij (2004).

Higher Mental Processes I.

Gorlaeus Building Room 6,
Thursday Morning, 9:00-10:40

Chaired by Michael R. Waldmann, University of Göttingen

9:00-9:20 (81)

A Signal Detection Approach to Covariation and Causal Learning. JOSÉ C PERALES, *Universidad de Granada*, DAVID R. SHANKS, *University College London*, & ANDRÉS CATENA, *Universidad de Granada*

—Numerical judgments are the most frequently used dependent measure in human covariation and causal learning tasks. A number of studies using trial-by-trial learning tasks have shown that judgments of covariation between a cue *c* and an outcome *o* deviate

from normative metrics. Parameters based on trial-by-trial predictions were estimated from Signal Detection Theory (SDT) in a standard causal learning task. Results showed that manipulations of *P(c)* when contingency (ΔP) was held constant did not affect participants' ability to predict the appearance of the outcome (*d'*), but had a significant effect on response criterion (*c*) and numerical causal judgments. The association between criterion *c* and judgment was further demonstrated by linking payoffs to the predictive responses made by learners. In all cases, the more liberal the criterion *c* was, the higher judgments were. The results imply that the mechanisms underlying the elaboration of judgments and those involved in the elaboration of predictive responses are partially dissociable.

9:20-9:40 (82)

Doing after Seeing: Planning Actions after Observational Learning. MICHAEL R. WALDMANN, BJÖRN MEDER, & YORK HAGMAYER, *University of Göttingen*

—Causal knowledge serves two functions: it allows us to predict future events on the basis of observations and to plan actions. Although associative learning theories traditionally differentiate between learning based on observations (classical conditioning) and learning based on the outcomes of actions (instrumental conditioning), they fail to express the common basis of these two modes of accessing causal knowledge. In contrast, the theory of causal Bayes nets captures the distinction between observations (seeing) and interventions (doing), and provides mechanisms for predicting the outcomes of hypothetical interventions from observational data. In two experiments, in which participants acquired observational knowledge in a trial-by-trial learning procedure, the adequacy of causal Bayes nets as models of human learning was examined. To test the robustness of learners' competency the experiments varied the temporal order in which the causal events were presented (predictive vs. diagnostic). The results support the theory of causal Bayes nets but also show that conflicting temporal information can impair performance.

9:40-10:00 (83)

The Meaning of Cause and Prevent: The Role of Causal Mechanism. CLARE WALSH, *University of Plymouth*, & STEVEN SLOMAN, *Brown University*

—What is a cause? Some theories (e.g., co-variation and counterfactual theories) propose that A causes B if A's occurrence makes a difference to B's occurrence in one way or another. Other theories (i.e., mechanism theories) propose that A causes B if some quantity or symbol gets passed in some way from A to B. The aim of our studies is to compare these theories' ability to explain judgments of causation and prevention. We compare judgments for causal paths that involve a mechanism, i.e., a process of transmission from cause to effect, against paths that involve no mechanism but nevertheless a change in the cause brings about a change in the effect. We describe three experiments which show that people are more likely to make attributions of causation when there is a mechanism but attributions of prevention when the mechanism is interrupted.

10:00-10:20 (84)

Priming Enabling Causal Relations. CAREN A. FROSCHE, & RUTH M.J. BYRNE, *University of Dublin*

—We report the results of an experiment designed to examine the sorts of mental representations people form of causal assertions. We examined the possibilities that people think about when they understand an enabling causal assertion, such as ‘If the key was turned, then the car started.’, by measuring the length of time it took them to read conjunctions (Espino & Santamaria, 2001; Santamaria, Espino and Byrne, 2004). We predicted that reading an enabling causal conditional would ‘prime’ participants to quickly

read a conjunction of the two possibilities 'the key was turned and the car started' (p and q). We also investigated whether an enabling relation primes the possibility that the key was turned and the car did not start (p and not-q). The experiment compared reading times for conjunctions following a prime with a conditional and a baseline condition. We discuss the implications of the results for the sorts of mental representations that people keep in mind.

10:20-10:40 (85)

Processing Epistemic Causal Relations: The Influence of Conceptual Order and Marking. EDWIN COMMANDEUR, LEO G.M. NOORDMAN, & ANNEMARIE WESTERBOS, *University of Tilburg*

—The influence of conceptual order and marking on processing epistemic causal relations like 'They exercised hard, so they must have been exhausted' was investigated in three experiments. Conceptual order was either cause-effect or effect-cause. In cause-effect order relations an event or change of state is given from which an effect is derived in the subsequent clause. In effect-cause order relations an event or change of state is given for which a cause is proposed in the subsequent clause. The epistemic relations were either marked by 'so', 'must have', or by both. It was found that the way epistemic causal relations are marked affects how fast they can be comprehended. First, effect-cause order epistemic relations can be processed faster than cause-effect order epistemic relations when they are marked by the modal 'must have'. Second, the epistemic connective 'so' is preferably used to mark cause-effect conceptual order.

Episodic Memory I.

Gorlaeus Building Room 7,
Thursday Morning, 9:00-10:40

Chaired by Gezinus Wolters, Leiden University

9:00-9:20 (86)

Executive Control in Episodic Inhibitory Processes. MIHÁLY RACSMÁNY, *Hungarian Academy of Sciences*, MARTIN A. CONWAY, *University of Leeds*, & ROLAND TISLJÁR, *University of Szeged*

—Converging evidences support the view that inhibitory control mechanisms operate in the human memory system and influence the accessibility of previously acquired information. Among others the two most widely used experimental memory paradigms in which retrieval inhibition occurs are the "global directed forgetting procedure" (DF) and the "selective practice paradigm" (retrieval induced forgetting – RIF). In a series of experiments we have examined an alternative proposal that executive control processes play different roles in directed forgetting and retrieval induced forgetting. In three experiments we combined the two inhibitory memory paradigms with secondary working memory load. Secondary memory tasks eliminated the DF effect, however left the RIF effect intact. In a further experiment using remember/know and recognition confidence paradigms we have found fundamental differences between DF and RIF.

9:20-9:40 (87)

Retrieval-Induced Forgetting in Perceptually-Driven Memory Tests. CARLOS J. GÓMEZ-ARIZA, *Universidad de Jaén*, ÁNGEL FERNÁNDEZ, *Universidad de Salamanca*, TERESA M. BAJO, *Universidad de Granada*, & ALEJANDRA MARFUL, *Universidad de Salamanca*

—Retrieval of a subset of studied items causes forgetting of related nonretrieved items in a later memory test. Retrieval-induced forgetting (RIF) has been observed with different types of procedures and materials. However, it has recently been argued that its presence depends on conceptually driven memory since the

effect is not found in perceptually driven tasks (Perfect, Moulin, Conway, and Perry, 2002). In several experiments, we aimed to further explore this issue. We adapted the standard paradigm to be used with sets of semantically unrelated words which shared the first two letters. No effect was found when the usual retrieval practice procedure was used. However, when perceptual/lexical competition was increased during that retrieval-practice phase by means of a precuing procedure, significant RIF effects emerged. These results indicate that RIF effects can be found in both conceptually and perceptually driven tasks, although they depend on the presence of competition among the related items.

9:40-10:00 (88)

Intact Retrieval Inhibition in Older Adults' Directed Forgetting. MARTINA ZELLNER, & KARL-HEINZ BAÜML, *University of Regensburg*

—In the list method of the directed forgetting paradigm, subjects study two lists of items for a later memory test. After the presentation of the first list, half of the subjects are cued to forget the so far seen items and to learn a new list. The other half is cued to continue to remember the first list and additionally learn a second list. Typically, in the test phase, the forget group recalls fewer list 1 items and more list 2 items than the remember group. These effects are often attributed to retrieval inhibition. For a wide range of cognitive tasks, older adults have been reported to show deficient inhibitory mechanisms. In particular, older adults have been supposed to show deficient inhibition in a directed forgetting situation. Using the list method of directed forgetting, we report the results from a series of experiments, in which we found no evidence for deficits in older adults' retrieval inhibition. Both older adults' list 1 impairment and their list 2 improvement were indistinguishable from younger adults' directed forgetting effects. This held both in pattern and in size. These results suggest that older adults have intact mechanisms of retrieval inhibition and show no general inhibitory deficit.

10:00-10:20 (89)

Part-List Cuing - Inhibition or Strategy Disruption? ALP ASLAN, & KARL-HEINZ BAÜML, *University of Regensburg*

—Part-list cuing refers to the ironic observation that the presentation of a subset of learned items as a retrieval cue can impair recall of the remaining items. Two prominent accounts of the effect are inhibition and strategy disruption. Strategy disruption predicts that the induced forgetting is only transient, inhibition predicts that it is lasting. We tested these predictions for three encoding conditions: a standard condition without specific learning instruction, a story condition in which meaningful sentences had to be built from the to-be-learned material, and a mnemonic condition, in which the items were learned using the method of loci. Whereas in the standard condition the forgetting turned out to be lasting, in the story condition the forgetting was transient, and in the mnemonic condition no forgetting arose at all. Obviously, type of encoding can strongly influence the effect of part-list cuing, both in pattern and in size. These results suggest that, depending on encoding, part-list cuing can be mediated by both inhibition and strategy disruption.

10:20-10:40 (90)

The Amount of Contextual Information: A Heuristic Basis for the "Memory" of Both Correct and Incorrect Episodic Detail. AINAT PANSKY, *University of Haifa*

—How do people monitor whether a certain episodic detail they recollect is correct or incorrect? Previous research suggests that such monitoring, and subsequent memory performance, are based on several inferential heuristics that are usually, but not always, valid. The current study is an attempt to highlight one such heuristic basis underlying both true and false memories: The

amount of related contextual information. Memory for story information was tested either immediately or following a retention interval of 48 hours. The findings indicate that whether or not a test item had appeared in the original story, recognition rates were higher following stronger activation of contextual information at encoding. Furthermore, subjective confidence and (free-report) volunteer rates for both targets and distracters were similarly affected by the amount of activated contextual information. The findings are consistent with the idea that the same reconstructive-heuristic processes apply to the “memory” of both correct and incorrect information.

Attention and Orienting.

Gorlaeus Building Room 1,
Thursday Morning, 11:00-12:40

Chaired by Annalena Venneri, University of Hull

11:00-11:20 (91)

Evidence for Attentional and Oculomotor Involvement in Stimulus Localization. JOS J. ADAM, *University of Maastricht*, & EDDY J. DAVELAAR, *University of London*

—This study examined a two-process model of localization performance, according to which a shift of attention, providing coarse location information, is followed by a saccadic eye movement, providing fine location information. Thirty participants located a single, peripheral target stimulus, appearing in one of 50 positions on either side of a central fixation point, with or without the requirement to identify a simultaneously presented central distractor stimulus. Results revealed a systematic shift of the target duration - localization performance function that depended on the number of the to-be-identified distractor items. These results suggest that the visual attentional system that underlies localisation performance is affected by the processing of identity information and triggers the eye movement system for further localisation.

11:20-11:40 (92)

Age Affects Phasic Alertness and Spatial Orienting in Covert Attention. THOMAS ESPESETH, IVAR REINVANG, *University of Oslo*, PAMELA M. GREENWOOD, & RAJA PARASURAMAN, *George Mason University*

—Human ability to attend and react adequately to relevant stimuli is improved if individuals are cued for the stimuli. Informative cues improve response times and accuracy to subsequent targets by activating attentional networks in the brain. These networks may be sensitive to advancing age. We tested the orienting and alerting networks of young and old participants with a cued visual discrimination task (Posner task). Participants were 214 persons (30 young, age range 20-32 and 184 older, age range 46-75). The task had four cue conditions (valid, invalid, neutral and no cue) and four different stimulus onset asynchronies (SOA) (200, 500, 800, and 2000 ms). Young participants showed larger effects of phasic alerting than older participants at short SOAs but smaller benefit (orienting) from spatial cues especially at long SOAs. These results are consistent with previously published data (Festa-Martino, Ott & Heindel, 2004).

11:40-12:00 (93)

An fMRI Investigation of Age and Disease Effects on the Vigilance Network. WILLIAM J. MCGEOWN, MICHAEL F. SHANKS, *University of Hull*, KATRINA E. FORBES-MCKAY, *The Robert Gordon University*, & ANNALENA VENNARI, *University of Hull*

—The aim of the present study was to distinguish the effects of normal ageing from those of Alzheimer's Disease (AD) on the

vigilance network. A sustained attention fMRI task was used. The study group included twelve patients with minimal to mild AD (MMSE 18-28), eight elderly and nine young participants. The sustained attention task involved the presentation of a sequence of individual letters and each participant indicated when a specific target letter was presented. The results revealed that behavioural performance on the vigilance task did not differ significantly between the three groups. Normal ageing altered brain activation during successful completion of the task. Activation was reduced in areas associated with visual discrimination, and additional medial cortical areas were activated. Where there was a clinical diagnosis of early AD, there was incremental activation of the medial cortical areas when compared to the normal elderly, which may have sustained successful performance.

12:00-12:20 (94)

Endogenous Orienting Mechanisms in Blind and Deaf Subjects MARTA OLIVETTI BELARDINELLI, & VALERIO SANTANGELO, *University of Rome La Sapienza*

—Several evidence showed that different auditory and visual spatial maps underlie the representation of attentional orienting mechanisms. Namely, specific increases of RTs were found when endogenous spatial cues and targets were separated by the vertical visual (VM) or by the vertical auditory (AM) meridian, when targets were visual or auditory, respectively. This effect could be attributed to longer RTs needed to shift activation from one hemisphere to the other, or to different spatial representations and different spatial codes underlying the visual and auditory modalities. Two experiments have been run with blind and deaf subjects in order to decide between these hypotheses. Our results showed neither AM effect in blind (Exp. 1) nor VM effect in deaf (Exp. 2) subjects, thereby suggesting that the co-existence of both visual and auditory modalities may induce interference effects, giving rise to the asymmetrical representation of visual and auditory spaces observed in normal subjects.

12:20-12:40 (95)

Auditory Spatial Orientation and Meridian Effect: A Human fMRI/MEG Study. MARCELLA BRUNETTI, *University of Chieti*, PAOLO BELARDINELLI, COSIMO DEL GRATTA, VITTORIO PIZZELLA, STEFANIA DELLA PENNA, ANTONIO FERRETTI, *University of Chieti & INFN - National Institute for the Physics of Matter*, MARCO SPERDUTI, LEONARDO FAVA, *University of Rome La Sapienza*, GIAN LUCA ROMANI, *University of Chieti & INFN*, & MARTA OLIVETTI BELARDINELLI, *ECONA & University of Rome La Sapienza*

—This study is aimed at investigating the cortical activated areas in sound localization. We investigated, particularly, if, as a consequence of the “meridian effect” (Ferlazzo et al., 2002), the crossing of the vertical auditory meridian determines a different activation with respect to the localization of sounds incoming from different locations in the same hemi-field. Different fMRI activations were observed in the superior temporal gyrus, supramarginal gyrus, and frontal gyrus, suggesting an influence of the “meridian effect”. The activation in the caudal superior temporal gyrus was significantly larger during localization of sounds coming from different hemi-field, with respect to localization of sounds coming from different location in the same hemi-field. The frontal activation was larger in the right hemisphere than in the left one during sound localization. Two early components (40ms and 60ms) localized in the auditory cortex, with a different pattern of activation across the experimental conditions were identified in MEG assessments.

**SYMPOSIUM: Synaesthesia:
Recent Findings and Future Directions.**
Gorlaeus Building Room 2,
Thursday Morning, 11:00-12:40

*Organized by Alicia Callejas, University of Granada,
Noam Sagiv, University College London,
& Juan Lupiáñez, University of Granada*

11:00-11:20 (96)

Implicit Bi-Directionality in Synesthesia. AVISHAI HENIK, ROI COHEN KADOSH, & MAYA TADIR, *Ben-Gurion University of the Negev*

—Synesthetes were presented with pairs of stimuli and asked to respond to the relevant feature of stimuli and to ignore the irrelevant colors. Displayed colors were either congruent or incongruent with experienced colors triggered by the relevant stimuli (e.g., digits). Synesthetes showed the classical congruity effect. Namely, they were slower to compare the relevant stimuli when the colors deviated from their experience than when they matched their experience. Moreover, we found that irrelevant color distance between the compared stimuli modulated performance. For example, participants were faster to compare two digits when the colors indicated a larger distance than the relevant numerical values (e.g., the digits 4 and 5 printed in the colors that induced 2 and 7, respectively) than when digits and colors were matched. In contrast, performance by non-synesthetes was not affected by colors. Accordingly, we suggest that colors can evoke magnitudes, and that synesthesia may be implicitly bi-directional.

11:20-11:40 (97)

Synaesthesia: When Colours Count. CHRISTINE MOHR, *University of Bristol*, DARIA KNOCH, *Department of Neurology, University Hospital, Zürich*, LORENA R.R. GIANOTTI, *The Key Institute for Brain-Mind Research, University Hospital of Psychiatry, Zürich*, & PETER BRUGGER, *Department of Neurology, University Hospital, Zürich*

—The subjective experience of digit-colour synaesthesia is largely unidirectional. Synesthetes report that digits evoke a colour percept, but not that colours elicit any numerical impression. To investigate experimentally the possibility of an implicit bi-directionality in synaesthesia, 20 synaesthetes and 20 matched controls (who learned the digit-colour combination prior to testing) participated in a random generation task. In the case of number generation, people typically produce too few repetitions (e.g. 4-4) and too many counts (e.g. 5-6). For the present study we made use of the universality of these systematic response biases. We required subjects to generate a random sequence of individual colour names associated by the synaesthetes with the digits 1 to 6. After back-translation of colour responses into digits, we found a significant counting bias in the synaesthetes but not in the matched controls. This finding constitutes evidence for a 'serial order of colours', indicating an implicit evocation of digits by colours, equivalent to an at least covert bi-directionality of synaesthetic associations.

11:40-12:00 (98)

Emotions Induced by Grapheme-Colour Synaesthesia. ALICIA CALLEJAS, & JUAN LUPÍÑEZ, *University of Granada*

—Synaesthetes usually report experiencing discomfort when presented with a stimulus that does not accommodate to their particular perceptions (i.e. a letter presented in a colour different from that of their photism). A series of experiments were carried out to examine the nature of such reports in a group of grapheme-colour synaesthetes. In order to do so, emotional words were presented in both congruent and incongruent colour (i.e. the colour reported to be experienced by the synaesthetes and a different colour) and synaesthetes, as well as a group of non-synaesthetes,

were asked to perform different tasks on them, in order to evaluate whether the color-photism congruency modulates perception of the emotionality of the words. Results show that an irrelevant dimension of the stimulus (colour) influences synaesthetes' performance even when asked to ignore it. Such influence was not found in non-synaesthete participants. A dual assessment hypothesis, in which emotional words are evaluated on the basis of both the actual meaning and the synaesthetic experience, is proposed to accommodate the results.

12:00-12:20 (99)

The Neural Bases of Synaesthesia: New Insights by Functional Imaging. PETER H. WEISS, *Department of Neurology, University Hospital Aachen*, KARL ZILLES, *Institute of Medicine (IME), Research Centre Jülich*, & GEREON R. FINK, *Department of Neurology, University Hospital Aachen*

—An overview of the functional imaging studies on synaesthesia will be given concentrating on grapheme-colour synaesthesia. After reviewing the early positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) studies which mainly aimed at revealing synaesthetic activation of visual (colour) areas in the absence of direct visual stimulation, more recent fMRI work will be presented focussing on the neural basis of the enhanced cross-modal processing in grapheme-colour synaesthesia. Finally, lines for further research on synaesthesia are proposed by using functional imaging as a tool to assess cognitive models of the different types of synaesthesia.

12:20-12:40 (100)

Individual Differences Among Grapheme-Color Synaesthetes: Psychophysical and Neuroimaging Investigations EDWARD M. HUBBARD, *INSERM Unité 562 Neuroimagerie Cognitive*

—Although previous behavioral and neuroimaging results show clear differences between synesthetes and controls, no study has directly compared behavioral performance and neuroimaging results in the same subjects. In this study, we compared behavioral and fMRI responses in six grapheme-color synesthetes to control subjects. We found that a subject's synesthetic experience can aid in texture segregation and to reduce the effects of crowding. For synesthetes, graphemes produced larger fMRI responses in color selective area hV4 than for control subjects. Importantly, we found a correlation between the behavioral and fMRI results; subjects with better performance on the behavioral experiments showed larger fMRI responses in early retinotopic visual areas (V1, V2, V3 and hV4). These results suggest that grapheme-color synesthesia is the result of cross activation between grapheme-selective and color-selective brain areas. These data suggest that grapheme color-synesthetes may constitute a heterogeneous group, whose experiences are elicited at different representational levels.

Executive Control and Age.

Gorlaeus Building Room 3,
Thursday Morning, 11:00-12:40

Chaired by Mariette Huizinga, University of Amsterdam

11:00-11:20 (101)

The Development of Executive Control, from Childhood through Young-Adulthood. A Latent Variables Approach. MARIETTE HUIZINGA, INGMAR VISSER, *University of Amsterdam*, ELLEN L. HAMAKER, *University of Virginia*, & MAURITS W. VAN DER MOLEN, *University of Amsterdam*

—We examined the unity and diversity of executive functions, and their contribution to complex frontal lobe tasks (see Miyake et al., 2000), from childhood through young-adulthood. Four age groups (7-year-olds, N=90; 11-year-olds, N=96; 15-year-olds, N=103; 21-year-olds; N=91) performed on three complex executive function

tasks: the Wisconsin Card Sorting Task; Random Number Generation, and the Tower of London, and nine simple experimental tasks assumed to involve three executive functions: Mental Flexibility (MF), Inhibition (INH), and Working Memory (WM). Latent factor analyses revealed differential contribution of MF, INH and WM to performance on the complex executive function tasks and a multi-stage developmental pattern. Findings are explained in terms of the (late) maturation of the frontal lobe.

11:20-11:40 (102)

Development of Executive Functioning in Wisconsin Card Sorting Predicted by Changes in Attention Regulation. RIEK J.M. SOMSEN, *University of Amsterdam*

—Performance of the Wisconsin Card Sorting task (WCST) improves dramatically with age. On the basis of this improvement in children between 6 and 18 years, it has been suggested that young children are high perseverators. However, WCST indices may be highly sensitive to immature attention regulation. To investigate the contribution of immature attention regulation, the inspection times of the WCST problem and of the feedback after each sorting was recorded. Hierarchical multiple regression analyses were performed with Number of Categories of Perseverative errors as dependent, and Age, general response time, and attention to error, to correct, and to perseverative feedback as independent variables. Both, before and after 10 years, attention to the feedback measures predicted a highly significant proportion of the variance in the WCST perseveration indices.

11:40-12:00 (103)

Age Differences in Dual-Task Performance. KATRIN GOETHE, KLAUS OBERAUER, & REINHOLD KLIEGL, *University of Potsdam*

—Based on the results of Oberauer & Kliegl (2004) who showed perfect timesharing for the execution of two cognitive operations in working memory for 5 out of 6 younger adults, we compared two age groups ($N = 2 \times 12$) using the identical experimental design as Oberauer et al. and examined age dependent efficiency in dual tasking. Both groups extensively trained the execution of a verbal-numerical and a visual-spatial continuous memory updating task in single task and dual task context with a minimum of 5120 practice trials for each task within the two dual task conditions. Two third of the younger adults were able to process the two tasks without dual task costs but none of the older adults reached the criterion of parallel processing. The results suggest a qualitative difference between young and old adults in how they approach dual-task situations.

12:00-12:20 (104)

Does Distribution of Attention in a Dual Task Increase with Age? MARIA VICTORIA SEBASTIAN, *Universidad Complutense de Madrid*, ROSA ELOSUA, *Universidad Nacional de Educacion A Distancia*, GEMMA DE LA TORRE, & SILVIA ORTEGA, *Universidad Complutense de Madrid*

—The aim of this study was to examine the central executive of Baddeley's working memory model, and more precisely, to check whether the distribution of attention in a dual task increases with age. Three hundred young people aged 9 to 20 participated in the experiment, divided into six age groups. They carried out the experimental paradigm devised by Baddeley et al. (1997) which involved combining immediate serial ordered recall of digit sequences at span with a paper and pencil tracking task. The results showed an age effect in the paper and pencil tracking task, but no such effect was obtained in the recall of digit sequences. And more important, no significant differences were found in the distribution of attention among the age groups. At the moment, we are collecting data from younger groups, from 5 to 8 years old.

12:20-12:40 (105)

Aging and Coordinative Control in Working Memory. PASCAL W.M. VAN GERVEN, WILLEMEN MEIJER, JACQUES PRICKAERTS, *Maastricht University*, & FREDDY VAN DER VEEN, *Erasmus Medical Center, Rotterdam*

—Costs associated with switches of focal attention within working memory were investigated as an explanation for age differences in performance on memory-search tasks. Performance of twenty young and twenty older adults was tested with a Sternberg memory-search task involving a fixed or a variable memory set, and an n-back task involving lags of one or two digits. In this way, four levels of control were established. Independent variables were age group, level of control, and memory load. Dependent variables were reaction time and accuracy. It was found that age group did not interact with memory load, which suggests that switch costs of focal attention do not account for age-related performance deficits on these tasks. In contrast, age group did interact with level of control, but either for reaction time or accuracy, not for both. The results can be explained in the light of age differences in coordinative control abilities.

Language Perception II.

Gorlaeus Building Room 4/5,
Thursday Morning, 11:00-12:40

*Chaired by Mirjam Ernestus, Max Planck Institute for
Psycholinguistics & Radboud University Nijmegen*

11:00-11:20 (106)

Masked Homographic Stem Priming Using Derived Words. HÉLÈNE GIRAUDO, *CNRS & University of Provence*

—Three masked priming experiments were carried out in order to examine how derived words composed with an homographic stem are represented in memory. Within an interactive activation model of word recognition where morphemic units are situated above whole word representations (referred as the 'supralexical' hypothesis of morphological representation developed by Giraudo & Grainger, 2000), a single morphological unit is necessary to connect the whole word units that share homographic stems because this unit is itself connected to different semantic representations. Following this assumption, morphologically unrelated primes composed with an homographic stem and morphology related primes should equally facilitate target's lexical decision times while they should both differ from mere orthographic control primes. The first and the second experiments explored this issue while the third experiment compared stem homograph priming effects relative to morphological priming effects using a semantic categorization task that requires retrieval of semantic information to be successfully performed.

11:20-11:40 (107)

The Basic Ingredients of Irregularity: Lexical Access and Storage of German Verb Inflection. EVA SMOLKA, FRANK RÖSLER, *Philipps-University of Marburg*, & PIENIE ZWITSERLOOD, *University of Münster*

—This study investigated whether German past participles are accessed by means of a rule-based morphological decomposition mechanism or by means of a memory-based retrieval mechanism. German participle formation is of particular interest, since it is concatenative for both regular and irregular verbs and results from combinations of regular/irregular stems with regular/irregular suffixes. In four lexical decision experiments, 'nonword'-responses for "illegal combination participles" (ICPs, *geworft*) were compared with those for pseudo-stem participles (*geworst*). Responses to ICPs were slower in comparison to pseudo-stem participles, indicating that items were decomposed into

constituents so that the stem meaning was accessed. Importantly, decomposition occurred for ICPs of both regular and irregular verbs, which fails to support a contrast between a rule-based 'default' mechanism and a retrieval system. In contrast to legal stems of different syntactic categories (gewurft), illegal but phonologically likely stem patterns did not impair responses compared to pseudo-stem participles. A model is presented that integrates these findings.

11:40-12:00 (108)

Syllabic Processing in Visual Word Recognition: Developmental Approach. NORBERT A.R. MAÏONCHI-PINO, ANNIE MAGNAN, & JEAN ECALLE, *University of Lyon2*

—We used a visual version of the paradigm from Mehler et al. (1981) adapted by Colé et al. (1999) to investigate the role of syllabic units in French first, third and fifth graders. The task consists to detect a visual target syllable CV or CVC structure (e.g., PA; PAL) appearing at the beginning of a subsequently presented printed word (e.g., PALAIS; PALMIER). We studied the effect of printed words frequency (MANULEX; Lété et al., 2004) and the printed syllable frequency (LEXIQUE database; New et al., 2001). The oral syllable frequency was controlled (Wioland, 1985). The results suggest a developmental pattern. At the beginning of reading, the children show a syllable compatibility effect whatever the printed words frequency and the printed syllables frequency. Later, this syllable effect is limited to low printed frequency words and syllables. In the fifth grade, an effect of length target suggests a visuo-orthographic processing.

12:00-12:20 (109)

The Effect of Syllabic Neighbourhood in French: Phonological or Orthographic? STEPHANIE L. MATHEY, *Université Bordeaux 2*, DANIEL ZAGAR, NADEGE DOIGNON, & SEIGNEURIC ALIX, *Université de Bourgogne*

—The purpose of this study was to examine whether the influence of phonological syllable units in visual recognition of French words might be related to orthographic redundancy. The syllabic neighbourhood effect and its relation to bigram properties were tested in lexical decision tasks. In Experiment 1, bisyllabic words with or without first syllable neighbours of higher frequency were compared. They were matched on the first bigram with monosyllabic words that had no syllabic neighbour by definition. The results failed to show a pure effect of syllabic neighbourhood. In Experiment 2, the first syllable neighbourhood and the first bigram frequency were manipulated. A reliable interaction was found, showing that the syllabic neighbourhood effect was inhibitory when bigram frequency was high, whereas it was facilitatory when bigram frequency was low. The results are discussed in parallel distributed processing and interactive-activation based models.

12:20-12:40 (110)

The Neural Substrate of the Semantic Illusion Effect in Sentence Processing. JOHN C.J. HOEKS, LAURIE A. STOWE, *University of Groningen*, & JUDITH PIJNACKER, *F.C. Donders Centre for Cognitive Neuroimaging*

—We report an event-related fMRI (functional Magnetic Resonance Imaging) experiment on the neural substrate of the "semantic illusion" effect in sentence processing. Recent research has identified a specific type of sentence that, although nonsensical, does not elicit an N400-effect (an ERP-component normally observed when a sentence is semantically anomalous). Instead, a large P600-effect occurs (normally associated with syntactic anomaly), even though the sentences are grammatical. We suggest that this pattern of results reflects the way readers try to make sense of an implausible sentence after having gone through a - short-lived - illusion of semantic correctness. In our

experiment, we compared semantic illusion sentences to matched semantically anomalous sentences. This contrast showed that only areas in the left inferior frontal gyrus in or around Broca's area (i.e., BA 45 and 47) were involved in recovering from a semantic illusion. This finding implicates Broca's area as an important contributor to the P600.

SYMPOSIUM: From Action Perception to Action Simulation.

Gorlaeus Building Room 6,
Thursday Morning, 11:00-12:40

Organized and chaired by Gertrude Rapinett, Max Planck Institute for Human Cognitive and Brain Sciences, Munich

11:00-11:20 (111)

Is It Me or Is It You? The Role of Self-Other Distinction for the Inhibition of Imitative Behavior. MARCEL BRASS, JAN DERRFUSS, & YVES VON CRAMON, *Max Planck Institute For Human Cognitive and Brain Sciences*

—There is converging evidence from different fields of neuroscience that the mere observation of an action leads to a tendency to imitate that action. It was assumed that such imitative response tendencies are based on a direct matching of the observed action onto an internal motor representation. But if this assumption holds true, the question arises, how we are able to distinguish externally triggered from internally generated motor representations? In a series of fMRI experiments we could show that the inhibition of imitative behavior is related to cortical areas which are known to be involved in perspective taking and determining self-agency. Our findings suggest that the inhibition of imitative response tendencies involves cortical and functional mechanisms which enable us to distinguish between internally generated and externally triggered motor representations.

11:20-11:40 (113)

Joint Attention from Grasp Prediction. MARTIN H. FISCHER, *University of Dundee*, & JULIA PRINZ, *University of Münster*

—Observers viewed pictures of object pairs (one large and the other small) in front of a hand that adopted either a power or precision grasp for 150 ms. After a random delay a detection target appeared unpredictably over one object. We found that, after 200 ms and 300 ms delays, observers detected targets faster near the grasp-congruent object, indicating rapid and spontaneous action simulation. When grasp postures were 20% predictive attention moved to the grasp-incongruent object after 100 ms delay, and to the grasp-congruent object by 300 ms delay, indicating that action simulation eventually overrules temporary grasp-object associations. Observers rapidly infer the goal object of another person's intended action and direct their own attention to it. Our results suggest that strictly congruent mirror neurons might contribute to action simulation in the human brain.

11:40-12:00 (114)

Predicting Point-Light Actions. MARKUS GRAF, *Max Planck Institute For Human Cognitive and Brain Sciences, Munich*, MARTIN A. GIESE, ANTONINO CASILE, *University Clinic Tübingen*, & WOLFGANG PRINZ, *Max Planck Institute for Human Cognitive and Brain Sciences, Munich*

—Evidence has accumulated for a mirror system in humans which simulates actions of conspecifics (Wilson & Knoblich, in press). One likely purpose of such a simulation system is to support action prediction. We focused on the time-course of action prediction, investigating whether action prediction involves real-time simulation. Human action sequences were rendered as point light stimuli. We presented brief videos of human actions, followed by a static test stimulus. Both the SOA (100, 400, and 700 ms) and the distance of the test stimulus to the endpoint of the action sequence

were varied. Subjects had to judge whether the test stimulus depicted a continuation of the action. Pilot data indicate that performance deteriorates with increasing distance to the endpoint of the sequence. More importantly, performance was increased when SOA and distance to the endpoint corresponded. These findings are in accordance with a real-time simulation process in action prediction.

12:00-12:20 (115)

Timing in Predicting the Actions of Others. GERTRUDE RAPINETT, *Max Planck Institute for Human Cognitive and Brain Sciences, Munich*, GÜNTHER KNOBLICH, *Rutgers University, Newark*, & WOLFGANG PRINZ, *Max Planck Institute for Human Cognitive and Brain Sciences, Munich*

—Perceiving another person's actions has been found to activate motor representations in the brain analogous to when our body overtly performs that same action. The functional significance of an action observation-execution matching system is still unclear. Our hypothesis is that the action system is engaged during action observation to enable predictions related to the outcome of the unfolding action. We tested this hypothesis by examining how the perceived timing of an observed action affects the prediction of the outcome of the action. We found that observers are very accurate in identifying changes in the timing of an action. This accuracy increases when the outcome of the action is more functionally congruent to the action. The accuracy in representation of the timing of an observed action provides evidence for the direct-matching hypothesis of action and perception. Moreover, these results suggest that the observed timing of actions is critical in facilitating prediction.

Episodic Memory II.

Gorlaeus Building Room 7,
Thursday Morning, 11:00-12:40

Chaired by Gezinus Wolters, Leiden University

11:00-11:20 (116)

False Recall and Recognition in Women Reporting Recovered Memories of Childhood Sexual Abuse. ELKE GERAERTS, MARKO JELICIC, & HARALD MERCKELBACH, *Maastricht University*

—Employing a strategy previously used by Clancy, Schacter, McNally, and Pitman (2000), we administered a neutral and a trauma-related version of the Deese/Roediger-McDermott paradigm to a sample of women reporting recovered ($n = 23$) or repressed memories ($n = 16$) of childhood sexual abuse (CSA), women reporting having always remembered their abuse ($n = 55$), and women reporting no history of abuse ($n = 20$). We found that individuals reporting recovered memories of CSA are more prone than other participants to falsely recalling and recognizing neutral words that were never presented. Moreover, our study is the first to show that this finding even held when trauma-related material was involved. Correlational analyses revealed that fantasy proneness, but not self-reported traumatic experiences and dissociative symptoms were related to false recall and false recognition.

11:20-11:40 (117)

Sex Differences in False Recall Following Stress Induced Cortisol Responses. TOM SMEETS, MARKO JELICIC, & HARALD MERCKELBACH, *Maastricht University*

—Recent findings suggest that the undermining effects of glucocorticoids on memory performance are modulated by gender differences. Little is known, however, about gender differences in the relationship between stress induced cortisol and false recollections. The current study investigated whether false recollections in a Deese-Roediger-McDermott (DRM) paradigm

are potentiated by acute psychosocial stress. Furthermore, we explored whether gender differences modulate false recall and recognition rates. A sample of 30 healthy young men and 30 healthy young women participated in either a stress (Trier Social Stress Test) or a non-stressed control group. Participants were subsequently subjected to 12 DRM word lists and were later probed for recall and recognition. There were no overall differences between the stress and control group on false recall or false recognition measures. A within stress group correlational analysis, however, revealed negative correlations among men between number of commission errors and proportion of false recollections on the one hand, and cortisol responses on the other hand. Positive correlations were detected between cortisol responses and correct recall and recognition rates, at least among men. No meaningful correlations were found between dependent measures and cortisol responses among female participants. Apparently, for male but not for female participants, large cortisol increases following stress are associated with an inhibition of false recollections in the DRM paradigm.

11:40-12:00 (118)

Encoding Modulation and the Effect of Repetition on Veridical and False Memories. SARAH N. GARFINKEL, ZOLTAN DIENES, & THEODORA DUKA, *University of Sussex*

—Three experiments modulated encoding to investigate the effect of repetition on veridical and false memory using the DRM paradigm. In Experiment 1, repetition was manipulated on a within subjects basis. Lists of associated words were presented once, five and ten times. Erroneous recognition of semantically related items served as the measure of false memory. In Experiment 2, the encoding phase was preceded by a warning about the false memory effect and in Experiment 3, a visually distinctive source monitoring procedure was used. In all three experiments, veridical memory increased monotonically with list repetition. In Experiment 1, repetition had no significant effect on false memory, in Experiment 2, repetition monotonically decreased false memory, and in Experiment 3, an inverted u-shaped relationship between repetition and false memory was found. The results are in accordance with the Activation Monitoring Framework. Familiarity and recollection distinctions are also used to account for the findings.

12:00-12:20 (119)

Generation Effects on Memory for Item and Context: Effects of List Composition. HASAN G. TEKMAN, *Middle East Technical University*

—Although generation of to be remembered items by participants causes reliable benefits for item memory, the effect on remembering contextual detail for the to be remembered items can result in no effect or even negative generation effects. To test the hypothesis that this happens because generation causes better encoding of item specific information at the expense of item-context relationship, memory for items and memory for list membership were measured in two experiments in which the usefulness of item-list associations in the generation task was manipulated. Categorized words were divided into two lists such that instances from each category were presented in one of two lists only or were distributed to the two lists. The effect of this manipulation did not interact with the effect of generation regardless of whether a positive generation effect was observed for remembering list context.

12:20-12:40 (120)

Reliance of Young and Older Adults on Schematic Knowledge for Source Monitoring. MIRI BESKEN, & SAMI GULGOZ, *Koc University*

—Source monitoring differences between young and old adults were tested. Statements were presented alongside pictures of two

sources. One of the sources was identified as a doctor and the other was identified as either a nurse or a bank-teller. Profession information was released either before or after the presentation of statements. The statements were profession-consistent, profession-inconsistent or neutral. In an immediate recognition test, the participants were asked to specify the source of the statements. There was a significant interaction of source and schema such that profession schema-consistent statements were better identified as belonging to the source. Whether the second source was a nurse or a bank-teller also interacted with schema such that nurse statements were identified better than bank-teller statements. For older adults, when profession information was released before the statements, source-inconsistent statements were better identified as compared to when profession information was presented afterwards.

SYMPOSIUM: Interaction of Visual Attention and Visual Working Memory.

Gorlaeus Building Room 1,
Thursday Afternoon, 2:00-3:40

Organized by Maria-Barbara Wesenick, Ludwig-Maximilians University Munich; Chaired by Søren Kyllingsbæk, University of Copenhagen; Discussant: Werner X. Schneider, Ludwig-Maximilians University Munich

2:00-2:20 (121)

Parallel Identification of Multiple Features from Several Visual Stimuli. SØREN KYLLINGSBÆK, & CLAUS BUNDESEN, *University of Copenhagen*

—The issue of parallel versus serial processing of complex visual stimuli has been intensely debated in cognitive psychology over 3-4 decades. Lately the dominant view has been that only simple visual features such as color, line orientation, or certain types of motion are processed in parallel, whereas complex visual objects, defined by conjunctions of simple features, must be processed one after another (early selection). Here we present converging evidence for parallel processing of simultaneously presented complex visual stimuli. The evidence comes from demonstrations of a) partial encoding of multiple stimuli into visual short-term memory, b) evidence of mutually independent encoding of multiple features from multiple objects into visual short-term memory, and c) the lack of evidence for illusory conjunctions when the complex visual stimuli were processed in parallel.

2:20-2:40 (122)

The Role of Saliency Signals in Processing Pop-Out Targets in Visual Search. JOSEPH KRUMMENACHER, & HERMANN MÜLLER, *Ludwig-Maximilians-University Munich*

—The ease and speed with which pop-out targets are responded to is one of the most striking phenomena in visual search. Three visual search experiments, using the redundant target paradigm, investigated the role of feature contrast / saliency signals in generating responses to singleton feature pop-out targets. In Experiments 1 and 2, target items differed from distractors in either a single (non-redundant) or in two dimensions (redundant difference). Variable targets among constant distractors were presented in Experiment 1; in Experiment 2 the target-to-distractor relation was reversed. Experiment 3 used variable mappings of visual information to target-present and -absent responses. In all of the experiments, mean reaction time redundancy gains and violations of Miller's (1982) race model inequality were observed, indicating that responses in singleton feature search are based on saliency signals thus obviating a mechanism of matching search items to the target identity in visual short term memory.

2:40-3:00 (123)

Event-Related Brain Potentials (ERPs) and Change Blindness: Which Image Can Be Recognized? MICHAEL NIEDEGGEN, & KRISTINA KÜPER, *Heinrich-Heine-University Düsseldorf*

—Change blindness describes the failure in detecting substantial differences between two consecutive visual displays separated by a blank screen. The phenomenon is caused by the observer lacking a detailed internal representation of either the pre- or the post-change stimulus. We tested these possibilities by recording ERPs in a recognition paradigm. Two visual displays containing object drawings separated by a blank screen were presented. Occasionally, one object was substituted for a different item in the second display. Recognition of the pre- and post-change-items was tested by requiring subjects to identify a single object as either "old" or "new". If the post-change object was classified as "new", the corresponding ERP signal indicated covert recognition reflected in a positive shift. No such ERP signature was obtained if

the pre-change object was not recognized. These results support the notion that the initial display is replaced in the representation by the new scene.

3:00-3:20 (124)

Working Memory Capacity and Attentional Capture in Visual Search. ADRIAN VON MÜHLENEN, THOMAS GEYER, & KATHARINA MAHN, *Ludwig-Maximilians-University Munich*

—Small changes in the stimuli of a parallel visual search task attract attention. That is, a small probe is detected faster when it appears at the location of a changed search stimulus than when it appears at a location of an unchanged stimulus. The current study examined whether the working memory is involved in this task when several simultaneous changes occur. The idea is that up to four changes can be processed in parallel (accessing the working memory once), but that more than four changes require serial access to the working memory. The results showed that Probe RTs were generally faster for changed than for unchanged stimuli. However, probe RTs did not significantly increase after four or more changes. The same result was found in a passive viewing control condition. This indicates that the working memory limitation does not apply to the attentional capture by simultaneous stimulus changes in parallel search.

3:20-3:40 (125)

The Role of Attention for Retrieval of Information from Visual Short-Term Memory. MARIA-BARBARA WESENICK, KLAUS GRAMANN, & HEINER DEUBEL, *Ludwig-Maximilians University Munich*

—We present a series of change detection experiments in which subjects typically indicated a mismatch between a sample and a test display. The test display was varied according to the experimental condition. Firstly the results do not show performance differences between conditions with a single test item and a full test array. Secondly, performance is better when in whole test displays a single local mismatch has to be detected compared to a single local match. We explain the data by assuming that a mismatch between stored and perceived information elicits a change signal which attracts visual attention. Consequently, in a multi-element display a single local mismatch – but not a match – is processed with high reliability. Electrophysiological correlates show that ERPs to detected changes differ in several components from ERPs to non-detected changes and non-changes. A significant N1 effect and a selection negativity suggest early attentional processing of the change.

3:40-4:00 (126)

Language, Music, and Emotion: How Did Our Communication System Evolve? Theoretical Insights and Practical Implications. MARTIN GUHN, & ANNE M. GADERMANN, *University of British Columbia* (read by Anne M. Gadermann)

—The human aptitudes for music and language evolved—consecutively—in a succession of adaptations that occurred in response to evolutionary pressures. Primarily, humans needed to improve the accuracy of communicating one's emotions, motivations, and intentions to others in human social structures of continuously increasing complexity. Integrating these evolutionary considerations with accounts from neuro-physiology, cross-cultural linguistics and musicology, and developmental psychology reveals how the brain processes involved in language, music, and emotions occur in overlapping brain structures. Remarkably, there are functional, hemispheric differences in language, music, and emotion processing between people speaking tonal versus non-tonal languages and musicians versus non-musicians, even though language and music development is universally alike during early childhood. This implies that the language and music environment during an individual's development notably influences the

organization of higher mental processes. For an applied context, these insights corroborate the notion of integrating music and language(s) in early education.

SYMPOSIUM: Grammar Induction.

Gorlaeus Building Room 2,
Thursday Afternoon, 2:00-3:40

Organized and chaired by Fenna H. Poletiek, Leiden University

2:00-2:20 (127)

Processing Disjoint Contingencies: A Graded, Associative Account. AXEL CLEEREMANS, *Université Libre de Bruxelles*, LUCIA ONNIS, *Cornell University*, ARNAUD DESTREBECQZ, *Université de Bourgogne*, MORTEN H. CHRISTIANSEN, *Cornell University*, & NICK CHATER, *University of Warwick*

—Numerous putative mechanisms have now been proposed to account for artificial grammar learning: rule abstraction, similarity with stored instances, knowledge of whole items or of chunks, sensitivity to the statistic regularities contained in the material. These models, however, cannot account for recent findings (Gomez, 2002; Onnis et al., 2003) that disjoint contingencies (e.g., A-X-B, where there exists a contingency between A and B but neither between A and X nor between X and B) appear to be best learnt when the embedded material (i.e., X) is either highly variable or invariant. In this paper, we explore how well five different connectionist models fare in accounting for this counter-intuitive U-shaped relationship between variability and performance, and show that Simple Recurrent Networks best capture the behavioural data. We discuss these findings in light of analyses of the internal representations that each model develops over experience with the training material.

2:20-2:40 (128)

Increasing the Complexity of Artificial Grammars: Effects on Implicit Learning Performance and Type of Knowledge Acquired. ESTHER J. VAN DEN BOS, & FENNA H. POLETIEK, *Leiden University*

—Implicit learning has been viewed as a process that automatically abstracts any regularity present in the environment. The process would be especially suited for complex regularities that are difficult to figure out intentionally, like the rules of a grammar (Reber, 1989). This view contrasts with claims that pattern learning mechanisms cannot deal with the complexity of natural languages (Gold, 1967; Pinker, 1989). We investigated whether implicit learning of artificial grammars is affected by a grammar's complexity. In addition, we examined whether complexity influenced the type of knowledge acquired. The results of our experiment showed that participants' performance decreased as they were presented with increasingly complex grammars. In addition, there was an effect of complexity on the type of knowledge acquired: first and second-order dependencies were learned implicitly for relatively simple grammars, whereas only first-order dependencies were acquired from more complex grammars.

2:40-3:00 (129)

Progressing from Local to Distant Structure in Speech Processing. PADRAIC MONAGHAN, *University of York*, LUCIA ONNIS, MORTEN H. CHRISTIANSEN, *Cornell University*, & NICK CHATER, *University of Warwick*

—Infants are sensitive to transitional probabilities between syllables in continuous speech. Artificial language learning studies have shown that learners infer word boundaries at points where transitional probabilities are lowest. In a series of studies we have explored the conditions under which non-adjacent structure in an artificial language can over-rule these local dependencies. In

particular, we tested whether high variability within the language, which makes adjacent probabilities less informative, caused participants to refocus on non-adjacent structure in the language. In speech segmentation studies we found that, when there was low variability, participants did not process non-adjacent dependencies but did so when there was high variability, even when this countered local transitional probabilities.

3:00-3:20 (130)

A Meta-Analysis of the Effects of Secondary Tasks and Stimulus Complexity on Implicit Learning. INGMAR VISSER, JENNY TAGARO, & HILDE HUIZINGA, *University of Amsterdam*

—Since Nissen and Bullemer's 1987 seminal paper on sequence learning, over 300 papers have appeared on implicit learning (200 of which about sequence learning). Nissen and Bullemer's original research focused on the effects of a secondary task on implicit learning. Because the learning effect is assumed to be implicit, a secondary task presented during learning should affect the learning process. Consequently, when subjects are tested under single task conditions, they should perform as well as subjects who were trained under single task conditions. Of course, such learning effects are mediated by stimulus complexity, the number of trials in the training, and many other variables. In a meta-analysis, such factors should be included as covariates to neutralize their influence. We developed routines in Mx (Neale, Boker, Xie, & Maes, 2003) to do so. Preliminary analyses for a limited number of studies reveal there is no effect of secondary tasks. Further analyses will reveal whether this holds up with more studies, and more study characteristics included in the analyses.

3:20-3:40 (131)

Implicit Grammar Learning: When 'Starting Small' Matters and When It Does Not. FENNA H. POLETIEK, *Leiden University*

—Do grammar learners exposed to exemplars of that grammar benefit from an ordering of these exemplars according to increasing complexity? In other words: How important is starting small for grammar induction (Elman, 1990)? This is an undecided question, despite the recent intensified interest in the 'starting small hypothesis'. Natural (sign) language acquisition studies (Newport, 1990) and computational studies produced mixed results (Elman, 1990; Rohde & Plaut, 1999). The effect has hardly been investigated in experimental paradigms, however (Conway, Ellefson, & Christianson, 2003). We performed two experiments in which we tested the facilitation effect of 'starting small' in the Artificial Grammar Learning task. The results suggest that starting small may not be helpful per se, but depend on specific structural properties of the grammar to be learned.

3:40-4:00 (132)

The Relationship between Implicit Learning and Sentence Processing. DEZSO NEMETH, *University of Szeged*, DANIEL GONCI, BALAZS ACZÉL, *ELTE University, Budapest*, GÁBOR HÁDEN, & GÉZA AMBRUS, *University of Szeged*

—Numerous theories claim that the motor and procedural systems are the cognitive background of mental grammar and sentence processing. The main purpose of this research is to study the relationship between implicit learning and sentence processing. The authors present a dual-task experiment, in which the subjects' implicit learning was measured by a serial reaction time (SRT) task, and at the same time subjects were tested on sentence processing, word processing, and mathematical tasks. Results show that implicit learning is significantly worse when the parallel task was sentence processing than when it was either nonword-detection or counting. The implication of the results is that there is relationship between implicit learning and sentence processing,

more precisely the operation of mental grammar. With this we are provided with a new proof that mental grammar is connected to procedural systems. These findings are interpreted in the framework of Ullman's procedural/declarative model.

**SYMPOSIUM: Neurodevelopmental Changes
in Cognitive Control.**

Gorlaeus Building Room 3,
Thursday Afternoon, 2:00-4:00

*Organized by Eveline A. Crone, Leiden University;
Chaired by Torkel Klingberg, Karolinska Institut, Stockholm;
Discussant: Phil Zelazo,*

2:00-2:20 (133)

Neural Basis for Development of Working Memory. TORSEL KLINGBERG, *Karolinska Institute*

—Development of working memory capacity during childhood is an important process but the neural basis for this development is still largely unknown. In this talk I will discuss different approaches to this problem and show recent data from neuroimaging studies relating changes in brain activity and structural maturation to development of working memory. In addition, neuroimaging data was combined with neural network simulations.

2:20-2:40 (134)

Neural Substrates of Normal and Abnormal Development of Cognitive Control Functions. KATYA RUBIA, *Institute of Psychiatry, King's College, London*

—Functions of cognitive control are essential for normal self-controlled adult behaviour and develop relatively late in life, peaking during adolescence. This talk will show findings on progressive increase of specific frontal and striatal brain regions in the transition from childhood to adulthood during a range of cognitive control functions including motor response inhibition, cognitive interference inhibition and cognitive switching by use of fast-event related fMRI. Furthermore, conjunction analyses will show age-related differences in common activation foci across all cognitive control tasks. Abnormal development of these cognitive control functions will be briefly discussed based on neuroactivation findings in clinical patients with Attention Deficit/Hyperactivity Disorder, conduct disorder, obsessive-compulsive disorder and depression.

2:40-3:00 (135)

Infants Imitation of Other Persons Actions: Cognitive and Neurophysiological Foundations. BIRGIT ELSNER, *University of Heidelberg*

—Human infants ability to imitate other persons' actions is subject to remarkable developmental changes within the first two years of life. Until now, little is known about the cognitive and neurophysiological correlates of these changes. On the cognitive side, memory capacity, attention, and abilities in action control seem to be important factors. In several studies, we identified a further contributor to 9- to 18-month-olds imitation, namely the ability to encode the relations between observed movements and the effects produced by these movements. On the neuronal side, studies on the brain regions activated during imitation are recently only done with adults. However, knowledge about the neuronal development of these areas may shed further light on infants emerging capacity to reproduce observed actions.

3:00-3:20 (136)

Monitoring of Internal and External Error Signals in Children with ADHD. CATHARINA S. VAN MEEL, *Universiteit Leiden*

—Cognitive performance of children with Attention-Deficit

Hyperactivity Disorder (ADHD) is characterized by large moment-to-moment fluctuations in cognitive control. Adaptive goal-directed behavior requires the constant comparison of ongoing actions with internal goals and standards. Neuropsychological research suggests that children with ADHD fail to efficiently utilize performance errors and environmental feedback in order to determine whether control processes need to be tightened. In this presentation, I will review some of our recent empirical work regarding the role of performance monitoring in school-aged children with ADHD. In a series of experiments we investigated two medial-frontal negative-polarity event-related potentials (ERP) related to the processing of internal and external error feedback: (1) the error-related negativity (ERN), a sharp negative deflection time locked to erroneous responses in a choice reaction time task, and (2) the feedback-related negativity (FRN) which was elicited by negative feedback in a guessing and time estimation paradigm. The implications of these findings for recent neurobiological models of ADHD will be discussed.

3:20-3:40 (137)

Prefrontal Activation Due to Stroop Interference Increases During Development — An Event-Related fNIRS Study. MATTHIAS L. SCHROETER, STEFAN ZYSSET, MARGARETHE WAHL, & YVES VON CRAMON, *Max-Planck-Institute for Human Cognitive and Brain Sciences, University of Leipzig*

—Although it is well known that executive processes supported by the frontal lobe develop during childhood and adolescence, only one functional imaging study has used the Stroop task to investigate the relationship between frontal lobe function and cognition from a developmental point of view. Hence, we measured brain activation in the lateral prefrontal cortex of children with functional near-infrared imaging during an event-related, color-word matching Stroop task and compared results with a previous study, conducted with the same paradigm in adults. In children, the Stroop task elicited significant brain activation in the left lateral prefrontal cortex comparable to adults. However, the hemodynamic response occurred later in children than adults. Individual brain activation due to Stroop interference varied much more in children than adults, which was paralleled by a higher behavioral variance in children. Data suggest that children differed in their individual cognitive development independent of their chronological age more than adults. Brain activation due to Stroop interference increased with age in the dorsolateral prefrontal cortex in correlation with an improvement of behavioral performance. In conclusion, our results indicate that neuromaturation processes regarding resolution of Stroop interference may depend on increased ability to recruit frontal neural resources.

Dyslexia.

Gorlaeus Building Room 4/5,
Thursday Afternoon, 2:00-4:00

Chaired by Bart Boets, University of Leuven

2:00-2:20 (138)

A Potential Neural Mechanism for Parafoveal Preview in Sentence Processing. JACQUELINE THOMSON, *University of Edinburgh*

—This experiment investigates a possible neural mechanism for parafoveal preview in sentence reading. The extra-foveal regions of the retina use the magnocellular visual pathway to transmit visual imagery to the brain, suggesting that the magnocellular pathway is responsible for parafoveal preview information. Stein and Walsh (1997) propose that disruption of the magnocellular visual pathway may cause a certain type of developmental dyslexia. Dyslexics make shorter saccades and longer fixations (Biscaldi et al., 1998),

suggesting that they do not get adequate preview information. This experiment shows how blocking parafoveal parts of the visual field can differentially affect the left and right visual fields. Extending Stein and Walsh, I argue that the fast, coarse-grain magnocellular pathway is the biological basis of the parafoveal preview.

2:20-2:40 (139)

The Effect of the Contextualisation of Pegboard Exercises on Segmentation Difficulties in Reading Tasks. MIEKE SOETAERT, *University of Mons-Hainaut*

—Most dyslexic children encounter word segmentation difficulties in reading tasks (1). The “two-route model” of reading (2) suggests that these difficulties refer to a perturbation of the “sub-lexical route”. We thus hypothesised during a preliminary research (3 ; 4) that confronting dyslexic children with vertically non-verbal segmentation exercises might help them solve their reading acquisition problems. We tested this hypothesis using a structured and non-verbal device : the pegboard. This research showed that these segmentation exercises had a significant effect on reading performances. We then realised a new experiment to know if the contextualisation of these pegboard exercises could ameliorate the remediation of segmentation difficulties. The exercises proposed in this new research were presented horizontally in order to be closer of reading tasks. The results have refuted our hypothesis. It seems thus that dyslexic children have difficulties to treat horizontal information. We now investigate this hypothesis through techniques of fMRI.

2:40-3:00 (140)

Sensory Processing and Reading Development: A Longitudinal Study. BART BOETS, JAN WOUTERS, ASTRID VAN WIERINGEN, & POL GHESQUIÈRE, *University of Leuven*

—According to the general magnocellular theory, deficient reading and spelling development (dyslexia) might be the behavioral consequence of dysfunctional sensory processing. Whereas a visual temporal processing deficit has been hypothesized to affect the development of orthographic skills, an analogous temporal auditory deficit might interfere with accurate speech perception and with the normal development of the phonological system. In a longitudinal study we investigated basic auditory and visual processing in relation with phonological and orthographic ability and developing reading and spelling skills. 31 children with a family history of dyslexia were followed up from preschool to first grade and were compared to an individually matched control group. At preschool age group differences could already be observed for phonological awareness and letter knowledge, but not for auditory or visual sensitivity. However, auditory spectral processing was significantly related to phonological awareness and visual motion processing was related to orthographic ability. At the conference we will present the preschool and first-grade data to illuminate whether the observed relations do further extend to reading and spelling development.

3:00-3:20 (141)

Developmental Dyslexia and the Dual Route Model of Reading. CAROLINE CASTEL, *University of Provence*, JOHANNES C. ZIEGLER, & F.-XAVIER ALARIO, *CNRS & University of Provence*

—We investigated developmental dyslexia within a well-understood and fully specified computational model of reading: the dual route cascaded model of reading aloud (Coltheart, Rastle, Perry, Langdon & Ziegler, 2001, *Psychological Review*). We used reading-independent tests to assess each stage of the DRC model. The strongest deficits were obtained for access to the phonological lexicon (i.e., lexical route) and for grapheme-to-phoneme conversion (i.e., nonlexical route). Weaker but statistically significant deficits were obtained for letter processing and

attentional capacities. We observed no deficits at the level of the orthographic lexicon. Hierarchical regression analyses showed that only phonological deficits accounted for unique variance. Subtyping analyses did not allow us to identify independent profiles (surface versus phonological). All children with dyslexia showed phonological deficits. Approximately half of them showed additional problems in visuo-attentional or letter processing. The results show that phonological deficits can affect both lexical and nonlexical processes. The present data constrain computational models of normal reading and contribute to a better understanding of impaired reading.

3:20-3:40 (142)

Beginning Reading, Dyslexia, and Sound-Spelling Inconsistency. ANNA M.T. BOSMAN, & WIETSKE VONK, *Radboud University Nijmegen*

—Studies in English with experienced readers show the interactive nature of visual word perception (Gibbs & Van Orden, 1998; Stone, Vanhoy & Van Orden, 1997; Ziegler & Jacobs, 1995; Ziegler, Van Orden & Jacobs, 1997). In their seminal paper, Stone et al showed that lexical-decision times of experienced readers are affected by the sound-spelling inconsistency of visually presented words, that is, response times to sound-spelling inconsistent words (e.g., LEAP) are longer than to sound-spelling consistent words (e.g., DUST). In our study, we extended this idea to the reading of beginning readers and young readers with dyslexia. Three groups of readers, children with dyslexia, an age-match and a reading-match group performed a lexical-decision task similar to the one used by Stone et al. The results indicate that, despite subtle differences, the reading-behaviour of all three groups emphasizes the interactive nature of sound and spelling.

3:40-4:00 (143)

Spared Lexical and Sublexical Processing in Neglect Dyslexia. PRISCA STENNEKEN, LUCIA VAN EIMEREN, ARTHUR M. JACOBS, *Freie Universität Berlin*, INGO KELLER, *Neurologic Clinic Bad Aibling*, & GEORG KERKHOFF, *City Hospital Munich-Bogenhausen*

—Unilateral spatial neglect may involve neglect dyslexia resulting in a failure to identify words (or letters) in the contralesional hemispace. Here, recent studies have documented that patients who neglect words during reading aloud in their contralesional hemispace are still able to perform lexical or semantic decisions (Arduino, Burani, & Vallar, 2002; Ladavas, Umiltà, & Mapelli, 1997). The present study investigated German neglect patients in a lexical decision and a reading task using mono- or disyllabic words of five letters with either high or low frequency. Results support previous findings of residual processing of lexical information in neglect dyslexia. The neglect patients showed some characteristics of reading errors and spared lexical effects (e.g. word frequency effect) that are typically observed in unimpaired readers. Implications for current theories of neglect dyslexia and models of visual word processing are discussed.

SYMPOSIUM: Action-based Memory: Theoretical and Applied Issues Emerging from SPT Research.

Gorlaeus Building Room 6,
Thursday Afternoon, 2:00-4:00

*Organized, chaired and discussed by Monika Knopf,
Johann Wolfgang Goethe-University Frankfurt*

2:00-2:20 (144)

Habitual Routines as Naturalistic Examples of SPTs. JENNIFER M. RUSTED, *Sussex University*

—In a longitudinal study of a small group of volunteers with probable Alzheimer type dementia, we monitored their ability to

generate instructions to complete a familiar kitchen routine, under different conditions. Longitudinal data demonstrates the anticipated deterioration in uncued recall as the dementia progressed. When the verbal instructions were performed in front of the volunteer as s/he produced them, verbal recall was significantly improved. Significantly, under these conditions, when verbal recall failed, volunteers would step in to spontaneously perform the missing instruction and maintain the routine, returning to the verbal instruction once the 'motor 'link' had been achieved. The data is presented and discussed in relation to current models of action-based memory and confrontation retrieval strategies.

2:20-2:40 (145)

The Lack or Enactment Effect in the Novelty-Encoding Phenomenon: A New Evidence for the Episodic Integration Theory. REZA KORMI-NOURI, *Stockholm University*

—In the Novelty-Encoding Phenomenon, enacted and non-enacted items were presented in two phases. In Phase 1 (familiarization Phase), subjects participated in a standard memory experiment. In Phase 2 (critical Phase) subjects evaluated the materials (both familiar items which were encoded earlier in Phase 1 and novel items which were not presented earlier in Phase 1) in a frequency judgment task. The results of two different studies showed that, in Phase 2, the novel items were recognized better than familiar items regardless of encoding enactment at Phase 1. That is, although the standard enactment effect was found at recognition of Phases 1 in these two studies, there was a null effect of enactment effect at recognition of Phases 2. This null effect of encoding enactment was found for subjects with different languages (Swedish, Japanese, Persian), different ages (young and elderly adults) and different health condition (normal control and brain damaged). The lack of encoding enactment was explained because of separation between two parts of action events (objects and action verbs) at encoding and at retrieval in Phases 2 and was interpreted as a support for the episodic integration theory in action memory.

2:40-3:00 (146)

A Contribution of Action-Specific Information to Recognition in SPT. HUBERT D. ZIMMER, *Saarland University*

—It is a well supported finding that performing actions strongly enhances memory for these items (cf. for a review, e.g., Zimmer et al., 2001). Therefore, researchers agree that encoding by enactment changes some aspects of memory traces generated during encoding. Controversial, however, is what kind of information is changed and whether information on the specific way of performing the action is part of it? I will report results of an experiment which demonstrates that quite specific information on the way an action was performed can influence recognition memory. Participants studied action phrases together with two different instruments for the action. Half of the instruments were selected so that different actions would be performed when they are used, whereas the other half would cause similar movements. During study one of the instruments was indicated as target and that instrument should be associated to the phrase. Recognition of the target instruments showed the usual advantage of an enactment compared to a verbal encoding condition for movement-different instruments, but not for instruments which required similar movements. We take this as evidence that information on the specific way of performing the action is part of memory after enactment.

3:00-3:20 (147)

The Subject Performed Task Effect Enhanced and Reduced. JAN VON ESSEN, *Stockholm University*

—It is still unclear whether enhancement of relational processing (i.e. association processing) contributes to the subject performed task (SPT) effect. Results from three experiments on this issue are

presented. First, the SPT effect was studied in two types of cued recall tasks that rely on item-specific association (i.e. verb-cued recall) and categorical-relational association (i.e. category-cued recall) respectively. The results show that SPT encoding interacts with verb-cued recall to produce a larger SPT effect compared to free recall. This supports the notion that a part of the SPT effect is due to enhanced item-specific association (verb-noun integration). Second, the associative effect in SPT was studied in age cohorts from 40 to 80 years old subjects. The results indicate that the item-specific associative effect in SPT is more age sensitive than recall of VT and other sub-effects of the SPT effect.

3:20-3:40 (148)

Imagining, Imitation and Performing Actions: Effects on Memory and Brain. WOLFGANG MACK, MICHAEL O. RUSS, & MONIKA KNOPF, *J. W. Goethe-University Frankfurt Am Main*

—One approach to explain the enactment effect is based on the assumption, that by performing an action, an optimal intra-item integration and item differentiation is effected. Independent experiments were run with additional variations of encoding conditions by using recognition data: Participants had to imitate the pantomimed actions performed by the experimenter and in another experiment to imagine the action performance. The imagination effect was significantly weaker than the imitation effect, which was comparable to the enactment effect. Brain data (fMRT) measured in the recognition phase are presented for the contrast between verbal, imitative and enactive encoding. The neural network underlying the enactment effect is discussed in relation to methodological problems in identifying it reliably and possible measures that should be taken to deal with them.

3:40-4:00 (149)

Did I Already Do That? A Retrospective and Prospective Approach to Action Memory. GERTRUDE RAPINETT, *Max Planck Institute for Human Cognitive and Brain Sciences*, & JENNIFER M. RUSTED, *Sussex University*

—Enactment at encoding has reliably been found to improve memory for the performed task (e.g. Cohen, 1989, Engelkamp, 1997). In addition, forming an intention to perform an action at a later stage has also been found to have a preferential access in memory (e.g. Goschke & Kuhl, 1996). We explore whether the facilitation observed in both overt and intended enactment results from similar memory processes in order to examine the nature of the source of the enactment advantage. We demonstrate that in both intended and already performed actions motoric activation contributes to the observed advantage. Moreover, we observed differences in the impact that enactment and intended enactment place on secondary tasks. This suggests that prospective enactment requires more strategic resources relative to its retrospective counterpart.

Bilingualism.

Gorlaeus Building Room 7,
Thursday Afternoon, 2:00-4:00

2:00-2:20 (150)

Bilinguals: Interconnected Language Systems. TÜNDE É. POLONYI, *University of Debrecen*

—My presentation examines lexical retrieval in bilinguals, involving issues connected with sentence-parsing and ambiguity resolution. The specific question of my experiment was whether in a disambiguating context the processing of an ambiguous word in one language facilitates the access of both of its meanings in the other language of the mental lexicon. In the study a cross-modal priming experimental setup was applied: the subjects listened to Hungarian or English sentences ending in an ambiguous word, then with 16, 100 or 500 ms latency a word appeared on the screen in

the other language, they had to read out as fast as possible. The target word was an associate of either the biased or the nonbiased meaning of the prime-word or a control word. There were three experimental groups: proficient English learners, bilingual subjects and interpreters, in total 110 subjects. Response latencies for the associates of both meanings of the ambiguous word were compared to that of the control word. Results showed only one condition when the processing of an ambiguous word automatically facilitated the access to both of its meanings in the other language of the mental lexicon for a short time, 500 ms (Hungarian sentence, English noun prime-word and target word). Our results seem to favour an interactionist interpretation of sentence parsing and the interdependence-hypothesis of languages in case of bilinguals.

2:20-2:40 (151)

Influence the First Acquired Language Has on the Second and Vice Versa on Poor and Good Readers/Spellers. SONJA UGEN, JACQUELINE LEYBAERT, *Free University of Brussels*, & SYLVIE BODÉ, *University of Luxembourg*

—The aim of the study is to examine whether the first acquired language (i.e. German) has a positive effect or interferes with the second acquired language at school (i.e. French) in reading and writing. In a longitudinal design, 43 good and 46 poor readers/spellers have been selected among 159 second grade children from Luxembourgish schools on the basis of their performance on a standardized dictation test in German. The next testing session scheduled (March 2005) will include reading speed and accuracy measures in German before the children start with written French. The children will then be retested when they start with French (September 2005). It is hypothesized that starting reading in a transparent writing system (German) will be beneficial for the acquisition of French characterized by a more opaque writing system for both poor and good readers (Da Fontura and Siegel, 1995).

2:40-3:00 (152)

Cognate Status and Cross-Script Translation Priming. MADELEINE VOGA, *University of Provence*, & JONATHAN GRAINGER, *CNRS & University of Provence*

—Greek-French bilinguals were tested in three masked priming experiments using the lexical decision task, where primes were in L1(Greek) and targets in L2 (French). Experiment 1 showed significant cognate priming, relatively to a phonological control, for the prime duration of 50ms, whereas cross-language morphological priming emerged at longer prime exposure durations (66 ms). In Experiment 2, the level of phonological overlap across translation equivalents was varied and priming effects were measured against matched phonologically related primes and against an unrelated prime condition. When measured against the unrelated baseline, cognate primes showed the typical advantage over non-cognate primes. However this cognate advantage disappeared when priming was measured against the phonological control. Finally, we will present new results examining cognate priming comparing cognates with L1 etymology and cognates with L2 etymology. The results will be discussed in terms of how translation equivalents are represented in proficient bilinguals.

3:00-3:20 (153)

Cognitive Categorisation of Colour in Japanese-English Bilinguals: Evidence for Bilingual Cognitive Shift. PANOS ATHANASOPOULOS, MIHO SASAKI, *University of Essex*, & VIVIAN J. COOK, *University of Newcastle Upon Tyne* (read by Panos Athanasopoulos and Miho Sasaki)

—Previous research has shown that colour cognition depends on the language people speak. Davidoff, Davies and Roberson (1999) found, based on monolingual populations, that how people judge the similarity or difference between colours depends on how they cut up the colour space linguistically. The current study extends the investigation of linguistic effects on colour cognition to the domain of bilingualism. 18 Japanese monolinguals and 18 Japanese-English bilinguals were given a similarity judgement task, using Coloraid colour chips. The colours under investigation were ao ('blue'), mizuiro ('light blue'), midori ('green') and kimidori ('yellow-green'). The results showed that bilinguals made less distinction between mizuiro and ao and between kimidori and midori than monolinguals. These results suggest that bilinguals may have different mental representations for colour from monolinguals as a result of using two colour vocabularies, thus supporting the view that language affects colour cognition.

3:20-3:40 (154)

Effects of Semantic Similarity across Different Tasks and Experimental Paradigms. ROSA SÁNCHEZ-CASAS, PILAR FERRÉ, MARC GUASCH, JOSÉ E. GARCÍA-ALBEA, JOSEP DEMESTRE, *Universitat Rovira I Virgili*, & TEÓFILIO GARCÍA CHICO, *Universidad Pontificia de Comillas de Madrid*

—The experiments we report in this paper examined the pattern of semantic effects using a variety of tasks and paradigms and two different languages (Catalan and Spanish). In all the experiments, the degree of semantic similarity was manipulated to form three different experimental conditions: (1) close semantic relation; (2) less close semantic relation; and (3) an unrelated control. In Experiment 1 and 2 we used an unmasked priming paradigm and a lexical decision task. The target was always presented in Spanish and the prime was either in Spanish or in Catalan. Experiment 3, 4, and 5 used an interference paradigm. Experiment 2 examined between language interference effects in a translation recognition task, while Experiment 3 and 4 investigated these effects within the same language (Spanish), using a synonym recognition task and a picture naming task. The results showed priming effects in the two semantic relations, both within- and between- languages, while interference effects were only found in the case of the semantic close condition, being the pattern of effects the same in the three tasks used.

3:40-4:00 (155)

Is the First Language Inhibited When Speaking the Second Language? Evidence from a Competitor Priming Paradigm. ZOFIA WODNIECKA, *Jagiellonian University*, SUSAN BOBB, JUDITH F. KROLL, *Pennsylvania State University*, & DAVID W. GREEN, *University College London*

—When bilinguals prepare to speak in one language, alternatives in the other language appear to be active and to compete for selection. Models of lexical access in bilingual production differ in the hypothesized level of parallel activity in both the first (L1) and the second (L2) languages and in the requirement to actively suppress the more active language to enable production of the less active language. We report two experiments using a competitor priming paradigm in which pictures were repeated from study to test. In both experiments the language congruency of picture naming varied from study to test but in Experiment 1 the test was blocked by language whereas in Experiment 2 it was mixed and trials alternated to require language switching. The results provide support for a model of inhibitory control in which cross-language competition is resolved by active suppression of the nontarget alternatives.

Visual Attention I.

Gorlaeus Building Room 1,
Friday Morning, 9:00-10:40

Chaired by Geoffrey Underwood, University of Nottingham

9:00-9:20 (156)

The Importance of Careful Stimulus Presentation in the Observation of Cueing Effects in Visual Search. DAVID HENDERICKX, & ERIC L.L. SOETENS, *University of Brussels*
—Visual attention is attracted by salient stimuli (exogenous) or can be voluntarily directed (endogenous). Briand (1998) found that exogenous spatial orienting effects in a covert spatial visual orienting paradigm (Posner, 1980) are stronger for conjunction than for feature search, whereas for endogenous spatial orienting, there is no such interaction. Results have been explained by a dissociation in their underlying mechanisms: an exogenous (posterior) system, and an endogenous (anterior) system. In a replication of Briand (1998), we did not observe any cueing effect in the endogenous condition. Conversely, we did register exogenous cueing effects, however without interaction. The ambiguous results can be explained by exogenous effects of stimulus presentation in the endogenous condition of Briand's design. Results will be discussed in context of Briand and Klein's (1987) suggestion that Posner's 'Beam' is related to Treisman's 'Glue'.

9:20-9:40 (157)

No Top-Down Modulation in Pop-Out Search: Evidence from Eye Movements. KAREN MORTIER, WIESKE VAN ZOEST, MARTIJN MEETER, & JAN THEEUWES, *Vrije Universiteit Amsterdam*

—The present study investigated the role of top-down control in saccadic eye movements. A feature search task was presented in which the dimension of the pop-out target was cued at the beginning of each trial. In Experiment 1 and 2 a verbal cue was used. The cue was either valid (e.g., the word "COLOR") or neutral (the word "NEUTRAL") relative to the dimension of the upcoming target. In Experiment 1, participants had to make a speeded eye movement to the target, whereas in Experiment 2, they had to detect the presence or absence of the target by a manual response. The results showed that top-down knowledge did not speed up saccadic latencies, whereas manual reaction time was modulated by the cue. Experiment 3 showed that a symbolic cue (e.g., a right-tilted line) was able to decrease the saccadic latencies. It is concluded that top-down knowledge in pop-out search tasks does not modulate early attentional processes, but has an effect on decisional processes.

9:40-10:00 (158)

The Preview Benefit: Bottom-Up and Top-Down Influences Operate in Different Time-Windows during Preview Search. FRANK AGTER, & MIEKE DONK, *Vrije Universiteit Amsterdam*
—Prioritized selection of new over old items might be mediated by onset capture and color-based inhibition (Agter & Donk, in press). The aim of the present study was to determine the relative contributions of onset capture and color-based subset selection over time. The results of Experiment 1 showed that early in time, prioritized selection of new items was primarily, but not exclusively, determined by onset capture. As time passed, selection became increasingly more guided on the basis of color. In Experiment 2, we demonstrated that color-based subset selection was initiated prior to the appearance of the new items, which points to inhibition. In sum, onset capture and color-based subset selection both contributed to the prioritization of new over old items. The relative contributions of these selection mechanisms were a function of response latency.

10:00-10:20 (159)

Top-Down Influences of Lexical-Semantic Knowledge on Searching for Objects: Effects of Perceptual and Working Memory Load. EVA BELKE, *Aston University*, GLYN W. HUMPHREYS, *University of Birmingham*, DERRICK G. WATSON, *University of Warwick*, & ANTJE S. MEYER, *University of Birmingham*

—In a series of experiments, Moores et al. (2003) demonstrated the existence of top-down associative effects on the deployment of visual attention during the visual search for objects. We replicated these findings using semantic associates and semantic competitors (same-category members). Following Lavie et al. (2004), we predicted that such distractor effects should interact with variations of perceptual and cognitive load. We did not find any significant interaction of relatedness effects with perceptual load. However, the distractor effects increased significantly when participants were asked to retain one or five digits in memory throughout the search task. There was no modulation of the cognitive load effects by the number of digits to be retained. We discuss the implications of our findings for models of visual attention and for theories of word retrieval in language production.

10:20-10:40 (160)

Perceiving Natural Scenes: Visual and Cognitive Saliency in the Allocation of Attention. GEOFFREY UNDERWOOD, *University of Nottingham*

—The saliency map hypothesis suggests that low-level visual factors are used to guide our initial eye movements as we inspect pictures, and the model makes good predictions about the inspection of pictures in a memory task. We know that the gist of a picture can be acquired during the first fixation of a scene, however, and that individual objects can be identified with very brief exposures. If semantic information can be extracted before the first eye movement, then can this information be used to guide the first eye movement? If so, this would suggest that visual saliency does not exclusively determine the target of the first saccade. When a search task is used, with the target being a member of a natural category appearing in a photograph containing an object of higher visual saliency, then it is cognitive saliency rather than visual saliency that determines the initial eye movements.

SYMPOSIUM: Visuo-Spatial Working Memory.

Gorlaeus Building Room 2,
Friday Morning, 9:00-10:40

Organized and chaired by Cesare Cornoldi, University of Padua

9:00-9:20 (161)

Problems in the Study of Visuospatial Working Memory and the Search for Standard Tasks: The Case of the Corsi Blocks Task. CESARE CORNOLDI, & IRENE C. MAMMARELLA, *University of Padova*

—Differently from the language area, where a long-standing tradition has described different cognitive processes, the area of visuospatial working memory is still in search of clarifications. The paper will review some critical problems in the area. In particular, it will illustrate the need for standard tasks which could make data obtained in different labs comparable. The implications of the Corsi task will be commented and the data of two studies on the backward version of the task will be presented. The two studies hypothesized that the backward spatial span does not involve the controlled use of the same type of sequential spatial processing involved in the forward version, that its impairment is modality specific and that children with specific visuospatial learning disabilities (VSLD) have lower performance in backward than in forward Corsi block test, compared to a control group. In Study 1,

children were presented with a the Digit span test and the Corsi blocks task both in the forward and backward versions, while in Study 2 only the Corsi test was administered. The comparison between the forward and backward span versions showed that both VSLD children and controls presented with the Digit span had a lower performance with the backward version. However, for the Corsi task, this difference was present only for VSLD children. In fact, results revealed a significant impairment in the backward version of the Corsi test in the VSLD group, but not in the forward version. Results suggest that the Corsi backward task is not the spatial analogue of the Digit backward task and that it involves specific simultaneous-spatial processes.

9:20-9:40 (162)

A Comparison of the Hebb Effect in a Visuo-Spatial and a Verbal Serial Recall Task. ANDRÉ VANDIERENDONCK, ANN J. DEPOORTER, & ELISA SENNA, *Ghent University*

—Research on verbal and visuo-spatial short-term serial recall has revealed both similarities and differences. Similarities are usually taken to support the hypothesis that these tasks rely on common memory mechanisms, while differences are sometimes used to argue in favour of different modality-specific memory architectures. Within the verbal domain, several studies have reported the presence of the Hebb effect. This effect reflects learning from unannounced repetitions of a list presented between non-repeating lists. We studied the Hebb effect with verbal (digits) and visuo-spatial (Corsi-like) materials. The Hebb effect was present in both modalities and both the size of the effect and the slope of the learning progress was the same in both conditions. The implications of these findings for the theoretical issue of common or separate memory mechanisms is discussed.

9:40-10:00 (163)

Working Memory and Interference: A Life-Span Perspective. CÉLINE JOUFFRAY, THIERRY LECERF, & ANIK DE RIBAUPIERRE, *Université de Genève* (read by Thierry Lecerf)

—The objective of the present study was to assess whether processes underlying verbal and visuo-spatial working memory (WM) differ across the life span. A WM task was administered, using a dual task paradigm, to 108 children (9 and 12 years of age), 108 young adults (18 to 35), and 54 older adults (60 to 90). Words were presented in cells of a 5x5 matrix. Participants were instructed to recall both words and locations (from 2 to 6 items). Three types of interference tasks were administered during the retention interval and compared to a control condition, using a within-subject design: verbal suppression, spatial suppression, and visual suppression. Results showed that young adults were better than children and older adults. Specific interference was observed for all age groups: Words were impaired by the verbal suppression, whereas locations were impaired by spatial suppression. However, for children and older adults, general interference was also observed.

10:00-10:20 (164)

Visual Processes in Working Memory. JERRY G. QUINN, *University of St. Andrews, Scotland*

—A series of experiments is presented that uses an interference paradigm, following the general approach of Quinn and McConnell (1996), to determine the nature of the material that can be represented within a visually-specific modality and so to begin to specify the material that can be accommodated within such a modality. Results are presented which demonstrate that particular types of memory material and the timing of the presentation of material can make a crucial difference to the implementation of modality specific processes. While dynamic visual noise has been shown to disrupt visually maintained material, systematic deviations from a noise field can significantly change the nature of

interference. In this vein, concepts such as the visual predictability, visual size and visual complexity of material are examined and there relevance to specifically visual disruption specified.

10:20-10:40 (165)

The Path Length Effect and the Structuring Space Effect. JEAN-LUC ROULIN, *University of Savoie*

—The maintenance of nonverbal information has been particularly studied using spatial short-term memory tasks. These tasks require the subject to recall, in the correct order, a sequence of locations in a two dimensional reference space. The most well-known task of localization is the Corsi Task, but it exist other similar tasks with more or less complex reference spaces such as localization in a matrix of 6 by 6, 8 by 8, « burst » matrix and so on. In these tasks, one significant effect is the complexity effect of reference space that we name “structuring space effect”. When the reference space is simple (like in the Corsi task), performances are better than when reference space is complex (matrix of 6 by 6). In the same manner, performances are lower for 8 by 8 matrixes than performance observe for 6 by 6 matrixes. Another effect was observed in spatial task with the same real space or reference space: as distances between locations are increased, performances decrease (Roulin, 2002). In our first work, we have postulated a visuospatial active sequential refreshing mechanism that would support the analogy proposed by Baddeley (1986) and Logie (1995) between verbal and nonverbal maintenance of information but we have some unattended results. For example, if we suppose an active refreshing mechanism to explain path length effect, we should observe a decrease of performance in localization tasks and, more particularly, suppression or a decrease in path length effect. Unfortunately, results with adults and different visuospatial interference tasks show that path length effect was maintained under suppression conditions (Loisy 1998, Roulin & Loisy, Submitted). In the light of these results and knowing that individual difference on path length effect was not associated to level of performance in visuospatial working memory tasks, another interpretation was proposed. We suppose that subjects maintain information in a restricted represented space and the path length effect would be a simple structuring effect. Moreover, not all subject could be restructure the reference space and individual difference in path length effect would be associated to individual differences in structuring effect. In two experiments, we show that subjects with large path length effect have low structuring space effect and inversely, subject with low path length effect have large structuring space effect. In more we test hypothesis that the capacity to maintain information in restricted useful space was constrained by individual differences in perceptual or cognitive style.

SYMPOSIUM: Neuropsychological and Neuroendocrinological Correlates of the Approach-Avoidance Systems.

Gorlaeus Building Room 3,
Friday Morning, 9:00-10:40

*Organized by Karin Roelofs, Leiden University;
Discussant: Bernhard Hommel, Leiden University*

9:00-9:20 (166)

Automatic Activation of Approach and Avoidance Tendencies in Response to Affective Stimuli: A Goal-Dependent Phenomenon? TRISTAN J. LAVENDER, & BERNHARD HOMMEL, *Leiden University*

—Automatic activation of approach and avoidance tendencies in response to affective stimuli may depend on the actor's current goals or task set. In order to investigate this possibility, we conducted an experiment in which participants were asked to respond to emotionally charged pictures on a computer screen by

moving a little doll either toward to the screen (approach) or away from it (avoidance). Half of the participants were instructed to evaluate the emotional valence of the pictures, whereas the other half were instructed to judge a non-affective aspect of the pictures (spatial orientation). For the first group of participants, the compatible positive-approach/negative-avoid mapping yielded faster responses than the incompatible positive-avoid/negative-approach mapping, but for the latter group, no such effect was found. This indicates that the automatic activation of approach and avoidance tendencies in response to affective stimuli is a goal-dependent phenomenon.

9:20-9:40 (167)

Affective Evaluation and Action Tendencies to Approach or Avoid the Stimulus. MARK ROTTEVEEL, & R. HANS PHAF, *University of Amsterdam*

—Emotions may have the function of preparing organisms for primitive actions, which are presumably organized in two motivational systems, enabling approach and avoidance behavior. Chen and Bargh (1999) suggested that affective processing resulted automatically in such action tendencies. This position can, however, be disputed because the critical test of automaticity may not have been sufficiently exhaustive. In three experiments, we varied instructions and experimental design to investigate the exact nature of this link. When faces with emotional expressions were evaluated consciously, congruent action tendencies were found in arm flexion and extension. When conscious evaluation was diminished, no action tendencies were observed, whereas affective processing of the faces was still evident from the affective priming effects. The results support the position of Clore and Ortony (2000) that action tendencies are not immediate or automatic consequences of affective information processing.

9:40-10:00 (168)

The Effects of Stress-Induced Cortisol Responses on Approach-Avoidance Action Tendencies. KARIN ROELOFS, BERNET ELZINGA, *Leiden University*, & MARK ROTTEVEEL, *University of Amsterdam*

—High glucocorticoid stress-responses are associated with prolonged freezing reactions and decreased active approach and avoidance behavior in animals. We investigated the effects of cortisol responses on approach-avoidance behavior in humans. Twenty individuals were administered a computerized approach-avoidance (AA)-task before and after stress-induction (Trier Social Stress Test). The AA-task involved a reaction time (RT) task, in which participants made affect congruent and affect incongruent arm movements towards positive and threatening social stimuli. Affect congruent responses involved arm extension (avoidance) in response to angry faces and arm flexion (approach) in response to happy faces. Reversed responses were made in affect incongruent instruction conditions. As expected, participants with high cortisol responses showed significantly decreased RT congruency-effects in a context of social stress. Thus, in agreement with animal research, high cortisol responses were associated with a decrease in active approach-avoidance behavior during stress. These findings may have important implications for the study of freezing and avoidance reactions in patients with anxiety disorders.

10:00-10:20 (169)

Effects of Testosterone on the Approach-Avoidance Systems. ERNO J. HERMANS, PETER PUTMAN, & JACK VAN HONK, *Utrecht University*

—Despite considerable knowledge about acute actions of testosterone in a variety of animal species, hardly any causal experimental studies have been conducted using human participants. In this presentation we will present data from studies that test the widely held assumption that testosterone shifts the

balance of approach-avoidance motivation towards the former. That is, theoretically, testosterone should facilitate reproductive behavior and social aggression on the one hand, but counteract fear-related processes on the other. We have performed a series of experiments in which we tested these notions using behavioral (the IOWA gambling task) and psychophysiological measures (facial electromyography, cardiac measures, and startle reflex modulation). Results were by and large in support of our hypotheses. Finally, we will present neuroimaging studies (functional MRI) in which we seek to specify the neural mechanisms by which these effects occur

10:20-10:40 (170)

The Insula and Resources to Approach. MATTIE TOPS, *University of Groningen*

—The insula has a phylogenetically old function in approach - avoidance processing, e.g., insula activation is especially associated with emotions of disgust whereas heightened appetite has been reported to be associated with insula deactivation. In humans the right insula has additionally evolved into a polymodal convergence area functionally specialized for behaviors requiring integration between extrapersonal stimuli and the internal milieu. Recently, evidence has become available that in humans the insula is the cortical area implicated in monitoring and regulation of peripheral (bodily) resources like levels of glucose, cortisol, testosterone, estrogen and muscle condition, even social resources. This information is integrated in the anterior insular cortex and forwarded to the orbital frontal cortex. By signaling the adequacy of resources, the insula may be importantly implicated in approach - avoidance decisions. Indeed, person characteristics of high approach motivation, as well as inhibition of approach, have both been related to insula activity.

SYMPOSIUM: Language, Reading and Brain.

Gorlaeus Building Room 4/5, Friday Morning, 9:00-10:40

*Organized by Andy W. Ellis, University of York,
& Michal Lavidor, University of Hull*

9:00-9:20 (171)

A Brief Introduction to the Research Training Network on Language and Brain. ANDY W. ELLIS, *University of York*

—The European Commission has funded a 3 Million Euro Research Training Network on Language and Brain involving 12 centres in 6 European countries. This short Introduction will outline the aims and objectives of the network and discuss how it will endeavour to train 10 postdocs ('experienced researchers') and 8 PhD students ('early stage researchers') to contribute to European cognitive science and neuroscience in years to come.

9:20-9:40 (172)

The Biology of Language: A Reductionist Approach. STEFAN KNECHT, *University of Münster*

—To understand language in the brain we need to understand what was there before. Mirror neurons discharge both when individuals perform a goal-directed action and when they observe another individual perform a similar action. In apes mirror neurons are found in brain regions that correspond to human language regions. The mirror neuron system provides a neural mechanism for imitating and learning complex actions and – as a functional consequence – to understand their meaning. Enlarged brain size boosted the hominid ability to link frequently co-occurring information. This way humans can map a wide range of sensory or motor cues onto their action-observation mirror neuron system. Because such cues are external events they can also be formalized and used as a code for communication. This scenario suggests that action and language are only different by grade. Targeting the

underlying neural interactions will help us understand language and language learning and improve language disturbances.

9:40-10:00 (173)

The Recognition of Words in Sentences by Bilinguals: RT and ERP Data. TON DIJKSTRA, JANET VAN HELL, & PASCAL BRENDERS, *Radboud University Nijmegen*

—To examine how sentence context affects bilingual word recognition, proficient Dutch-English bilinguals (with Dutch as first language, L1, and English as second language, L2) read Dutch or English high and low constraint sentences, followed by sentence-final English target items. The words of a sentence were presented using an RSVP technique. Target words were orthogonally varied with respect to cognate status and concreteness. In Experiment 1, the participants performed an English lexical decision task with respect to English target words and nonwords. In Experiment 2, event-related potentials (ERPs) were measured using the same word and sentence materials. The RT analyses showed consistent main effects of context constraint, cognate status, and concreteness on bilingual visual word recognition. Among other effects, the ERP analyses showed consistent main effects of language and context constraint on bilingual word recognition. These results can be interpreted within the framework of the BIA+ model of bilingual word recognition.

10:00-10:20 (174)

Modelling Very Early Reading Development. PADRAIC MONAGHAN, SOPHIE BRIGSTOCKE, & CHARLES HULME, *University of York*

—Computational models of reading have typically focused on simulating adult readers' performance. In this paper, we explore the extent to which these models can be adapted to reflect the very early stages of learning to read. We collected data from three children in the first four months that they were reading. All the classroom reading materials that they were exposed to were logged, and their reading vocabulary was tested at regular intervals. We compared their learning performance to that of a connectionist model of reading, adapted from Harm and Seidenberg (1999), trained on exactly the same reading material as the children. We report properties of the words that predicted accurate reading by the children, and the extent to which these can be mirrored in the computational model.

10:20-10:40 (175)

Morpheme-Based Reading Aloud in Italian Developmental Dyslexia. CRISTINA BURANI, *Istituto di Scienze e Tecnologie della Cognizione, CNR, Rome*

—Italian has a regular orthography, with mostly one letter-to-one phoneme correspondences. Italian developmental dyslexics are characterized by extremely analytical, fragmented, and sequential reading aloud, which suggests over-reliance on the non-lexical reading routine. We report experiments which analysed the influence of morphological constituents (roots and derivational suffixes) in the reading of young Italian dyslexics. Effects of morphemic structure were observed, particularly in the reading of low frequency words and pseudowords. Overall, these data indicate the availability of a morpheme-based lexical procedure in a language with transparent orthography, and shed light on the relative time-course of lexical, morpho-lexical and non-lexical reading in slow readers.

Action Planning and Control I.

Gorlaeus Building Room 6,
Friday Morning, 9:00-10:40

Chaired by Sander A. Los, *Vrije Universiteit Amsterdam*

9:00-9:20 (176)

Instruction-Induced Feature Binding. DORIT WENKE, DIETER NATTKEMPER, & ROBERT GASCHLER, *Humboldt University Berlin*

—In order to test whether or not instructions specifying the S-R mappings for a new task suffice to create bindings between specified stimulus and response features, we developed a dual task paradigm of the ABBA type in which participants saw new S-R instructions for the A-task in the beginning of each trial. Immediately after the A-task instructions, participants had to perform a logically independent B-task. The imperative stimulus for the A-task was presented after the B-task had been executed. The present data show that the instructed mappings influence performance on the embedded B-task, even when they (i) have never been practiced, and (ii) are irrelevant with respect to the B-task, at least when (iii) overlapping features are relevant for both tasks. These results imply that instructions can induce bindings between S- and R-features that lead to automatic response activation without prior execution of a task.

9:20-9:40 (177)

Two Modes of Motor Learning in Stimulus-Based and Intention-Based Actions. FLORIAN WASZAK, *CNRS & Université Paris V*, & WOLFGANG PRINZ, *Max-Planck-Institute for Human Cognitive and Brain Sciences, Munich*

—Humans can either carry out movements to manipulate the environment in order to produce desired environmental effects; or they may carry out movements to accommodate to environmental demands. It is well known that the neural substrates controlling these two kinds of actions are different. However, only little is known about what happens -in functional terms- on these different 'routes to action'. We present an experiment suggesting that stimulus-based and intention-based actions rely on two different kinds of learning. The activity of the reaction system results in the compilation of a kind of S-R dictionary containing rules about which motor-routines action-relevant objects habitually require (sensorimotor learning). By contrast, the activity of the volitional system entails the compilation of a kind of action-effect dictionary containing rules about which action produces which effect (ideomotor learning).

9:40-10:00 (178)

When Does Preparation End? SANDER A. LOS, & MARK L.J. SCHUT, *Vrije Universiteit, Amsterdam*

—During the preparation interval which starts with the onset of a warning stimulus (S1), the participant is allowed to prepare for action to the impending imperative stimulus (S2). When does the buildup of preparation stop? One possibility is that it stops simultaneously with the onset of S2. This might be the case when preparatory resources are immediately converted to enhance early perceptual processing of S2. Alternatively, it might be that preparation supports later processing stages, in which case it may continue to develop after the onset of S2, in parallel with the early processing of S2. To decide between these alternatives, we varied the duration of the preparation interval in conjunction with factors that are supposed to influence specific stages of S2 processing. Apart from providing new insights in the dynamics of preparatory processes, this method also sheds light on the recent controversy about the stages that benefit from preparation.

10:00-10:20 (179)

Cognitive Pupillary Response in a Finger Precueing Task. SOFIE MORESI, & JOS ADAM, *University of Maastricht*

—Cognitive pupillary responses among 19 university students were investigated. Mean pupil dilation and reaction time were measured during a finger precueing task. In this task a spatial precue provides partial information about which fingers to use for

responding. According to the Grouping model (Adam, Hommel & Umiltà, 2003, 2005), cues indicating two fingers on the left or right hand represent a strong perceptual and corresponding response group which results in a fast automatic selection of the cued responses. On the other hand for cues indicating fingers on different hands need a slower, more effortful process is needed to select the relevant response. Because mean pupil dilation increases with cognitive loading, a higher mean pupil dilation was expected for later cue conditions. In contrast the results showed the strongest pupil dilation to occur when the cue indicated two fingers on one hand compared to two fingers on two hands.

10:20-10:40 (180)

Tool Transformation: An Instance Where Fitts' Law Does Not Hold. MARTINA RIEGER, *MPI For Human Cognitive and Brain Sciences*

—Does Fitts' law does hold with different transformations between movement and visual space? In Experiment 1 participants carried out continuous vertical reversal movements. Movement amplitude (12 cm) and target width (0.4 cm) and therefore index of difficulty (5.91) were equal for all conditions. Nine different gain conditions were conducted in different blocks (1.8, 1.6, 1.4, 1.2, 1.0, 0.8, 0.6, 0.4, 0.2). According to Fitts' law movement times should be equal in all conditions. Systematic differences between conditions must be attributed to the influence of the visual reference frame on movement organization. Movements with higher gain were slower and had lower peak velocity than movements with lower gain. This indicates that extracorporeal space has an effect on movement kinematics and that Fitts' law does not hold across different transformations between movement space and visual space. In Experiment 2 we replicated those results investigating horizontal reversal movements and different index of difficulties.

Language Perception III.

Gorlaeus Building Room 7,
Friday Morning, 9:00-10:40

Chaired by Ram Frost, The Hebrew University

9:00-9:20 (181)

SOA Does Not Necessarily Reveal the Absolute Time Course of Activation in Fast Priming Experiments. RAM FROST, & BOAZ TZUR, *The Hebrew University*

—Applying Bloch's law to visual word recognition research, both exposure duration of the prime and its luminance determine the prime's overall energy, and consequently determine the size of the priming effect. Nevertheless, experimenters using fast priming paradigms traditionally focus only on the SOA between prime and target to reflect the absolute speed of cognitive processes. Some of the discrepancies in results regarding the time course of orthographic and phonological activation in word recognition research may be due to this factor. This hypothesis was examined by manipulating parametrically the luminance of the prime and its exposure duration, measuring their joint impact on masked repetition priming. The results show that small and unreliable priming effects can more than triple by simply increasing luminance, when SOA is kept constant. Moreover, increased luminance may substitute for additional exposure duration and vice versa. Similar effects are found when contrast is manipulated rather than print luminance. The implications of these findings to the modeling of word recognition will be discussed.

9:20-9:40 (182)

The FN5 Model of French Spoken Word Recognition and Its Position Processor. NICOLAS LÉWY, & FRANÇOIS GROSJEAN, *Université de Neuchâtel*

—We will present and demonstrate a new computational model,

called FN5, that addresses the recognition of spoken words in French (determiners, prenominal adjectives, nouns), presented either in isolation or as a sequence of two words (determiner + noun, prenominal adjective + noun). The model contains a lexicon of more than 17,000 words and has a localist connectionist architecture. We will focus on how the model deals with simultaneously active words that begin at different temporal positions. At each cycle, a Position Processor aligns each word with each phoneme position in the string of phonemes and chooses the word alignment that gives the highest activation input. After each cycle, only one position and one updated activation level are stored per word. As compared to the approaches used in TRACE and SHORTLIST, this one does not need to reduplicate words nor does it need to restrict its list of candidates.

9:40-10:00 (183)

Further Tests of Morpho-Semantic and Morpho-Orthographic Influences in Early Word Recognition. KEVIN DIEPENDAELE, *University of Antwerp*, JONATHAN GRAINGER, *University of Provence*, & DOMINIEK SANDRA, *University of Antwerp*

—In a recent paper (Diependaele, Sandra, & Grainger, 2005) we demonstrated a dissociation between morpho-semantic and morpho-orthographic influences in the early stages of recognizing suffix-derived words. Importantly, morpho-semantic influences - unlike morpho-orthographic influences - seemed limited to processing in the visual modality. We will present two further tests of these findings. In our first experiment we used the masked cross-modal priming technique in a go/no-go semantic categorization task. Our second experiment used the masked transposed-letter priming paradigm in a visual lexical decision task. The results of both experiments provide further evidence for the existence of the two distinct processing mechanisms and thus question any model that explains morphological processing purely in terms of either morpho-semantic or morpho-orthographic processing. Moreover, in our semantic categorization experiment, morpho-semantic processing was again only evident in the visual modality. We will discuss how current models of lexical processing can account for the present findings.

10:00-10:20 (184)

Regular Irregularity: The Importance of Inflectional Paradigms in Lexical Processing. FERMÍN MOSCOSO DEL PRADO MARTÍN, *Medical Research Council, United Kingdom*

—We investigate, by means of two lexical decision experiments, whether the differences in the processing of regular and irregular English verbs can arise from the distributions of their inflectional paradigms. The effect of verb regularity is also observed when participants respond to uninflected present-tense forms and to inflected continuous ('-ing') forms of regular and irregular verbs. Both of these cases are completely regular in English, but differ in the presence or absence of an inflectional suffix ('-ing'). This rules out the suggestion that the previously reported differences between regular and irregular past-tense forms are due to the presence or absence of an inflectional suffix or a rule-application mechanism. The second experiment shows that the degree of productivity of the past-tense suffix ('-ed') or vowel alternation class (e.g., meet-met, keep-kept, ...) is more accurate than the traditional regular/irregular dichotomy to describe the differences in the processing of English verbs.

10:20-10:40 (185)

Simple Word Frequency Effect: Does It Exist? JOANNA RACZASZEK - LEONARDI, *Warsaw University*

—Two experiments have been conducted in order to gain information about how length, frequency of occurrence and presence of digraphs affect speed of word recognition. Results of

the first experiment showed that frequency of occurrence was a good predictor of recognition time. The effects of word length, however, depended on word's frequency: short frequent words were responded to much faster than short infrequent words but for long words this effect almost disappeared. Also, short infrequent words were not recognized any faster than long infrequent words. We've also found a significant interaction of frequency with the presence of digraphs. The second study was designed to test the hypothesis that the effects observed are due to the influence of number and relative frequency of words' orthographic neighbors. It seems that neighborhood density and frequency effects may account for some of the results previously thought to be pure frequency effects.

Visual Attention II.

Gorlaeus Building Room 1,
Friday Morning, 11:00-12:40

Chaired by Claus Bundesen, University of Copenhagen

11:00-11:20 (186)

Neural Theory of Visual Attention (NTVA). CLAUS BUNDESEN, THOMAS HABEKOST, & SØREN KYLLINGSBÆK, *University of Copenhagen*

—The neural theory of visual attention (NTVA) developed by C. Bundesen, T. Habekost, and S. Kyllingsbæk (in press) is outlined. NTVA is a neural interpretation of Bundesen's (1990) theory of visual attention (TVA). In NTVA, visual processing capacity is distributed across stimuli by dynamic remapping of receptive fields of cortical cells such that more processing resources (cells) are devoted to behaviorally important objects than to less important ones. By use of the same basic equations, NTVA accounts for a wide range of known attentional effects in human performance (reaction times and error rates) and a wide range of effects observed in firing rates of single cells in the primate visual system. NTVA provides a mathematical framework to unify the two fields of research - formulas bridging cognition and neurophysiology.

11:20-11:40 (187)

Persisting Asymmetries of Vision after Right Side Lesions. THOMAS HABEKOST, *University of Copenhagen*, & EGILL ROSTRUP, *Hvidovre Hospital*

—This study shows that even with minor or no clinical signs of neglect, and in the stable phase of recovery, asymmetric visual perception is common after right side lesions. Using the TVA model (Bundesen, 1990), parameters of visual capacity and attentional weighting were estimated in 26 patients with right-side stroke. The measurement error of each test result was estimated by bootstrap statistics (Habekost & Bundesen, 2003). Lesions were examined by MRI. Two types of deficit were found. The first was related to perception of unilateral displays, where most patients showed left side reductions of visual processing speed. This asymmetry was linked to a highly frequent affection of the putamen area. The second deficit type occurred with bilateral displays, which increased the visual asymmetry for most patients with large cortico-subcortical lesions, but rarely after focal lesions. However in a single case with pulvinar damage, visual asymmetry occurred selectively with bilateral stimulation.

11:40-12:00 (188)

A Multinomial Processing Model of Visual Perception. EMMANUELLE BOLOIX, CLAUDE BASTIEN, & ABDESSADEK EL AHMADI, *University of Provence*

—Recent works on visual attention modeling encompass both the task-relevance and the perceptual saliency as crucial factors in directing the visual attention and the eyes on objects during on-line scene perception. Though such models successfully simulate ocular

behaviour of humans performing a task on visual scenes, they do not account for visual information that is represented in memory. This issue is yet crucial, since (I) the fact of having been previously fixed by the eye and attention doesn't guarantee that information will be represented in memory, and (II) the information that is represented in memory will guide subsequent behaviour. Here we propose a multinomial processing-tree model of visual perception. It aims to determine the visual information that is processed and represented in memory when observers have to perform a task on visual scenes. The model was tested with empirical data. Results and implications of theories of visual perception are discussed.

12:00-12:20 (189)

Space-Based and Object-Based Visual Attention in Overlapping Tasks. HAGIT MAGEN, *Princeton University*, & ASHER COHEN, *Hebrew University* (read by Asher Cohen)

—When subjects perform two tasks (T1 and T2) in close temporal succession, performance of T2 is typically severely limited. However, much evidence suggests that some aspects of T2 can be performed concurrently with T1. In our previous research we showed that this performance limitation can be explained to a large extent by the modular architecture of the visual system. In this talk we examine whether visual attention can operate on T2. A previous paper showed that spatial attention can be used for T2 concurrently with the performance of T1. We present evidence, using the classical Duncan task, that object-based attention can also be used for T2. We describe a model that assumes different roles for space- and object-based attention systems during overlapping tasks and present an additional experiment with the PRP paradigm that confirms the prediction of this model.

12:20-12:40 (190)

Visual Selective Attention and the Effects of Monetary Rewards CHIARA DELLA LIBERA, & LEONARDO CHELAZZI, *University of Verona*

—Outcomes of actions, in the form of rewards and punishments, are known to shape behavior. As a result, adaptive behaviors are reinforced at the expenses of competing ones, thus increasing fitness of the organism with its environment. However, it is unknown whether similar influences also regulate covert mental processes, such as Visual Selective Attention (VSA). VSA underlies goal-directed performance by allowing privileged processing of task-relevant information, while inhibiting distracting contextual elements. Using variable monetary rewards as arbitrary feedback on performance, we tested whether acts of attentional selection, in particular their lasting effects, can be modulated by their consequences. Through a variety of behavioral paradigms, we observed profound adjustments of VSA efficacy both in the short-term, with a trial-by-trial procedure, and in the long-term, with delayed tests. Our findings reveal an adaptive feature of VSA that may provide attentive processes with both flexibility and self-regulation properties.

SYMPOSIUM: Trauma and Memory.

Gorlaeus Building Room 2,
Friday Morning, 11:00-12:40

Organized by Annika M.D. Melinder, University of Oslo; Chaired by Annika M.D. Melinder, & Tim Brennen, University of Oslo; Discussant: Asher Koriati, University of Haifa

11:00-11:20 (191)

What We See is Not What We Remember: Schema Activation and Commission Errors. INGRID E.L. CANDEL, ELLEN SANDERS, ELLEN SCHELBERG, & HARALD MERCKELBACH, *Maastricht University*

—Boundary extension is a memory illusion that lies on the border

of perceiving and remembering. It refers to the tendency to remember central objects smaller than they actually were and to remember more background than there actually was. Perceptual schema activation might account for this phenomenon. In this study, we examined whether schema manipulation would result in boundary extension along with schema-congruent commission errors. Participants ($N = 62$) were primed with one of two descriptions before picture presentation. Pictures were 6 aversive and 6 neutral scenes. Next, participants drew all pictures from memory. Results indicated boundary extension for both emotional and neutral scene memory. Amount of extension differed between the two picture categories in that more boundary extension occurred in neutral scene memory. Moreover, participants made more schema-congruent than schema-incongruent commission errors. Commission errors occurred more often in neutral than in emotional scene memory. Results are discussed in terms of schema activation.

11:20-11:40 (192)

Effect of Acute Psychosocial Stress on Emotional Verbal Memory. MARKO JELICIC, *University of Maastricht*

—We examined effects of acute stress on memory for neutral and emotional words. Participants ($n = 40$) were exposed to either a psychosocial stressor or a control task, followed by a memory test. The stress hormone cortisol was measured in saliva before and after stress induction, and after the memory test. Acute stress had a differential effect on memory such that recall of neutral words was impaired, while that of emotional words was enhanced. These effects on memory performance were not mediated by cortisol. Results are not in line with the concept of mood dependent memory, but can be explained using a neuropsychological framework.

11:40-12:00 (193)

Trauma-Related False Memories in War-Induced Posttraumatic Stress Disorder. TIM BRENNEN, *University of Oslo*, RAGNHILD DYBDAHL, *Regional Centre for Children and Adolescents' Mental Health, Oslo*, & ALMASA KAPIDZIC, *University of Tuzla*

—Zoellner, Foa, Brigidi, and Przeworski (2000) and Bremner, Shobe, and Kihlstrom (2000) showed that PTSD patients and trauma-exposed controls did not differ in susceptibility to false recall of critical lures in the DRM paradigm. Because several studies have demonstrated enhanced recall of trauma-related material in PTSD, the present study investigated recall of critical lures for war-related and neutral words in 100 Bosnian adults (50 patients with war-induced PTSD and 50 trauma-exposed controls). Over all, the controls correctly recalled more war and neutral words, and, replicating the above studies, there was no difference between the groups for neutral critical lures, but the PTSD patients falsely recalled more war-related critical lures. While measures of PTSD severity and depression correlated negatively with correct recall, only depression had a positive correlation with the recall of critical lures. The results are discussed in terms of a source-monitoring framework and fuzzy trace theory.

12:00-12:20 (194)

Children's Memory and Confidence-Ratings for Aversive and Neutral Pictures. ANNIKA MELINDER, TOR ENDESTAD, *University of Oslo*, & MAGNUS LINDGREN, *University of Lund*

—There is good evidence that adults remember highly negative events well because they activate physiological (LeDoux, 2000) and behavioral (Christianson, 1992) responses that help consolidate or maintain memories. In the present study we investigated whether this also holds true for children. Using emotional and neutral pictures whose ratings of valence and arousal did not differ between adults and children, memory and meta-memory were

tested in 8-year-old children, using event-related-potentials (ERP), behavioral tests, and confidence-ratings. Preliminary results indicate that children's reaction time to new/old - aversive/neutral pictures did not differ significantly between conditions. The children tended to be more confident the more correctly they recognized the pictures, and shorter response-time in the recognition test correlated significantly with faster decision on their confidence ratings. The relation between memory and distress will be discussed in terms of developmental models of memory.

12:20-12:40 (195)

Facing the Words: A Study of Affective Distractibility. TOR ENDESTAD, ANNIKA MELINDER, *University of Oslo*, & MAGNUS LINDGREN, *University of Lund*

—This study investigated the degree of automaticity in processing of facial expressions. Affective words were superimposed on pictures of faces with affective expressions and participants evaluated the affective value of the words while disregarding the faces. Results revealed that when the words expressed affect congruent with the facial expression, the judgment task was facilitated. When the faces expressed incongruent affect, the judgement task was inhibited. This effect was present for the affects of anger, sadness, happiness, fear and surprise, but not for disgust. In those cases where word judgements were not semantically relevant to affect, no effect was found related to the facial expression. Priming effects were found for the task relevant condition (e.g., gender judgement of names). The results are discussed in relation to the De Houwer & Hermans (1994) extension of the Glaser & Glaser (1989) model.

SYMPOSIUM: Bilingualism and Cognitive Control.

Gorlaeus Building Room 3,
Friday Morning, 11:00-1:00

*Organized by Teresa Bajo, University of Granada, &
Judith F. Kroll, Penn State University;
Chaired by Teresa Bajo, University of Granada*

11:00-11:20 (196)

Inhibiting First Language Phonology in Planning and Producing Speech in a Second Language. CHIP GERFEN, APRIL JACOBS, & JUDITH KROLL, *Penn State University*

—L1 phonetic categories influence the production and perception of L2 phonetic categories in late bilinguals. In this study we examined phonetic control in English-Spanish bilinguals, focusing on the inhibition of the phonology of English in speaking Spanish. We tested two groups of L1 English speakers of equivalent Spanish proficiency, differing only in that one of the groups was participating in a summer immersion program. While measures of proficiency did not reveal significant differences between the groups, performance on a word naming task in Spanish was faster for the immersion group and a phonetic analysis of VOT durations showed that the immersion group exhibited significantly greater control of the short lag VOT target for Spanish voiceless stops, while the non-immersion group exhibited English-like aspiration in the production of these sounds. The results suggest that immersion itself facilitates the inhibition of L1 phonology, enabling speakers to more closely approximate L2 targets.

12:20-12:40 (197)

Bilingual Language Control in Speech Production: The Role of Language Similarity, Age of Acquisition and Proficiency. MIKEL SANTESTEBAN, & ALBERT COSTA, *Universitat de Barcelona*

—A remarkable ability of bilingual speakers is that of keeping their two languages apart during speech production. Researchers have argued that the attentional mechanisms responsible for this

ability may vary depending on the proficiency achieved by the bilinguals in their L2 (Green, 1986; Costa & Santesteban, 2004). In this study, we further explore the extent to which these different attentional strategies depend also on: a) the typological similarity between the two languages of a bilingual; and b) the age of L2 acquisition. We assess these issues by means of a language-switching task in which Basque-Spanish and Spanish-English bilinguals were asked to name pictures in their two languages unpredictably. As previously advanced, the major factor determining the type of attentional control processes involved in bilingual language production is the L2 proficiency rather than the typological similarity or age of acquisition. We conclude that highly-proficient bilinguals shift from the inhibitory mechanism used by L2 learners' to a language-specific selection mechanism.

11:40-12:00 (198)

When Do Friends Help You? Recognition of Cognates and Homographs in Beginning L2 Learners. JANET G. VAN HELL, PASCAL E.A. BRENDERS, & TON DIJKSTRA, *Radboud University Nijmegen*

—In fluent bilinguals, cognates (word pairs sharing lexical form and meaning across languages, e.g., Dutch-English?appel-apple?) are recognized faster than noncognates, irrespective of whether these lexical friends are presented in the second (L2) or in the first language (L1). We studied how variations in cross-linguistic overlap in orthography, phonology and semantics influences word recognition in beginning L2 learners. In lexical decision experiments, cognates were recognized faster than noncognates in L2, but not in L1. However, when cognates were presented along with false friends (homographic word pairs sharing lexical form but not meaning across languages, e.g., ?angel? meaning ?sting? in Dutch), they were recognized slower in L2 than noncognates. These findings indicate that, in beginning learners, the co-activation of lexical friends depends on nontarget language proficiency. Furthermore, the facilitatory effect can be modulated by the presence of false friends.

12:00-12:20 (199)

Changing "Modes" when Reading for Understanding and Reading for Translation. TERESA M. BAJO, PEDRO MACIZO, *University of Granada*, CARMEN RUIZ, *University of Arizona*, NATALIA PAREDES, & ANTONIO J. IBÁÑEZ, *University of Granada*

—Is reading for translation equal to reading in monolingual contexts? Do trained translators change from monolingual to bilingual modes when they have to translate? This question was addressed by considering the cognitive demands imposed on Working Memory (WM) during normal reading and translation, and by manipulating lexical and syntactic properties of the target language (TL) while reading in the source language (SL). Translators performed reading tasks under instructions of only understanding or of understanding and translating. Results indicated that reading for translation consumes more WM resources than reading for understanding. In addition, the effect of lexical and syntactic properties of the TL depended on the task, the blocking procedure and the translators' experience. These results provide support to theories of translation that propose that the TL is activated before finishing comprehension for later translation. In addition, they suggest that translators can change from monolingual to bilingual modes depending on the task demands.

12:20-12:40 (200)

Effects of Bilingualism and Aging in the Anti-Saccade Task. ELLEN BIALYSTOK, FERGUS CRAIK, & JENNIFER RYAN, *University of York, Toronto*

—The cognitive control required to manage two language systems also controls attention to nonverbal stimuli. We used an anti-

saccade paradigm in two response modes to compare monolingual and bilingual performance. In the behavioral task, participants responded with a key press to the same or opposite side as a target stimulus. In the eye-movement task, participants looked toward or away from the target. Participants were younger (20 years) and older (65 years) monolinguals and bilinguals. For the behavioral task, there were small advantages for young bilinguals and very large advantages for older bilinguals in resisting interference in the anti-saccade conditions. For the eye-movement task, there were no differences between monolinguals and bilinguals in either age group. These results show that the groups are the same at early stages of processing used for the eye movement task (200 ms) but bilinguals are better at later stages of processing (350 ms) when more cognitive control is involved.

12:40-1:00 (201)

Effects of Language Proficiency and Working Memory on the Interpretation of Wh-Gaps by Chinese-English Bilingual. PAOLA E. DUSSIAS, *Penn State University*, & PILAR PINAR, *Gallaudet University*

—A number of theories have suggested that the difficulty monolingual English speakers experience while reading sentences with subject gaps ((1) Who does Ann believe __ likes her friend?) and object gaps ((2) Who does Ann believe her friend likes __?) is partially rooted in a limitation on memory: the parse needs to retain the Wh-word in memory until it finds a suitable gap to associate it with. In this paper, we examine how language proficiency and working memory affect the interpretation of subject and object gaps by Chinese-English bilinguals. Sixty Chinese-English bilinguals and 60 English monolingual speakers read sentences exemplifying four conditions. L2 proficiency was assessed via a language background questionnaire and a lexical decision task. The Waters & Caplan (1996) reading span test was administered to obtain a measure of cognitive resources. Preliminary findings suggest that language proficiency and cognitive resources modulate the interpretation of filler-gap dependencies when bilingual speakers read constructions in their L2 which do not exist in their L1.

SYMPOSIUM: Language, Reading and Brain.

Gorlaeus Building Room 4/5,
Friday Morning, 11:00-12:40

*Organized by Andy W. Ellis, University of York,
& Michal Lavidor, University of Hull*

11:00-11:20 (202)

Computational Modelling of Phenomena of Normal Visual Word Recognition. RICHARD SHILLCOCK, *University of Edinburgh*

—I will report a series of simulations of orthographic processing, in which an anatomically motivated neural network model is trained to take representations of words at the level of visual features and establish letter-level representations of words in a shift-invariant mapping corresponding to fixating the words at different positions. I will show how factors such as word frequency, the information profile of words, morphological structure, the position at which words are typically fixated, and letter visibility away from fixation all conspire to affect isolated visual word recognition as it manifests itself in effects such as the Optimal Viewing Position (OVP) effect

11:20-11:40 (203)

Recognising Written Words with a Split Fovea. ANDY W. ELLIS, *University of York*

—Split fovea theory proposes that the human visual world, including that part that falls on the fovea, is divided into a left half

which projects initially to the right hemisphere and a right half which projects initially to the left hemisphere. Importantly, there is no central strip which projects bilaterally to both hemispheres. I will discuss the results of experiments in which effects known to be true for whole words presented in the left or right visual fields are shown to be true also for those parts of centrally-presented words that fall to the left or right of fixation. These results provide some of the best evidence for brain-based constraints on models of visual word recognition.

11:40-12:00 (204)

Spatial and Temporal Aspects of Word Length Effects in Visual Word Recognition. MICHAL LAVIDOR, & PAUL SKARRATT, *University of Hull*

—The number of letters in a word has been shown to affect lexical decision performance in the left, but not the right visual field. This word length and hemifield interaction was used in the current study to explore whether initial processing of centrally presented words is split or bilaterally projected to the two cerebral hemispheres. We presented 5- and 8-letter words at fixation, with a slight left or right field bias. We found word length effects only for words with a left-field bias. In addition, when applying repetitive transcranial magnetic stimulation (rTMS) over the occipital cortex, we found that left occipital TMS created a word length effect for right-biased words, whereas right occipital TMS accentuated the word length effect already shown for left-biased words. We then applied single pulse TMS to investigate the temporal aspects of these effects. Together, these results support the split fovea account of visual word recognition.

12:00-12:20 (205)

Characterizing Bottom-Up and Top-Down Interactions during Visual Word Recognition Using Brain Imaging Data. TATJANA NAZIR, CLARA MARTIN, QING CAI, & YVES PAULIGNAN, *Centre National de La Recherche Scientifique Lyon*

—We will present a series of studies that are aimed at characterizing the cortical structures and functional mechanisms involved in skilled reading. We will first report results of a meta-analysis performed on a large set of brain imaging data during perception and production of written words. This analysis revealed a bilateral network of activated brain region that run along main cerebral sulci from the fusiform gyrus to the inferior parietal cortices, and the inferior frontal cortices. We will then report results from studies where we measured Event-Related Potentials (ERP's) while subjects identify individual letters within words or nonwords (two-alternative forced choice) displayed at various locations in the visual field. Comparison between the two context-conditions provides insights as to when stimulus familiarity (top-down) starts to modulate task-related ERP's.

12:20-12:40 (206)

Allographic Processing in Word Recognition. ANNALENA VENNERT, *University of Hull*, KATRINA E. FORBES-MCKAY, *The Robert Gordon University*, NEAL O'BRIEN, *University of Hull*, & ANDY W. ELLIS, *University of York*

—According to current cognitive models allographic processing (i.e. processing of letter case or letter style) has no role in the early stages of word recognition, when only an abstract representation of the word is formed which is not dependent on any allographic feature. New evidence from patients with allographic dysgraphia and experimental manipulations of word form (e.g. mIxEd cAsE or cAsE rEVERSAL) appears to indicate that allographic information must be included in the very early stages of word processing. Findings from patients with allographic dysgraphia and from behavioural and functional neuroimaging experiments with normal participants will be presented showing that experimental manipulation of letter case influences word recognition. Overall

converging evidence is found that letter case information is coded in the early stages of word recognition. Allographic information appears to support word recognition, as familiar word/case form combinations provide a speed advantage in accessing the corresponding lexical representation.

Action Planning and Control II.

Gorlaeus Building Room 6,
Friday Morning, 11:00-12:40

Chaired by Ardi Roelofs,

Max Planck Institute for Psycholinguistics

11:00-11:20 (207)

The Role of Response Modality in Stroop-Like Tasks. ARDI ROELOFS, *Max Planck Institute for Psycholinguistics*

—Response modality is a major determinant of Stroop-like effects. In responding to the arrow of arrow-word stimuli (e.g., a right-pointing arrow combined with the written word LEFT), incongruent words delay vocal responses but they have (almost) no effect on manual responses. In contrast, in responding to the word, incongruent arrows delay manual responses but they have (almost) no effect on vocal responses (e.g., Baldo, Shimamura, & Prinzmetal, 1998; Turken & Swick, 1999). Baldo et al. (1998) argued that processing speed and compatibility principles explain these effects, whereas others advanced architectural accounts, as implemented in WEAVER++ (Roelofs, 2003). The contribution of processing speed and architectural factors was assessed by manipulating the timing of the arrows and words. Preexposed words interfered with manual responses to the arrows, but preexposed arrows did not interfere with vocal responses to the words. This suggests that the architecture is critical. WEAVER++ simulations corroborated this claim.

11:20-11:40 (208)

Reversed Congruency Effects by Practicing Incompatible Mapping Rules: The Reversal of the SNARC Effect. WIM NOTEBAERT, WIM GEVERS, & WIM FIAS, *Ghent University*

—Proctor and Marble (2000) demonstrated that the Simon effect reverses when participants respond spatially incompatible in a concurrent task. We investigated this reversal in the SNARC task (tendency to respond left on small numbers and right on large numbers). Participants randomly switched between a magnitude task (>5 or <5) and an orientation task (number presented upright or italic). Experiment 1 revealed a reversed SNARC effect in the orientation task for participants that received an incompatible mapping rule in the magnitude task (>5 left, <5 right). Experiment 2 showed that this reversal is not stimulus-specific and Experiment 3 revealed a reversal of the SNARC effect through the practice of a spatially incompatible mapping. This suggests that the reversal of congruency effects is not caused by inappropriate use of the mapping rule from the alternative task but by the configuration of new associations.

11:40-12:00 (209)

The Effects of Intentional Cues on Spatial S-R Correspondence. PETER WUEHR, *University of Erlangen*

—The Simon effect involves faster responses to spatially corresponding than to noncorresponding stimuli, even when stimulus location is irrelevant. This effect is thought to arise at the response-selection stage. Consistent with this view, intentional cues (stimuli signaling the upcoming response) affect the size of the Simon effect. In particular, previous studies found that valid cues increased Simon effects, while invalid cues decreased Simon effects, when cue validity was imperfect (e.g., 80%). Although this finding is robust, one might expect valid cues to decrease interference from irrelevant information, instead of increasing it.

The present study compared the effects of highly predictable cues (i.e. 80% validity) with the effects of perfectly predictable cues. In Experiment 1, highly predictable cues increased Simon effects, consistent with previous research. In contrast, perfectly predictable cues decreased Simon effects in Experiment 2. Hence, the response-selection machinery appears to treat highly predictable cues different from perfectly predictable cues.

12:00-12:20 (210)

Evidence for Independent Simon Effects in Reaction Time and Movement Time? ERIC L.L. SOETENS, *Vrije Universiteit Brussel*, WIM NOTEBAERT, *Ghent University*, & KATHLEEN MAETENS, *Vrije Universiteit Brussel*

—Reaction times (RT) are faster when stimulus and response locations correspond than when they do not, even when stimulus location is task irrelevant. This Simon effect supposedly is located in response selection and is not expected in movement time (MT). In three experiments participants reacted to the colour of left or right appearing stimuli by releasing a key and moving quickly to another key. Simon effects appeared in both RT and MT when movement occurred from a central to a right or left key. Correlational analyses showed a trade-off between RT and MT for noncorresponding trials only. A small but significant reversed Simon effect was found in MT when subjects moved from a lateral to a central key, with no trade-off between RT and MT. The same, but a more pronounced pattern was found with wider movements. The data support the presence of Simon effects in post response-selection processes.

12:20-12:40 (211)

Influence of No-Go Trials on the Temporal Aspects of the Simon Effect. KATHLEEN MAETENS, & ERIC L.L. SOETENS, *Vrije Universiteit Brussel*

—Hommel (1994) presented a temporal overlap model, explaining the Simon effect as the consequence of the overlap in time between two processes, a conditional response identification route and an unconditional (spatial) response-priming route. Although there is evidence suggesting that the origin of this effect resides in response selection, it is not clear how response selection operates in this model. We presented the stimulus colour centrally prior to its location. Using a fixed SOA of 0 and 600 ms we found a Simon effect increasing with SOA when coloured go and no-go trials were used. This Simon effect still exists using non-coloured go and no-go trials. These results indicate that the subjects can not select a response before they know for certain that they have to respond. Alternatively the Simon effect may be located in the processes after response selection.

Working Memory I.

Gorlaeus Building Room 7,
Friday Morning, 11:20-12:40

Chaired by Axel Larsen, University of Copenhagen

11:20-11:40 (213)

Visual and Spatial Interference Effects on Visuospatial Working Memory Performance. LOUISE A. BROWN, DOUGLAS FORBES, & JEAN MCCONNELL, *Glasgow Caledonian University*

—The study assessed whether or not performance of the visuospatial working memory (WM) system, as measured by the Visual Patterns Test (VPT), would be affected by the presence of dynamic visual noise (DVN) and/or a spatial tapping task. Sixty-nine participants, aged between 18-40 years, were divided into 3 conditions: one group which was required to view DVN during the delay period; a second group which carried out a spatial tapping task; and a third control group. It was found that DVN had a marginal effect upon WM performance, while spatial tapping

produced the lowest scores. These results call into question previous evidence, as they reflect that spatial interference has a greater effect upon VPT performance than does visual interference, while they also suggest that DVN does have a small interfering effect upon a matrix-type task. The performance of an elderly population will also be discussed.

11:40-12:00 (214)

Modeling Visual Performance in the Classical Mental Rotation Task. AXEL LARSEN, *University of Copenhagen*

—Early studies of visual imagery seemed to suggest that visual images were rich and detailed – like visual templates – and Shepard and Metzler's classical studies of mental rotation is often cited to support these notions. Recent evidence from research on visual attention and the change blindness paradigm suggests almost the opposite: That images maintained in visual short-term memory are anything but rich. The replications and modeling of the classical mental rotation task reported here suggest a solution to some long-standing puzzles concerning the role of complexity and the related issue of the speed of mental rotation. The solution assumes that visual images are sparse and that mental rotation velocity is bounded by an upper limit. With these assumptions effects of complexity and similarity may be explained by the hypothesis that encoding, mentally rotating, and matching a visual image with a stimulus is repeated until sufficient evidence for match/mismatch is accumulated.

12:00-12:20 (215)

Working Memory for Locations of Sounds and Pictures. GÜNTHER LEHNERT, & HUBERT D. ZIMMER, *Saarland University*

—We investigated to what extent modality-specific processing contributes to short-term retention of object locations. The stimulus material consisted of sounds and pictures presented at different locations in space. Items were presented in pure or mixed modality lists of different length. At test, subjects responded to renewed presentation of the objects by indicating their original position. If two modality-specific and resource-limited buffers contribute to location memory, performance should be higher in the mixed modality than in the pure modality condition. Instead, memory performance was equivalent for both list types and auditory and visual items responded to the memory load manipulation with exactly the same decline in performance. The results indicate common processing of stimuli from both modalities. ERP slow potentials recorded during the maintenance interval showed parieto-occipital activity for both modalities, suggesting that items from either modality are rehearsed by visual spatial imagery.

12:20-12:40 (216)

Limited Capacity of Focal Attention in Working Memory. ROBERT BALAS, *Warsaw School of Social Psychology*, ZBIGNIEW STETTNER, JAROSLAW ORZECOWSKI, & KRZYSZTOF T. PIOTROWSKI, *Jagiellonian University*

—Current theories of WM imply the activation as a basis of memory functions and define the focal attention as the most activated part of WM capable of holding only few separate elements at a time. Three experiments using a modified Sternberg paradigm were designed to test (a) hypotheses concerning the activation-based mechanisms of WM search, and (b) the role of focal attention in storing verbal and non-verbal stimuli in WM. In Experiment 1 the position effect on stimulus identification was tested. Experiments 2 and 3 varied the salience of elements held in WM by modifying one of the features (a color). The results showed that the number of directly accessible elements in WM was limited to about four whereas the focus of attention holds only one (presumably the most recent) element at a time. Conclusions are discussed with respect to activation mechanism of storing and searching for information in working memory.

Temporal Visual Attention.
Gorlaeus Building Room 1,
Friday Afternoon, 2:00-4:00

Chaired by Christian N.L. Olivers, Vrije Universiteit Amsterdam

2:00-2:20 (217)

Selective Temporal Attention Enhances the Temporal Resolution of Visual Perception: Evidence from a Temporal Order Judgment Task. ANGEL CORREA, *University of Granada*, DANIEL SANABRIA, CHARLES SPENCE, *University of Oxford*, PIO TUDELA, & JUAN LUPIÁÑEZ, *University of Granada*

—The present work addresses the temporal orienting of attention, a topic of growing interest, and provides new insights to the intriguing debate on the locus at which temporal attention modulates stimulus processing. In the present study, we combined a temporal cuing procedure with the use of a temporal order judgment task (TOJ), to investigate whether the temporal resolution of pairs of visual stimuli could be improved by attending to the relevant moment in time. A temporal cue indicated that the two stimuli could appear after a cue-target interval of either 400 or 1400 ms. The results showed a significant improvement in TOJ performance (i.e., lower JNDs) for attended stimuli than for unattended stimuli, suggesting that endogenous temporal attention can enhance perceptual processing by enhancing the temporal resolution of perception. Some implications for theories about the effects of attention on both spatial resolution and temporal resolution of visual perception are discussed.

2:20-2:40 (218)

Expectations of Identity and Position in Time? – Time as Predictor. ANNIKA WAGENER, PHILIPP GAUL, ANDREA KIESEL, *Universität Würzburg*, WILFRIED KUNDE, *Martin-Luther-University of Halle-Wittenberg*, & JOACHIM HOFFMANN, *Universität Würzburg*

—Studies using different foreperiods prior to target onset showed that orienting attention in time is possible (e.g. Milliken, Lupiáñez, Roberts, and Stevanovski, 2003). We investigated whether covariations between foreperiods and target's identity (Experiment 1) or target's position (Experiment 2) are acquired. In our experiments one of two targets was presented at one of four possible positions. Participants were instructed to indicate target's identity by pressing one of two keys. The foreperiods prior to target onset predicted validly either identity (Experiment 1) or position (Experiment 2) of the target in 80 % of the trials. Participants responded faster in valid than in invalid trials. This was the case, even when they had no explicit knowledge of the covariation. Results evidence that covariations with time intervals are implicitly acquired and used to form expectations about characteristics of the target.

3:00-3:20 (220)

Quick Minds don't Blink: Electrophysiological Correlates of Individual Differences in Attentional Selection. SANDER MARTENS, JAAP MUNNEKE, DICK SMID, & ADDIE JOHNSON, *University of Groningen*

—A well-established phenomenon in the study of attention is the attentional blink: a deficit in reporting the second of two targets when it occurs 200-500 ms after the first. Although the effect has been shown to be robust in a wide variety of task conditions, not every individual participant shows the effect. We measured EEG activity for “non-blinkers” and “blinkers” during execution of a task in which two letters had to be detected in an RSVP stream of digit distractors. Non-blinkers showed an earlier P3 peak, suggesting that they are quicker to consolidate information than are blinkers. Differences in frontal selection positivity (FSP) were also

found, such that non-blinkers showed a larger difference between target and non-target activation than blinkers did. Non-blinkers seem to extract target information at an earlier stage than blinkers do, allowing them to reject distractors more easily and leaving sufficient resources available to report both targets.

3:20-3:40 (221)

Goal Switching Contributes to the Attentional Blink Effect. FABIO FERLAZZO, SABRINA FAGIOLI, & STEFANO SDOIA, *University of Rome “La Sapienza”*

—In four experiments we investigated the contribution of switching between goals to the attentional blink effect. Instructions were used to lead observers to set one or two goals while performing the RSVP task, maintaining constant the mechanisms involved in T1 and T2 processing. In all the experiments we compared two conditions. In one condition observers had two separate goals, namely identifying T1 and T2, and reporting the two. In the second condition, instead, observers had still to identify T1 and T2, but to report some combination of the two. In this way, observers had a single goal for each trial, that could only be achieved after the presentation of T2, and thus never had to switch between goals. According to our hypothesis, switching between goals mediates part of the attentional blink, as the effect was smaller in the second condition than in the first one.

3:40-4:00 (222)

Spreading the Sparing: Against a Limited-Capacity Account of the Attentional Blink. CHRISTIAN N.L. OLIVERS, & STEFAN VAN DER STIGCHEL, *Vrije Universiteit Amsterdam*

—When two targets (T1 and T2) are presented within a stream of distractors, the second target is often missed when presented in close temporal proximity to the first – a phenomenon known as the attentional blink. It is thought that T1 consumes limited capacity resources which are then denied to T2. However, contrary to the limited-capacity account, the present study shows that when even more targets are included (T3 and T4) and presented at the same temporal proximity, performance improves dramatically. It is demonstrated that targets can be spared from the blink at any point in time whenever they are preceded by another target. The results indicate that temporal attention is much more dynamically controlled than previously thought.

SYMPOSIUM: Memory and Metamemory in Psychopathology: Empirical Data on Theoretical Controversies.

Gorlaeus Building Room 2,
Friday Afternoon, 2:00-4:00

Organized by Rafaele J.C. Huntjens, & Iris M. Engelhard, Utrecht University; Chaired by Rafaele J.C. Huntjens, Utrecht University; Discussant: Albert Postma, Utrecht University

2:00-2:20 (223)

Perseverative Checking Causes Memory Distrust. MARCEL VAN DEN HOUT, *University of Utrecht*, & MEREL KINDT, *University of Amsterdam*

—Most patients suffering from Obsessive Compulsive Disorder repetitively check e.g. doors, electrical outlets or gas stoves. They tend to say they do so because after checking they distrust their memory about the checking. For theoretical reasons, to be discussed during the symposium, it was hypothesised that repeated checking is a counterproductive strategy to increase confidence in memory. In 6 experiments sharing the same design healthy participants were asked to carry out compulsive-like behaviour i.e. checking a virtual gas stove. Relative to pertinent control groups who checked virtual light bulbs, participants in the experimental groups witnessed substantial drops in vividness and detail of

memory about checked events. Likewise, memory confidence dropped reliably and substantially. The subjective quality of the induced memory uncertainty was highly comparable to reports about uncertainty from patients. Patients may be motivated to repeated checking by the wish to increase memory confidence, the very repetition has the ironical effect of decreasing rather than increasing memory confidence. Implications for the understanding and treatment of Obsessive Compulsive Disorder will be discussed

2:20-2:40 (224)

Effects of State Dissociation on Objectively and Subjectively Assessed Memory Disturbances. MEREL KINDT, *University of Amsterdam*

—Clinical claims about an association between dissociation and memory disturbances have been around since 1900. Recently, this supposed relation was brought up again in research on posttraumatic stress disorder (PTSD). Trauma victims who develop PTSD are supposed to suffer from memories disturbances, which are held to be the result of dissociation. Moreover, it is argued that the detrimental effects of dissociation are due to disturbances in information processing of the trauma, resulting in these memory disturbances. Until now the observations of fragmentary traumatic memories are based on clinical reports without experimental control of the memorized material. If these supposed detrimental effects are indeed the result of disturbances in information processing, not only subjectively assessed but also objectively assessed memory disturbances should be observed. Four experimental studies will be presented, in which the effects of dissociation on actual memory disturbances and subjectively evaluated memory disturbances were investigated.

2:40-3:00 (225)

Working Memory Capacity, Memory Suppression, and Intrusive Memories of an Emotional Film Fragment. INEKE WESSEL, *Groningen University*

—Intrusive memories often occur in the first few weeks after a experiencing a traumatic event. However, these intrusions persist in only a minority of traumatized people. The question rises whether relatively poor functioning of inhibitory mechanisms in working memory may result in difficulties in warding off traumatic memory material. The present experiment addressed this question using an analogue sample. Memory inhibition is thought to be sensitive to circadian variation. In that sense, testing healthy subjects at off-peak times provides an experimental analogue for deficient inhibition. Evening-type undergraduates performed cognitive control (Working Memory Capacity and Think-No Think) tests at either off-peak (8.30 am) or peak times (3.00 pm). Next, they saw a distressing film-clip and engaged in a thought-suppression procedure. Preliminary analyses suggest that general cognitive control performance and intrusive memory frequency during thought suppression are related.

3:00-3:20 (226)

Memory Consistency of Traumatic Events. IRIS M. ENGELHARD, *Utrecht University*

—Retrospective accounts of traumatic events are consistently related to symptoms of post-traumatic stress disorder (PTSD), and this has often been interpreted as causal impact of such events on psychological functioning. Yet self-reports of prior events are not objective phenomena, and are subject to distortion. In fact, recent studies found that high levels of PTSD symptoms are associated with amplified recollections of precipitating traumatic events. However, these studies relate to the presence or frequency of stressors, and are silent about the consistency of specific memories. Moreover, little is known about factors that determine this enhanced reporting. The aim of this longitudinal, prospective study is to 1) index memory consistency for traumatic events reported by

100 Dutch Army soldiers at two time points after a peacekeeping mission to Iraq, and 2) test the contribution of pre-existing reporting biases, such as those arising from neuroticism or social desirability, and new information acquired.

3:20-3:40 (227)

Amnesia as a Metamemory Phenomenon. KIM I.M. VAN OORSOUW, & HARALD MERCKELBACH, *Maastricht University* (read by Harald Merckelbach)

—Both defendants and victims of crimes sometimes claim to have no memory of the offence. Such claims of amnesia could be organic, dissociative or simulated. However, the question arises whether a clear distinction can be made between dissociative and simulated amnesia. Previous studies have shown that beliefs about memory performance, so called metamemory beliefs, may play an important role in claims of amnesia. The studies that will be discussed have shown that the retrieval of many childhood memories can, paradoxically, induce the metamemory belief that memory for childhood is poor. That such beliefs can be experimentally induced may have important implications for claims of amnesia that arise during psychotherapy. Furthermore, placebo studies have shown that manipulating expectations about memory performance, actually affects memory performance in both undergraduate students and psychiatric inmates. This may be promising for resolving claims of (dissociative) amnesia in which expectations play a role.

3:40-4:00 (228)

Apparent Amnesia. Interidentity Memory Functioning in Dissociative Identity Disorder. RAFAELE J. C. HUNTJENS, *Utrecht University*, & ALBERT POSTMA, *Utrecht University, Helmholtz Institute*

—DID patients very frequently report episodes of interidentity amnesia, in which an identity claims amnesia for events experienced in another identity state. While clinical observations of this so-called interidentity amnesia are numerous, controlled experimental evidence is scarce and contradictory. We designed a series of studies to objectively determine the degree of information transfer from one identity to another. Both explicit and implicit memory tests were used and both neutral and trauma-related material was included. Special attention was given to exclude, or control for, the possibility of simulation of amnesia symptoms. The results of these critical studies all collude in that they showed, in contrast to the patient reports, evidence of transfer of information between identities. Instead of an actual, objective inability to recall information, the disorder seems to be characterized by metamemory beliefs of being unable to retrieve information. The results argue against a separate diagnostic status for DID.

Task-Switching.

Gorlaeus Building Room 3,
Friday Afternoon, 2:00-4:00

Chaired by Andrea M. Philipp,

Max Planck Institute of Cognitive and Brain Sciences

2:00-2:20 (229)

Cognitive Representations in Task Switching: the Task-Integration Model. ANDREA M. PHILIPP, & IRING KOCH, *Max Planck Institute of Cognitive and Brain Sciences*

—We propose a model that is supposed to account for task switching in situations in which subjects switch only one task-set component (e.g., the stimulus categories) and in situations in which two task-set components are manipulated in an experiment (e.g., stimulus categories and response modalities). In several experiments we found that different task-set components like stimulus categories or response modalities have to be integrated

into one single task representation before subjects can perform a "task". This task integration is necessary before response selection. Thus, even components that have been classified as motor-related processes so far (e.g., the response modality) need to be specified and integrated into a task representation before the selection of a response. We suggest that the task integration is a necessary process in task switching and present different experiments to characterize the nature of the task-integration process and to discuss its specific role in task switching.

2:20-2:40 (230)

Dynamics of a Goal Execution. SVETLANA BIALKOVA, & HERBERT SCHRIEFERS, *Nijmegen Institute for Cognition and Information*

—We investigated the dynamics of task switching in a situation with "competition" between two concurrent task goals. In each block of 16 trials, two cues were presented, indicating either a color or a form match task. Cue1 was presented at the beginning of a block, and cue2 between trials 8 and 9. The two cues either indicated the same task (non-conflict condition) or different tasks (conflict condition). One, two, three or four trials after cue2, a warning signal was presented which forced a task switch in the conflict, but not in the non-conflict condition. The results show differences in task switch performance as a function of the numbers of trials intervening between cue2 and the warning signal as well as a function of whether the trial following cue2 requires the same response for both tasks (convergent condition) or different responses (divergent condition). The results are discussed in terms of top-down control processes, bottom-up stimulus driven processes and their potential interaction.

2:40-3:00 (231)

Evidence for a Response Selection Independent Inhibitory Process in Task-Switching. STEFANO SDOIA, *University of Rome 'la Sapienza' & Imaging Laboratory, Fondazione Santa Lucia, Rome*, & FABIO FERLAZZO, *University of Rome 'la Sapienza'*

—Task shifting involves inhibition of the previous task-set, as switching back to a task after one intermediate trial is harder than switching back after two intermediate trials (ABA vs CBA). However, processes triggering such an inhibition are still debated. The hypothesis that inhibition of the currently-irrelevant task set is triggered by processes occurring before the response selection has been investigated by means of a new task-switching procedure. In 2 experiments response selection has been manipulated by asking participants to compare the current stimulus to a another stimulus, occurring only after the successive task was completed, preventing them from selecting a response at the moment of the first stimulus. Results clearly showed that inhibition is already triggered by the first stimulus processing, when response cannot yet be selected. Processes taking place before the response selection are responsible for the inhibition of the irrelevant task-set.

3:00-3:20 (232)

Similarity between Tasks and the Need for Task Inhibition. MIRIAM GADE, & IRING KOCH, *Max Planck Institute of Cognitive and Brain Sciences*

—Sequential control of tasks relies on activation of currently relevant task sets. Recent evidence suggests that inhibitory processes also play a role in performing task sequences. Empirical marker of these inhibitory processes are the n-2 repetition costs. N-2 repetition costs are observed when comparing a n-2 repetition (ABA) with an n-2 switch (CBA). In four experiments we explored the differential contribution of similarity in stimulus and response set for the occurrence of n-2 repetition cost. Similarity was operationalized as overlap in features in stimulus and response sets. Our results suggest that although similarity in stimulus set (i.e.,

same stimuli for different tasks) leads to interference between tasks, inhibition occurs only when tasks are similar in response sets (i.e., in response categories or modalities). These findings suggest that inhibition in the sequential control of tasks has to met certain antecedent conditions to occur, such as similarity-based interference in response sets.

3:20-3:40 (233)

Task Switching by Processing of Time Intervals. The Negative Effect of Task-Precueing. OLEKSIY V. POLUNIN, *Kiev University*

—Task-switching by processing of time-intervals was studied in two experiments. One negative effect of task-precueing was expected. Following assumption guides to this negative effect: two sets (one for perceiving of time-interval and the other one for task-processing) being activated together will interfere. This interference causes the negative effect of task-precueing. 3sec and 4sec intervals were used as stimulus in both experiments. Two tasks were implemented: multiplication and division of the duration of stimulus interval. Three cue-positions (1,2sec, 1sec and 0,6sec before start of stimulus interval) were compared with cue-position on the beginning of stimulus interval. The RT for all cues before beginning of stimulus interval was significantly longer than RT for cue on the beginning of stimulus interval. This result was found in both experiments as for switching as for repetition. The negative effect of task precueing seems to be usual when stimulus is prolonged.

3:40-4:00 (234)

Associative Binding of Task-Set to Stimulus: A Significant Source of Task-Switch Cost? STEPHEN MONSELL, & GUY A. MIZON, *University of Exeter*

—There is typically a cost of switching tasks even when subjects have ample opportunity to prepare for an upcoming change of tasks. On the basis of experiments manipulating the associative history of individual stimuli, Waszak, Hommel and Allport (2003) attributed this 'residual cost' largely to retrieval of a competing task-set associated with the current stimulus. However, many task-switching experiments have used small sets of stimuli: if such associative bindings are stable, all stimuli should become asymptotically associated to both task-sets through repeated presentation; if associative bindings are labile, associative interference should be determined by the recency of association. We report the effects of manipulations of the task with which a stimulus was previously associated, and the recency of that association, with large sets of stimuli each encountered only twice, and with small sets, other things being equal.

Language Perception IV.

Gorlaeus Building Room 4/5,
Friday Afternoon, 2:00-4:00

Chaired by Lars Konieczny, University of Freiburg

2:00-2:20 (235)

Phonological Development in English, French, Icelandic, Portuguese and Spanish: Tracing the Effects of Speech Rhythm and Literacy Acquisition. LYNNE G. DUNCAN, PHILIP H.K. SEYMOUR, *University of Dundee*, NATHALIE GENARD, JACQUELINE LEYBAERT, *Université Libre de Bruxelles*, RANNVEIG G. LUND, *Reykjavik Academi*, BALDUR SIGURÐSSON, *University of Education, Iceland*, ANA SUCENA, SÃO LUÍS CASTRO, *Universidade do Porto*, FRANCISCA SERRANO, & SYLVIA DEFIOR, *Universidad de Granada*

—As part of a larger European investigation of reading acquisition and reading disability, the present study explores the course of phonological development during the first year of reading

instruction. The participants were monolingual beginning readers whose native language was English, French, Icelandic, Portuguese or Spanish. Phonological skills were assessed using two tasks (same-different matching and common unit identification) to enable comparison of epi- and meta-linguistic awareness of syllables, rimes and phonemes as early reading ability develops. The outcome revealed a striking variation in syllable awareness that appeared to be related to differences between the languages in speech rhythm as measured by properties such as vowel reduction and syllable structure. The emergence of a meta-linguistic awareness of phonemes was more uniformly associated with the acquisition of literacy in each language where an effect of orthographic depth on the rate of acquisition of reading and reading-related skills was apparent.

2:20-2:40 (236)

A Computational Model of Sentence Comprehension. STEFAN L. FRANK, MATHIEU KOPPEN, *Radboud University Nijmegen*, LEO G.M. NOORDMAN, *University of Tilburg*, & WIETSKE VONK, *Radboud University Nijmegen*

—Understanding a sentence requires the construction of a 'situational representation', i.e., a mental representation of the situation the sentence describes. Such a representation depends strongly on the reader's or listener's world knowledge. The Distributed Situation Space model (Frank, Koppen, Noordman, & Vonk, *Cognitive Science*, 2003) uses situational representations to simulate how readers construct inferences during the comprehension of stories taking place in a simplified story world. Here, we present a model that comprehends sentences describing story-world situations. It consists of a recurrent neural network which learns to transform these sentences into the DSS representations of the described situations. During training, the network develops internal representations of sentences, which can be shown to combine textual, propositional, and situational information. Experimental data by Fletcher and Chrysler (*Discourse Processes*, 1990), which has been taken as evidence for three distinct levels of representation of text, is thereby accounted for within a single representation.

2:40-3:00 (237)

Storage, Integration and Anticipation Effects during Sentence Comprehension. LARS KONIECZNY, *University of Freiburg*

—How difficult is it to integrate words in sentences during reading? According to Dependency Locality Theory (Gibson, 2000), processing sentences is increasingly costly with more open dependencies to be maintained throughout the sentence (storage cost) and with more previously encountered dependents to be integrated with the current word (integration cost). On the other hand, comprehenders might be able to anticipate verbs better when more, and more informative, dependents have been encountered beforehand. We conducted an eye-tracking reading study with sentences where one NP and a PP could either be modifying a preceding noun, or be a complement of the verb. The results support the anticipation hypothesis and disconfirm DLT: Clause final verbs were read faster when the NPs were verb-complements. To test the storage cost hypothesis, we ran two eye-tracking reading studies with sentences, where clauses of varying complexity (subject relative clauses, SRCs, vs. object relative clauses ORCs) was either additionally centre-embedded in another clause, or not. While first-pass reading time measures revealed an advantage of SRCs over ORCs in simple sentences, there was no slow-down in embedded clauses. Total reading times, however, were significantly higher on the entire sentence when it was embedded, indicating that embedding/storage affects integration during re-reading, rather than online reading.

3:00-3:20 (238)

Resolving Word Order Ambiguities in Basque: Event-Related Brain Potentials Evidence. KEPA ERDOZIA, *University of the Basque Country*, ANTONI RODRIGUEZ-FORNELLS, ANNA MESTRES, *University of Barcelona*, & ITZIAR LAKA, *University of the Basque Country*

—In this pioneering research using neuroimage in Basque (pre-indoeuropean, head-final language), we show that the processing of non-canonical word order (object-first sentences) supposes an additional cost in the working memory for the parser. Additionally, this research shows that the semantic disambiguation of temporally ambiguous sentences generates a semantic component (N400). Linguistic analyses argue that the object-subject-verb order contains a displaced object. In our research we provide electrophysiological and reading times evidence supporting theoretical proposals in linguistics. Those proposals argue that sentences containing displaced elements are syntactically more complex, and hence, they have a higher processing cost. As reading times show, visually presented non-canonical object-first sentences require more time to be processed than canonical subject-first, and the former are harder to comprehend. The ERPs show that visually presented displaced objects require more activation of working memory (LAN), and a higher cost of integration in the position of the subcategorizer verb (P600).

3:20-3:40 (239)

Discourse, Syntax, and Prosody: The Brain Reveals an Immediate Interaction. ROEL KERKHOFS, *Radboud University, Nijmegen*, WIETSKE VONK, *Max Planck Institute for Psycholinguistics, Nijmegen & Radboud University, Nijmegen*, HERBERT SCHRIEFERS, *Nijmegen Institute For Cognition and Information, Radboud University, Nijmegen*, & DOROTHEE J. CHWILLA, *Nijmegen Institute For Cognition and Information, Radboud University, Nijmegen & F.C. Donders Centre For Cognitive Neuroimaging*

—Speech is structured into parts by syntactic and prosodic breaks. However, in isolated sentences, detection of a syntactic break necessarily follows detection of a corresponding prosodic break, making an investigation of the immediate interplay of syntactic and prosodic information impossible. We present a solution to this problem by embedding sentences in a discourse context that induces the expectation of either the presence or the absence of a syntactic break right at a prosodic break. Event-related potentials (ERPs) to acoustically identical sentences in these different contexts were compared. We found that the Closure Positive Shift, an ERP component known to occur after prosodic breaks (Steinhauer et al. 1999), was significantly smaller when a prosodic break coincided with the expectation of a syntactic break than when a syntactic break was not expected at that point in the sentence. These results establish that the brain matches prosodic information against syntactic information immediately.

3:40-4:00 (240)

Spatial Relations and Object Regions: The Constitution of Localization-Specific Areas. PETRA WEISS, *University of Bielefeld*

—Concept of region is used to describe the semantics of spatial prepositions: 'x is in y, if x is located in the region of y.' But this concept remains unclear and vague and has nearly no explanatory value. The idea of object regions as an explanatory construct became relevant in the work of Miller and Johnson-Laird. They explain the fact that objects can be brought together in a meaningful spatial relation by the overlap of their regions. To establish a concrete spatial relation between objects, this overlap is not sufficient. In fact, a topologically or dimensionally specified part in this overlapping area has to be cognized to build up a topological or dimensional relation respectively. Two studies are

reported in which participants had to place one object in relation to another one. The results show that the determination of object regions depends on a complex interaction of different situation-specific factors.

Action Planning and Control III.

Gorlaeus Building Room 6,
Friday Afternoon, 2:00-4:00

2:00-2:20 (241)

Effect of Learning on Imitation of Meaningless Actions. ALESSIA TESSARI, *University of Bologna*, & RAFFAELLA I. RUMIATI, *S.I.S.S.A.*

—The effects of learning in the context of action imitation have been investigated in two experiments conducted with healthy controls. It was predicted that, once learnt, meaningless actions might be processed by the cognitive system as meaningful and this new representational status might influence the process selection in action imitation. Results showed that not only learnt meaningless actions were treated as known, meaningful actions, but they were imitated even better. An interpretation is because they only have a single representation in episodic, long-term memory system not requiring solving any competition among the multiple stored representations as it happens for meaningful actions. The findings are interpreted in the light of a multiple route model for action imitation (Rumiati & Tessari, 2002).

2:20-2:40 (242)

Intentional Ideomotor Movements. ANNE HÄBERLE, RAFAEL LABOISSERE, & WOLFGANG PRINZ, *Max-Planck-Institute for Human Cognitive and Brain Sciences*

—Ideomotor movements are involuntary body movements which occur in every person during the observation of a goal directed action. They are investigated by measuring body movements of subjects observing goal-directed actions. Ideomotor movements reflect two aspects of the observed scene in particular: Perceptually induced ideomotor movements reflect observed movements, intentionally induced ideomotor movements reflect aspects of the goal-directed action, i.e. when subjects observed a ball missing a target they make ideomotor movements, as if they were able to influence the course of the ball and to achieve a hit. A new experiment further investigates the mechanism of intentional induction by manipulating personal interest in the observed scene. The findings show, that intentional ideomotor movements are modulated by personal interest in the observed visual scene and occur exclusively in such situations, when the personal interest is not realised in the observed actions.

2:40-3:00 (243)

The Influence of Effect-Attributions in Action-Awareness. KAI ENGBERT, & ANDREAS WOHLISCHLÄGER, *Max-Planck-Institute for Human Cognitive and Brain Sciences*

—When subjects judge the onset time of their actions (Libet, 1983), a temporal attraction can be observed: The perceived time of a movement is shifted towards its effect. This temporal binding can be found in self- and other-generated movements but not in the observation of a mechanical event. Temporal binding is related to the detection and representation of intentions. However, the contribution of explicit attributions has not been investigated. Using a modified version of the Libet-clock paradigm, we explored temporal binding in case of intended and not intended effects. The first experiment compared an effect to its absence. It indicated that only intended effects did influence the perceived time of a prior movement. A second experiment compared two auditory effects.

However, no difference in temporal binding was observed. These results indicate that temporal binding is influenced by an attribution of the effect. However, this influence seems to be limited to the distinction whether or not an effect is integrated.

3:00-3:20 (244)

Anticipatory Effect Codes in and before the Bottleneck. MARKO PAELECKE, & WILFRIED KUNDE, *Martin-Luther-University Halle-Wittenberg*

—Ideo-motor theories of action control assume that actions are represented and accessed by the anticipation of their sensorial effects. In three experiments we investigated whether the activation of effect codes is subject to central capacity-limited mechanisms. Participants were required to make two choice reactions in response to stimuli presented in rapid succession at variable stimulus onset asynchronies (SOA). In Task 2 we varied the compatibility between responses and forthcoming sensorial effects (Experiment 1 and 2) or between responses and stimuli partially resembling those effects (Experiment 3). With forthcoming effects and thereby anticipated effect codes compatibility effects were additive with effects of SOA, whereas with perceptual stimulation of effect codes an underadditive interaction with SOA was obtained. These findings suggest that an endogenous, but not an exogenous activation of effect codes takes place during the capacity-limited response selection stage. The results are discussed with regard to current models of action control.

3:20-3:40 (245)

Task-Specific Action-Effect Binding - Evidence from Task-Switching Experiments. DIETER NATTKEMPER, *Humboldt-University Berlin*, MICHAEL ZIESSLER, *University of Sunderland*, & PETER A. FRENSCH, *Humboldt-University Berlin*

—Recent findings indicate that the mechanisms being responsible for the acquisition of the relations between actions and their remote environmental effects are bound to processes involved in anticipative action control and selectively bind features of intended effects to features of the actions that bring these effects about. This notion implies that we should be able to show that features of the task-specific context within which particular actions produce particular effects are incorporated into the binding, too. This question was studied in experiments where participants were required to perform two different, either systematically or randomly changing tasks in succession.

3:40-4:00 (246)

Switching between Movement-Effect-Mappings. CRISTINA MASSEN, & WOLFGANG PRINZ, *Max-Planck-Institute for Human Cognitive and Brain Sciences*

—According to the ideomotor approach to voluntary action, actions are planned in relation to their effects in extracorporeal space. Especially in tool use, this requires the ability to flexibly map bodily movements to their consequences in extracorporeal space, because the same movement can have different effects, depending on the tool used. In our experiments we explored the relative roles of the effect, the movement and their mapping in the representation of actions. Switching between different response-to-letter-mappings, subjects were required to 'write' letters on a screen by pressing one of four buttons on a response pad. We systematically varied transitions between trial n-1 and trial n, keeping either only the effect, only the movement or only the mapping constant. Results indicate positive priming effects for keeping the transformation or the effect constant, whereas the production of the same movement is impaired if it leads to a different effect with a different mapping.

SYMPOSIUM: Do Numbers Have Special Representation in the Human Brain?

Gorlaeus Building Room 7,
Friday Afternoon, 2:00-4:00

Organized by Roi Cohen Kadosh, Ben Gurion University of the Negev, Jan Lammertyn, Ghent University, & Veronique Izard, INSERM unit 562 'Neuroimagerie Cognitive'; Chaired by Roi Cohen Kadosh, Ben Gurion University of the Negev

2:00-2:20 (247)

What Is a Clever Thing Like Number Doing in the Zombie Brain? VINCENT WALSH, *University College London*

—Of the cognitive functions that we often associate with being human most are associated with our capacity to plan, assess outcomes, make counterintuitive choices, be aware or perform other intellectual operations. The brain substrates for many of these functions have been located to the frontal lobes or to specialised areas in the temporal cortex. Number processing, on the other hand begins in the parietal cortex, a region of the brain not usually associated with higher functions. Indeed the parietal cortex has been labeled as part of the "zombie brain" associated with automatic processing without awareness. I will discuss why this is the case and argue that, because "numeros" have been located in homologous areas in the brains of humans and monkeys that any complete explanation of the origins of number must account for why quantity information would be in the parietal cortex in both species.

2:20-2:40 (248)

Parietal Lobe Involvement in Numerical and Ordinal Comparisons of Symbolic and Non-Symbolic Information. WIM FIAS, BERNIE CAESSENS, *Ghent University*, & GUY ORBAN, *University of Leuven*

—Intraparietal sulcus (IPS) activation is robustly observed during number processing. However, numbers not only convey magnitude information, but also ordinal information. In this study we tested the specificity of IPS for coding magnitude by comparing judgements based on magnitude and ordinal information for both symbolic and non-symbolic stimuli in a blocked fMRI design. Participants judged angle size, number size, position of letters of the alphabet or the position of a dot on a circle. Dimming detection was used as a control task. As expected, magnitude activated IPS. However, most importantly, our results also indicated IPS activation in the order tasks. The present data cast a new light on the ongoing debate concerning the functional specialization of the IPS in that they suggest that not only magnitude but also ordinal coding recruits IPS and can therefore lead to IPS activation in a broader range of tasks.

2:40-3:00 (249)

What Is Universal in Numbers? VERONIQUE IZARD, *INSERM unit 562 'Neuroimagerie Cognitive'*, PIERRE PICA, *CNRS & Paris VIII University*, CATHY LEMER, & STANISLAS DEHAENE, *INSERM unit 562 'Neuroimagerie Cognitive'*

—Several lines of evidence indicate that approximate and exact arithmetic do not rely on the same cognitive systems in occidental adults. Approximate calculation seems to be solved using a system of analogical, approximate, non-verbal representations. By contrast, exact tasks would engage language-specific representations. Different hypotheses have been raised to explain the role of the manipulation of number words in the development of arithmetic. To address this issue, we studied an indigene group, the Mundurucus, whose language do not possess number words beyond 'five'. Mundurucus performed exact and approximate tasks on numerosities. On the approximate problems, they behave

comparably to occidental controls; on an exact task however, their performance drops as the numerosity increases, just as predicted if they were only relying on approximate quantity representations. Our results show that approximate arithmetic can develop even in the absence of number words referring to large quantities referring to it.

3:00-3:20 (250)

Response-Selection Related IPS Activation During Number Comparison. SILKE M. GÖBEL, & MATTHEW F.S. RUSHWORTH, *University of Oxford*

—Recent studies have questioned the specific contribution of the posterior parietal cortex (PPC), especially of the intraparietal sulcus (IPS), to number processing. It has been suggested that numerical magnitude might be represented in the context of response selection in the PPC. In an fMRI study we found IPS activation for number comparison (NC) versus rest, but no significant IPS activation for NC versus control tasks. However, there was a significant IPS activation correlated with changes in reaction times (RT). In a subsequent study we investigated the effect of repetitive Transcranial Magnetic Stimulation (rTMS) on NC using motor responses and spatial reference frames that could be congruent or incongruent. TMS over left PPC significantly increased RT on congruent but not on incongruent trials. Our results suggest that the left PPC is involved in number representation in a way that is strongly linked with response selection processes and visuo-spatial reference frames.

3:20-3:40 (251)

Late Resolution of Conflicts in the Brain: Evidence for Parallel Comparison Systems. ROI COHEN KADOSH, *Ben-Gurion University of the Negev*, DAVID E.J. LINDEN, *University of Wales*, KATHRIN COHEN KADOSH, & AVISHAI HENIK, *Ben-Gurion University of the Negev*

—When subjects perceive multiple features while having to attend only to a subset of them, some irrelevant attributes may still be processed and hence affect performance. We conducted an fMRI (functional magnetic resonance imaging) study and manipulated numerical value and physical size independently. Interference effects were found in a post-comparison stage, in the primary motor cortex of the hemisphere ipsilateral to the response hand. An ERP (event-related potentials) study with the same paradigm found results that were in line with the fMRI study. These results indicate that the stimulus-stimulus conflict is not resolved until response initiation. Moreover, our results suggest that numbers and physical magnitudes are represented by independent neural pathways that converge on the motor cortex.

3:40-4:00 (252)

The Representation of Numerical Magnitude: Insights from Computational Modeling. MARCO ZORZI, *University of Padova*

—The numerosity code (Zorzi & Butterworth, 1999) is a model of mental number representation that represents a cognitive equivalent of the logical idea of cardinality, which is radically different from the more familiar proposal of numerical magnitudes represented as regions on a mental number line. Computational modeling studies show that the numerosity code supports key tasks in which numerical magnitude plays an explicit role - number comparison, and also where it is known to play an implicit role - simple arithmetic and priming. The important conclusion is that benchmark effects in the numerical domain (e.g., distance effect, problem size effect) arise in domain-general learning system (i.e., neural networks) only if they operate on domain-specific representations.

SYMPOSIUM: The Relationship between Perception and Imagery: New Insights from Congenital Blindness.

Gorlaeus Building Room 1,
Saturday Morning, 9:00-10:20

*Organized by Tomaso Vecchi, University of Pavia,
& Pietro Pietrini, University of Pisa;
Chaired by Tomaso Vecchi, University of Pavia*

9:00-9:20 (253)

Perceiving and Imagining Spatial Orientations by Blind Individuals. ALBERT POSTMA, MATTHIJS L. NOORDZIJ, & SANDER ZUIDHOEK, *Utrecht University*

—Visual processing mechanisms are critically important for perceiving spatial features of our surroundings. This also appears to be so in situations where vision is absent. We will present data from a haptic spatial orientation task (parallel setting of two bars), which show a beneficial effect of noninformative vision (viewing the general setup but not the relevant bar orientations). These results suggest that haptic information might be translated into visuospatial representations which support performance. In line with this, blind individuals performed worse than blindfolded sighted participants on comparable haptic spatial tests, in particular congenitally blind did so. Finally, the blind participants were tested on a mental imagery test of spatial orientation (imagine the angle between the two hands of the clock for digital clock times). Here, they also performed worse than the sighted. Together these results not only indicate that blind individuals might be limited in spatial imagery abilities but also that this might play an important role in spatial perception of the world by means of their available senses.

9:20-9:40 (254)

Visuo-Spatial Images in Impaired Vision. TOMASO VECCHI, MAURA MONEGATO, & WILLIAM ZANALETI, *University of Pavia*

—The paper investigates the relationships between visual perception and mental imagery through the analysis of the comparison between blind and sighted people's performance. In particular, the studies reported here match performance of sighted with that of binocular and monocular congenitally blind people and that of visually impaired people. These data allow us to improve our understanding of the analogies and differences between sighted and blind people's performance in visuo-spatial tasks. In addition, we compared tasks involving either visual or tactual stimuli, in order to assess the modal/amodal nature of the cognitive processes involved in mental representation.

9:40-10:00 (255)

Where Touch and Vision Meet in the Brain. MARC O. ERNST, *Max-Planck Institute for Biological Cybernetics, Tübingen*

—The question how information derived from these different sensory modalities converges in the brain to form a coherent and robust percept is central to understanding the process of perception. A desirable goal for the perceptual system is to maximize the reliability of the various perceptual estimates. From a statistical viewpoint the optimal strategy for achieving this goal is to integrate all available sensory information. This may be done using a "maximum-likelihood-estimation" (MLE) strategy. In a recent study we showed that humans actually integrate visual and haptic information in such a statistically optimal fashion. We found that the strengths of coupling is varying depending on the set of signals used; e.g. strong coupling for stereo and texture signals to slant and weak coupling for visual and haptic signals to size. The strength of coupling, which can be modeled using Bayesian statistics, seems to depend on the natural statistical co-occurrence between signals.

10:00-10:20 (256)

The Functional Exploration of the Brain in Congenital Blindness. PIETRO PIETRINI, *University of Pisa Medical School*

—The study of congenitally blind individuals is fundamental to investigate the question of how the brain represents the external world in the absence of visual perception and experience. In sighted subjects, the ventral and dorsal cortical visual pathways are devoted to processing visual information associated with object recognition and spatial location, respectively. To test the hypothesis that these cortical pathways may be capable of responding also to non-visual information, we used fMRI to measure brain response while congenitally blind and sighted individuals performed distinct object recognition and spatial location tasks using either the visual or the tactile sensory modality. Blind subjects showed activation in ventral "visual" areas during tactile object recognition and in the dorsal cortical pathway during tactile spatial discrimination that overlapped with areas activated by visual presentation of the same tasks in sighted subjects. Altogether, these results support a supramodal organization for the ventral and dorsal extrastriate streams.

10:20-10:40 (257)

Visual Mental Imagery, Deductive Reasoning, and Blindness. MARKUS KNAUFF, *Max-Planck-Institute for Biological Cybernetics*, & ELISABETH MAY, *University of Oldenburg*

—In three experiments, sighted, blindfolded sighted, and congenitally totally blind persons solved deductive inferences based on three sorts of relations: (1) visuospatial relations that are easy to envisage either visually or spatially, (2) visual relations that are easy to envisage visually but hard to envisage spatially, and (3) control relations that are hard to envisage both visually and spatially. In absolute terms, congenitally totally blind persons performed less accurately and more slowly than the sighted on all such tasks. In relative terms, however, the visual relations in comparison with control relations impeded the reasoning of sighted and blindfolded participants, whereas congenitally totally blind participants performed the same with the different sorts of relations. We conclude that mental images containing visual details that are irrelevant to an inference can even impede the process of reasoning. Persons who are blind from birth are immune to this visual-impedance-effect.

SYMPOSIUM: Neurocognitive Aspects of Binding in Episodic Memory.

Gorlaeus Building Room 2,
Saturday Morning, 9:00-11:00

Organized by Hubert D. Zimmer, Saarland University; Chaired by Yvonne Brehmer, Max Planck Institute for Human Development

9:00-9:20 (258)

Lifespan Age Differences in Episodic Memory Plasticity: Implications for Considering Components of Episodic Memory. YVONNE BREHMER, SHU-CHEN LI, VIKTOR MÜLLER, *Max Planck Institute for Human Development*, TIMO VON OERTZEN, *Saarland University*, & ULMAN LINDENBERGER, *Max Planck Institute for Human Development*

—Lifespan age differences in episodic memory plasticity were investigated in a multi-session training study with imagery mnemonics for encoding and retrieving location-noun pairs. The sample consisted of 108 participants distributed over four age groups (9-10, 11-12, 20-25 and 65-78 years). The main findings are: (a) All individuals were able to acquire and optimize the imagery mnemonic; (b) age differences were magnified through instruction and training; (c) older adults profited likewise from

initial instruction but less from subsequent training than children; (d) children showed greater plasticity than older adults; (e) younger children's performance was highly variable across lists, often failing to reach a stable asymptote. These results support general assumptions about lifespan differences in memory plasticity. They suggest an interpretation in terms of strategic and associative components, according to which mnemonic instruction and training reduced strategic deficits among children and revealed the relative strength of their associative processes.

9:20-9:40 (259)

Recollection and Familiarity in Retrieval-Induced Forgetting. BERNHARD SPITZER, & KARL-HEINZ BAUML, *University of Regensburg*

—Retrieval-induced forgetting refers to the finding that retrieval practice on a subset of previously learned material can inhibit later recall of the unpracticed material and also recognition memory. Successful recognition often results from recollection processes that rely on the spatio-temporal binding of the learned material. However, successful recognition may also result from subjective familiarity with the presented material, reflecting the assessment of intra-item binding. Results from prior work have shown that experimental manipulations often influence recollection processes while leaving familiarity processes largely unaffected. In two experiments we investigated whether inhibition as studied in the retrieval-practice paradigm reduces only recollection or affects the familiarity component of recognition as well. To separate recollection from familiarity processes, we used the independence-remember/know method (Experiment 1) as well as a ROC-analysis of confidence ratings (Experiment 2). The results from both experiments suggest that the inhibition underlying retrieval-induced forgetting also affects the familiarity of unpracticed material.

9:40-10:00 (260)

ERP Correlates of Binding Processes in Repetition Priming and Recognition Memory. CHRISTIAN GROH-BORDIN, & HUBERT D. ZIMMER, *Saarland University*

—In our study, we investigated stimulus specificity effects on implicit and explicit memory measures in the visual domain. In recognition memory tasks, subjects' reaction times for old items are decelerated when arbitrary stimulus features (like color or size) are changed from study to test. Processing advantages attributed to implicit memory have rather been diminished by changing stimulus features that are required for the identification of visual stimuli (such as the shape of visual objects). In our experiment, we tried to differentiate the binding processes associated with specific perceptual information under implicit and explicit memory conditions. During testing, participants attended either a semantic judgement task or an episodic recognition task about new and old items; stimulus features relevant for the identification of the visual objects were manipulated from study to test. The effects of these perceptual specificity variations on behavioral (Accuracy, RT) and electrophysiological measures (ERPs) during both kinds of memory test will be presented.

10:00-10:20 (261)

Emotional Influences on Episodic Memory Retrieval. MIKAEL JOHANSSON, *Lund University*, AXEL MECKLINGER, *Saarland University*, & ANNE-CECILE TREESE, *Lund University*

—There is ample evidence to suggest a modulatory role of emotion on memory. While studies employing free-recall measures of memory have consistently observed an emotion-induced enhancement, the results from recognition memory studies have been less consistent. A series of event-related potential (ERP) studies will be presented that was conducted to elucidate how emotion induced by faces and scenes influences processes related

to recognition memory. Specifically, we will describe how emotional valence and arousal modulate (a) the hypothesized ERP correlates of familiarity and recollection, (b) criterion setting, (c) the state of awareness accompanying recognition judgments, and (d) the ability to retrieve various types of source-specifying information. The overall pattern of findings suggests that emotional effects on memory performance depend on the extent to which the task relies on familiarity or recollection for responding, and furthermore that emotion influences source memory by modulating attentional focus during study.

10:20-10:40 (262)

Blue Bananas – An ERP Study on Prototypical Colours in Implicit Memory. ULLRICH K.H. ECKER, & HUBERT D. ZIMMER, *Saarland University*

—In the behavioural literature, reaction times are reported to increase in direct memory tests (episodic recognition) if the colour of objects is changed from study to test. In indirect (implicit) memory tests this is typically not observed. The colour of objects, however, can be prototypical or arbitrary; in the first case, colour can also be appropriate or inappropriate. We found an effect of colour change in an implicit test if objects with prototypical colours were used – independent of appropriateness. We now replicated this finding and extended it by the use of electrophysiological methods (ERPs). Effects of semantic appropriateness and study-test congruency are discussed in light of our neurocognitive model of human memory

10:40-11:00 (263)

New Faces for Old – Binding for Persons with Learning Disability. HENRIK DANIELSSON, *The Swedish Institute for Disability Research, Linköping & Linköping University & the Swedish Defence Research Agency*, JERKER RÖNNBERG, *The Swedish Institute for Disability Research, Linköping & Linköping University*, JAN ANDERSSON, *The Swedish Defence Research Agency Linköping*, & ANNA LEVÉN, *The Swedish Institute for Disability Research, Linköping & Linköping University & the Swedish Defence Research Agency*

—When 2 previously presented pictures are blended into a new picture, this picture can be falsely recognized. This phenomenon is called a memory conjunction error or binding error. 23 persons with learning disability and 18 chronologically age-matched controls without learning disability participated in 2 experiments on binding using drawings (Experiment 1) and photographs (Experiment 2). For individuals with learning disability, compared to the controls, the error rate was most pronounced for conjunctions. Nevertheless, significantly more feature errors (1 old and 1 new component), and errors to completely new pictures were also made. Interestingly enough the groups performed at the same level for old pictures. The pattern of data indicates that qualitatively different memory processes are involved for the 2 groups. A dual-processing approach received more support than a binding approach.

SYMPOSIUM: Emotional Modulation of Cognitive Control,
Gorlaeus Building Room 3,
Saturday Morning, 9:00-10:40

Organized by Thomas Goschke, Dresden University of Technology

9:00-9:20 (264)

Emotion and Cognitive Control: Affective Modulation of Goal Shielding and Goal Switching. THOMAS GOSCHKE, & GESINE DREISBACH, *Dresden University of Technology*

—Organisms pursuing goal-directed behavior in changing environments face two fundamental challenges: to maintain and shield goals from distraction on one hand, and to flexibly switch

between goals and update working memory in response to significant changes on the other. Here we show that phasic increases of positive or negative affect play an important role in the dynamic regulation of the balance between goal maintenance and goal switching. In a task-set switching paradigm, either positive or negative affect was induced by briefly presenting emotional pictures prior to each experimental trial. Negative affect increased goal shielding as indicated by increased switch cost and inhibition of competing task-sets, whereas positive affect facilitated flexible switching of goals, albeit sometimes at the cost of increased distractibility. Results fit with recent neuropsychological models of cognitive control according to which effects of positive affect may be mediated by increased dopamine levels in frontal brain areas.

9:20-9:40 (265)

Affective Modulation of Cognitive Control in a Dynamic Categorization Task. RENÉ MAYER, & THOMAS GOSCHKE, *Dresden University of Technology*

—We investigated the influence of phasic affects on cognitive control in a new dynamic categorization task. On each trial a reference stimulus was presented together with three comparison stimuli, which varied with respect to shape, colour, and number. Participants had to indicate as fast as possible which of the three comparison stimuli matched the reference stimulus with respect to one of the three dimensions. When the matching dimension changed from one trial to the next, reaction times increased compared to repetitions of the matching dimension. Phasic changes in affect were induced by brief presentation of pictures from the International Affective Picture Set (Lang et al., 1999) before each trial. Switch costs were reliably increased after negative compared to positive and neutral affective pictures. Results indicate that phasic increases of positive vs. negative modulate the balance between cognitive flexibility and perseverance.

9:40-10:00 (266)

Influence of Different Specific Negative Moods on Task Switching. MAJA DSHEMUCHADSE, & THOMAS GOSCHKE, *Dresden University of Technology*

—Whereas positive affect has repeatedly been shown to increase cognitive flexibility [Isen, 2000], effects of negative affect appear less consistent, including reports of decreased flexibility, general cognitive impairments, or no effect. Here we investigated effects of different negative moods (anxiety, anger, sadness) in comparison to a positive mood on performance in a task switching paradigm. After a mood induction (reading emotional stories or imaging emotional events), participants performed blocks of trials on each of which two digits were presented in different colours. Participants had to classify the digit appearing in a pre-cued colour as even/uneven. After runs of four trials the task-relevant colour switched (e.g., the formerly irrelevant colour or a completely new colour became the new target colour). Colour switches produced increased reaction times and this switch cost was reliably larger for participants in a sad compared to a positive or anxious mood, indicating that sad mood increased perseveration.

10:00-10:20 (267)

Affective Modulation of Crossdimensional Attention Switching: Reduced Perseveration at the Cost of Increased Distractibility. BRIT REIMANN, & THOMAS GOSCHKE, *Dresden University of Technology*

—To prevent interference in the control of behavior, organisms must select task-relevant information while suppressing distracting information. On the other hand, it is equally important to monitor the environment for potentially significant information, even if this information is not relevant for the currently active goal and even if such a “background monitoring” may increase distractibility (“selection-monitoring-dilemma”). Here we show that emotions

modulate the balance between goal-directed selection and background-monitoring. In a visual search task participants searched for pop-out targets, that deviated from distracters with respect to color, form, or orientation. Brief presentation of positive affective pictures before each search display facilitated cross-dimensional attention switching, as indicated by reduced reaction time costs when attention had to be switched from one dimension (e.g. color) to another (e.g. shape). Conversely - and consistent with previous findings [Dreisbach & Goschke, 2004] - positive affect also incurred a cost in terms of increased interference from novel distracters.

10:20-10:40 (268)

Effects of Positive and Negative Mood on the Activation of Remote Associates in Semantic Memory. ANNETTE BOLTE, *Braunschweig University of Technology*, & THOMAS GOSCHKE, *Dresden University of Technology*

—We investigated effects of positive and negative mood on spread of activation in semantic memory. In Experiment 1 participants were presented three primes followed by a single target. The target word was either (a) strongly associated with one of the primes (direct priming), (b) weakly associated with all three primes (summation priming), or (c) unrelated. Participants in positive mood showed summation and direct priming (indicated by reduced lexical decision latencies), whereas participants in negative mood showed only direct priming. In Experiment 2 participants were presented direct primes (e.g. TIGER – STRIPES) or indirect primes, which were associated with the target via a mediator (e.g. LION – STRIPES). Participants in positive mood showed direct and indirect priming, whereas participants in negative mood showed only direct priming. We conclude that positive mood potentiates spread of activation to weak or remote associates, whereas negative mood appears to restrict spread of activation to close associates.

Language Production III.

Gorlaeus Building Room 4/5,
Saturday Morning, 9:00-10:40

Chaired by Niels O. Schiller, Maastricht University

9:00-9:20 (269)

The Effects of Ageing on the Time Course of Object Naming. LINDA MORTENSEN, ANTJE S. MEYER, & GLYN W. HUMPHREYS, *University of Birmingham*

—In naming one object, young speakers fully identify the object before planning its name. In naming two objects, they plan the first object's name before shifting their gaze to the second. We investigated whether elderly speakers use the same sequential strategy. Participants named visually intact or degraded objects in isolation and in triplets, while hearing words phonologically related or unrelated to the target object, which was named first in the triplet (“flute, kite, ear”). Both age groups showed additive effects of degradation and relatedness on target naming, suggesting that speech planning and speech-to-gaze coordination are unaffected by ageing. However, elderly speakers showed slowed processing of the second object. When the target object was named second (“kite, flute, ear”), the relatedness effect disappeared in both age groups, but the age-related slowing in processing the second object was maintained. The implications for understanding the effects of ageing on object naming are discussed.

9:20-9:40 (270)

Facilitation in Picture-Word Interference with Different Types of Associative Distractors. JENS BÖLTE, ANNETT JORSCHICK, & PIENIE ZWITSERLOOD, *University of Münster*

—We report a picture-word interference experiment investigating

the effects of different types of associative relations on picture naming latencies. In word production research, associative effects are rarely reported. Semantic (and phonological) effects are investigated more often. In our experiment, distractor and picture name had a part-whole relation (Kern-Apfel; apple seed - apple), a feature-relation (rot-Apfel; red - apple) or a location relation (Baum-Apfel; tree - apple). The effects of these relations on picture-naming latencies were compared to effects of category relation (Birne-Apfel; pear - apple) and to effects of an unrelated control condition (Hirsch-Apfel; deer - apple). Associative distractors facilitated picture naming, while semantic distractors slowed down picture naming relative to the unrelated control condition. Associative and semantic effects are clearly distinct in direction in picture-word interference suggesting a different origin.

9:40-10:00 (271)

Facilitation and Inhibition in Speech Production. NIELS O. SCHILLER, *Maastricht University*, NINA GROTEN, *University of Bonn*, & INGRID K. CHRISTOFFELS, *Maastricht University*

—In speech production, speakers have to select words from the mental lexicon in order to express meaning. Theories of lexical access assume that several lexical entries might become activated on the basis of conceptual information and that speakers have to select the appropriate lexical entry. This selection procedure presumably uses mechanisms such as lexical competition: Simultaneously activated lexical entries compete for selection. In this study, we investigated this competition mechanism. We present a series of picture naming experiments in which we employed the picture-word interference paradigm. Distractor words were either phonologically or semantically related to the picture or to an associate. That way we manipulate the set of competitors. We show that using the same pictures and distractors the direction of the effects (facilitation or inhibition) depends on the target response speakers were required to give. The results will be discussed in terms of current theories of speech production.

10:00-10:20 (272)

The Role of Frequency Information in Compound Production. HEIDRUN BIEN, HARALD BAAYEN, & WILLEM J.M. LEVELT, *Max Planck Institute for Psycholinguistics*

—Four experiments investigated the role of frequency information in compound production by independently varying the frequencies of the first and second constituent as well as the compound frequency itself. Pairs of Dutch noun-noun compounds were selected, such that there was a maximal contrast for one frequency, while the other two frequencies were matched. In a position-response association task, participants first learned to associate compounds with visually marked positions on a screen. In the test phase, participants produced the associated compound in response to the appearance of the position mark. The speech onset latencies varied significantly according to factorial contrasts in the frequencies of both constituents, but not according to a factorial contrast in compound frequency, providing further evidence for decomposition in speech production. Furthermore, positional measures of constituent frequency were of superior predictivity compared to the individual constituent lemma frequencies, suggesting a role for morphological paradigmatics in the mental lexicon.

10:20-10:40 (273)

Access to Phonological and Gender Information during Language Processes in French. FLORELLE CHEVAUX, & FANNY MEUNIER-HOEN, *Laboratoire Dynamique Du Langage*

—In order to evaluate whether grammatical gender and wordform information affect gender judgment latencies we report the results of two series of experiments conducted in production (a naming task, a phonological decision, and two gender decision experiments

according to indefinite and possessive articles) and in comprehension of nouns (one lexical and three gender decision tasks according to indefinite and possessives determiners or Masculine/Feminine labels). Taken together, results suggest that (1) both phonological and gender information are implicated during gender identification and that noun's wordform is retrieved first; (2) the initial phoneme effect plays a role across the board, even when the determiner form does not depend on the initial phoneme; (3) a gender effect is only found in tasks involving the processing of determiners sensitive to the initial phoneme: the possessive determiners. We will discuss theoretical implications of the similarities and differences of the results in the two modalities.

Higher Mental Processes II.

Gorlaeus Building Room 6,
Saturday Morning, 9:00-10:40

Chaired by Koen Luwel, *University of Leuven*

9:00-9:20 (274)

Discovery and Development of a Smart Numerosity Estimation Strategy: A Microgenetic Analysis. KOEN LUWEL, *University of Leuven*, ROBERT S. SIEGLER, *Carnegie Mellon University*, & LIEVEN VERSCHAFFEL, *University of Leuven*

—We used the microgenetic method to investigate the discovery and development of a smart strategy for estimating numerosities of blocks in a grid. This strategy involved subtracting the number of empty squares from the total number of squares in the grid. Two groups of second graders, who had not discovered this subtraction strategy yet, accomplished this task during eight sessions. Both groups differed in terms of the frequency of items eliciting the subtraction strategy. Results revealed: (a) no difference between both groups regarding the rate of discovery of the subtraction strategy; (b) a faster generalization of the subtraction strategy towards other items in the high-frequency than in the low-frequency group; (c) a gradual improvement in task performance on the trials containing high numerosities, and (d) a gradual increase in the adaptiveness of strategy choices. These results suggest that a small number of well-selected critical items is sufficient to promote the discovery and subsequent development of an advanced strategy.

9:20-9:40 (275)

Age-Related Differences in Strategies for Approximate Quantification. DELPHINE GANDINI, PATRICK LEMAIRE, *University of Provence-LPC*, & STÉPHANE DUFAU, *CNRS-LPC*

—In three experiments, we investigate aging effects on approximate quantification. In all studies, young and older adults had to determine numerosities of black dots displayed in square grids. Participants reported their solution strategy after each trial. Eye-movements, trial-by-trial verbal reports, accuracy, and latency were recorded. Converging evidence from these different measures revealed following main results: (a) both young and older participants used five different strategies to estimate numerosities (Exp 1), (b) these strategies exhibited different patterns of speed, accuracy, and eye-movements, (c) surprisingly, when participants had to use a forced strategy, there were no differences between young and older adults (Exp 2), and (d) older adults chose strategies much less systematically and adaptively. These results have implications for further understanding approximate quantification skills and age-related differences in these skills. We discuss these implications.

9:40-10:00 (276)

Evaluating Critical Thinking Skills in Undergraduate Psychology Students. ANA N. CAZARES, *National Pedagogic University, Mexico*

—The aim of this research was to evaluate one of the most important skills of critical thinking in psychology students: identification of arguments from psychological information. Sixty students from a researching course in psychology, (the second in a four-course series of methodological areas), participated in this study. By means of Ex post facto design, the ability in these students for identifying arguments was measured. Specific text from Critical Thinker Manual of Mayer and Goodchild (1997) was selected, from which the student identified main affirmation, empirical evidence given by the text and theoretical explanation on which the affirmation was founded. Qualitative analysis showed a deficiency in the student's ability for identifying any of these three components, over all, the theoretical explanation. This emphasizes the need to develop in the students even the more basic abilities of critical thinking and for teaching them, besides course's contents, strategies for analyzing, synthesizing and evaluating the information.

10:00-10:20 (277)

Compelling Promises and Hollow Threats: Why You Can Keep Someone to His Promise But Not to His Threat. SARA VERBRUGGE, KRISTIEN DIEUSSAERT, WALTER SCHAEKEN, & WILLIAM VAN BELLE, *University of Leuven*

—This paper focuses on the differences in interpretation between promises and threats. We investigated to what extent uttering a conditional promise or threat implies an obligation for the speaker to carry out the reward or punishment mentioned in the consequent. Therefore, we presented the participants of the experiment with four promise contexts and four threat contexts. These were each time followed by six conditional sentences of which the antecedent remained the same and the consequent varied in credibility. The experiment procured us with interesting findings about the difference in interpretation between promises and threats: there appears to be a greater discrepancy between uttering and putting into effect the consequent of a conditional in the case of threats than in the case of promises.

10:20-10:40 (278)

Keeping Track of Referents: How the Eyes Reveal Referential and Relational Coherence Processes. REINIER COZIJN, *Tilburg University*, WIETSKA VONK, *Max Planck Institute for Psycholinguistics, Nijmegen*, LEO G.M. NOORDMAN, EDWIN COMMANDEUR, & KARIEN COPPENS, *University of Tilburg*

—In a visual world paradigm experiment, referential and relational coherence processes were investigated. Eye movements on visual scenes that depicted two characters mentioned in an auditory presentation of a sentence revealed an early syntactic influence of parallel parsing, a later semantic influence of an implicit causality bias, and a late influence of world knowledge on the resolution of pronouns. The results indicate that referential coherence is achieved as soon as the information concerning relational coherence is available.

Working Memory II.

Gorlaeus Building Room 7,
Saturday Morning, 9:00-10:40

Chaired by Axel Buchner, Heinrich-Heine-Universität Düsseldorf

9:00-9:20 (279)

The Effect of Word Length on Encoding Salience, Output Interference, and Inhibition. MARITE WAHRLICH, & SILKE HAMM-EDER, *University of Bonn*

—The word length effect refers to the superior memory performance of simple words over complex words in the serial recall task. Although this effect is well known and well documented (e.g. Baddeley, Thomson, & Buchanan, 1975), the

cognitive processes assumed to be responsible for this phenomena vary according to differing memory models. The working memory model (Baddeley, 2003) assumes that short words are more resistant to temporally based decay. The ACT-R model assumes that long words are subject to weaker encoding due to a limited pool of activation resources (Anderson & Matessa, 1997). The Feature model (Neath, 2002) postulates that increased interference during stimulus reproduction causes the word length effect. A fourth assumption outlines the increased inhibition of reproduced items (e.g. Page & Norris, 1998). These models' assumptions are experimentally compared by means of a method which isolates encoding salience, output interference and degree of inhibition in the serial recall task (Cowan, Sauls, Elliott, & Moreno, 2002).

9:20-9:40 (280)

Artificially Induced Valence of Distractor Words Increases the Effects of Irrelevant Speech on Serial Recall. AXEL BUCHNER, BETTINA MEHL, *Heinrich-Heine-Universität Düsseldorf*, KLAUS ROTHERMUND, *Friedrich-Schiller-Universität Jena*, & DIRK WENTURA, *Universität des Saarlandes*

—Non-words were artificially associated with negative valence, or they were in some sense neutral or irrelevant. Subsequently, participants memorized target words in silence or while ignoring the previously irrelevant, neutral, or negatively valent distractor non-words. The presence of distractor non-words impaired recall performance, but negative distractor non-words caused more disruption than neutral and irrelevant distractors, which did not differ in how much disruption they caused. These findings conceptually replicate earlier results showing disruption due to valence with natural language words, and they extend these earlier results in demonstrating that auditory features that may possibly be confounded with valence in natural language words cannot be the cause of the observed disruption. Explanations of the irrelevant speech effect within working memory models that specify an explicit role of attention in the maintenance of information for immediate serial recall can explain this pattern of results, whereas structural models of working memory cannot.

9:40-10:00 (281)

A Dissociation of Two Modality Effects in Sentence Recall. RALF RUMMER, & JUDITH SCHWEPPE, *Saarland University*

—Verbal short-term retention is better if materials are presented auditorily than visually. This modality effect is restricted to the most recent items of a memory list and can be observed independently from whether recall takes place in an oral or in a written modality. In a first experiment, we demonstrated such a modality effect for sentence recall. Using an immediate recall version of Potter and Lombardi's (1990, JML) intrusion paradigm, we found that the presentation of nouns similar in meaning to a target noun located at the end of the sentence led to more intrusions in sentence recall if the sentences were presented auditorily. In a second experiment, we tested how modality of presentation and modality of recall modulate intrusions if the target word is in the midfield of the sentence. Here, an advantage was observed for those conditions in which the modality of presentation and the modality of recall were in a congruent relationship (i.e., auditory presentation and oral recall; visual presentation and written recall). These two findings dissociate two kinds of modality effects.

10:00-10:20 (282)

Semantic Crossmodality and Working Memory. FRANCO DELOGU, & MARTA OLIVETTI BELARDINELLI, *University of Rome*

—In our research we focus on the role of crossmodal semantic integration in working memory. We verified whether the multimodality can influence the memory span capacity. We used

unimodal non linguistic stimuli (pictures or environmental sounds) and bimodal non linguistic stimuli (pairs of pictures and environmental sound semantically matched). Participants were tested in a four-condition memory span test (audio – visual – audiovisual audio or visual). Reiteration was controlled by means of an articulatory suppression task. Data analysis shows no differences in the average number of elements correctly recollected between the four conditions. Interestingly the multimodal conditions did not cause an overload effect. Our results are consistent with the idea that a complex, semantic integration of information from different modalities is possible already in the encoding phase of environmental stimuli. This result suggests the existence of relationships between different modal stores and processes in working memory. Theoretical implications are also discussed.

10:20-10:40 (283)

Phonological Processing and Memory Deficits in Children with a Foreign Language Learning Disability. MARCELLA FERRARI, & PAOLA PALLADINO, *University of Pavia*

—Memory skills of a group of 7th and 8th grade Italian children with difficulty in learning English as a foreign language (FLLD) were examined and compared to those of a control group matched for age and non-verbal intelligence. Results showed that children with FLLD showed a poorer performance in phonological working memory than the control group but performed to a comparable level in a visuo-spatial working memory task. Furthermore, the word length and the answer modality of a word span task were manipulated in order to examine the efficiency of the articulatory loop and the relevance of the spoken output in the FLLD group. The FLLD group did not show sensitivity to the word length effect and showed no advantage in the picture pointing recall condition. FLLD group's impairment in phonological working memory and phonological processing appeared to independently contribute to the FLLD children's difficulty in learning a second language.

Attention and Grouping.

Gorlaeus Building Room 1,
Saturday Morning, 11:00-12:20

Chaired by Pertti Saariluoma, University of Jyväskylä

11:00-11:20 (284)

Curve Tracing: An Obligatory Spread of Attention? DAVID E. CRUNDALL, *University of Nottingham*

—How do we trace lines? Previous research has suggested that attention spreads through the line in order to classify it as a perceptual object. Two experiments will be presented however that question whether lines are traced via an obligatory spread of attention. Participants were asked to trace one of two convoluted lines in order to check that two targets appeared on the same line. This was done under differing task demands and, in one case, with a global flicker that changed the required response. The results suggest that line tracing is a strategy that can be employed according to task demands and that the process is more likely to involve a moving focus of attention rather than a spreading trace.

11:20-11:40 (285)

Endogenous Attentional Orientation Affects Perceptual Grouping. MAGALI ALBERT, & THIERRY RIPOLL, *University of Provence*

—Several studies revealed contradictory results concerning the implication of attention in perceptual grouping. In the present study, we chose to adopt a new approach: instead of examining the need of attentional resources in perceptual grouping, we asked whether specific attentional orientation modulated perceptual

grouping. We hypothesized that endogenous control of visual attention, induced by prior knowledge about perceptual organization, could affect perceptual grouping. To do so, we used stimuli consisting of 2*2 matrices of simple elements organized by color or shape similarity. Participants had to indicate if target matrix contained pair of identical elements. A source matrix, shown before target onset, informed about horizontal or vertical arrangement of target identical elements. Source gave valid information in 80% of cases. We found that participants' ability to detect similarity between elements depended on validity of attentional orientation induced by source. Interestingly, results suggested a form of attentional beam never considered before.

11:40-12:00 (286)

The Same-Object Effect Outside the Object. ALESSANDRO COUYOUMDJIAN, ROBERTA TRICAS, & ENRICO DI PACE, *University of Rome 'la Sapienza'*

—In 1994, Egly, Driver and Rafal published a seminal work demonstrating that moving attentional focus within a perceptual object is less costly than between two objects. Even if this effect seems to be extremely robust, as it has been replicated several times with different experimental paradigms, it can be interpreted in different ways. The present study investigates the hypothesis that the same-object effect is actually just one case of a broader category of attentional effects caused by the ways the objects affect the spatial organization of the visual field. Three cueing experiments, analogous to those of Egly et al., were run to test this hypothesis. Results, demonstrating that the same-object effect is modulated by object orientation and that it persists even if target locations are outside the objects, are discussed with reference to the meridian effects and the role of perceptual objects in the construction of the spatial representation over which attention moves

12:00-12:20 (287)

Role of Attention and Grouping Cues in the Processing of Verbal Messages. MARIE RIVENEZ, *Université Paris 5*, CHRIS DARWIN, *University of Sussex*, & ANNE GUILLAUME, *IMASSA*

—The aim of this study was to show the role of attention and grouping cues (pitch and timbre) in the processing of concurrent verbal messages. This processing is assessed with a repetition priming paradigm: participants had to detect a target word belonging to a specific category presented in a rapid list of words in one ear. The prime was presented just before the target word in the other ear. We evaluated the role of pitch and timbre difference between concurrent messages on unattended message processing. We found a priming effect (around 23 ms) when the messages had different pitch or timbre and no priming when the pitch or timbre was the same. The results suggest that attention is not necessary for concurrent messages processing when they have different voice.

12:20-12:40 (288)

An Analysis of Apperception in Transfer. PERTTI SAARILUOMA, & SASCHA HELFENSTEIN, *University of Jyväskylä*

—Apperception is essential in transfer. This kind of research aims at explicating the role of mental contents in thinking and the mechanisms people use in constructing the information contents of their mental representations. Four experiments were devised to shed more light on how people represent various aspects of the classic 'Weigh the Elephant'-problem. The experimental conditions differed in the way the solution aids were visually presented (detached or grouped) and the type of typical function they were implicitly and explicitly associated with. The analysis of the apperceptive processes focused on the identification of non-presented and non-perceivable information contents in people's

mental representations, the organization and consistency of how contents are integrated, mental transformations, and the tacit assumptions and implications inherent to reasoning. In addition to the analysis of the solutions, thinking-aloud protocols and questionnaires were used to uncover more about people's problem and solution representation. In addition, the theoretical aspect of the approach shall be discussed.

Memory.

Gorlaeus Building Room 2,
Saturday Morning, 11:00-12:40

Chaired by Lauren R. Shapiro, Emporia State University

11:00-11:20 (289)

How Forgetting Aids the Fluency Heuristic: An Exaptive Function of Forgetting. LAEL J. SCHOOLER, *Max Planck Institute for Human Development*, & RALPH HERTWIG, *University of Basel*

—Some theorists have argued that forgetting is essential to the proper functioning of human memory. Schooler and Hertwig (in press) propose that forgetting may in addition prove beneficial for making inferences that depend on recognition. For example, when asked which of two musicians has sold the most albums, you could use the heuristic that the one you recognize fastest has sold the most. To explore the mechanisms by which forgetting could boost the efficiency of such memory based inferences, we describe a modeling and empirical effort that bridges two research programs that emphasize the adaptive nature of human cognition: The program on fast and frugal heuristics explores cognitive processes that use limited information to make effective decisions (Gigerenzer et. al 1999) and the ACT-R research program (Anderson & Lebiere, 1998), a cognitive modeling framework. We show how the ignorance that forgetting brings can, paradoxically, enhance inferences about real world objects.

11:20-11:40 (290)

International Study of Flashbulb and Event Memory of 9/11. LAUREN R. SHAPIRO, *Emporia State University*, TIA HANSEN, *Aalborg University*, & DANIELLE POLAGE, *Pepperdine University*

—The tragedies of September 11, 2001 and its vast media coverage provided a unique opportunity for the investigation of flashbulb and event memory as it affected people in the US and abroad. Respondent age, location, media, and metacognition is examined to determine their effect on recall for the reception (location, activity, source, relevance, emotional response) and news event of September 11th. Approximately 1100 memory surveys were collected from young (less than 24) and old adults (greater than 24) from 4 US locations (NY, KS, AR, CA) and 3 non-US locations (Great Britain, Netherlands, Denmark). Analyses will focus on whether canonical categories were reported at all locations and by all ages. Event reports were analyzed for the total number and degree of elaboration of features recalled. Finally, information about media consumption and conceptualization of memory on recall will be addressed.

11:40-12:00 (291)

Dating Events: Solving the Jigsaw Puzzle. STEVE M.J. JANSSEN, ANTONIO G. CHESSA, *University of Amsterdam*, & JAAP M.J. MURRE, *University of Maastricht*

—In this online experiment, more than 4,000 participants were asked at what time, on which weekday, on which day of the month, in which month, or in what year certain news events took place. We found that these five time scales were independent. For some events, the weekday was recalled best, whereas the month was recalled best for other events. Because the experiment ran for

twelve months, we also could find a forgetting effect for the events and time scales. The results were consistent with our model of memory for time, in which both location-based and distance-based theories of memory for time are integrated. People date events with the help of the context of the event or related events. However, when this type of temporal information is forgotten, people date events with the help of distance-based temporal information, such as clarity of the memory.

12:00-12:20 (292)

Conscious Recollection and Unconscious Familiarity Processes Are Differentially Influenced by D-Amphetamine. INGE ZEEUWS, & ERIC L.L. SOETENS, *Vrije Universiteit Brussel*

—With d-amphetamine memory consolidation in recall is improved after one hour, whereas with recognition improvement only shows up after one week. The relative importance of conscious and unconscious processes in the tasks may explain this difference. Participants had to recognize previously presented words in a counterbalanced, double blind, within-subject design. They studied two lists, with a 5-min break between lists, and were tested after 3 different delays. Two questions were asked: (1) 'Do you recognize this word?' and (2) 'To which list did it belong?'. Using the process dissociation procedure we found a positive effect of d-amphetamine on both processes for List 2. The drug increasingly disrupts the unconscious process for List 1. Performance of List 1 is far worse than of List 2, due to retroactive interference. In subsequent experiments, the timing between the two lists is manipulated to suppress the interference between the lists.

12:20-12:40 (293)

An ERP Study of N400 and Word Frequency Effects. PETTER KALLIOINEN, & SVERKER SIKSTRÖM, *Lund University*

—Pure lists of high frequency (HF) words are better recalled than pure lists of low frequency (LF) words. However mixing HF and LF words affect recall of HF words negatively while recall of LF words is improved. Inter-item relationships and distinctiveness are two factors that have been suggested as explanations of this effect. Both factors have been linked to the ERP component N400, a central negativity approximately 400ms after stimulus onset that is thought to reflect semantic integration. In a paradigm with mixed and pure lists of HF and LF words these two explanations yield different predictions. If N400 index distinctiveness it should be stronger for LF words in mixed lists than in a pure LF word list. If N400 reflects less inter-item relationships with previous words its amplitude should increase when less HF words are in a list. Our results support the latter hypothesis.

Face Recognition Processes.

Gorlaeus Building Room 3,
Saturday Morning, 11:00-12:40

Chaired by Karen Lander, University of Manchester

11:00-11:20 (294)

Contexts Influence Recognition of Facial Expression. RUTHGER RIGTHART, & BEATRICE DE GELDER, *Tilburg University*

—The study of facial emotion recognition has, to date, focused on emotions expressed by isolated faces. In daily life, faces appear in meaningful contexts and facial expressions tend to reflect the affective meaning of surrounding scene. In the present study we investigated whether pictures of scenes with affective meaning (i.e., pictures depicting happiness, fear or disgust) influence recognition of facial emotion (happiness, fear or disgust). Participants categorized faces on facial expressions. Faces were embedded in a scene picture with either a congruent or incongruent

affective meaning. Stimuli were presented for 200 ms. Scene-congruent facial expressions were recognized more rapidly than scene-incongruent ones. The results indicate that contexts contribute significantly to the recognition of facial signals.

11:20-11:40 (295)

Consciousness in Face Comprehension. Subliminal Stimulation Effect on ERPs. MICHELA BALCONI, *Catholic University of Milan*

—Hypnosis, defined as a particular state of consciousness, might be seen a privileged way to study emotions. We analyzed the emotional face processing in two different experimental conditions (with and without hypnosis). Our purpose was to test that evoked-related potentials (ERPs) related to emotional comprehension present peculiar differences in amplitude and cortical distribution of ERPs as a function of hypnotic condition. Moreover we expected to find a higher correlation between the decoding processing and emotional reactivity as stated by the subject. Prototypical emotional faces and neutral faces were used as stimulus material. Several psychophysiological measures were recorded for each subject: ERPs, heart rate, breath curves and EDA (electro dermal activity). Collected data showed a N230 ERP effect of higher amplitudes in frontal sites only for hypnotic subjects. Physiological parameters showed that hypnosis is really more effective in eliciting emotional response.

11:40-12:00 (296)

Impaired Recognition of Facial Expressions, Instrumental and Emotional Body Actions in Huntington Disease. JAN VAN DEN STOCK, HANNEKE MEEREN, *Tilburg University*, RUTH DE DIEGO BALAGUER, ANNE-CATHERINE BACHOUD-LEVI, *Henri Mondor Hospital*, & BEATRICE DE GELDER, *Tilburg University*

—Huntington disease (HD) involves motor and cognitive deficits and a deficit in emotion recognition. This latter aspect is investigated by presenting facial expressions. Posture and movements of the whole body also express emotions. To investigate a possible relation between motor disorders and emotion deficits of HD and a possible deficit in recognition of body postures we performed two experiments with 22 HD patients. The first set of results indicates a deficit in facial expression recognition, which is most severe for the expression disgust. The second set of results indicates that HD are impaired in recognizing both instrumental postures and emotional ones, but that the deficit for the latter category is significantly stronger across all emotions tested. Taken together the results suggest a more severe impairment for recognition of whole body expressions of emotion than for facial expressions alone and point to the role of motor abilities for intact emotion recognition.

12:00-12:20 (297)

Recognizing Face Identity from Natural and Morphed Smiles. KAREN LANDER, *University of Manchester*, & LEWIS CHUANG, *Max Planck Institute*

—People find it is easier to recognise the identity of a familiar face in non-optimum viewing conditions when it is moving (smiling, talking), compared to when shown as a static image. Here we explore the theoretical underpinnings of the moving face recognition advantage. Specifically, we compare the identification of personally familiar faces from natural smile sequences (dynamic morphing), artificial smile sequences, single static neutral images and single static smiling images. Results showed recognition was best when the face was viewed naturally smiling. A further experiment investigated the impact of motion tempo on the recognition of morphed familiar faces. Results indicate a significant interaction between the naturalness of the motion and the speed of the observed motion. We conclude that the recognition

advantage for face motion does not reflect a general benefit for motion, but instead suggests that, for familiar faces, information about their characteristic motion is stored in memory.

12:20-12:40 (298)

The R and K Paradigm in Familiar Face and Familiar Voice Recognition. LJUBICA DAMJANOVIĆ, & J.R. HANLEY, *University of Essex*

—Previous research has shown that there are cross-modal differences in the retrieval of person-specific information from faces and voices (Hanley, Smith and Hadfield, 1998). This phenomenon was investigated in a series of experiments using the Remember / Know (R/K) paradigm with familiar faces and familiar voices. Overall recognition between faces and voices was equated by presenting the faces in a blurred format. Although overall recognition did not differ between the blurred faces and voices, the two modalities produced selective effects on remembering and knowing. Specifically, blurred faces were much more likely to be associated with contextual based recognition (R) than voices. Furthermore, voices were much more likely to be associated with familiarity based recognition (K) than blurred faces. This suggests that the advantage of faces over voices in terms of person-specific information may be understood in terms of differences in memory processes.

Language Production IV.

Gorlaeus Building Room 4/5,
Saturday Morning, 11:00-12:40

Chaired by Niels O. Schiller, Maastricht University

11:00-11:20 (299)

Gender Agreement and Multiple Referents. CHIARA FINOCCHIARO, *Scuola Normale Superiore, Pisa*, BRADFORD Z. MAHON, & ALFONSO CARAMAZZA, *Harvard University*

—Gender agreement is mandatory for both singular and plural Italian nouns. However, when two or more nouns are differently marked for gender, masculine plural agreement is required. In this study, we combined on-line and off-line methodologies in order to assess the mechanisms involved in gender selection in the context of multiple referents. The results of two pronoun production tasks showed that plural feminine agreement was significantly more difficult than plural masculine agreement. Preliminary data from Spanish seem to go in the same direction. A test of acceptability judgements revealed that agreement violations in Italian are tolerated more readily in the case of two feminine vs. two masculine referents but only when the referents are of different types (e.g., one apple and one banana vs. two apples). These findings suggest that both referent number and referent type may affect gender selection. Implications for models of grammatical feature selection are discussed.

12:20-11:40 (300)

Stroop-Like Competition in Determiner Selection. F.-XAVIER ALARIO, *CNRS & Université de Provence*

—We investigate the processes that are responsible for the oral production of determiners (articles, demonstratives, possessives, etc.). This issue has been previously addressed by using several variants of the picture naming paradigm. In a new series of experiments we attempted to observe Stroop-like interference in determiner production. Participants were asked to name pictures of common objects with determiner + noun phrases. At the same time they ignored distractor determiners printed on the pictures. We manipulated the features (e.g., number, gender, type of determiner) that were shared or that contrasted between the distractor determiners and the expected target. The results show a pattern of competition that is modulated by the shared or contrasted features.

These experiments make clear that Stroop-like competition can be used to understand the processes of determiner production. The pattern of results is discussed in relation to current models of determiner form competition.

11:40-12:00 (301)

Regular and Irregular Plural Inflections: Evidence from Hebrew. VERED VAKNIN, & JOSEPH SHIMRON, *University of Haifa* (read by Joseph Shimron)

—The debate between single and dual route models of inflections may benefit from comparing reaction time and error rate of regular and irregular inflections in an on-line inflection task, where the participants are presented with a singular noun and are asked to name its plural form. In Hebrew, plural inflection of regular masculine nouns is done by suffixing –im (e.g., balon-balonim ‘balloon/s’). Plural inflection of regular feminine nouns is done by suffixing –ot (e.g., dvora-dvorot ‘bee/s’). In irregular nouns, the masculine singulars get the feminine suffix (e.g., xalonot ‘windows’), and the feminine nouns get the masculine suffix (e.g., beycim ‘eggs’). In this study it was found that the inflection of irregular nouns took longer and was involved with more errors compared with the inflection of regulars. We interpret the results as supporting a dual-route model in which, in the inflection of irregulars, a default route interferes with a retrieval route.

12:00-12:20 (302)

Evidence Against Dual Route Modelling, Semantics and (Ir)regularity. WIEKE TABAK, ROBERT SCHREUDER, *Radboud University of Nijmegen*, & HARALD BAAYEN, *Radboud University of Nijmegen & Max Planck Institute Nijmegen*

—Pinker (1999) argues that semantics is irrelevant for the past tense in English. We present distributional and experimental evidence to the contrary. Statistical analyses of lexical variables in English and Dutch show that irregular verbs are characterized by a greater semantic density. For instance, irregular verbs have more meanings and more associates than regular verbs, they cluster into less productive argument alternation classes, and they are more likely to express telic events. These distributional variables are significant predictors of RTs in visual lexical decision and word naming in Dutch. E.g., in visual lexical decision, the greater number of meanings characterizing irregulars led to shorter RTs for irregular past tense forms. In word naming, we also observed evidence for competition between the present and past tense forms for both irregulars and regulars. These findings challenge Pinker's encapsulated dual route model and point to a confound of regularity with semantic density.

12:20-12:40 (303)

Do We Monitor the Verbal Outfit [... Uhm ...] Output of Others? IEMKE HOREMANS, & NIELS O. SCHILLER, *Maastricht University*

—Speakers monitor their own speech for errors. Previous research showed that we also monitor speech of others for semantic and syntactic errors. However, relatively little is known about monitoring the speech of others for phonological errors. We report a study in which we presented participants with line drawings and auditory sentences describing these drawings. Participants were asked to press a button when they detected an error in the description. Errors were either semantic or phonological. Phonological errors were created following actual speech error patterns. In addition to reaction times, event-related potentials were measured. Preliminary data analysis showed that phonological errors were detected significantly faster than semantic errors. ERP analyses revealed differences between semantically, phonologically, and control conditions between 140 and 320 ms as well as between 430 and 690 ms after the onset of the erroneous

word. These data suggest that monitoring is different for phonological compared to semantic errors.

Higher Mental Processes III.

Gorlaeus Building Room 6,
Saturday Morning, 11:00-12:40

Chaired by Michael Öllinger,

Max Planck Institute for Human Cognitive and Brain Sciences

11:00-11:20 (304)

Move Selection Reveals Hidden Mysteries for Insight Problems. GARY JONES, *University of Derby*

—Insight occurs when we reach impasse on a problem and then –aha! – the solution suddenly appears. The representational change theory (Ohlsson, 1992) suggests people impasse through failing to decompose chunks into their constituent parts. The progress monitoring theory (MacGregor, Ormerod & Chronicle, 2001) suggests people impasse through selecting heuristics that reduce the distance to goal. A 2 (chunk decomposition [CD] versus no chunk decomposition [NCD]) x 3 (non-solution move nearer to goal [NG], non-solution move away from goal [AG], solution move) design used established two-move insight problems (matchstick arithmetic and eight coin) to examine which move participants would select as the appropriate first move to make. The results show an interesting phenomenon: for eight coin, NCD participants choose the AG move, but CD participants choose the NG move; for matchstick, participants always choose the NG move. Eight coin selection is based on perceptual grouping rather than heuristics, whereas matchstick selection is based on prior knowledge of arithmetic rather than chunk decomposition.

11:20-11:40 (305)

The Influence of the Selective Activation of Problem Elements on the Solution of Insight Problems. MICHAEL ÖLLINGER, *Max Planck Institute for Human Cognitive and Brain Sciences*, & GÜNTHER KNOBLICH, *Rutgers University, Newark*

—Knoblich et al. (1999) suggest that solving insight problems requires a representational change. They identified two processes that can trigger a representational change: Constraint relaxation that breaks constraints imposed by prior knowledge and chunk decomposition that decomposes the automatically built-up constituents of the problem. Little is known about how the activation of particular problem elements interact with representational change. In four groups (N = 4 * 30) participants solved matchstick arithmetic tasks that required different degrees of representational change. Between groups the direct perceptual access of problem elements was varied by removing parts of the equation: either the values (group 1), the operators (group 2), or the whole equation (group 3) disappeared after an initial encoding phase (in the control group the equation remained unchanged). Groups 1 - 3 showed impaired problem solving behavior in comparison with the controls, with group 1 performing exceptionally poorly. The probability of representational change depends critically on the selective activated elements.

11:40-12:00 (306)

Semantic Illusions, Conditional Probability, and the Breakdown of Probabilistic Inference. SHIRA ELQAYAM, SIMON J. HANDLEY, & JONATHAN ST.B.T. EVANS, *University of Plymouth*

—In the recent controversy over the psychology of conditionals, a central place is assigned to the Ramsey test adopted by the suppositional account, and rejected by mental model theory. According to Ramsey, we evaluate the conditional by adding the antecedent to our beliefs and evaluating the consequent in that

context, resulting in evaluations of conditional probability. We contend that when the antecedent is indeterminate, its evaluated probability depends on whether it's amenable to the collapse illusion, which involves the tendency to evaluate indeterminate constituents as determinate, and true. This meta-deductive illusion occurs when the pragmatically cued assumption that the speaker is truthful fails to result in contradiction, and disappears when the indeterminate constituent is paradoxical. We show that when the antecedent is collapsible the probability of conditionals is collapsed to evaluations of conditional probability; when it is paradoxical, hypothetical thinking is stretched to its limits and probabilistic judgements sometimes fail.

12:00-12:20 (307)

Entrenchment of Instructed and Experienced Belief States. KRISTIEN DIEUSSAERT, DEBORA VANSTEENWEGEN, & AN VAN ASSCHE, *University of Leuven*

—Since Elio and Pelletier (1997) presented their seminal paper on belief revision, existing reasoning theories were challenged to adopt non-monotonic reasoning in their framework. Simultaneously, the human contingency literature recognized the importance of belief revision. A crossfertilisation of both research areas seems obvious. However, a major problem for the transferability of experimental results may be that the research areas have a different method to (artificially) construct the belief that is to be revised in a later stage. In this paper we discuss the differences between both experimental paradigms and its implications.

12:20-12:40 (308)

The Neural Mechanisms Underlying the Formation of New Object Categories. MARIEKE VAN DER LINDEN, *F.C. Donders Centre, Nijmegen*, JAAP M.J. MURRE, *University of Amsterdam*, & MIRANDA VAN TURENNOUT, *F.C. Donders Centre, Nijmegen*

—Various object categories elicit distinctive patterns of activity across the occipitotemporal pathway. In the present study the experience-dependent formation of new object categories is investigated by training subjects to recognize novel bird categories. Six prototypes of artificial birds were created. To create different exemplars, the prototypes were morphed along a continuum. Subjects were implicitly trained on category discrimination by performing a 1-back task (same/different bird). There were three training conditions: 1) Categorization training, where subjects received correct feedback to their responses, 2) Visual training, where the amount of exposure to the birds was the same, but category learning was hindered by random feedback, 3) No training. To investigate training induced changes in patterns of activity in the cortex, subjects were scanned before and after training while they viewed pictures of the different bird types. Behavioral and imaging results show that training induces a differentiation in responses to newly learned categories.

Working Memory III.

Gorlaeus Building Room 7,
Saturday Morning, 11:00-12:40

Chaired by Catherine Thevenot, University of Sussex

11:00-11:20 (309)

The Impact of Working Memory Training on Selected Cognitive Measures. MARTIN BUSCHKUEHL, & SUSANNE M. JAEGGI, *University of Bern*

—With a group of 8 healthy participants we conducted a working memory (WM) training over a period of 10 days. The participants were trained daily for 25 minutes with an adaptive n-back task implemented as dual-task paradigm, i.e. participants had to respond concurrently to visual and auditory stimuli. Pre- and post-tests

consisted of a digit span task, task-switching, Raven Advanced Progressive Matrices and a standardized test of the used n-back task. The results yielded a significant training effect in which no asymptotic level was reached. A significant generalized improvement could be found in the digit span task and a clear tendency was observed in the task-switching test. These data provide evidence that a specific WM training does result in generalized effects in other cognitive domains. It is of further interest, whether these enhancements are due to improvements in capacity or efficiency.

11:20-11:40 (310)

Updating the Working Memory Complex. YOAV KESSLER, & NACHSHON MEIRAN, *Ben-Gurion University of the Negev*

—In a series of experiments, participants were required to keep track of one or two working memory (WM) counters, having to update their values in 80% of the trials. Updating cost, defined as the difference between update and non-update trials, was larger when two counters were involved compared to when there was only one counter. This finding was interpreted as evidence that all active information in WM is bound together, and has to be updated as a whole once any of its elements is updated. This result supports the claim that WM holds a unitary complex representation (e.g. Halford, Wilson, & Philips, 1998; Zelazo & Frye, 1997), and appears incompatible with views of WM as composed of several independent objects (e.g. Cowan, 2001; Oberauer, 2002). The authors suggest that these two seemingly contradicting approaches may be resolved by assuming that WM objects are independent in the information that they contain but dependent in the processes of updating these contents.

11:40-12:00 (311)

Working Memory and Comprehension of Survey and Route Spatial Texts. CHIARA MENEGHETTI, FRANCESCA PAZZAGLIA, ROSSANA DE BENI, *University of Padua*, & VALÉRIE GYSELINCK, *Université René Descartes*

—This study investigates whether spatial texts assuming survey and route perspectives differ in the components of working memory solicited in their comprehension. In Experiment 1, participants listened to survey and route texts while concurrently performing tasks of articulatory suppression and of spatial tapping. The articulatory suppression impaired memory performance of both survey and route texts, whereas the tapping task impaired performance of only the route text. In Experiment 2, survey and route texts were presented concurrently with a spatial 'sequential' task, which required memorising order of presentation of sequences of dots; and a spatial 'simultaneous' task, which required memorising their positions. The two concurrent tasks impaired memorisation of the survey text to the same extent, but that of the route text differently, the sequential task having a stronger effect. Overall, these results suggest that comprehension of survey and route texts calls different components of working memory into play.

12:00-12:20 (312)

Temporal Status of Visual Information: A Determinant of Short Term Memory Storage. EMMANUELLE GAVAUULT, *University of Provence*, MOHAMED A. BEN ABBES, *University of Tunis*, & THIERRY RIPOLL, *University of Provence*

—Because of the limitations of visual working memory, we hypothesized that a crucial determinant of memory storage is the temporal status of the visual information. To test this, we used an original paradigm in which participants had to memorize four targets among four distractors. Participants of experimental groups previewed the distractors during a variable time (100, 300 and 500 ms) and after a variable delay they saw targets among distractors. These participants had better performances than participants who

only saw targets among distractors. Furthermore, this facilitatory effect is dependant on the distractors presentation time. Thus, the visual system is able to quickly and gradually deprioritize old information and prioritize new information to be memorised. Moreover, the configuration of distractors presented previously seemed to play a role in the storage of the new targets. Finally, these results have implications for further understanding links between the allocation of attention and visual working memory.

12:20-12:40 (313)

Representations and Strategies to Solve Arithmetic Word Problems: The Role of WM Capacities. CATHERINE THEVENOT, & JANE OAKHILL, *University of Sussex*

—The experiments presented in this paper provide evidence for the isomorphism between the situation described in the text of an arithmetic word problem and the mental representation constructed by adults to solve this problem. Dynamic problems, which describe sequential events, are more likely to be solved by sequential strategies than are static problems. In other words, the order of succession of sub-goals reached by individuals for the resolution is determined by the order of succession of sub-goals explicitly described in the text of the problem. However, in order to decrease the processing demands of the task, low span individuals may construct an alternative representation to the one directly induced by the text and consequently may use sequential strategies to solve static problems as well.

Working Memory and Emotion.

Gorlaeus Building Room 1,
Saturday Afternoon, 2:40-4:00

Chaired by Sverker P. Sikström, Lund University

2:40-3:00 (314)

The Price of Victory and Defeat: Exploring the Impact of Affect on Working Memory. NUNO S. GASPAR, *University of Porto*

—Immediate serial recall of words (presented before a card bet) and letters (corresponding to the initials of the bet outcome, e.g., 'V' for victory) were compared in three groups: 70%-victory, 30%-victory, and a control group. Results from 69 undergraduates revealed that words were equally recalled. However, the 70%-victory group better recalled the letters, showing differences in the recall of words vs. letters across conditions, $F(2, 66) = 5.79$, $p < 0.01$, in the absence of a condition main effect. During the experiment, initials recall improved across all conditions but words recall didn't improve in the 30%-victory group. This pattern suggests differences in processing efficiency associated with different rates of positive/negative game outcomes. Implications for theories of the impact of affect on working memory are discussed.

3:00-3:20 (315)

Somatic Markers and Memory for Outcomes: Computational and Experimental Evidence. ANDREA STOCCO, & DANILO FUM, *University of Trieste* (read by Danilo Fum)

—The most influential theory of what emotions are and how they affect cognition is the Somatic Marker Hypothesis (Damasio, 1994). Most of the evidence supporting this theory, as well as some contrary results (e.g. Maia & McClelland, 2004), comes from a decision-making paradigm known as the Gambling Task. We propose a revision of the role of somatic markers in cognition. We support our alternative view by describing a detailed computational model that can account for all the experimental data, and successfully reproduce the impairments of patients with different brain lesions. Furthermore, we tested our alternative view by running an experiment with healthy normal participants. The experiment was designed to dissociate the phases of encoding and retrieval of previous negative outcomes in a modified version of the task. An analysis of participants' performances and latencies confirmed that the effect of somatic markers is restricted to the encoding phase.

3:20-3:40 (316)

Cognitive and Physiological Effects of the Anticipation of Unpleasant Affect. THOMAS KLEINSORGE, *Universität Dortmund*

—In a series of experiments participants were asked to make speeded judgments regarding the correctness of arithmetic equations (arithmetic verification task) that were presented in front of pictorial stimuli that are known to elicit neutral, positive, or strong negative affective responses. In one condition, precues predicted the affective valence of the next picture, whereas in another condition the precues were uncorrelated with the type of picture. The main question was in which way the opportunity to anticipate a forthcoming negatively valenced stimulus would modulate its impact on cognitive performance. Anticipation generally enhanced the interfering effect of unpleasant pictures. Furthermore, it turned out that anticipation (and not affective valence per se) was the main source of interference. In addition, in those participants who scored high on a measure of subjective emotional self control, anticipation of negative affect went along with an enhanced physiological stress response as indexed by cortisol in saliva.

3:40-4:00 (317)

A Model of Stochastic Resonance and Dopamine in ADHD. SVERKER P. SIKSTRÖM, *Lund University*, & GÖRAN SÖDERLUND, *Stockholm University*

—Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder characterized by inattention, impulsivity, and hyperactivity. It is believed to involve a deficit of dopamine neurotransmitters that modulates the signal to noise ratio in neural cells. Stochastic resonance (SR) is the empirical phenomena that a signal presented under the detection threshold can be detected in presence of moderate noise. The role of SR in ADHD is here investigated for the first time. A computational model is suggested where the dopamine level modulates the signal to noise ratio in SR. Consistent with the model, experimental data show that ADHD children benefit, in episodic memory performance, from auditory noise whereas performance is attenuated for controls. The model also predicts that performance in ADHD is highly sensitive to the presentation rate whereas controls are robust against this manipulation.

Priming.

Gorlaeus Building Room 2,
Saturday Afternoon, 2:40-4:00

Chaired by Doris Eckstein, University of Bern

2:40-3:00 (318)

Masked Semantic Priming is Mediated by Task Goals. DORIS ECKSTEIN, & WALTER J. PERRIG, *University of Bern*

—Masked priming experiments with short prime-target SOAs have shown to yield replicable short-lived priming with number and word primes. Although repetition of stimuli contributes to short-lived priming, namely by boosting automatic responding, recent findings suggest that the prime's semantic content is accessed, because number primes never seen during the experiment also led to priming. This study tested if, as for number primes, word primes are processed on a semantic level. Using two different tasks with a fixed stimulus set, we investigated whether different semantic aspects of primes are retrieved depending on task. Participants alternatively classified target words as positive vs. negative (valence), or as animated vs. inanimated (animacy). Thus, the positive prime 'baby' and the positive target 'happiness' were congruent with respect to valence, but they were incongruent with respect to animacy. Results show that priming varied with task and not with overall prime-target congruency on valence and animacy.

3:00-3:20 (319)

Additive and Interactive Effects of Frequency and Masked Repetition Priming: Implication for the Mechanism of Masked Repetition Priming. SACHIKO KINOSHITA, *Macquarie University*

—In the long-term priming paradigm, the effect of repetition is greater for low- than high-frequency words. In contrast, Forster and Davis (1984) have shown that when the prime is masked and is not available for conscious report, the effects of repetition and frequency are additive. This additive pattern has been replicated in a number of studies, and has been used to argue for different mechanisms underlying long-term vs. masked repetition priming effects. I report lexical decision experiments using masked primes showing that both additive and interactive effects with frequency can be observed, depending on the subjective familiarity of low-frequency words used. The implication of results for mechanisms underlying masked repetition priming effects will be discussed.

3:20-3:40 (320)

Priming in Cognitively Blind Subjects. WALTER J. PERRIG, MATTHIAS A. STURZENEGGER, & DORIS ECKSTEIN,

University of Bern

—A person is considered to be cognitively blind, if she does not see features or objects in scenes presented to her. Cognitive blindness can be generated by focusing attention away from target information by instruction or distracting stimuli. In this situation the subjects are not aware of a physically present stimuli. They do not see phenomenologically the targets. The interesting theoretical question is, whether and how information is processed without conscious awareness. In this presentation a series of experiments is summarized, in which we investigated priming effects in situations of cognitive blindness using a mirror-masking paradigm. There is evidence of unconscious word processing in behavioral as well as in ERP- data using lexical decision tasks. Further experiments with perceptual and conceptual priming tasks corroborate perceptual and lexical priming effects with little evidence of semantic priming.

3:40-4:00 (321)

What Gets Masked in Object Substitution Masking? ANGUS R.H. GELLATLY, *Open University, United Kingdom*, MIKE PILLING, *University of Nottingham*, & GEOFF COLE, *Durham University*

—Object substitution masking (OSM) is a relatively recently described phenomenon that has attracted considerable attention. Enns & DiLollo (2000) considered it an outstanding question whether in OSM all aspects of a target are masked or only some of them. We report experiments examining this issue. We begin by demonstrating that in conditions in which four dot masking substantially reduces an observer's ability to report whether the left or right corner of a diamond target was missing, there is a very much smaller effect on ability to report the presence or absence of the target. Subsequent experiments examine what other features of the target may be selectively masked in OSM. On the strength of these data, conclusions are drawn as to the level of representation on which OSM must operate, and on the relationship between OSM and other forms of visual mas

Face Recognition and Change Blindness.

Gorlaeus Building Room 3,
Saturday Afternoon, 2:40-4:00

Chaired by Joachim Hoffman, University of Würzburg

2:40-3:00 (322)

Developmental Differences in Configural Processing of Faces: A Schema Effect? JISIEN YANG, & CHON-WEN G. SHYI, *National Chung Cheng University*

—Although configural processing is considered as the major developmental difference of face processing, most studies on that issue used adults' faces. The present research aims to clarify the confounding factor of the age of face stimuli since it influences the children's face processing. Four different kinds of face stimuli with manipulation of configural information between features are adopted in present experiment: adult, child, cartoon and cat faces. The results show that the configural processing of adults is significant better than 1st graders regardless of the type of faces. Children performed equally poor on the four different kinds of face stimuli. Obviously, it's harder for children to detect the configural change on faces no matter how familiar or attractive the face stimuli are. Face schema theory is not supported. The developmental difference of face processing was a general deficit in the ability of dealing with the configural information on faces.

3:00-3:20 (323)

Does the Vergence Angle Adapt to the Hollow Face Illusion? JOACHIM HOFFMANN, & ALBRECHT SEBALD, *University of Würzburg*

—In two experiments participants looked at a rotating mould of a

human face from a distance of about 50 cm. In each trial the rotation of the mould was fixed at an angle between 0 and +/-180 degree. At 0 degree the convex side and at 180 degree the concave side of the mould looked straight to the observer. Participants were to fixate the tip of the nose while the vergence of their eyes was measured. At rotations around 180 degree participants quite often had the illusion to see a normal face (the hollow face illusion) showing a substantial stronger vergence than participants who correctly saw the hollow mould. Despite the contradicting depth information from disparity, fixation was moved from the real to the apparent location of the tip of the nose. The results suggest that perception and the control of eye movements rely on common data.

3:20-3:40 (324)

Implicit Change Detection: The Fat Lady Hasn't Sung Yet. CÉDRIC LALOYLAUX, ARNAUD DESTREBECQZ, & AXEL CLEEREMANS, *Université Libre de Bruxelles*

—Using a simple change detection task involving vertical and horizontal stimuli, Thornton and Fernandez-Duque (2000) showed that the implicit detection of a change in the orientation of an item influences performance in a subsequent color change detection task. However, Mitroff, Simons and Franconeri (2002) were not able to replicate this result and attributed Thornton et al.'s findings to methodological biases. We believe that Mitroff et al.'s failure to replicate might stem from several methodological differences between their study and that of Fernandez-Duque. In this study, we offer a conceptual replication of the Thornton and Fernandez-Duque's experiment in which we attempted to address all the methodological issues that we could identify. We found that implicit change detection does not appear to be artefactual, as we could replicate Thornton and Fernandez-Duque (2000) findings after having corrected all the potential biases identified so far in a single experiment.

3:40-4:00 (325)

The Role of Action on Change Blindness. FRANCESCO DI NOCERA, MICHELA TERENCE, & FABIO FERLAZZO, *University of Rome 'la Sapienza'*

—Interest toward change blindness and other 'looked-but-failed-to-see' phenomena arises because of both the hints their investigation can give to our understanding of human visual processes, and their relevant implications for road safety, as they account for some 10% of road accidents in a number of countries. Some authors have hypothesized a role of the action systems in change blindness, yet empirical evidence for such a link is still lacking. Here we show that change blindness depends on the action the observer is performing while looking at the visual scene. In three behavioural experiments observers are found to be faster at detecting a change in the visual scene when it concerns an object that has the same color, form, affordance, or motion direction of the visual object they are tracking. Our results suggest that action may have consequences also for lower-level processing of visual scenes.

Language Production and Perception.

Gorlaeus Building Room 4/5,
Saturday Afternoon, 2:40-4:00

Chaired by Ingrid K. Christoffels, Maastricht University

2:40-3:00 (326)

Effects of Auditory Distractors on Verbal Self-Monitoring. LESYA GANUSHCHAK, & NIELS O. SCHILLER, *Maastricht University*

—Self-monitoring is one of the processes involved in speech production necessary for error detection and self-repair processes. According to Levelt's (1983) proposal, self-monitoring is a resource-limited process. Therefore, the efficiency of the monitor should decrease under resource-demanding conditions. Here, we

created such conditions by presenting native Dutch participants with auditory distractors during a phoneme monitoring task (e.g., "Does the sound /t/ form part of the picture name table?"). We investigated the influence of the distractors on the efficiency of the verbal self-monitor by measuring behavioral responses and the Error-Related Negativity (ERN). Participants showed auditory interference effects in reaction times, and we obtained an ERN after verbal (phoneme monitoring) errors. The amplitude of the ERN was largest following semantically related distractors. We suggest that semantically related distractors led to more conflict between possible responses and demanded additional resources than unrelated distractors, thereby increasing reaction time and the amplitude of the ERN.

3:00-3:20 (327)

Solving Conflict in Lexical Access: An Event-Related Potentials (ERP) Study. HEIDI KOPPENHAGEN, & NIELS O. SCHILLER, *Maastricht University*

—The verbal monitoring system controls for the correctness of our speech. We hypothesized that the monitor detects situations that involve conflict in information processing. If the amount of monitoring depended on the amount of conflict present, this should be reflected in gradually different amplitudes of a conflict-monitoring ERP-component. The present study investigated speech monitoring during overt picture naming while the amount of conflict at the lexical level was varied. "No lexical conflict" consisted of naming a picture that corresponded to only one lexical entry, "low lexical conflict" referred to naming with its dominant name a picture that corresponded to multiple lexical entries, and "high lexical conflict" consisted of naming with its non-dominant name a picture that corresponded to multiple lexical entries. Results showed at mid fronto-central electrodes an N450 followed by a positive Sustained Potential (SP) that had significantly higher amplitudes for both conflict conditions relative to the no-conflict condition.

3:20-3:40 (328)

The Relationship between Phonological Forms in Speaking and Listening. REBECCA OEZDEMIR, ARDI ROELOFS, & WILLEM J.M. LEVELT, *Max Planck Institute for Psycholinguistics*

—Language users are both speakers and listeners. We investigated the relationship between the phonological form representations that are used in producing and perceiving words. In a first series of experiments, we observed that hearing phonologically related words speeds up object naming at both sublexical and lexical form levels, suggesting phonological form links running from speech perception to production. A second series of experiments showed that planning spoken words speeds up the recognition of speech segments in hearing words, suggesting form links running from speech production to perception. In a third series of experiments, we observed that the perceptual uniqueness point of words influenced internal speech monitoring but not object naming, suggesting that the phonological forms engaged in speech production and perception are separate. To conclude, our experiments provide evidence that separate but closely linked phonological representations are engaged in spoken word production and perception.

3:40-4:00 (329)

Investigating the Shared Neural Correlates of Speech Comprehension and Production Using fMRI. INGRID K. CHRISTOFFELS, ELIA FORMISANO, & NIELS O. SCHILLER, *Maastricht University*

—The large functional overlap between speaking and hearing suggests that language comprehension and production networks are closely integrated. Nevertheless, these two sides of the language

coin are often approached independently. Using fMRI we investigated the shared neural correlates of comprehension and production. In a blocked design we studied 14 participants who engaged in overt picture naming, overt picture naming while noise was presented (to auditorily block the participants' voice), covert picture naming, listening to pre-recorded picture names, and listening to noise. Random effects analyses showed regions in the superior temporal gyrus/sulcus (STG/STS) bilaterally that responded more to speech perception than to noise. The same regions were activated for overt (but not covert) speaking indicating overlap for speech production and perception. Interestingly, also speaking under noise activated the same regions in the STG/STS, suggesting that this activity is not related to hearing ones own voice when speaking.

Higher Mental Processes IV.

Gorlaeus Building Room 6,
Saturday Afternoon, 2:40-4:00

Chaired by Michael Öllinger,

Max Planck Institute for Human Cognitive and Brain Sciences

2:40-3:00 (330)

Meta-Representation in a Dual Connectionist Model. DIONYSSIOS THEOFILOU, & AXEL CLEEREMANS, *Université Libre de Bruxelles*

—Meta-representations can be seen as cognitive tools for thinking and are now considered in studies of developmental-psychology, linguistics, religion, as well as in explaining autism and communication disorders. We explore a possible mechanism that can augment a neural network (NN) with the ability to develop and use meta-representations. As an application-paradigm we use an artificial grammar learning task. Our model consists of two parallel NNs. The first-order NN (performer) is a simple (SRN) trained to discriminate grammatical strings. The second-order network (observer) is a self-organizing map (SOM) that receives as input the entire set of activations from the first-order network. Although the grammar states were never provided explicitly to either the performer or the observer, the second order network can explicitly differentiate the states of the graph used to define the transition-rules of the grammar. Essentially, this has been achieved by means of meta-representing the activations from the first-order network.

3:00-3:20 (331)

Conceptual Information Elicited by a Specific Abstract Domain in Expert and Naïve People. ANNALISA SETTI, & NICOLETTA CAMELLI, *University of Bologna*

—Recent studies have stressed the different role of taxonomic, thematic and attributive relations in shaping abstract conceptual knowledge organization (Barsalou & Wiemer-Hastings, in press; Caramelli et al., in press). In this framework, the aim of the present research was to investigate with a definition production task the different pattern of relations elicited by abstract concepts belonging to the legal domain in both expert (lawyers, judges) and naïve participants (university students and laymen). Besides confirming the major role of thematic relations in providing abstract knowledge in the legal domain with situational information, the results have also shown that expert and naïve participants produced different patterns of relations. In particular, the definitions produced by lawyers and judges rested on taxonomic information more than those produced by students and laymen. Thus, it can be concluded that expertise helps structuring abstract knowledge at least in the legal domain.

3:20-3:40 (332)

Individual Differences in Information Reduction. ALISON J.K. GREEN, *Open University, United Kingdom*, & MICHAEL J. WRIGHT, *Brunel University*

—Haider and Frensch (1996) demonstrated that with practice, we learn to attend less to task-irrelevant elements. Green and Wright (2003) showed that when given a choice of two relevant information sources, individuals tend to reduce to the first-encountered source. The 3 experiments reported here examine in more detail the selection of one source over another, where there exists a choice, and consider the possibility that with increasing amounts of practice, invariant aspects of task-relevant information may come to be represented differently to those elements that vary. We show that when presented with a choice, reducers tend to use one information source, while non-reducers continue to process all available information. We show also that the bias towards the first-encountered source can be altered. Errors data indicate that, with practice, reducers appear to represent invariant elements of the task relevant information differently. Specifically, reducers appear to cease to check the identity of invariant elements of task-relevant information. Our third experiment tracks the development of information reduction. We discuss our results in the context of Haider and Frensch's information reduction hypothesis, and Logan's (1998, 2002) instance theory.

3:40-4:00 (333)

Multiple Learning Modes in the Development of Rule-Based Category-Learning Task Performance. VERENA D. SCHMITTMANN, MAARTJE E.J. RAIJMAKERS, & INGMAR VISSER, *University of Amsterdam*

—Behavioral and Neuropsychological data suggest that multiple systems are involved in category learning. Through the application of mixtures of latent Markov process models, the existence of multiple modes of behavior in learning a simple discrimination is examined. We analyzed the sequential data from a cross-sectional study of 249 subjects aged 4 to 12 years and adults carrying out a rule-based category-learning task (Raijmakers et al., 2001). Mixtures of latent Markov models are fitted to the time series data. The data is best described by a mixture of two learning modes: a concept identification learning process and a simpler all or none learning process. The development of the learning modes in the given age range is investigated with multi-group mixtures of latent Markov process models. The results support the hypothesis of distinct learning modes instead of a single general mode of learning with a continuum of appearances.

Numerical Cognition.

Gorlaeus Building Room 7,
Saturday Afternoon, 2:40-4:00

Chaired by Valerie Camos, Université de Bourgogne

2:40-3:00 (334)

Priming Numbers with Masked Single-Digit Multiplications. JAVIER GARCÍA-ORZA, & JESÚS DAMAS, *Universidad de Málaga*

—A masked priming paradigm (SOA= 48 ms.) was used to explore automatism in single-digit multiplication solving. Participants were instructed to name Arabic numbers ranging from 6 to 72. Type of prime (number priming and single-digit multiplication priming) and prime-target relationship (congruent and incongruent) were manipulated. In the congruent multiplication priming condition the solution to the prime matched the target number (e.g., prime: $2 \times 3 =$; target: 6). In the congruent number priming condition the prime and the target were the same number (e.g., 6; 6). In the incongruent conditions the primes were multiplications or numbers unrelated to the targets (e.g., respectively: $4 \times 8 =$; 6 and 32; 6). A visibility tasks ensured that participants were unaware of the primes. The ANOVA showed a significant effect of prime-target relationship and no evidence of interaction between both variables. Results demonstrated that single-digit multiplications are automatically

solved. Additional data lead us to suggest that single-digit multiplications are lexically represented.

3:00-3:20 (335)

ERP Interference Effects While Verifying Simple Addition and Multiplication Problems. KERSTIN JOST, & FRANK RÖSLER, *Philipps-University Marburg*

—Eighteen participants verified single-digit addition and multiplication problems. 50% of the incorrect results were correct for the other operation (e.g., $4 \times 5 = 9$, $3 + 8 = 24$). Verification times were longer for these interfering than for neutral incorrect results (e.g., $4 \times 5 = 11$, $3 + 8 = 26$). In the EEG incorrect compared to correct results evoked a relative negativity around 350 ms. The amplitude of this arithmetic N400 effect was smaller for interfering than for neutral results. For multiplication problems this amplitude reduction had a centro-parietal topography and its size correlated with the size of the behavioral interference-effect. For addition problems the amplitude difference between interfering and neutral results had a different topography and prevailed in time windows following the N400 effect. The results indicate that interference between addition and multiplication is caused by the parallel activation of facts from the other operation. For the verification of addition problems, however, other processes, e.g., magnitude estimation, also seem to be invoked.

3:20-3:40 (336)

Subitizing and Slow Object Counting: Are They the Same? Evidence from Eye Movement. ATTILA KRAJCSI, *University of Szeged*, ZOLTÁN VIDNYÁNSZKY, *Semmelweis University*, GYULA KOVÁCS, *Budapest University of Technology and Economics*, & ZSOLT PALATINUS, *University of Szeged*

—Object counting comprises two phases. A relatively fast phase called subitizing, when the number of objects is not greater than 4, and a slow counting process for greater numerosities, with a higher slope when the number of objects is increased. The precise mechanisms underlying this phenomenon are still debated. In the present study subjects enumerated dots, while the eye movement was registered. Results show that the number of fixations predicts the response latency. Detailed analyses of the eye movement data reveal a constant 1,6 dots/fixation limitation in the counting process that will be reached only at 4 or more objects. Reaction time data separated by the number of fixations will also show a low slope in the slow counting phase. These results mean that the same fast subitizing mechanism is used in slow counting phase but several times in a trial as the dots are partitioned to smaller (subitizable) subsets.

3:40-4:00 (337)

Subitizing of Auditory Events: Evaluating the Focus of Attention. VALÉRIE CAMOS, *Université de Bourgogne*, & BARBARA TILLMANN, *CNRS - UMR 5020*

—Subitizing is characterized by a rapid and accurate quantification of small collections (less than 4 objects). An ongoing debate in the literature concerns the attentional or pre-attentional nature of subitizing. Cowan (2001) suggests that the subitizing range is caused by limits of the focus of attention. On the contrary, Trick and Pylyshyn (1993, 1994) propose that subitizing is an emergent property due to pre-attentional processes involved in the analysis of visual scenes (i.e., simultaneously presented information). The current study presents 2 experiments that compare the subitizing of visual vs auditory stimuli. Moreover, the simultaneous vs sequential presentation of the stimuli was also manipulated. Both children and young adults were able to subitize auditory stimuli. However, the range of subitizing for auditory stimuli was smaller than the classical limit at 4 obtained for visual simultaneously presented stimuli. Implications for a new model of subitizing are discussed.

PERCEPTION I

(1001)

The Visual Basis of Category Effects in Object Identification: Evidence from the Visual Hemifield Paradigm. TORSTEIN LÅG, *University of Tromsø*

—The basis for the category specific living things advantage in object recognition (e.g. Laws & Neve, 1999) was investigated in this experiment. It was hypothesised that the global shape of living things on average provides more information about their basic-level identity than the global shape of nonliving things. Subjects in this experiment performed a name-picture verification task in which blurred images of living and nonliving things were presented in either the right or the left visual hemifield. Recognition performance was worst for nonliving things presented to the right visual field/left hemisphere, indicating that the lack of visual detail in the stimulus combined with a left hemisphere bias toward processing high frequency visual elements proved detrimental for processing nonliving stimuli in this condition. This result is compatible with the global shape hypothesis and converges with evidence using other paradigms.

(1002)

Learning Symmetry Relations in Visual Pattern Categorization. MARTIN JUTTNER, *Aston University, Birmingham*, & INGO RENTSCHLER, *Institut Für Medizinische Psychologie, Germany*

—The discrimination of patterns that are mirror-symmetric counterparts of each other is notoriously difficult and requires substantial training. We explored whether perceptual symmetry discrimination is based on associative learning strategies or involves the acquisition of an abstract symmetry concept. Subjects were trained to discriminate between sets of unfamiliar grey level images in two conditions, which either required the separation of mirror-symmetric patterns or not. Both groups were subsequently tested in a 4-class category-learning task employing the same set of stimuli. The results show that subjects who had successfully learned to discriminate between mirror-symmetric patterns were distinctly faster in the categorization task, indicating a transfer of conceptual knowledge between the two tasks. Additional computer simulations suggest that the development of such symmetry concepts involves the construction of structural pattern descriptions in terms of parts and their relations, in which part positions are coded relative to an external coordinate system.

(1003)

Latent Markov Models for Categorization. MAARTJE E.J. RAIJMAKERS, *University of Amsterdam*

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

(1004)

No Early Magnocellular Deficit in Schizophrenia. SANDRINE DELORD, *University of Bordeaux 2*, MARIA G. DUCATTO, STÉPHANE THIMEL, DELPHINE PINS, PIERRE THOMAS, & MURIEL BOUCART, *University of Lille 2 & CNRS*

—The two main streams (parvocellular and magnocellular) of visual processing can be experimentally isolated very early due to their different contrast gain properties (Pokorny and Smith, 1997, JOSA). This psychophysical study tested whether the global magnocellular dysfunction found in schizophrenia (e.g. Schwartz et al., 2001, *Frontiers in Bioscience*) spares the earliest processes. Seven schizophrenic patients and 24 controls participated. The task was to discriminate the slightly brighter square target among four. Target luminance threshold was determined in 3 conditions: target was pulsed for 17 ms together with the 3 squares (pulse paradigm), target was presented on a steady background made of 4 uniform squares (steady paradigm), or target was presented alone (zero paradigm). Our study first replicated previous results as magnocellular and parvocellular processing could be dissociated in control participants. Moreover, no evidence for an early magnocellular deficit in the schizophrenic patients could be detected as all of them were within normal limits in the steady paradigm (presumed magnocellular mediation). If any, magnocellular dysfunction in schizophrenia should concern more integrated processes, possibly parvocellular and magnocellular interactions.

(1005)

Cultural Relativity and Colour Categories: Further Evidence. DEBI ROBERSON, *University of Essex*, JULES DAVIDOFF, *Goldsmiths College, University of London*, IAN R.L. DAVIES, *University of Surrey*, & LAURA R. SHAPIRO, *University of Warwick*

—We report a series of studies of adult colour categorisation in a remote traditional culture in Namibia, in South West Africa. Comparisons to previous studies showed that adult speakers of two languages with few colour terms showed no tendency to a cognitive organisation of colour similar either to each other or to English. Previous reports of the colour term acquisition of Himba and English children had revealed that both groups appeared to acquire colour vocabulary slowly and with great individual variation. The influence of naming on memory increased over time for both groups of children. The results suggest that an initial perceptually driven colour continuum is progressively organized into category sets appropriate to each culture and language.

(1007)

Context Influences the Perceptual Transparency of Moving Plaid Displays. LAJOS R. KOZAK, *University of Coimbra & Hungarian Academy of Sciences*, SERGIO NEUENSCHWANDER, BRUSS LIMA, LARS MUCKLI, *Max Planck Institute For Brain Research*, & MIGUEL CASTELO-BRANCO, *University of Coimbra*

—We aimed to investigate the effect of contextual surround on plaid motion perception. Nine observers had to report whether they perceived transparent or non-transparent motion in a 4 degree central circular region of a moving square-wave plaid display (30% duty-cycle gratings, 0.7 cycles/degree, 1.3 cycles/second, 120 degree difference in direction). We varied both the luminance of intersections (11 pre-defined randomized steps) and the context (having either no surround, or 19 degree diameter surround with the same spatio-temporal parameters as the central stimulus, but biased either towards transparent or non-transparent motion). Both the luminance of intersections and the contextual surround caused significant perceptual modulations. The central percept shifted

towards the bias provided by the context by an amount that depended on the type of bias of the central stimulus itself. Future studies should elucidate the dependence of contextual effects on levels of inherent perceptual ambiguity.

ATTENTION I

(1008)

Global/ Local Processing of Letter-Based and Object-Based Hierarchical Stimuli: A Developmental and Neuropsychological Study. LUC KÉÏTA, NATHALIE BEDOIN, *Université Lumière Lyon*, ANNE MERIGOT, *Centre de Rééducation Roman Ferrari*, & VANIA HERBILLON, *Hôpital Debrousse, Lyon*

—Hemispheric specialisation for global/local processing of letter- and object-based hierarchical stimuli was investigated in normal readers and in dyslexic children. For local processing, previous results showed a left-hemisphere (LH) specialisation for letter-based stimuli, but a right-hemisphere (RH) specialisation for object-based stimuli in adults (Kéïta & Bedoin, submitted; Fink et al., 1997). In a divided attention paradigm (Experiment 1, the target appeared either at the local or the global level), a LH specialisation for local processing was observed in first-graders, whatever stimulus category, whereas this specialisation was restricted to letter-based stimuli in third- and fifth-graders. Data recorded in dyslexic children (9 presented phonological deficits, 9 did not) revealed specific anomalies in each group. On the one hand, atypical hemispheric specialisation for letter-based stimuli was observed in dyslexic children with phonological deficits. On the other hand, visual attention disorders whatever category of stimulus were recorded in dyslexic children without phonological deficits, in a focused attention paradigm (Experiment 2).

(1009)

Age-Related Differences in the Attention Network Test (ANT). NADIA GAMBOZ, STEFANIA ZAMARIAN, & CORRADO CAVALLERO, *University of Trieste*

—The Attentional Network Test (ANT), a modified version of the flanker task with alerting and orienting cues, has been developed to evaluate the efficiency of the attentional functions of orienting, alerting and executive control in children and young adults. We aimed to assess (a) whether normal aging determine differential changes in the efficiency of the three attentional networks and (b) the effect of multiple test trials and of time of the day on young and older adults performances. To these purposes young and old adults performed the ANT at six different times of the day within a week. Results indicated age-related differences in executive control and orienting functions. Repeated practice significantly improved the efficiency of the executive control function to the same extent in young and older adults. No time of the day effect was found for neither age groups. These results are discussed with respect to the implications they have for the frontal cortex function theory of cognitive aging.

(1010)

Unconscious Mirror Masked Priming: Evidence for Lexical Access. MATTHIAS A. STURZENEGGER, *University of Bern*, DORIS ECKSTEIN, *MRC Cognition and Brain Sciences Unit, Cambridge*, & WALTER J. PERRIG, *University of Bern* (presented by Doris Eckstein)

—Three experiments are presented that demonstrate unconscious processing of visually presented mirror masked verbal material. The mirror masking technique is based on processes known from inattention blindness research. The spatial context of words is used to direct attention away from the actual word information, thus creating a state of cognitive blindness in participants. This is done by mirroring primes at their baselines. The resulting

geometric-like patterns thus contain both the upright letterstrings and their mirrored counterparts. In previous experiments the technique has proven successful in suppressing conscious perception of primes while yielding replicable priming on a perceptual level (Perrig & Eckstein, in press). Experiment 1 now shows that the priming is not due to an overlap of single letters between prime and target but rather to the whole word form. Experiments 2 and 3 further indicate that information about the masked prime's lexical status is available.

(1011)

Differences in Alerting, Orienting and Spatial Conflict Resolution between Subtypes of Dyslexic and Normal Spanish Children. María JESUS FUNES, FRANCISCA SERRANO, ALICIA CALLEJAS, SYLVIA DEFIOR, & JUAN LUPIAÑEZ, *University of Granada*

—This study aims to determine whether Spanish children with phonological dyslexia and surface dyslexia behave differently from control children on separate aspects of attention, such as alerting, orienting and conflict resolution. We used a modified version of the ANT task (Fan, McCandliss, Sommer, Raz, & Posner, 2002) to obtain independent measures of the three attentional components and possible interactions between them, and to compare these measures across the three groups. The result showed differences between the control group and each group of dyslexic children. The phonological group showed larger alerting and orienting effects than control. On the contrary, the surface group differed from control on the interaction between orienting by spatial conflict, so that the control group showed reduced conflict on cued trials, while the surface group showed no differences in conflict between cueing conditions.

(1012)

Eating Behaviour Characteristics as Determinants of Attentional Function in Women. LORRAINE C. ALS, MARTIN R. YEOMANS, & JENNIFER M. RUSTED, *University of Sussex*

—Recent research has proposed that different aspects of eating behaviour are associated with distinct cognitive impairments. Specifically, dietary restraint was associated with sustained attention deficits, whereas emotional eating - eating in response to emotions - was not. Additionally, emotional eating was significantly correlated with food related preoccupations, whereas restraint was not. This contrasts with earlier studies reporting emotional Stroop effects in restrained eaters. In two studies, we explored the relationship between eating behaviour (based on subscales of the TFEQ and DEBQ) and measures of attention. Specifically, we examined performance on the DSST, the Stroop task, the RVIP, and a novel variant of the emotional Stroop task (measuring food related preoccupations). There were no clear dissociations in attentional function between emotional and restrained eater profiles. There was, however, some evidence for food related attentional biases, indicated most strongly in restrained eaters, and the predictive value of these effects will be discussed.

(1013)

Why Paranormal Believers Show a Greater Inhibition of Return (IOR)? LEANO CITERONI, ALESSANDRO COUYOUMDJIAN, & ENRICO DI PACE, *University of Rome "la Sapienza"*

—In exogenous spatial cueing when cue-target onset asynchronies are greater than 300 ms IOR is observed. IOR refers to the performance advantage observed when cue and target appear in different spatial locations, in comparison with stimuli presented in the same location. IOR is often explained as an effect caused by a mechanism that discourages individuals to orient attention towards recently attended locations. Even if this is a broadly accepted explanation, IOR seems similar to the alternation sequential effect

observed in two-choice tasks, usually associated to gambler's fallacy. Three experiments were run to test the hypothesis that IOR depends on this kind of bias. In the first between-subjects experiment paranormal believers, persons that differ from disbelievers with respect to probability judgments concerning random events (Bugger & Taylor, 2003), showed greater IOR. The second and third within-subjects experiments demonstrated that IOR was modulated by two types of debiasing.

(1014)

Expectancy on Inhibition of Return. SHAI GABAI, & AVISHAI HENIK, *Ben-Gurion University of the Negev*

—In exogenous attention experiments, the cue which summons attention is non informative as to where the target will appear. However, it is predictive as to when it will appear. Because in most experiment there is an equal number of cue-target intervals (SOA) as time passes from the appearance of the cue, the probability of target presentation increases. Previously, it was suggested that this temporal information influences inhibition of return (IOR). We manipulated the temporal predictability of the cue by using non-aging, aging, and accelerated-aging SOA distributions. In the non-aging distribution, the cue was non predictive as to when the target would appear, and in the accelerated distribution, the cue was more predictive than in the commonly used aging distribution. We found a robust IOR that was not modulated by temporal information.

(1015)

Inhibition of Return Induces Recognition of Items. STEPHAN J. STEGT, CRISTINA MASSEN, *University of Bonn*, LUTZ CÜPPER, *University of Mannheim*, & MARTIN OSTAPCZUK, *University of Bonn*

—In 4 experiments, we investigated the impact of inhibition of return (IOR) on memory access by presenting test items or retrieval cues under perceptual conditions that usually lead to IOR. Results indicate that in yes/no-recognition tests, subjects give more 'old' responses for items that are presented under IOR (experiment 1). In a cued recall test following the learning of paired associates, presenting the cue under IOR did not affect recall (experiment 2). Furthermore, in a source monitoring test, neither old-new nor source monitoring decisions were affected by the IOR manipulation (experiment 3). We assume that presenting test items under IOR increases familiarity. In experiment 4 we further explore this familiarity assumption by altering the balance of recollection and familiarity in memory decisions. Similarities to the revelation effect are discussed.

(1016)

Implications of Low Level Visual Processes and Attentional Resources in the Attentional Blink Paradigm. LJUBISA M.P. PLACÉ, *Université de Rennes 2*, & CHRISTOPHE BOUJON, *Université d'Angers*

—The attentional blink (AB) is an impaired detection of a second black target (T2) during about 500 msec after identification of a first white target (T1), within a distractor stream (Raymond, Shapiro & Arnell, 1992). After replicating the classical AB effect, we show that visual perception is involved in the AB effect: when T2 is a highlighted to-be-detected letter, the effect is suppressed. However, an identification task on the highlighted T2 is sufficient to restore the AB effect. Given that Kawahara, Enns and Di Lollo (2001) showed that attention is required for identification, attentional resources seem decisive in the AB effect. The AB paradigm thus reflects time course of attentional processes (Duncan, Ward & Shapiro, 1994, and Ward, Duncan & Shapiro, 1997), and more precisely the allocation deficit of attentional resources in a dual task.

(1017)

Interactions between Memory and Selective Attention. ELKAN G. AKYUREK, *Leiden University & University of Reading*, & BERNHARD HOMMEL, *Leiden University*

—Attention is known to be limited in the spatial as well as in the temporal domain. A demonstration of the latter is the attentional blink phenomenon (AB), in which the second of two rapidly presented stimuli is much more difficult to report than the first. The source of this difficulty has been attributed to the process of consolidating information in (short-term) memory. A dual-task design that taxed memory as well as attention was implemented in a first series of experiments to test the dependency of successful selection on memory capacity. Although evidence for increased overall task difficulty was found for high memory loads, there was no interaction with attentional selection (i.e. the magnitude of the AB). A second series of experiments was designed to see whether task-relevant information can have a differential effect on attentional selection. The results confirmed that active, task-relevant information did affect attention. Taken together, these findings provide support for the idea that attention is not limited by capacity constraints, but rather by competition between active elements in (working) memory.

PERCEPTION AND ACTION I

(1018)

The Influence of Attention and Explicit Coding in Action Control. RENA M. EENSHUISTRA, MAAIKE WEIDEMA, & BERNHARD HOMMEL, *Leiden University*

—Following a modern version of the ideomotor theory, we believe that goal directed behaviour is characterized by goal anticipating. That is, people control their actions by retrieving, selecting, and maintaining representations of the effects these actions have evoked in the past (Hommel, Müsseler, Aschersleben, & Prinz, 2001). We examined how we acquire and use these action-effect contingencies. More specifically we investigated the role of executive control in these processes. Although we originally assumed that integration of actions and the accompanying consequences is a more or less automatic process (Elsner & Hommel, 2001), we recently found evidence that executive functions, such as attention, can influence this process. In another line of research, in which the use of action-effect contingencies was examined, we found that explicitly formulating the task rules of the task-to-be-performed overwrites the influence of previously learned action-effect contingencies. These findings are consistent with the idea that language and internal speech are powerful processes to control one's own cognitive system.

(1019)

Incidental Color/ Word Associative Learning in Stroop Color-Naming Task. CELINE M.A.R. LEMERCIER, *Laboratoire Travail et Cognition*

—Recent study on the Stroop task indicated that strong working memory capacities drove to less interference effect. Incongruent items rather than neutral or congruent ones are unfamiliar items. Then, the increase in their response latency would be explained by an incidental color/word associative learning during the naming task. In classical stroop task, the number of incongruent items (12) is higher than the WM capacities, preventing their incidental associative learning. The present study evaluates this hypothesis of an incidental associative learning during incongruent color-naming. The protocol was divided into 7 parts : a pre and a post Stroop test, and 5 color-naming practice sessions : neutral, congruent, incongruent 1 (including only 4 different incongruent items) incongruent 2 (including 4 others) and incongruent 3 (the 4

remaining ones). Analysis revealed a disappearance of interference effect in post-test. Results were discussed in light of the interference effect theories.

(1020)

The Reverse Stroop Effect in Switching between Color Naming and Word Reading. ESTHER AARTS, *F. C. Donders Centre For Cognitive Neuroimaging*, MARTIJN LAMERS, KIM VERHOEF, *Nijmegen Institute For Cognition and Information*, & ARDI ROELOFS, *Max Planck Institute For Psycholinguistics*

—When participants switch between Stroop color naming and word reading, incongruent colors interfere with word reading: the reverse Stroop effect. Several implemented models of task switching (e.g., Gilbert & Shallice, 2002; Yeung & Monsell, 2003) explain this effect by assuming that in task switching, the color naming task set is still active on a word reading trial, yielding the effect of colors on reading. However, Yeung and Monsell (2003) observed reverse Stroop effects on both switch and repeat trials. We examined the reverse Stroop effect by employing a cued task switching paradigm in which the Stroop color naming and word reading tasks randomly switched (Experiment 1) or predictably switched every two trials (Experiment 2). For random as well as predictable switches, we observed a reverse Stroop effect, on both switch and repeat trials, and in the absence of a switch cost. These findings challenge extant models of Stroop task switching.

(1021)

Reduced Stroop Interference for Opponent Colors May Be Due to Input Factors. TORSTEIN LÅG, BRUNO LAENG, *University of Tromsø*, & TOM BRENNEN, *University of Oslo*

—We examined how sensory or input factors can influence the strength of interference in the classic Stroop color-word task in 1) human subjects differing in color discrimination ability and 2) in neural network simulations (with different input layer implementations). Specifically, we first established that in a single-trial computerized version of the Stroop task when color-word pairs were incongruent, opponent color pairs (e.g., BLUE in yellow) showed reduced Stroop interference compared to non-opponent color pairs (e.g., BLUE in red). In addition, during the same session, participants had their color discrimination ability measured by standard color vision tests (i.e., Farnsworth-Munsell 100 Hues, and Ishihara Plates). It was found that error rates in the Farnsworth-Munsell 100 Hues test correlated positively with the amount of Stroop interference. The neural network simulations (variants of Cohen, Dunbar and McClelland's, 1990, model) showed that only a distributed trichromatic input layer was able to simulate these findings. We conclude that sensory input from the color system needs to be incorporated into current accounts of the Stroop effect.

(1022)

Instructions Lead to Reflexive Response Triggering: Direct Evidence for Prepared Reflex from First Trials in the Flanker Paradigm. OSHRIT COHEN, & NACHSHON MEIRAN, *Ben Gurion University*

—It is widely believed that S-R links can trigger responses automatically only after extensive practice. We used Eriksen and Eriksen's (1974) flanker compatibility paradigm to show that the Flanker Compatibility Effects (FCE) are already present in the first trials, before any of the stimuli have been repeated. The findings suggest that intention, formed by instructions, is involved in forming S-R links that operate like a prepared reflex (Hommel, 2000).

(1023)

Simon-Like Effect Based on Stimulus-Response Short-Term Memory Associations. ANTONIO PELLICANO, *University of*

Padua, KIM-PHUONG L. VU, *California State University Northridge*, ROBERT W. PROCTOR, *Purdue University*, ROBERTO NICOLETTI, *University of Bologna*, & CARLO UMILTÀ, *University of Padua*

—Recent studies have shown that spatial Simon effects can be modulated or produced by task-irrelevant short-term associations developed from a previous task. We investigated whether a memory-based Simon-like effect would occur if short-term memory links were formed between nonspatial imperative stimuli, presented centrally, and spatial responses. In a spatial cuing task, participants made left/right gaze shifts on the basis of the color of a central color-cue (i.e., blue square-left shift, green square-right shift). In a second task, they made left/right keypresses to the same color squares presented as target stimuli at a central location. Performance on the second task was better when responses to the color squares were consistent with the spatial value of responses assigned to those squares in the spatial cuing task than when they were inconsistent. This Simon-like effect provides the first evidence for enduring effects of short-term associations that transfer to a different response mode.

(1024)

The Influence of Attentional Load on the Performance in a Numeric Stroop-Like Paradigm. SARIT ASHKENAZI, ORLY RUBINSTEN, & AVISHAI HENIK, *Ben Gurion University of the Negev*

—Researchers commonly use a Stroop-like paradigm to study basic processing of numeric and magnitude information. Participants are presented with two digits that differ in numerical value and physical size and are asked to pay attention to one feature and ignore the other. Such task result in: 1) a numerical distance effect – faster responding as the distance between the digits increases, and 2) a size congruity effect - faster responding to congruent stimuli (e.g. 3 4) than to incongruent stimuli (e.g. 3 4). Both effects are considered to be automatic. We examined the effect of attentional load on performance of such tasks. Attentional load was manipulated by changing the requested search (feature vs. conjunction). Size congruity (i.e., the interference of the irrelevant dimension) was modulated by load. In particular, interference increased with cognitive load. In contrast, load did not affect the distance effect.

PSYCHOLOGICAL REFRACTORY PERIOD DUAL TASK

(1025)

Dual-Task Interference: Task Load or Task Content? MEREL M. PANNEBAKKER, GUIDO P.H. BAND, *Leiden University*, & K. RICHARD RIDDERINKHOF, *University of Amsterdam & Leiden University*

—Functional as well as structural models have been proposed to explain dual-task performance. Structural models suggest serial processing of different tasks due to task load restrictions. Within functional models on the other hand, parallel processing indicate that not task load is the constraint, but task content. The central executive will postpone possible interfering concurrent processes or reverse their responses when generating the response to the stimuli. In this current behavioural dual-task experiment, two mental rotation tasks are used, each presenting a stimulus (number or letter) in a variable angle. Participants decide whether the stimulus is normal or mirror image and react correspondingly. Structural limitations predict comparable costs when stimuli are rotated in similar or dissimilar direction. Functional limitations predict that rotation for two stimuli in the same direction is easier than rotation in opposite directions. In addition, functional limitation models predict a larger congruence effect for the same than for opposite direction rotation.

(1026)

Perfect Time-Sharing Does Not Contradict the Central Bottleneck Model. ROMAN LIEPELT, TORSTEN SCHUBERT, & PETER FRENSCH, *Humboldt University of Berlin*

—The assumption of a central structural bottleneck, restricting the cognitive system, has been widely debated. The complete elimination of dual-task costs after practice, called perfect time-sharing (Schumacher et al., 2001), was taken as major evidence against the presence of a structural bottleneck. Our study challenges this argument by showing that despite the fact of perfect time-sharing a bottleneck can be present. We argue that practice will shorten central processing stages to a degree of minimal bottleneck delay. After training subjects to the level of nearly perfect time-sharing, we included a transfer session, which prolonged Task 1 central stages. This factorial manipulation propagated fully onto Task 2, which indicates the existence of a centrally demanding bottleneck. Our results support the idea of a latent bottleneck after practice (Ruthruff et al., 2003) and suggest that the complete absence of dual-task costs should not be taken as evidence against a central bottleneck.

(1027)

Dual-Tasking Is Not Affected by Gender, Alcohol Use, or Gaming-Experience. GUIDO P.H. BAND, & EDWIN CAMFFERMAN, *Leiden University*

—Folk psychology often invokes group differences in multi-tasking ability that are not founded on experimental results. Therefore, the ability to process information in parallel was tested with two measures derived from the psychological refractory period (PRP) paradigm, in which subjects had to make speeded letter/number discriminations to two stimuli that were presented with a variable stimulus onset asynchrony (SOA). The delay of the response to the second stimulus on short relative to longer SOAs was used as a measure of capacity limitations. Effects of congruence between the two responses onto the latency of the first response were considered indicative of the extent of parallel Stimulus-Response translation. In a sample of 56 young adults matched for IQ and health, the two measures of dual-tasking did not differ between men and women, between mild and heavy alcohol consumers, and between frequent and infrequent computer game players.

(1028)

Exploring the R2-S1 Backward Compatibility Effect. RAVID ELLENBOGEN, ROY LURIA, & NACHSHON MEIRAN, *Ben-Gurion University of the Negev*

—R2-S1 Backward Compatibility Effect (BCE) is attributed to differences on the primary-task performance according to the compatibility between secondary-response and primary stimulus. In the present experiment, participants were displayed with a colored digit or letter. Task 1 was a digit-letter discrimination using right-left key presses as responses. Task 2 was a red-green discrimination using the vocal responses “ot” (letter) and “mispar” (number). We manipulated the number of possible digits and letters between participants. The results indicate that R2-S1 BCE was present with two stimuli for S1 (one digit and one letter), but was statistically absent when we used eighteen stimuli for S1 (nine digits and nine letters). The theoretical implications of the findings are discussed.

(1029)

Is It Easier to Stop with a Visual or with an Auditory Stop Signal? LARA ZORDAN, *University of Padua*, & GORDON D. LOGAN, *Vanderbilt University*

—The present study investigated the modality of the stop signal (visual vs. auditory) in the stop signal paradigm. Subjects performed a go task in which they pressed a key as quickly as

possible to indicate whether the target was an X or an O. On 25% of the trials, they received a stop signal that told them to inhibit their response to the go task on that trial. The stop signal was either an auditory tone or a visual change in the color of the target from white to red. Two experiments were conducted. In one experiment, the modality of the stop signal was blocked. In the other experiment, stop signals in both modalities were randomly intermixed. There was a small advantage for auditory stop signals when modality was blocked and a larger advantage for auditory stop signals when modality varied randomly.

(1030)

Detecting Bottleneck with PRP and Selective Influence: Generalized Methodology. BORYSLAW PAULEWICZ, & AGATA BLAUT, *Jagiellonian University*

—Data from studies of psychological refractory period with selective influence methods strongly point to the existence of bottleneck at the level of reaction selection. When processes other than reaction selection are being studied the methods typically used do not allow for exhaustive testing of predictions derived from bottleneck hypotheses. We propose a generalized methodology for investigating bottleneck effects for a broader class of cognitive processes. The essence of the proposed method is a task design with which enforcing various interesting temporal orderings of elementary processes is possible. Results obtained in two experiments show that the method, although still requiring refinements, appears to be useful.

(1031)

Working Memory for Spatial Locations and Ballet Movements in Expert Ballet Dancers. ANTONIO CORTESE, ANNALISA LUCIDI, *University of Rome "la Sapienza"*, VINCENZO CESTARI, *Università Lumsa, Rome*, & CLELIA M. ROSSI-ARNAUD, *University of Rome "la Sapienza"*

—The effect of two concurrent tasks on a dual memory task in ballet dancers was investigated. The main task required subjects to watch a sequence of black “X” signs appearing in different positions on a white pc screen combined with spoken ballet move names. Recall entailed reproducing the location sequence by performing the ballet moves on a series of black “X” signs positioned on a white carpet on the floor. Subjects (n= 24 expert ballet dancers) performed the task both in a control condition (with articulatory suppression) and with a double concurrent interference task performed during the presentation phase (articulatory suppression with second task). In the experimental condition they were randomly assigned to one of two task groups: a finger tapping (4 touches), and a body tapping (“arm movement task”). Results are discussed in terms of the working memory model and of separation between spatial component and configurational motor component.

TASK SWITCHING

(1032)

The Representation of Task Components in the Task-Set: Evidence from Task and Dimension Switching. EVELIEN CHRISTIAENS, & ANDRÉ VANDIERENDONCK, *Ghent University*

—Recently, the subject of task-set representations and their relation to task performance is trickling through task switching research. In a series of experiments we studied this factor by manipulating the number of task components that required a switch. Compound cues informed the subject about two task components: the relevant stimulus dimension and the task rules. Either none, one or both of the cue components were switched. Consequently, none, one or both of the task components required a switch. If each combination of the task components is represented

separately, we predicted a cost whenever a component was switched. If the task components are represented in a more modular structure, only in case of a complete switch a cost would be expected. The results supported the first prediction and were replicated manipulating the amount of preparation time for the cue components and further differentiated switching the order of the cue components.

(1033)

Switch Cost Asymmetry with Cues Differing in Their Difficulty. AVIVA FUX, ROY LURIA, & NACHSHON MEIRAN, *Ben-Gurion University of the Negev*

—Logan and Bundesen (2003, 2005) argued that in the task-cueing paradigm switch costs stem from cue alternation alone. According to their 'compound cue-target' interpretation, target processing shouldn't be dependent upon cue processing. In the present study subject switched between right-left and up-down tasks. Each task was cued by a meaningful (arrows) or arbitrary (square's color) task cue. The results showed a significant interaction between cue type and switch conditions (cue repetition, task repetition, task alternation). Arbitrary cues showed only cue switch costs. Meaningful cues showed both cue and task switch costs. The pattern found for the meaningful cues resulted from a longer time required to alternate from arbitrary cue to a meaningful one in the task-alternation condition. These results are inline with the classical switch-asymmetry effect (Allport et al., 1994) taking place at the level of the task cue, and providing evidence that target processing was dependent on cue processing.

(1034)

Two Forms of Attentional Control in Switching between Two Simple Cognitive Tasks. FRANÇOIS PAPIN, *Université de Toulouse*, CHRISTOPHE BOUJON, *Université d'Angers*, & CÉLINE LEMERCIER, *Université de Toulouse*

—This study relates to the interaction of automatic and executive under-components of attentional control allowing an optimal performance of subject. In a task-switching paradigm between two simple cognitive tasks, repetition and preparation are manipulated from anticipation, response-stimulus interval (RSI) and session. The main results indicate that the switching cost increases according to the increase in the RSI and the session ; and that the anticipation effect increases according to the increase in the RSI, whereas it decreases according to the increase in the session. Moreover, although a null effect of anticipation on the switching cost is observed, this result is interpreted in terms of additivity. Considered together, these results seem to suggest that the automatic control and the executive control are additive factors.

(1035)

To Inhibit or Not To Inhibit: Is Task-Set Inhibition the Cause of Task Switch Costs? DAVID P. KUHN, MEI-CHING LIEN, *Oregon State University*, & ERIC RUTHRUFF, *Nasa Ames Research Center*

—It has been suggested that people inhibit the recently performed task set when switching to a new task set. Inhibition would be especially beneficial when the upcoming stimulus is bivalent (affording performance of both task sets), because it would reduce the likelihood of a task perseveration error. However, when the inhibited task later becomes relevant, the lingering inhibition might slow responses. Thus, residual inhibition can lead to task switch costs. We assessed the contribution of task-set inhibition to switch costs by asking participants to perform a predictable sequence of univalent and bivalent tasks. We compared conditions where inhibition would be unnecessary to conditions where inhibition would be highly beneficial. Regardless of the need for inhibition, participants responded slowly on task switch trials. These findings suggest that switch costs are not caused by task set inhibition.

(1036)

The Influence of Contextual Information on Task Set Reconfiguration Process. KAMILA ĆEMIGASIEWICZ, BLAZEJ W. SZYMURA, *Jagiellonian University, Cracow*, & ALEKSANDRA SLABOSZ, *MRC Cognition and Brain Sciences Unit, United Kingdom*

—The main aim of presented study is to investigate the influence of context on task set reconfiguration process during switching of attention. In everyday live context supports additional information about appropriate behavior (R-S mappings). The process of contextualization is also present during switching of attention. The contextual information can be utilized in task set reconfiguration process. In the present study, FAST switching of attention test was employed (N=80). Contextual information (coincidence of irrelevant stimuli with appropriate task) were present or absent. Subjects were explicitly informed or not about existence of such information (explicit/implicit instruction condition). Duration of the breaks between particular tasks was also varied. It is hypothesized that both: automatic and control processes are of the great importance in the switching costs reduction. However the control processes are especially important in the experimental condition of explicit instruction and long breaks. In the conditions of implicit instruction or shorter breaks the influence of automatic processes on reduction of switch cost is greater. The data is just being analyzed.

(1037)

Some Different Aspects of Executive Control Processes in Attentional Switching. KAMILA ĆEMIGASIEWICZ, *Jagiellonian University, Cracow*, ALEKSANDRA SLABOSZ, *MRC Cognition and Brain Sciences Unit, United Kingdom*, & BLAZEJ W. SZYMURA, *Jagiellonian University, Cracow*

—There are different kind of tasks (constructed with different sorts of stimuli) that are used in experiments designed in task switching paradigm and serve to study executive control processes. The main aim of presented study is to analyze the relationship between two different switching of attention tasks and to investigate whether they engage the same or different aspects of control processes necessary in switching of attention. One hundred psychology students were participated as the subjects. The computerized TPISA test of selective attention and FAST switching of attention test were employed. The first one requires engagement of elementary cognitive processes (selective attention with letter discrimination), whereas the second one engages high-level processes (mental operation on discriminated letters). Duration of the breaks, cue presence and secondary task load were experimental factors that were manipulated in both tasks. It was hypothesized that both: automatic and control processes were of the great importance in the reduction of the switching costs in both tasks. However, it is interesting to check if subjects' performance of both tasks is comparable and, if so, to examine in which experimental condition. The data is just being analyzed.

(1038)

Switching of Attention in the Condition of Cognitive Overload and Speeded Presentation. BLAZEJ W. SZYMURA, *Jagiellonian University*, ALEKSANDRA SLABOSZ, *MRC Cognition and Brain Sciences Unit, United Kingdom*, & KAMILA ĆEMIGASIEWICZ, *Jagiellonian University*

—The main aim of the presented study is to search on the task requirements that have an impact on the process of attentional shifting. The selective attention task based on Posner and Mitchell's paradigm was applied in three independent experiments (N=80, N=80, N=80). In compliance with the task instructions, subjects were requested to make an elastic change of the selection rule (nominal identity, e.g. <R,R>/physical identity, e.g. <R,R>). Task switching was either regular (signaled condition) or random

(unsignaled condition). The duration of the breaks between the tasks was also varied. The presentation of stimuli was speeded up in the first study, whereas additional psychomotor task that are requested to be simultaneously performed by subjects was used in the second experiment. In the third study both experimental manipulations were employed. It is hypothesized that both: automatic and control processes contribute to the reduction of the switching costs. However, their relative contribution should differ with regard to the specific task conditions. Automatic processes seem to be of greater importance in random condition of task switching when stimuli presentation is speeded up, whereas control processes – in regular condition when dual task should be simultaneously performed. The data has just been analyzed. The results will be presented also with regard to individual differences characteristics of attentional system (i.e. selectivity, ability to divide attention between tasks, resistance to attentional interference).

(1039)

Automatic and Controlled Retrieval in Task-Switching: Evidence from Distance Priming in the Task-Cueing Paradigm. BAPTIST LIEFOOGHE, FREDERICK VERBRUGGEN, ANDRÉ VANDIERENDONCK, & WIM FIAS, *Ghent University*
—Mayr and Kliegl (2000; 2003) have proposed a two-step model for task-switching. First, the adequate task rules are retrieved from long-term memory. Second, these task rules are applied to the stimulus. Besides the controlled retrieval of task rules, stimulus triggered automatic retrievals are also of importance during task-switching (e.g. Waszak et al., 2003). The present study tested whether controlled retrieval could have an influence on automatic retrieval. Across-trial distance priming (Koechlin et al., 1999) was considered as a form of automatic retrieval. The question was if distance priming would persist across tasks. In a series of three experiments, we observed that distance priming facilitated response repetition and interfered with response alternation. However, distance priming did not interact with task-switching. The present results suggest that automatic retrievals are restricted to the application of task rules and probably elicits repetition effects in the ways Pashler and Baylis (1991) proposed.

LANGUAGE PRODUCTION/ PERCEPTION I

(1040)

Effects of Polygraphy and Word Frequency in Spelling and Reading: A Cross-Tasks Comparison. JEAN NOËL FOULIN, & STÉPHANIE MATHEY, *University of Bordeaux 2*
—The aim of this study was to investigate whether similar processes are implied in word spelling and reading in French. Experiment 1 tested the influence of word frequency (high vs. low) and polygraphy (consistent vs. inconsistent) on spelling production. Experiment 2 examined the influence of these factors on silent reading. French-speaking students participated in spelling-to-dictation and lexical decision tasks. The same 80 content words were presented in the two tasks. Participants wrote on a digitalizer in the spelling task. The results showed that word frequency and polygraphy influenced both spelling production times and accuracy. In the lexical decision task, word frequency also affected reaction times and error scores, while polygraphy only influenced reaction times. As a whole, the influence of the two factors did not vary across the two tasks. The findings are discussed in the framework of a dual-route model conjointly applied to word spelling and silent reading.

(1041)

The Lexical Route Is Still the Winning Horse in the Race: New Evidence from Italian. GIANNI PAGLIUCA, *Institute For Cognitive Sciences and Technologies, ISTC-CNR, Rome*, LISA S.

ARDUINO, *University of Urbino & ISTC-CNR Rome*, LAURA BARCA, & CRISTINA BURANI, *ISTC-CNR, Rome*

—The existence of a lexical route in reading aloud words of transparent orthographies is still a matter of debate. The present research sheds some light to the issue by investigating Italian, a language with an almost strict one-to-one correspondence between graphemes and phonemes. The effects of lexicality and word frequency were analyzed with respect to list composition. The results indicated that i) words are read faster than nonwords both when mixed together (mixed condition) and when only words (frequency blocked) or only nonwords are presented, whereas nonwords are read equally slow independently of the list composition. Moreover, and differently from previous studies with transparent orthographies, ii) a frequency effect is still present when words and nonwords are mixed together. The results, which confirm lexical reading in a shallow orthography, are discussed in terms of two different accounts, the route-shifting account and the time criterion account.

(1042)

Processing Gender Inflection of the Italian Nouns. MARIA DE MARTINO, *University of Salerno & ISTC CNR Rome*, JOSEPH SHIMRON, *University of Haifa*, GIULIA BRACCO, *University of Salerno*, & ALESSANDRO LAUDANNA, *University of Salerno & ISTC CNR Rome*

—The research on morphological processing has been characterized by the debate between the Dual Mechanism Account (DMA) and the Single Mechanism Account (SMA). DMA claims that regular words are processed by a rule-based system, while irregular words are stored in an associative memory component. SMA claims that both regular and irregular words are processed by the same associative system. Within this broader issue, we investigated the grammatical gender of nouns in Italian. In Italian the majority of feminine nouns displays the final vowel: “-a” (casa, house). Masculine nouns ending in “-a” (aroma, flavour), constitute an exception. In our experiments we compared regular vs. irregular nouns both in naming and in lexical decision. The results showed that regular nouns are processed faster and better than irregular ones. We discuss these results within the two alternative frameworks on morphological processing cited above.

(1043)

Syllable-Weight and the Cognitive Representation of Rising versus Falling Diphthongs in Spanish. MICHAEL SHELTON, CHIP GERFEN, *Penn State University*, & NICOLÁS GUTIÉRREZ PALMA, *Universidad de Jaén* (presented by Chip Gerfen)

—This study employs a non-word naming task to probe the cognitive representations of rising (RD) versus falling (FD) diphthongs in Spanish. Spanish diphthongs are problematic. Phonotactic patterns show that FDs are uniformly heavy, while RDs behave in contradictory ways, patterning with FDs in some contexts but with monophthongs in others. Phonological representations employ binary distinctions in syllable-weight, thus predicting no intermediate level of weightedness for RDs in syllable-structure. In our experiment non-words are presented to provoke production errors in native speakers. Target stimuli exploit an impossible Spanish pattern—antepenultimate stress in words with a diphthong in the penultimate syllable (e.g. *pá.taj.ga vs. *pá.tja.ga). If FDs are cognitively represented as heavier than RDs, we expect them to more strictly enforce the phonotactic ban by attracting stress to the diphthong, thus yielding a higher error rate on target items. Analyses of error rates confirm this prediction, revealing a three-way weight distinction: FD>RD>monophthongs.

(1044)

Compensation for Coarticulation in Fricative-Vowel Syllables

Is Phonologically Mediated. HOLGER MITTERER, *Max-Planck-Institute for Psycholinguistics*

—I examined whether compensation for coarticulation in fricative-vowel syllables is a consequence of auditory processes or mediated phonologically. Smits (2001) had shown that compensation occurs for anticipatory lip-rounding in a fricative caused by a following vowel in Dutch: Fricatives with a lower spectral profile are accepted as /s/ rather than /ʃ/ in front of a rounded vowel, compensating for the acoustic effects of coarticulation. In a first experiment, the possibility that compensation is due to auditory processing is investigated using nonspeech sounds. These failed to exert an effect akin to compensation for coarticulation. In a second experiment, a phonological basis for compensation for coarticulation was assessed by using audiovisual speech. If the visual display induced the perception of a rounded vowel, this also influenced compensation for anticipatory lip-rounding in the fricative. These results indicate that compensation for anticipatory lip-rounding in fricative-vowel syllables is phonologically mediated.

(1045)

Orthographic Neighbourhood Size Effects on Morphological Priming. MADELEINE VOGA, & HÉLÈNE GIRAUDO, *University of Provence*

—We investigate the role of orthographic neighbourhood size in morphological processing with two masked priming experiments using French stimuli. We define this variable as the number of words sharing orthographic characteristics but no morphological relation. Within a supra-lexical interactive activation model of morphology (Giraudo & Grainger, 2000), neighbours act as competitors and interfere with recognition of primes. In the first experiment, low neighbourhood size derivations yielded greater morphological facilitation than large neighbourhood ones. In the second experiment, the semantic transparency of derivations was controlled: semantic opacity affected processing of large orthographic neighbourhood verbs differently than low orthographic neighbourhood verbs. We assume a greater interference from the numerous intra-level (lexical) competitors for large neighbourhood opaque derivations, amplified by reduced feed-back from the semantic level, whereas small neighbourhood opaque derivations benefit from the absence of competitors at the lexical level and from a more efficient feed back from the semantic level.

(1046)

Written Spelling to Dictation: Do Irregularity Effects Persist on Writing Durations? MARIE DELATTRE, PATRICK BONIN, *University of Blaise Pascal*, & CHRISTOPHER BARRY, *University of Essex*

—The dual-route view of spelling-to-dictation assumes that written spelling requires the involvement of two types routes: lexical and nonlexical. It has been shown that words having low-probability phoneme-to-grapheme (PG) mappings are produced slower and less accurately than words having high-probability PG mappings. These irregularity effects have been accounted for by assuming that the outputs generated by the two routes conflict in cases of irregular words at the central level of grapheme representations. The present study investigated whether the conflict also affects the peripheral process of handwriting execution. Latencies and writing durations to regular and irregular words were analysed in a series of three experiments. Irregularity effects were found on both the latencies and the writing durations suggesting that the conflict generated by the two routes is not entirely resolved when handwriting movements start.

(1047)

Oreja... An Environment for the Design of Psychoacoustic

Experiments. ELVIRA V. PEREZ, *University of Liverpool*, RAUL RODRIGUEZ-ESTEBAN, *Columbia University*, & GEORG MEYER, *University of Liverpool*

—The Oreja software has been designed specially to study speech intelligibility. It combines aspects of engineering and psychology to allow researchers interested in speech perception to manipulate speech signals, and study how these manipulations affect human perception. The feature of this package is that it uses a high-level interpreted language (MATLAB) allowing you to load, decompose into different channels, analyze, or select parts of the signal(s) for posterior labeling and/or manipulation (e.g., attenuating the amplitude of the channels selected, adding noise, etc.) We also present a psychoacoustic experiment designed with Oreja. In this experiment we test if human listeners use predictability as a cue for stream segregation. Results show that noise predictability doesn't improve speech perception against background noise. Oreja is free and can be downloaded at

<http://www.liv.ac.uk/psychology/Downloads/Oreja.htm>.

A demo will complement the poster description.

(1048)

WordGen: A Tool for Word Selection and Non-Word Generation in Dutch, English, German and French. WOUTER DUYCK, TIMOTHY DESMET, LIEVEN P.C. VERBEKE, *Ghent University*, & MARC BRYSAERT, *Royal Holloway University of London*

—WordGen is an easy-to-use program that uses the CELEX and Lexique lexical databases for word selection and non-word generation in Dutch, English, German and French. Items can be generated in these four languages, specifying any combination of seven linguistic constraints: number of letters, neighborhood size, frequency, summated position-nonspecific bigram frequency, minimum position-nonspecific bigram frequency, position-specific frequency of the initial and final bigram and orthographic relatedness. The program also has a module to calculate the respective values of these variables for items that have already been constructed (either with the program or taken from earlier studies). Stimulus queries can be entered through WordGen's graphical user interface, or by means of batch files. WordGen is especially useful for (1) Dutch and German item generation, because no such stimulus selection tool exists for these languages, (2) the generation of non-words for all four languages, because our program has some important advantages over previous non-word generation approaches and (3) psycholinguistic experiments on bilingualism, because the possibility of using the same tool for different languages increases the cross-linguistic comparability of the generated item lists. WordGen can be downloaded freely from the following URL: <http://expsy.ugent.be/wordgen.htm>

LANGUAGE PRODUCTION: BILINGUALISM

(1049)

Does 'The sheep that is red' Prime 'Het schaap dat groen is'? Syntactic Priming in Dutch-English Bilinguals. SARAH BERNOLET, ROBERT J. HARTSUIKER, *Ghent University*, & MARTIN J. PICKERING, *University of Edinburgh*

—Syntactic priming is the tendency for speakers to reuse the syntactic structure of recently processed utterances (Bock, 1986). Experiment 1 showed syntactic priming of noun phrase structure in Dutch (cf. Cleland & Pickering, 2003). Noun phrases like 'the sheep that is red' (NP, RC) were more likely after primes with the same structure than after primes with a different structure like 'the red sheep' (ADJ, NP). Moreover, the priming effects were larger when the noun was repeated between prime and target (= 'lexical boost'). Experiment 2 will repeat this experiment with Dutch-English bilinguals to test for priming effects in a cross-linguistic task (L2 → L1). A syntactic priming effect would provide evidence

for shared syntactic structure between languages. Additionally, a manipulation of cognate status (baby – baby vs. window - raam) will make it possible to test whether the repetition of cognates in prime and target sentences boosts cross-linguistic priming effects.

(1050)

Investigating the Role of Number of Translations in Bilingual Comprehension. CARMEN RUIZ, TERESA BAJO, *University of Granada*, & JUDITH KROLL, *Pennsylvania State University*
—Research with professional translators (Macizo & Bajo, 2005; Ruiz et al., 2004) has shown that lexical and syntactic properties of the Target Language (TL) influence reading in the Source Language (SL) when translators prepare to translate the sentence but not when they simply read for ordinary comprehension. In the present study we examined the activation of the TL by manipulating the number of translation equivalents in critical words in the SL. Bilinguals performed simple word naming and translation and also sentence repetition and translation. We found that words with more than one translation slowed bilingual performance only when tasks required both languages to be active (i.e., single word and sentence translation tasks but not word naming and sentence repetition tasks). These findings suggest that activation of the TL in translation takes place on line while reading the SL. We discuss the implications for models of comprehension in translation.

(1051)

Translation and Associative Priming with Cross-Lingual Pseudohomophones: Evidence from Dutch-English Bilinguals. WOUTER DUYCK, *Ghent University*

—Using a masked priming paradigm with a lexical decision task performed by Dutch-English bilinguals, we showed that the recognition of visually presented L1 (e.g. TOUW) and L2 (e.g. BACK) targets is facilitated by respectively L2 and L1 primes, which are pseudohomophones (roap and ruch) of the target's translation equivalent (rope and rug). In two further experiments, we found that recognition of L2 targets (e.g. CHURCH) was also facilitated by L1 pseudohomophones (e.g. pous) of related words (paus [pope]). Contrastingly, no significant effect was obtained for L1 targets (e.g. BEEN [leg]) and L2 pseudohomophone associative primes (e.g. knea). In two last experiments, we found that a L2 target word (e.g. CORNER) is facilitated by an L2 (intra-lingual) homophone (e.g. hook) of its L1 translation equivalent (hoek). The same was not true for respective L1 targets (e.g. DAG [day]) and primes (e.g. dij). These findings are in line with recent research on language-independent activation of phonological representations in bilinguals.

(1052)

How Are Stored Phonetic Syllables Retrieved and Processed in Dutch and English? JOANA CHOLIN, GARY S. DELL, *Beckman Institute, University of Illinois at Urbana-Champaign*, & WILLEM J.M. LEVELT, *Max Planck Institute for Psycholinguistics, Nijmegen*

—During speech production, speakers encode and retrieve single syllables of multisyllabic words and phrases to form an utterance. Effects of syllable frequency in Dutch and English suggest that syllables are retrieved from a mental syllabary. The mental syllabary is hypothesized to provide abstract motor programs in order to facilitate the process of phonetic encoding. In a first step during word-form encoding, syllables are phonologically encoded; in a subsequent step, these abstract phonological syllables access their stored phonetic representation in the mental syllabary. A crucial question concerns the temporal coordination of the retrieval and integration of subsequent syllables in multisyllabic utterances. In a series of experiments investigating the production of Dutch and English disyllabic pseudo-words, the retrieval and integration

of successive syllables in a language with relatively clear syllable boundaries (Dutch) is compared to a language with less clear syllable boundaries (English). Results are discussed against the background of an incremental approach of speech production.

LANGUAGE PERCEPTION: PRIMING

(1053)

Priming Verb Transitivity Information. JAMIE PEARSON, *University of Edinburgh*, ROGER P.G. VAN GOMPEL, & MANABU ARAI, *University of Dundee*

—In two structural priming experiments (e.g., Bock, 1986), we investigated the priming of transitivity information. Experiment 1 showed that priming from intransitives was stronger when the verb in prime and target was repeated than when it was not, whereas priming from transitives was unaffected by verb repetition. Experiment 2 compared priming from intransitives and transitives with a baseline. Intransitives primed relative to the baseline, but transitives did not. These results indicate that intransitive structures prime, but transitive structures do not. We propose that the transitive structure is maximally activated and cannot be further boosted. The transitive structure is the default because nearly all verbs can be used transitively and transitives occur more frequently than intransitives. Therefore, the transitive structure cannot be further activated. Evidence that transitives constitute the default is supported by the observation that children produce more transitive overgeneralisations with age, but fewer intransitive overgeneralisations (Brooks et al., 1999).

(1054)

Priming Lexical Stress. JULIO SANTIAGO, *Universidad de Granada*, NICOLÁS GUTIÉRREZ, *Universidad de Jaén*, MARC OUELETTE, OUAFA BOUACHRA, NIEVES RODRÍGUEZ, & ANTONIO ROMÁN, *Universidad de Granada* (presented by Nicolás Gutiérrez)

—Lexical stress in word production may be assigned in two different ways: a) retrieving the stress pattern from its entry in the mental lexicon; b) computing the stress pattern through the application of stress rules. The present study used a reading task with auditory primes. Stimuli were trisyllabic Spanish words of high or low frequency and antepenultimate or penultimate stress. Antepenultimate stress is necessarily stored in the Spanish lexicon for both high and low frequency words. In contrast, penultimate stress is regular in Spanish. Therefore, low frequency penultimate stress words probably have their stress computed by rule, whereas many high frequency words of this type probably have their stress pattern stored in the lexicon. By observing the patterns of priming across these four types of words, this study assesses whether it is possible to prime stored stress patterns and/or the application of stress rules.

(1055)

Orthographic Neighbourhood Effects on Italian Dyslexic Children's Reading. LAURA BARCA, *Institute for Cognitive Sciences and Technologies, ISTC-CNR, Rome & University of Rome "la Sapienza"*, MARIA DE LUCA, *Neuropsychology Research Center, IRCCS Fondazione Santa Lucia, Rome*, GLORIA DI FILIPPO, PIERLUIGI ZOCCOLOTTI, *University of Rome "la Sapienza" & Neuropsychology Research Center, IRCCS Fondazione Santa Lucia, Rome*, & CRISTINA BURANI, *ISTC-CNR, Rome*

—A pervasive reading speed deficit has been documented among Italian dyslexics, associated with the predominant use of the nonlexical reading procedure (Zoccolotti et al., 1999). In this study, we examined the role of number of orthographic neighbors (Nsize) and frequency on word reading aloud in dyslexics and proficient readers. A facilitatory effect of Nsize has been consistently

reported in word reading aloud, at least for low-frequency words. In the present study, both dyslexics and controls showed a frequency effect on naming RTs. Neither Nsize, nor its interaction with frequency, were significant. Frequency and Nsize affected reading accuracy in both dyslexics and controls. The facilitatory effect of Nsize (resulting in less pronunciation errors when words had a larger neighborhood) was limited to low frequency words. These data support the view that, in both proficient and impaired readers, the lexical reading procedure contributes to word reading aloud in a transparent orthography (Italian).

(1056)

Comprehension by French Dyslexic Children: The Use of Phonetic and Orthographic Cues in Understanding Oral and Written Language. SÉVERINE CASALIS, *Université de Lille 3*, & CHRISTEL LEUWERS, *Université de Savoie*

—Listening comprehension is stronger than reading comprehension amongst dyslexic children. The aim of the present study is to elucidate which cues are used by dyslexic children in the comprehension of sentences that include a subject-object relative clause (“the pirate the queen likes is blond”). Given the structural complexity, comprehension may be improved by considering the gender markers of the adjective. In French, these markers may be phonetic (verte), orthographic (bleue) or neutral (rouge). Children (n=68) were tested with 24 sentences in a picture choice task. 11-year-old dyslexics performed below the level of age-matched controls and at a similar level to reading-age matched controls. In contrast to both control groups, the dyslexic children performed higher in listening than in reading comprehension, especially in the phonetic condition. Only the older groups of children made use of the orthographic cues, the other groups showed no difference between the orthographic and the neutral conditions.

(1057)

Word Morphology and Reading Aloud in Italian Developmental Dyslexia. STEFANIA MARCOLINI, *Institute For Cognitive Sciences and Technologies, ISTC-CNR, Rome & University of Trieste*, ALESSANDRA LUCI, *ISTC-CNR, Rome*, PIERLUIGI ZOCCOLOTTI, *University of Rome "la Sapienza"*, & CRISTINA BURANI, *ISTC-CNR, Rome*

—For both adults and children, the presence of morphemes (roots and suffixes) favors speed and accuracy in reading aloud low-frequency words or pseudowords. In two experiments, we evaluated if Italian dyslexic children, who are known to prevalently adopt the sub-lexical reading procedure, take advantage of morphemes as processing units. Low-frequency words and pseudowords varying for morphological structure (either composed of root and suffix or morphologically simple) were presented. In dyslexics, the root had a leading role with respect to the suffix in morpho-lexical reading, presumably because of its position at the beginning of the stimulus. Furthermore, the performance of both proficient and dyslexic readers was modulated by word and root length, as the growth of both increased the chance of morphemic parsing. Consistent with previous evidence, this latter effect may indicate the role of pre-lexical visuoperceptual factors in developmental reading deficits in an orthographically shallow language.

(1058)

On the Rapid Use of Verbal Mood Information in Sentence Processing: Evidence from Spanish. JOSEP DEMESTRE, & JOSÉ GARCÍA-ALBEA, *Universitat Rovira i Virgili*

—This paper presents a series of self-paced reading experiments that examined the influence of verb-specific information on sentence processing in Spanish. We studied a particular type of information—the mood constraints a matrix verb imposes on a

subordinate verb—that had received little attention to date. Spanish affords us a way, not possible in English, to examine the role this information plays in parsing. Subcategorization for a subjunctive (or indicative) sentence complement is generally assumed to be a lexical property of verbs. We addressed three questions concerning this source of information: (1) are mood anomalies rapidly detected?, (2) is mood information rapidly made available to the processor?, and (3) does mood information have a rapid influence on ambiguity resolution? The results showed that the answer to these three questions is affirmative. This finding is in accordance with lexicalist parsing models, which assume lexical information plays a central role in parsing.

(1059)

Extended Neighborhood Effects in Visual Word Recognition. WALTER J. B. VAN HEUVEN, *University of Nottingham*, & TON DIJKSTRA, *Radboud University Nijmegen*

—We investigated how word recognition is affected by orthographically similar words (so-called extended neighbors) that are not neighbors according to Coltheart et al. (1977)'s definition. Extended neighbors are defined as words that have an additional letter at the front or the back of a target word (e.g., SLOW is an extended neighbor of LOW, and FEEL is an extended neighbor of FEE). Lexical-statistical analysis showed that such neighbors are quite common in Dutch, English, and French. In three Dutch lexical decision experiments, extended higher-frequency neighbors were found to inhibit target word processing. Extended neighbors with an extra letter at the front inhibited target word processing more strongly than extended neighbors with an extra letter at the back, which suggests that the rime of the extended neighbor and the target word plays a role. Implications of these results for models of visual word recognition will be discussed.

(1060)

Transposed-Letter Similarity Effects and CV Structure: A Study with Children. NICOLAS GUTIÉRREZ-PALMA, *University of Jaén*

—Nonwords created by transposing consonants (i. e., batido -> badito) produce priming effects in comparison to orthographic controls (i. e., batido -> bamiso). However, this effect disappeared when nonwords were created by transposing vowels (i. e., animal -> anamil) (Perea & Lupker, 2004). This suggests that orthographic representations might be organized in CV sequences in Spanish. This work aims to test whether the above results can be obtained in children that are learning to read. Two masked form priming experiments using the lexical decision task were carried out. Orthographic similarity to the base words (i. e., batido / animal) was manipulated. In a control condition, two letters were substituted (i. e., bamiso-BATIDO / anomel-ANIMAL). In two experimental conditions, two consonants (i. e., badito-BATIDO) or two vowels (i. e., anamil-ANIMAL) were exchanged. Results are discussed in the framework of the most recent models of coding schemes at the orthographic level.

(1061)

The Neighbourhood Distribution X Masked Orthographic Priming Interaction Depends on Prime Exposure Duration. CHRISTELLE ROBERT, & STÉPHANIE MATHEY, *Université Bordeaux 2*

—Previous findings from the lexical decision task (LDT) revealed that orthographic priming was influenced by neighbourhood distribution (i.e., the number of letter positions in the stimulus yielding at least one neighbour) at an SOA of 60-ms (Mathey, Robert, & Zagar, 2004). The present study examined whether this interaction depends on prime processing duration. Word targets had two higher frequency neighbours that were either concentrated on a single letter position (e.g., GIVRE/vivre-livre) or spread

across two letter positions (e.g., TRAME/drame-trace). LDTs were run with a masked priming procedure at very brief SOAs (53 and 39 ms). Word targets were preceded by their highest frequency neighbour or by a control prime. The results replicated a main effect of neighbourhood distribution. The priming x neighbourhood distribution interaction observed at a 60-ms SOA was cancelled at shortest SOAs of 53 and 39 ms. The theoretical implications of these results are discussed.

(1062)

Neural Responses to Morphological, Semantic and Orthographic Properties of Words: An fMRI Study. DELPHINE M. FABRE, *Université Lyon 2, Laboratoire Dynamique Du Langage*

—Does the lexical access of morphological complex words involve a specific cognitive function or is a single undifferentiated system required for simple and complex words? We investigated this question by running an fMRI experiment. Measures of brain activity were recorded while volunteers read triplets of French words sharing: orthographic, semantic or morphological links. In the morphological condition, words of each triplet (such as “modernité, modern, modernisation” modernity, modern, modernization in English) shared the same stem (i.e., decomposable complex forms); in the orthographic condition the three words of each triplet (such as “foulard, foule, foulure” scarf, crowd, sprain) shared their first letters that do not correspond to a stem (i.e., decomposable but could not be used for lexical access), and in the semantic condition (“humain, individu, personne” human, individual, person) words did not share form (i.e., undecomposable), but were related in meanings. Results show differences in the activation pattern between the orthographic and semantic conditions and the morphological condition. We will discuss these data in light of recent results observed in neuropsychological studies and in terms of specific morphological processes.

(1063)

Similarities and Differences in French Children's Semantic Priming with Varying Comprehension Skills in a Lexical Processing Task. ISABELLE BONNOTTE, & SÉVERINE CASALIS, *University of Lille 3*

—Semantic priming was assessed with a visual lexical decision task using a long SOA (800 ms) in French children: normal and poor comprehenders matched on both chronological age (10;4 years) and decoding level. Targets were preceded by neutral, related, and unrelated primes. Two relations between related primes and targets were examined: categorical versus functional relation, and high versus low association in context. As in Plaut and Booth (2000), the priming effects shown were always facilitation (no inhibition). First, good comprehenders showed facilitation for category-related targets, irrespective of the degree of prime-target association, whereas poor comprehenders only showed facilitation if the category pairs also shared high association strength. Second, in both groups of children, no priming effect was registered for functional relation, whatever the association. In all, our study argues for individual differences in printed word processing due to a narrower semantic priming in poor comprehenders.

(1064)

Syllabic Priming Effects in Picture Naming in French: Lost in the Sea! CYRIL PERRET, PATRICK BONIN, & ALAIN MÉOT, *University Blaise Pascal*

—Ferrand, Grainger and Segui (1996) found robust syllable priming effects on picture naming latencies: Pictures primed with their initial syllable (e.g., 'bal' for 'balcony') were processed faster

than pictures primed with a string of letters shorter or longer than their initial syllable ('ba' for 'balcony'). However, in several studies, these priming effects have not been replicated either in Dutch or in English (Schiller, 1998, 1999, 2000). The present study was aimed at replicating syllable priming effects in picture naming in French using a masked priming paradigm. A large number of participants and items than used in the Ferrand et al. (1996) study was used. The syllable priming effect in picture naming latencies was not replicated. Subsampling procedures were then used to determine the probability of replicating the Ferrand et al. pattern of results. The syllabic priming effect turned out to be a very rare event.

SKILL ACQUISITION AND IMPLICIT LEARNING

(1065)

Grammar Induction: The Influence of Stimulus Set Size on Learning Performance. TESSA J.P. VAN SCHIJNDEL, & FENNA POLETIEK, *Leiden University*

—A new theoretical development in the cognitive psychology of (language) learning concerns information sampling. Sample characteristics of stimulus sets in our environment seem a still poorly understood, but possibly significant, factor in cognitive learning and information processing. For example, the stimulus sample from which a structure has to be learned is not random in many natural cases. Instead, it has interesting statistical biases which even seem to be shaped to facilitate the task of the learners (Newport, 1990). An Artificial Grammar Learning experiment was conducted to investigate the influence of two related aspects of stimulus set size on learning performance. The first aspect refers to the number of exemplars in a learning set and the second aspect refers to the extent to which the grammar is covered by the learning set. This coverage was defined as the sum of the probabilities of its exemplars. An interaction between number of exemplars and statistical coverage was found; when a large set was available, lower coverage sufficed to learn something of the grammar, but when only a small number of stimuli was available, high coverage was needed to facilitate learning. We tentatively propose that the interaction found is analog to the phenomenon of overrepresentation of basic grammatical rules occurring in the early stage of natural grammar induction.

(1066)

Incidental Learning of Predictive Relationships in a Discrimination Task. AMPARO HERRERA, & ANTONIO MALDONADO, *University of Granada*

—Although recent research has shown that humans are rather accurate at detecting and judging the degree of relationship between events, most of these studies have used contingency judgments task in which subjects know they will have to estimate the relationship. In this work we examined whether people are able to detect predictive relationships while they are performing a different task. Two experiments demonstrated the ability detecting the relationships between different events while participants were performing a discrimination task. The results also showed a different performance as a function of the contingency of a predictive cue and also of the type of trial. In the confirmatory trials there was facilitation, whereas an interference effect appeared in the non-confirmatory ones. All these findings and especially the interference effects allow to study how the knowledge of the relationships influence the discrimination learning process and they suggest the influence of automatic and controlled processes during such learning.

(1067)

The Acquisition of Specialised Knowledge and the Efficiency of Translation. PILAR GONZALVO, FRANCISCA M. PADILLA,

& ROSA CASTRO, *University of Granada*

—Professional translators usually translate highly specialized texts in different domains. Translation students learn methods for quickly acquiring conceptual knowledge. However, it is not clear what level of knowledge organization they acquire with these methods and how this organization is related to the quality of their translation. The aim of this study was to explore these issues. Forty students enrolled in the “Terminology” course of the translation specialty were evaluated before and after taking the course. As part of the course requirements, they had to acquire domain specific knowledge in several topics related to Cognitive Psychology. Relatedness judgments between concepts were collected from students and experts and analyzed with the Pathfinder technique. Analyses of the similarity between the networks obtained by the two groups indicated that the students achieved high levels of knowledge. In addition, participants, whose networks were more similar to those of the experts, were also the more efficient translators.

(1068)

Information Reduction in Skill Acquisition – An Item-General Process? ROBERT GASCHLER, & PETER A. FRENCH, *Humboldt-University, Berlin*

—An important aspect of cognitive skill acquisition is the ability, developed through task practice, to ignore task-irrelevant information (i.e., information reduction). Three experiments using the alphabet verification task investigated whether information reduction is an item-specific or an item-general process. The frequency with which items were repeated during task practice was varied both within and between participants. The results are consistent with the assumption that information reduction is an item-general phenomenon. Irrelevant parts of infrequent items were ignored to the same extent as were irrelevant parts of frequent items. The findings are incompatible with most data-driven theories of skill acquisition but are consistent with theories that assume a top-down influence on skill acquisition.

(1069)

Model of the Acquisition of the Ability to Count. THIERRY BORDIGNON, *University of Mons-Hainaut*

—Our research consists working out a model of the acquisition of the ability to count. In this model, we integrate data of developmental psychology (Fayol, 1990) and neuropsychology (Dehaene, 1992). We have tested our model with 300 children. Our model is articulated around three precursors. The first one is the perceptive ability of quantities discrimination. This ability is in place very early and allows to approach quantities approximately. The second precursor is the schema of the ordered course (Bastien & Bovet, 1980). This ability makes it possible to consider in a linear way a collection of objects. The numerical litany is the last precursor. Initially, these precursors are independent. Then, there are articulated gradually and allow the emergence of the ability to count. The access to the numerical language by children makes possible to pass from a continuous and approximate quantities perception to a discrete and exact perception.

(1070)

The “Lag” Effect (or the Effect of Distance of Repetition) in Learning Verbal and Tonal Sequences. MAUD L. BOYER, & REGINE KOLINSKY, *Université Libre de Bruxelles*

—Recently, Boyer, Destrebecqz and Cleeremans (in press) focused on a choice reaction situation introduced by Lee (1997), in which participants were exposed to visual material that follows a single abstract rule, namely that stimuli are selected randomly but never appear more than once in a legal sequence. Boyer et al. showed that participants developed a sensitivity to the repetition distance occurring between two identical stimuli (the lag effect). In this

context, we presented three experiments evaluating the role that surface structure of auditory stimuli may have on the lag effect when stimuli share a common abstract structure, thus either tonal or verbal sequences were used. We compared non-musicians participants (they were presented with either the musical intervals or the syllables) to musician participants with or without absolute pitch (they were only presented with the intervals). Results showed that labeling ability seems to be crucial in the occurrence of the lag effect.

(1071)

Implicit Perceptual Learning in Amnesia. LORELLA ALGERI, *Hospital “Ospedali Riuniti” of Bergamo*, DANIELA PAOLIERI, *University of Urbino*, BARBARA TRECCANI, *University of Padua*, & ROBERTO CUBELLI, *University of Urbino* (presented by Daniela Paolieri)

—Amnesic patients can learn new information and acquire new skills, even if they fail to recollect the learning phase. Neuropsychological studies have amassed evidence suggesting spared procedural memory, but data concerning perceptual memory are sparse. In this study, nine hidden figures were used as stimuli. In the study phase both control participants (n=22) and amnesic patients (n=11) failed to identify any of the hidden figures before they were revealed by the experimenter. In the test phase amnesiacs showed a clear dissociation between poor explicit memory (old/new recognition) and normal implicit memory (identification) of the hidden figures. This result suggests that in amnesiacs as well as in the volunteers the modifications of the figure-ground organisation brought about by the unmasking of the figures are long-lasting.

HIGHER MENTAL PROCESSES

(1072)

Meta-Cognitions and General Mental Health. USHA BARAHMAND, & SALEH JAHANMOHAMMADI, *Mohaghegh Ardebili University*

—The purpose of the present study was to examine the relationship between negative metacognitions and general mental health. A randomly selected sample of 378 undergraduates responded to the General Health Questionnaire and the Metacognitions Questionnaire. Findings revealed that negative metacognitive beliefs correlated positively with general mental health. Positive beliefs about worry, negative beliefs about uncontrollability and danger, general negative beliefs and negative beliefs about cognitive competence correlated with anxiety, depression, physical complaints and social dysfunction measures. A greater number of negative metacognitions were associated with greater anxiety, physical complaints and social dysfunction. A curvilinear relationship emerged between negative metacognitive beliefs and social dysfunction. Regression analysis revealed that metacognitions alone accounted for a substantial part of the variance in mental health with positive beliefs about uncontrollability and danger accounting for 28% of the variance and beliefs about cognitive competence accounting for an additional 1%. Sex differences emerged only with regard to positive beliefs about worry with boys reporting more positive beliefs about worry than girls. However, positive beliefs about worry correlated with mental health scores in both sexes indicating that worry is probably used as a coping strategy. Findings are discussed in light of previous studies and cultural factors.

(1073)

Salience as a Predictor of Item Difficulty for Raven's Progressive Matrices. MARIA MEO, *University of Rome “la Sapienza”*, MAXWELL J. ROBERTS, *University of Essex*, & FRANCESCO S. MARUCCI, *University of Rome “la Sapienza”*

—Raven's Progressive Matrices is a frequently used intelligence test, and it has been suggested that the major determinant of difficulty for each item is its number of elements, and their rule complexity. The current study investigated another potential source of difficulty - salience. Items are harder where their elements are difficult to identify. We investigated two aspects of this: whether item elements were (1) overlapping; and (2) based upon familiar or unfamiliar shapes. Three sets of newly devised matrices were compared to the standard task: (1) easy to identify elements (European letters); (2) difficult to identify elements (invented 'letters'); (3) overlapping elements (using European letters). Standard matrices (with many overlapping and/or unfamiliar elements) were the hardest. Performance was significantly better when item elements were either difficult to identify but were not overlapping or were overlapping but easy to identify. Performance was best when item elements were neither difficult to identify nor overlapped.

(1074)

Do Peripheral Bodily Sensations Play a Role in Inferring False Beliefs from Others' Actions? SIMONE BOSBACH, *Max Planck Institute For Human Cognitive and Brain Sciences, Munich*, JONATHAN COLE, *Wessex Neurological Centre, Southampton & Poole Hospital*, WOLFGANG PRINZ, *Max Planck Institute For Human Cognitive and Brain Sciences, Munich*, JACQUES PAILLARD, *Laboratoire de Neurobiologie du Mouvement, CNRS, Marseille*, & GUENTHER KNOBLICH, *Rutgers University, Newark*

—Social cognition critically depends on the ability to understand others' actions in terms of the underlying mental states such as intentions, expectations, and beliefs. Two types of theories have been proposed to explain this extraordinary human ability. The theory of mind approach claims that we infer others' mental states based on visual cues related to the observed actor. In contrast, the simulation approach states that motor knowledge and bodily sensations enrich visually perceived cues and add an experiential dimension to them. Whereas earlier studies have demonstrated the contribution of both the motor system and central body representations to action understanding, the role of peripheral bodily sensations has not yet been explored. In the present study we show that losing one's senses of touch and proprioception leads to a specific deficit in detecting false beliefs. Thus, peripheral bodily sensations can contribute to the understanding of mental states associated with certain actions.

(1075)

The Activation of Hypotheses During Diagnostic Reasoning. MARTIN BAUMANN, & JOSEF F. KREMS, *Chemnitz University of Technology*

—We view diagnostic reasoning as a comprehension process. Observations are sequentially comprehended and integrated into a mental representation that represents the current explanation of the observations. During this comprehension process hypotheses that could explain the encountered observations become activated through associations to these observations. Those hypotheses that were then contradicted by later observations should be inhibited and removed from the mental representation to yield a coherent explanation. The participants in our experiments had to solve many diagnostic reasoning tasks, where they had to explain a small set of sequentially presented observations. Whereas after the first observations different explanations were possible, all except for one could be excluded by following observations. We measured the activation of explanations by a probe reaction time task presented at varying points during the reasoning process. Our results indicate that relevant hypotheses become activated during the reasoning process. The inhibition effect for excluded hypotheses was only small.

(1076)

Direct Measurement of Memory for Context Using a Recognition Paradigm: Evidence from a Signal Detection Approach. YAAKOV HOFFMAN, *Bar Ilan University*, & JOSEPH TZELGOV, *Ben Gurion University*

—In this study, context was manipulated by presenting stimuli consisting of two words, a large grey word (target) appearing in back of a smaller black word (context). Participants were instructed at encoding to generate associations between two words but to remember only the grey word. At test, 4 classes of word pairs appeared; Targetold-Contextold, Targetold-contextnew, Targetnew-Contextold and Targetnew-Contextnew. Memory was measured by a recognition test, where participants were told to respond 'old' to targets. Applying signal detection to memory for context words (i.e. contextold = hit, contextnew = false alarm) reveals a significant effect only when target stimuli were old. The implications for these results are addressed.

(1077)

The Representation of Ordered Stimuli and Transitive Inference in Humans. FILIP VAN OPSTAL, TOM VERGUTS, & WIM FIAS, *Ghent University*

—Several studies have focused on the ability of animals and humans to make transitive inferences on ordered stimuli ($A < B$, and $B < C$, then $A < C$). Animal studies have shown that the ability to make a transitive inference is impaired after a hippocampal lesion. It is however not known how humans represent the ordered stimuli and whether the hippocampus is involved in human transitive inference. In this study we use functional magnetic resonance imaging (fMRI) to see how the representation of ordered stimuli evolves during training and which brain areas are active when solving transitive inference problems.

(1078)

Being Mindful about Mindlessness: Mindlessness as a Mind Set. HADAS GERNER, & NACHSHON MEIRAN, *Ben-Gurion University of the Negev*

—We conducted 4 experiments to examine the cognitive basis of mindfulness and mindlessness. Our measure of mindfulness was the number of trials required to find a rule and our major manipulation was whether rule generation was performed as a task switch (after rule application) or as a task repetition (after rule generation). We also included a baseline group which was required to find the test rule without being pre-exposed to application or generation beforehand. Our findings reveal that, in accordance with Langer's (1989) theory, rule finding after rule application caused mindless thinking (more trials to find the rule relative to baseline). Moreover this mindlessness was found even after a single application trial. Groups performing rule finding after rule finding performed as good as the baseline group. These results support our hypothesis that mindlessness and mindfulness are mental sets.

PERCEPTION II

(2001)

Effects of Types of Figures and Patterns of Movement on Attributing Mental States to Moving Figures. MASUO KOYASU, & ASUKA TATSUWA, *Kyoto University*

—This study investigated how people attribute mental states to a moving figure which is bouncing up and down on a computer screen. The figures used were a ball, a cartoon rabbit figure, and a human silhouette. The moving patterns are made physically predictable, psychologically predictable, or unpredictable (random). Twenty-eight university students participated individually in the experiment. They were given nine trials in which one of the three bouncing figures was presented in one of the three moving patterns. Participants were asked to rate it on 14 items by a five point rating scale. Three factors were extracted by a factor analysis; animacy (4 items), regularity (2 items), and activity (4 items). Analyses of variance revealed the main effects of types of figures (animacy, regularity, and activity) and patterns of movement (regularity and activity). The rabbit figure in particular tended to elicit attribution of mental states to its movement.

(2002)

The Role of Reference Frames in Imagined Navigation. SOFRONIS G. SOFRONIOU, & MARIOS N. AVRAAMIDES, *University of Cyprus*

—Past research on spatial frameworks (e.g., Franklin & Tversky, 1990) has shown that a set of orthogonal axes centered on our bodies is used to encode and remember the locations of objects that surround us. Work by Avraamides and Carlson (2003) has extended the spatial framework research to situations in which we imagine ourselves moving within a perceptually available space even in the absence of any objects. The present work examines the conditions under which the spatial framework model can be used to characterize imagined navigation. The results of our experiments suggest that an embedded perspective is critical for the spatial framework model to apply. Instead, the occasional updating of the imagined facing direction -- proposed by Avraamides and Carlson (2003) as a precondition for spatial frameworks -- does not seem necessary.

(2003)

Imagined Perspective-Taking In Perceptual Scenes: Manual vs. Verbal Responding LOUIZA M. IOANNIDOU, & MARIOS N. AVRAAMIDES, *University of Cyprus*

—Experiments in spatial cognition typically require participants to imagine themselves adopt perspectives in a previously depicted or described scene and locate from memory a number of target objects using manual responses (e.g., pointing, facing a target). The present study challenges the suitability of using such manual responding for evaluating spatial reasoning abilities. In a series of experiments participants completed a computer-based task in which they located objects from various imagined perspectives in a presented spatial scene. In one condition, participants were asked to respond manually. In another condition they located the targets using verbal labels. Overall, results revealed an advantage for verbal responding, suggesting that language is a more flexible medium than manual responding, presumably because it does not rely as strongly as manual responding on the human body. This difference is exemplified when responses are made from imagined perspectives that are misaligned with participants' actual facing direction.

(2004)

Optimal Presentation Time Presentation of a Audio-Visual Sequence of a Landscape, with an Aim of Inducing Immersion Feeling. DELPHINE PRESSELIN, *University of Lyon 2, &*

PATRICIA CHAMPELOVIER, *INRETS*

—This research was carried out in the Environmental simulation and Assessment Laboratory (ESAL of INRETS), aiming at reproducing the resident's surrounding close to road infrastructure, in order to study the perception of the environmental impacts of transports (noise and visual intrusion). The participant's immersion in the simulated environment is essential to attest validity's results obtained. This work aimed at defining the time of projection of bimodal stimuli (sound and visual) necessary to induce a feeling of immersion. It was also taking part in a better comprehension of the concept of immersion in a cognitive level. Measurements of immersion's times as well as qualitative answers of the participants made possible to establish that the time of observation of an audio-visual sequence to induce immersion was higher than the observation's time of a visual sequence. We also could deduce an efficient presentation time of an audio-visual sequence of 1'16".

(2005)

Comparing Recognition and Localization Tasks with Crossmodal Stimuli: A fMRI Study. CARLO SESTIERI, ANTONIO FERRETTI, COSIMO DEL GRATTA, ROSALIA DI MATTEO, MASSIMO CAULO, ARMANDO TARTARO, GIAN LUCA ROMANI, *University of Chieti*, & MARTA OLIVETTI BELARDINELLI, *University of Rome "la Sapienza"*

—Similar what/where functional segregations have been proposed for both visual and auditory cortical processing. In this fMRI study, we investigated if the same segregation exists in the crossmodal domain, when visual and auditory stimuli have to be matched in order to perform either a recognition or a localization task. Ten male right handed subjects were presented with a picture and an environmental sound coming from either the same or the opposite hemifield, and representing either the same or a different object. Both the recognition and the localization tasks required a manual response. An event related design was used in order to analyze the activation during the execution of both tasks in those brain areas known to take part in crossmodal recognition processes (i.e. superior temporal sulcus) and crossmodal localization processes (i.e. intraparietal sulcus). Preliminary results are partially consistent with the what/where distinction.

(2006)

Perceptual and Decisional Factors Modulate Audiovisual Interactions in Motion Perception. DANIEL SANABRIA, *University of Oxford*, SALVADOR SOTO-FARACO, *Universidad de Barcelona*, & CHARLES SPENCE, *University of Oxford* (presented by Charles Spence)

—When reporting the direction of an auditory motion stream in the presence of a distractor visual motion stream, people's responses are often biased in the direction of the visual stream, an effect known as crossmodal dynamic capture (Soto-Faraco et al., 2002). However, the level of processing at which visual stimuli modulate the perception of the direction of auditory motion remains a hotly-debated topic. We report three experiments demonstrating the existence of both perceptual and decisional factors contributing to the crossmodal dynamic capture effect. Interestingly, perceptual changes were measured only as interference: While a directionally-incongruent visual stream impairs the perception of the direction of an auditory stream, congruent visual motion does not facilitate the perception of the direction of auditory motion.

(2007)

Haptic Perception of Parallelity in Adolescents and Adults. INEZ FERNANDEZ, & HANNEKE I. VAN MIER, *University Maastricht*

—Previous research has shown that haptic space is not Euclidean in adults and children, children being less accurate than adults. In the present study adolescents were compared to adults to establish

developmental changes. Thirty-six adolescents of 12, 14 and 16 years old and twelve adults were tested, 6 men and women in each group. Blindfolded subjects were instructed to rotate a test bar, which could appear at different orientations in such a way that it felt parallel to a reference bar. Distance between the reference and the test bar was varied. The dependent variable was the deviation between the test and reference bar. A repeated measurement ANOVA was performed with age and gender as between factors, and distance and orientation as within factors. Previously observed effects of gender, orientation and distance were replicated. No significant effect of age was found suggesting that adolescents perform haptic parallel matching at adult levels.

ATTENTION II

(2008)

Probing the Dynamics of Gradual Popout and Top-Down Cueing over Time. GWENDID T. VAN DER VOORT VAN DER KLEIJ, & FRANK VAN DER VELDE, *Leiden University*

—Visual selective attention is usually distinguished in bottom-up and top-down selection of visual information. In previous experiments, we found that multiple, identically colored elements capture attention (or prioritize visual search) in an analogous manner as uniquely colored elements. In addition, top-down color cues appeared to facilitate the selection of potential target locations, even when the target location already popped out (to some extent). We now investigated the dynamics of such gradual popout and top-down cueing over time. Thereto, we manipulated top-down cueing for color (i.e., present or absent), gradual popout, and the duration of the popout display consisting of colored elements (i.e., from 50 ms to 200 ms). After the presentation of the popout display, subjects performed a visual search task. The results confirmed our previous findings, and showed that the faster responses for targets on previously cued and popout locations were fairly stable for varying durations of the popout display, except for top-down cueing at the shortest duration (i.e., 50 ms).

(2009)

Auditory Spatial Attention: Effect of Different Cueing Strategies. KATHERINE L. ROBERTS, DEBORAH A. HALL, *MRC Institute of Hearing Research, United Kingdom*, & QUENTIN SUMMERFIELD, *University of York*

—A study comparing spatial orienting of attention in matched auditory and visual tasks revealed modality-specific differences. In a sample of 40 subjects, cues to target location produced a significant 48-ms reduction in reaction times in the visual task, but a non-significant 12-ms reduction in the auditory task. This is contrary to the spatial relevance hypothesis (McDonald & Ward, 1999, JEP:HPP 25, 1234-1252), which predicts that informative auditory spatial cues will improve processing of auditory targets. To investigate this disparity further, a follow-up experiment varied the informativeness and salience of auditory spatial cues. The results reveal that exogenous (automatic) spatial orienting is a robust phenomenon. However, endogenous (voluntary) spatial orienting varied with the cueing paradigm. Under all cueing conditions there was a great deal of inter-subject variability, but the pattern of results suggests that increased spatial salience leads to increased benefits from spatial cues.

(2010)

Attentional Capture in Serial Visual and Audiovisual Search Tasks. POLLY DALTON, *University of Oxford*, NILI LAVIE, *University College London*, & CHARLES SPENCE, *University of Oxford*

—The phenomenon of attentional capture by unique yet irrelevant “singleton” distractors has typically been studied in spatial visual search tasks. Recently, however, Dalton and Lavie (2004)

demonstrated that auditory attention could also be captured by a singleton item in a rapidly-presented sequence of tones. In the present research, we investigated whether these findings extend to serial visual or audiovisual search tasks. Participants had to search a centrally-presented visual stream for targets defined on a particular dimension (e.g. size). Task performance was compared in the presence versus absence of a singleton distractor that was unique on an irrelevant dimension (e.g. duration). Both visual and auditory singleton distractors interfered with visual task performance. However, if the singleton feature coincided with the target item, search was facilitated. These results suggest that visual attention can be captured both by visual and by auditory singleton items in nonspatial search tasks.

(2011)

On the Influence of Crossmodal Integration on Exogenous Orienting. VALERIO SANTANGELO, *University of Rome "La Sapienza"*, ROB H.J. VAN DER LUBBE, *University of Utrecht*, MARTA OLIVETTI BELARDINELLI, *University of Rome "la Sapienza"*, & ALBERT POSTMA, *University of Utrecht*

—It may be hypothesized that the speeding up of responses due to exogenous orienting effects of bimodal cues exceeds the sum of single unimodal and crossmodal cues. Namely, the amplitude of event related potentials (ERPs) elicited by a combined audiovisual stimulus is larger than the sum of a single auditory and visual stimulus, which may reflect crossmodal integration and could affect the magnitude of orienting effects. Behavioral data, however, revealed no increased orienting effect, although this null effect may be due to a failure of crossmodal integration. To control for this, we measured both ERPs elicited by task-irrelevant bimodal, crossmodal, and unimodal cues, and determined their exogenous orienting effects in a visual discrimination task. ERP components elicited by bimodal cues were indeed larger than the sum of a single auditory and visual stimulus, but no enlarged orienting effect was found. Thus, crossmodal integration fulfils no special role for exogenous orienting.

(2012)

Ambiguous Figures in the Flanker Task. ILSE M. VERSTIJNEN, *University of Utrecht*

—Recently, Lavie (1995; 2004) proposed a perceptual load account for divergent findings in the early- vs late-selection debate on selective attention, claiming that in a traditional flanker-paradigm (Eriksen & Eriksen, 1974) increasing perceptual target load causes reduction in the flanker-compatibility-effect. This claim was tested with ambiguous figures taken from series ranging from one extreme (e.g. duck) via ambiguous intermediates (duck/rabbit) to the other extreme (rabbit). Going from one extreme to the other the series presumably had a continuous increment in physical changes, but around the point of pure ambiguity the identity change turned out to be more abrupt (S-shaped) for series containing semantic figures than for geometric ones (Verstijnen & Wagemans, 2004). Ambiguity of flankers and target were varied independently. It is concluded that the perceptual load theory can account for our findings with geometric figures where semantic and physical changes coincide, but not for our findings with semantic figures.

(2013)

Dissociating between Endogenous and Exogenous Components Triggered by Spatial Cues and Their Modulation of Spatial Congruency Effects. ANA B. CHICA, MARÍA J. FUNES, & JUAN LUPIÁÑEZ, *University of Granada*

—Previous research in our lab has demonstrated that the Spatial Stroop effect is oppositely modulated by peripheral non-informative cues and centrally presented informative cues, being systematically reduced following peripheral cues, and amplified

following central cues (Funes et al., submitted). The aim of this study is to further dissociate the role of endogenous and exogenous orienting on Spatial Stroop, but using the same set of stimuli. We presented peripheral cues predicting either the same or the opposite target location, so that expected and non-expected positions could be either cued and uncued. The results showed the typical reduction of Spatial Stroop on cued trials, but mostly at unexpected locations, while at expected locations similar Spatial Stroop effects were obtained for both cued and uncued trials. These data will be discussed in terms of multiple attentional systems and on the hypothesis of further processes, non-attentional in nature, exclusively triggered by peripheral cues.

(2014)

The Role of Object's Spatial Meaning in the Construction of Space Representation over Which Attention Moves. ROBERTA TRINCAS, ALESSANDRO COUYOUMDJIAN, & CARLAMARIA DEL MIGLIO, *University of Rome "la Sapienza"* —Some recent results suggest that the presence of "objects" in the visual field can alter the form of spatial representations over which attention operates (Robertson & Kim, 1999). Considering in more detail this hypothesis, the study aims at investigating if visual meridian effects are affected by the specific spatial categories evoked by the objects in the display (up/down vs left/right). Two cueing experiments were run to study separately the vertical and the horizontal meridian effects. Targets were presented in one of four positions along the horizontal or vertical meridian, concurrently with two background objects on the opposite meridian. Three object conditions were compared in each experiment: Exp1) "cars", the Italian words for "up" and "down" and "blobs"; Exp2) "climbers", the Italian words for "left" and "right" and "blobs". Results, besides a validity effect, highlight a significant expected modulation of the horizontal meridian effect by means of the presented objects.

(2015)

The Task Set and the Perceived Onset Position of Moving Stimuli. JOCHEN MÜSSELER, *University of Technology Aachen*, ELLEN BRINKMEIER, *University of Bielefeld*, & SONJA STORK, *Max Planck Institute For Human Cognitive and Brain Sciences, Munich*

—It is long known that observers make localization errors in the direction of motion when asked to point to the perceived onset position of a moving target (Fröhlich effect). However, recent studies revealed a strong effect of trial context: When the stimuli did not appear at predictable positions but at unpredictable positions, pointing errors in direction of motion were at least drastically reduced (Müsseler & Kerzel, 2004). In the present experiments this effect of trial context was examined with an absolute pointing task and a relative judgment tasks. The first experiments indicated that the trial context had a strong impact on the observers' judgments in pointing tasks, but not on relative judgment tasks. However, when observers were informed about the task only after stimulus presentation, the effect of trial context was also observed with the relative judgment task. Thus, the task set had a strong impact on perceived spatial positions.

(2016)

Disruption of Attention by Irrelevant Tone Change in Serial Recall. ELKE B. LANGE, *University of Potsdam*

—Attention should be disrupted by a sudden, unexpected change in the physical environment, leading to a performance deficit in a concurrent serial recall task. This prediction, which is based on the working memory model of Cowan (1995, 1999), was investigated in a series of experiments. The change was introduced by switching to a new tone in an otherwise repeated sequence of irrelevant steady-state sound, presented synchronized to the relevant stimuli

of a verbal or spatial serial recall task. Tone change led to a small but reliable performance deficit in the verbal but not in the spatial task. The performance deficit occurred mainly for items presented before the irrelevant change. This retroactive interference is predicted by the model of Cowan; the modality specificity of the effect needs further explanation.

(2017)

When Is Search for a Static Target Efficient? YAIR PINTO, *Vrije Universiteit Amsterdam*

—Intuitively, dynamic visual stimuli, such as moving objects or flashing lights, attract attention. Visual search tasks have revealed that dynamic targets among static distractors can indeed efficiently guide attention. The present study shows that the reverse case, a static target among dynamic distractors, allows for relatively efficient selection in certain but not all cases. A static target was relatively efficiently found among distractors that featured apparent motion, corroborating earlier findings. The important new finding was that static targets were equally easily found among distractors that blinked on and off continuously, even when each individual item blinked at a random rate. However, search for a static target was less efficient when distractors abruptly varied in luminance, but did not completely disappear. We suggest that the division into the parvocellular pathway dealing with static visual information on the one hand, and the magnocellular pathway common to motion and new object onset detection on the other, allows for efficient filtering of dynamic and static information.

(2018)

Pop-Out Detection and Context Homogeneity: Electrophysiological Evidence for Deviant-Detection Mode of Processing. AGNIESZKA WYKOWSKA, & ANNA SCHUBÖ, *Ludwig-Maximilians-Universität, München*

—Efficiency of detecting a target in visual search tasks not only depends on target properties, but also on target-context relationship as well as on the context itself. That is to say, properties of the context elements also affect search behavior. Duncan and Humphreys (1989) already stressed the role of context elements for target detection. Analyzing Event-Related brain Potentials (ERPs), we have recently found electrophysiological evidence for context-dependent processing of search displays (Schubö et al., 2004). Both the posterior N2 (N2p) and the P3 differed for blank and target trials, however, N2p effects were only observed for homogeneous contexts that formed uniform backgrounds. In the present study, we further investigated the effect of different contexts on target detection using a simple line orientation pop-out detection task. Participants had to detect an oblique line element while contexts varied with respect to their degree of homogeneity. ERPs for blank and target trials in different contexts were compared. Results showed a decrease in search performance with the increase of context heterogeneity. While there was an enlarged P3 for target present compared to blank trials in all three context conditions, an enhanced N2p in blank compared to target trials was most prominent in homogeneous contexts. This effect declined with the decrease of homogeneity within context elements. These results indicate existence of a fast deviant-detection mode of processing (reflected by the N2p) that is not (entirely) affected by the target features but rather by homogeneity of the context.

PERCEPTION AND ACTION II

(2019)

Common Valence Coding: Affective Blindness towards Response-Compatible Stimuli. ANDREAS B. EDER, *University of Bonn*, & KARL CHRISTOPH KLAUER, *University of Freiburg*

—The "Theory of Event Coding" proposes that perceptual end products and first parts of action regulation are coded in a common

representational domain. In action planning features of the to-be-executed action are bound together rendering them less accessible for concurrent perceptual processing. In several experiments we examined whether approach and avoidance movements are analogously controlled by codes common to actions and evaluations. If the programming of such movements encapsulates valence codes, simultaneous evaluations of stimuli with the same valence should be impaired. In a dual task paradigm participants were to move a joystick either toward (approach movement) or away from the body (avoidance movement) after unlimited planning time. The second task required an unspeeded evaluative decision about a word that was presented right before movement execution. Several experiments revealed an impaired identification (d') of the response-compatible valence. Implications for models of affective compatibility are discussed.

(2020)

Intentions Determine the Effect of Invisible, Metacontrast-Masked Primes. ULRICH ANSORGE, *Bielefeld University*

—Five experiments tested whether or not the processing of nonconscious spatial stimulus information depends on a prior intention. This test was conducted with the metacontrast dissociation paradigm. Experiment 1 demonstrated that masked primes that could not be discriminated above chance level affected responses to visible stimuli that masked them. Experiments 2 and 3 showed that this effect was abolished when the task instruction was changed in such a way that the primes ceased to be task relevant. In Experiments 4 and 5, it was demonstrated that a prime's effect depended on whether it was associated with the same response as the target or with an opposite response.

(2021)

The Influence of Unconscious Effect Representations on Action Control. JULIANE WENDT, & THOMAS GOSCHKE, *Dresden University of Technology*

—Recent studies suggest that action effects, which were associated with specific actions, automatically activate associated motor responses when subsequently presented as stimuli (Elsner & Hommel, 2001; Kunde, 2004). Here we show that even subliminally presented effect stimuli activate associated responses. In an acquisition-phase participants freely chose on each trial to press one of two keys. Each of the two actions was followed by a particular effect stimulus (a square or diamond). In a test-phase the same effect stimuli were presented subliminally immediately before each free-choice action. Participants chose significantly more often the action associated with the subliminal effect stimulus than the alternative action. This indicates that unconscious effect representations automatically activate associated actions and that this activation can bias free choices among alternative actions. This conclusion was further supported by a second experiment in which we measured the lateralised readiness potential as an indicator of response activation.

(2022)

Do Road Signs Prime Driver Behavior? MEHMET KOYUNCU, SONIA AMADO, & OSMAN YILIKCI, *University of Ege*

—Recent studies suggest that road signs have an automatic priming function in addition to conscious transmission of information (Crundall and Underwood, 2001). The current study aims to investigate the traffic signs (either symbolically or via written words) through the application of the priming paradigm. 239 participants, aged between 19 and 35, took part in the study which consisted of three experiments. The first experiment investigated the repetitive and semantic priming effects and their relation with stimulus type (symbol, word, word+symbol). In the second experiment, the effect of the stimulus type and location on the priming effect was studied. In the third experiment, the relationship

of the priming effect with the stimulus type and duration was investigated. Strong repetitive priming effects and weaker semantic priming effects were found. The signs containing word+symbol, located at the right side of the scene and presented for longer durations produced stronger priming effects. These results are significant in showing that there is a strong relationship between the road scenes + road signs especially when the priming effect is semantic; hence, the more frequent use of written road signs and the decrease in velocity provide a stronger priming effect and shorter reaction times, which may result in fewer collisions and traffic accidents.

(2023)

Unconscious primes activate motor codes through semantics BERT REYNVOET, *University of Leuven*, BERNIE CAESSENS, & WIM GEVERS, *Ghent University*

—Today, it is generally accepted that unconscious stimuli can activate a response code, leading to a response congruency effect on a subsequent target. However, it is not yet clear whether this is due to the semantic processing of the primes or to the formation of direct stimulus-response associations bypassing the semantic system. Several attempts have been made to disentangle both hypotheses (e.g. the use of novel primes, for which no direct S-R links exist) but no definite choice could be made between both alternatives. In these experiments we report a novel effect in unconscious priming that might be considered as a good marker for semantic processing, i.e. a category match priming effect independent of RCE. The effect shows that novel unconscious primes activate their semantic category, and most likely their corresponding classification rules, so that a cost arises when subjects have to switch to different classification rules for the target.

(2024)

Size of Target Set Matters for Transfer of Priming to Unseen Stimuli. WILFRIED KUNDE, *Martin-Luther-University of Halle-Wittenberg*, CARSTEN POHL, & ANDREA KIESEL, *University of Wuerzburg*

—When target words are classified as belonging to a certain category (e.g. to be either small or large) responding is faster when the target is preceded by a masked prime-word belonging to the same rather than a different category. Recently, there has been some controversy on whether such masked priming effects are confined to primes that are practised as targets as well, or transfer to other novel prime words. We report data which show that the transfer of unconscious priming to unpractised stimuli depends on the size of the targets set. Priming does transfer to novel (unpractised) primes, with a large target set (40 different target words), whereas no transfer to novel primes occurs with a small target set (4 different target words). We conclude that the size and structure of the target set crucially determines the way participants handle a task and therewith determines how unconscious stimuli are processed.

(2025)

The Role of Cerebellum in the Manual Line Bisection Task. ROBERTA DAINI, *Università degli Studi Milano-Bicocca*, LISA S. ARDUINO, *Università degli Studi di Urbino & ISTC-CNR, Roma*, DONATELLA MENZA, *Università Cattolica, Roma*, GIUSEPPE VALLAR, *Università degli Studi Milano-Bicocca*, & M. CATERINA SILVERI, *Università Cattolica, Roma*

—Eight brain-damaged patients, four with left and four with right cerebellum lesion, and eight neurologically unimpaired subjects, were asked to mark the mid-point of horizontal lines. Two variables were manipulated: hand (left or right) and the visual feedback of their movements (presence or absence). The results were as follows: in the two conditions where visual feedback was

available, the performance was the same in all groups and for both hands, showing a small leftward bias (pseudo-neglect). In contrast, without visual feedback, the performance differed between groups: while right cerebellum damaged patients and control subjects showed a rightward bias (larger when the right hand was used), the opposite pattern was shown by left cerebellum damaged patients, who presented a leftward bias (larger when using the right hand). Results are discussed in terms of the possible role of the left cerebellum in the representation of visuo-motor space.

(2026)

Conceptual Constraints on the Production of Bimanual Responses. MATTHIAS WEIGELT, MARTINA RIEGER, & WOLFGANG PRINZ, *Max Planck Institute For Human Cognitive and Brain Sciences*

—To investigate possible constraints at the perceptual-cognitive level, has recently become a new focus in bimanual coordination research (e.g., Mechsner, 2004). We examined the effects of abstract representations on the production of discrete bimanual responses in 4 Experiments. Participants initiated their responses either out of the same or different starting positions to either the same or different target locations. To signal the responses for the left and right hand, we used symbols that were either from the same category (i.e. letters) or out of different categories (i.e. letters and numbers) for the two hands. Results showed strong coupling between the two hands when the symbols belonged to the same category, but distinct uncoupling of the effectors for different categories. We propose that bimanual coupling depends on abstract representations, where conceptualizing two actions within the same framework will lead to a strong coupling of the two hands.

(2027)

Entrainment to Isochronous and Non-Isochronous Meters: A Comparison between Tapping by Musicians and Non-Musicians. RICCARDO BRUNETTI, *University of Rome "la Sapienza"* & *ECONA – Interuniversity Centre for Research in Cognitive Processes in Natural and Artificial Systems*, ENRICO CUPELLINI, *University of Rome "la Sapienza"*, & MARTA OLIVETTI BELARDINELLI, *University of Rome "la Sapienza"* & *ECONA*

—Accent perception and entrainment in music were investigated. 88 Ss (experts and naïve) were invited to tap freely along with two kinds of musical stimuli. Both kinds of stimuli where excerpts of performances on the Jew's Harp based on isochronous and non-isochronous meters: the excerpts were processed in order to independently eliminate or randomize the variations of different musical parameters (timbre, loudness, expressive timing, pitch, and different combinations of these). Results show that the effect of musical training is present only in relation to familiar metrical structures: when facing an unknown meter, the musicians are no more accurate than non-musicians. The analyses show also that all the manipulated parameters can be similarly used to extract the temporal structure of a piece. This can be considered a proof towards a model of the perceptual system where structure detection in rhythmical sequences can be performed using alternatively a wide range of parameters.

(2028)

Effects of TMS on Interhemispheric Transmission Time (ITT) in Right and Left-Handed People. DEMIS BASSO, *University of Rome "la Sapienza"*, LILACH AKIVA KABIRI, ILARIA BASCHENIS, ELISA BOGGIANI, TOMASO VECCHI, *University of Pavia*, & PATRIZIA S. BISACCHI, *University of Padua*

—In right-handed people, ITT is dependent upon the direction of

the signal through the corpus callosum. The present study was aimed to investigate the performance of left-handed people, and whether ITT can be modulated by the TMS stimulation applied at a motor stage. Thirty-two subjects were administered a randomized sequence of 8 blocks of simple reaction times. TMS stimulation was delivered with a 8-figure coil, at 80% of the motor threshold, over the motor areas of the 2 index fingers. The experimental design showed 4 factors within subjects: (hand of response, side of presentation, hemisphere stimulated, presence of TMS stimulation) and a factor between (handedness), 2 levels each. Results showed that the pattern of the ITT was specular in left- and right-handed people, depending on the degree of hand-specialization. Furthermore, we reported a facilitation when TMS was delivered on the right but not on the left hemisphere, both on right- and left-handed people.

(2029)

Repetitive Transcranial Magnetic Stimulation on Virtual 3D Navigation: Gender Differences in the Parietal and Frontal Involvement. DEMIS BASSO, CHIARA SARACINI, *University of Rome "la Sapienza"*, MARTIN LOTZE, *University of Tübingen*, MARTA OLIVETTI BELARDINELLI, *University of Rome "la Sapienza"*, & NIELS BIRBAUMER, *University of Tübingen*

—Navigation through mazes involves, beyond the hippocampus, also the parietal and frontal cortices. Gender differences in cortical contribution are not clearly defined. Twenty-four subjects (matched for sex) were asked to navigate in 18 virtual-3D regular mazes, and to collect 7 subgoals (located in a 7x5 roads grid) in the shortest time and trajectory. Repetitive Transcranial Magnetic Stimulation (rTMS, 1Hz) was delivered alternatively over 4 locations (F3, F4, P3, P4), in 4 randomized sessions on different days. Time and distance to complete the task, and the sequence of movements made (determining the trajectory and, thus, the strategy) were collected. rTMS over the frontal lobe showed only in men a strong reduction in changes of strategies ($\chi^2(2)=12.43$; $p<0.05$), while a lower reduction was found in both sexes while stimulating the parietal cortices ($\chi^2(2)=6.78$; $p<0.05$). A different cortical distribution of the processes involved in navigation, due to gender, might be inferred.

DECISION MAKING I

(2030)

EEG Activity of Associative Cortices in Low-Level Decision Making about Visuo-Spatial Patterns. DEMIS BASSO, GIULIANA LUCCI, MASSIMILIANO REA, MARTA OLIVETTI BELARDINELLI, & ADRIANO GENTILOMO, *University of Rome "la Sapienza"*

—Decision making has been defined as the voluntary selection, among competing possibilities, of a solution that could achieve a goal. This study was aimed to verify whether there are different patterns of neural activity, depending on the choice made among particular spatial configurations. Ten subjects performed 168 epochs, in which they had to: 1) mentally determine the best path when navigating between 2 green circles on a computer monitor, and 2) execute the path by moving an human silhouette with the arrow-keys. The green circles could be located in 3 different visuo-spatial patterns, depending on how easily the path could be perceptively identified. Electrodes were applied over F3, F4, CZ, P3, P4. Results showed the following task-specific electrophysiological patterns: an N270-P350 complex more delayed over parietal cortex ascribed to visuo-spatial analysis, a N470 related to the planning process; a N680 only for more difficult configurations, associated to the determination of the most suitable strategy.

(2031)

Falsification and Alternative Hypotheses in Wason's 2-4-6 Task. MICHELLE COWLEY, & RUTH M.J. BYRNE, *Trinity College Dublin*

—Falsification is pivotal to scientific thinking. Yet experimental evidence has shown people find falsification unhelpful (Poletiek, 1996). We outline two experiments showing falsification is helpful when an explicit alternative hypothesis is considered. We used the 2-4-6 task where participants discover a rule that the number triple 2-4-6 conforms to ('ascending numbers'). Participants test their hypotheses by generating their own falsifying triples. In our 2-4-6 task participants tested an incorrect hypothesis belonging to an imaginary participant called Peter ('even numbers ascending in twos'). Experiment 1 found the incorrect hypothesis was falsified when participants considered the correct alternative (any ascending numbers). And participants falsified more when the alternative was correct than when it was incorrect. Experiment 2 showed participants discovered the correct rule more often when it was considered as an explicit alternative hypothesis (any ascending numbers) than a non-explicit alternative hypothesis (something else), or when there was no alternative considered.

(2032)

Representational Effects in a Causal Judgment Task. TERESA PAYTON, & FREDERIC VALLEE-TOURANGEAU, *Kingston University*

—Representational effects in a fictitious virus-disease causal induction task were examined in two studies. In both, six different judgment conditions were created by crossing two levels of virus-disease covariation (0, .5) with three levels of disease base rate (.25, .5, .75). In Study 1, the information was presented as four statements summarising the frequencies of the four patient types, namely patients with or without the virus who either have or do not have the disease. Judgments were determined by the disease base rate, betraying no covariation discrimination. In Study 2, the information was presented in a non-propositional format; patients were represented by schematic faces in a 2x2 grid, the presence/absence of virus was denoted by colour coding and the presence/absence of the disease by a frowning/smiling face. Causal judgments reflected a significantly more robust covariation discrimination. These results signal the presence of important representational effects in causal induction tasks.

(2033)

Causality Within the Fast and Frugal Heuristics Approach. ROCIO GARCIA-RETAMERO, *Max Planck Institute For Human Development, Berlin*, & ULRICH HOFFRAGE, *Université de Lausanne*

—Fast and frugal heuristics are simple but nevertheless fairly accurate decision rules people use in situations in which they have limited time, knowledge, and computational power (Gigerenzer, Todd, & ABC Research Group, 1999). This research program has, however, been criticized for not detailing how we select and structure the information such heuristics depend on to be effective. When making decisions we rely on cues in the environment to inform us, but it is impossible to keep track of all the possible cues and how they relate to any relevant criterion. This problem becomes even more critical if compound cues are considered. I submit that knowledge about the causal structure of the environment help decision makers to focus on a manageable subset of cues and to estimate their validities, thus effectively reducing the potential computational complexity inherent in even relatively simple decision-making tasks. This is the hypothesis has been tested in two series of decision-making experiments. Results support the hypothesis that causal knowledge acts as a meta-cue for identifying highly valid cues, either individual or compound, and helps in the estimation of their validities.

(2034)

Age-Related Cognitive Decline and the Use of Decision Making Strategies. RUI MATA, *Max Planck Institute For Human Development*

—The adaptive toolbox approach to human rationality analyzes environments and proposes detailed cognitive mechanisms that exploit the structures identified (Gigerenzer, Todd, & The ABC Research Group, 1999). In the presentation I will argue that the posited mechanisms are suitable for implementation in a connectionist framework. Furthermore, I propose that implementing decision mechanisms as neural networks allows (1) integrating behavioral, biological, and information processing levels, and (2) addressing developmental issues in decision making. These claims are supported by reporting implementations of decision strategies using simple recurrent networks and showing how age differences related to attenuation in cholinergic modulation can be modeled by lowering the G parameter in these networks. This approach is shown to be productive by deriving empirically testable predictions of age differences in mean performance as well as complexity costs in decision making tasks.

(2035)

Training Conditional and Cumulative Risk Judgments: The Role of Frequencies, Problem-Structure and "Einstellung". RACHEL MCCLOY, C. PHILIP BEAMAN, BETH MORGAN, & REBECCA SPEED, *University of Reading*

—This presentation describes two experiments which evaluated a training program designed to help participants interpret probability and risk information presented in a normalized single-event probability format. Both conditional probability and cumulative probability judgments benefited from training in using tree-structures to represent the problem and the set-subset relations involved. The effects of this training persisted over time regardless of whether the training required them to translate the single-event probabilities into "natural" (non-normalized) frequencies or remain with a probability format. However, training did not generalize and was specific to the problem-type tested. In fact, our participants were shown to exhibit an 'Einstellung' effect, whereby they use the trained strategy on the untrained problem type, for which it is inappropriate. A training program for coping with single-event probabilities is therefore feasible for specific problem (or risk judgment) types but may create difficulties when alternative risk or probability judgments are encountered.

(2036)

How Do Planners Reason? Inferences and Tasks in Rolling Staff Planning in the Netherlands Railways (NS). DERK JAN KIEWIET, & RENÉ J. JORNA, *University of Groningen*

—A cognitive approach to planning support (software) requires insight into the domain and the reasoning. We used KADS as a knowledge systems methodology to analyze and categorize the problem solving steps of planners. KADS has a cognitive orientation and distinguishes four layers: domain, inference, task and strategy. In our quasi-experimental research we focused on inferences and tasks. We studied the rolling staff planning by the Netherlands Railways (NS). Four straightforward but realistic planning problems with multiple solutions were given to 36 planners of 2 units. Three kinds of data were collected: a) time, b) solution and especially c) inferences. By using knowledge identification (video/audio-recording), knowledge conceptualization and epistemological analysis, frequencies and patterns of inferences were studied. We discerned 13 inferences, such as classifying; identifying, dissolving, sorting, etc. We found that inferences thought to be important were not frequently used. We also revealed patterns of inferences (tasks).

LANGUAGE PRODUCTION/ PERCEPTION II

(2037)

Reading Pseudowords: Base-Word Frequency Effect and Length Effect. FRANCESCA PERESSOTTI, *DPSS & Università degli Studi di Padova*, & CLAUDIO MULATTI, *DiScOF & Università degli Studi di Trento*

—Pseudowords were derived from Italian words by changing one letter. The Italian version of the Dual Route Cascaded model predicts that the time required to read these pseudowords is influenced by a) their letter length and b) the frequency of the words they derived from. In addition, the model predicts an interaction between length and base-word frequency: Pseudowords derived from high frequency words show a reduced effect of letter length compared to pseudowords derived from low frequency words. We performed an experiment in which we manipulated pseudoword letter length and base-word frequency in a naming task. The discussion of the results is situated in the context of the Dual Route Cascaded model framework.

(2038)

The On-Line Comprehension of Transitive and Intransitive Sentences: An Incremental Optimization Approach. MONIQUE J.A. LAMERS, *Radboud University of Nijmegen*

—The information that becomes available incrementally during language comprehension can be very diverse (e.g. morphosyntactic information, semantic/conceptual information). Whereas in languages with a rich case system this morphosyntactic information can be used, in languages with a poor case system, this is not the case. On the basis of experimental data of several experiments in which event related brain potentials (ERPs) were measured, I will show that in poor case languages (i.e. English and Dutch) not only word order, but also animacy is an important source of information for the comprehension of the argument structure. It is used to resolve local subject-object ambiguities, and it influences the expectation of the semantic and syntactic characteristics of the incoming information. I will show that the on-line comprehension of transitive and intransitive sentences can be captured by the incremental evaluation of four violable constraints, namely Case, Precedence, Prominence, and Selection.

(2039)

Accessing Meaning and Retrieving Phonology: Are They Parallel Processes? REMO JOB, FRANCESCA DELOGU, & CLAUDIO MULATTI, *DiScOF & Università degli Studi di Trento*

—To assess whether retrieval of the phonological forms and access to the meaning of visually presented words are parallel rather than serial processes, naming times to low and high frequency words were collected. Two naming conditions were contrasted, free - name all the stimuli - and conditional - name only words belonging to a pre-specified category (Job & Tenconi 2002). If meaning is accessed while phonology is retrieved, the size of the frequency effect should be smaller in the conditional than in the free naming task, since part of the frequency effect would be absorbed into the time required to access meaning. The results are discussed in the context of an interactive-activation framework.

(2040)

Age Differences in the Comprehension of Interrogative Sentences. MARICA DE VINCENZI, BETH FAIRFIELD, & NICOLA MAMMARELLA, *University of Chieti* (presented by Beth Fairfield)

—This poster investigates the comprehension of subject and object wh-questions in young (age 21,63), older adults (age 34,22) and oldest adults (age 69,78). The sentences also manipulate the wh-element (WHO and WHICH-N). We expect to find significative differences between young and older adults in subject and object

extraction of the wh-elements as assumed by the chain between the wh and the grammatical position. Furthermore, if working memory capacity (measured by forward and backward span) influences comprehension of wh-questions, we expect an asymmetry for WHICH object extraction. The results show a strong subject extraction preference. Object extraction worsens with age (.91 vs. .76 vs. .35) and is penalized for subjects with low forward (H: .82 vs. L: .48) and backward (H: .79 vs. L: .44) memory. The results also confirm the role of working memory in older adults (the asymmetry for Who and Which is stronger for lower memory span).

(2041)

Ambiguity Resolution in Relative Clauses: An ERPs Study. ROSALIA DI MATTEO, BERNARDO PERFETTI, ALBERTO DI DOMENICO, BETH FAIRFIELD, MARCO ONOFRI, & MARICA DE VINCENZI, *University of Chieti*

—Sentences containing relative clauses raise a temporary ambiguity, because the pronoun may serve as either the subject or the object of the subordinate verb, and produce a greater difficulty for the reader in the case of object extraction. For the first time an ERPs study investigated the reading of relative clauses in Italian, using 64 couples of sentences containing a center embedded relative clause (NP1 – PRONOUN – SubVERB – NP2 – MainVERB – NP3). The subordinate verb agreed with either the NP1 or the NP2, giving respectively a subject or an object interpretation. Results showed a P600 on the verb (SubVERB) and both a P350 and a P600 on the following word (NP2) of the object clauses. The time course of the reanalysis was traced suggesting a structural revision on the verb, by changing the role of the NP1, and an integration process on the following word, by correctly indexing the NP2.

(2042)

Processing of Word-Level Prosody Is Left Lateralised. JOANNE ARCIULI, *University College London*, & LOUISA SLOWIAK, *Bowdoin College, United States of America*

—It has been suggested that prosodic processing of small linguistic units (as opposed to the processing of larger sentential units and/or the processing of affective prosody) is left lateralised. In a dichotic listening task we presented typically and atypically stressed disyllabic English target words (Arciuli & Cupples, 2004) to one or other ear while a reversed version of each target was presented to the alternate ear. Naming times from 26 right-handers showed a 50 msec typicality effect in the left hemisphere and a 10 msec effect in the right (interaction: $F(1,25) = 5.78, p < .05$). Comparisons showed advantaged processing for typically stressed words in the left hemisphere ($t(25) = 2.68, p < .05$) but no such effect in the right ($t(26) = -.57, p > .10$). These results suggest that the processing of word-level prosody and, in particular, sensitivity to stress typicality, is left lateralised.

(2043)

Why Does the Phonological Similarity Effect Reverse with Nonwords? PAUL JOHAN KARLSEN, *New York University & University of Oslo*, A.G. IMENES, K. JOHANNESSEN, T. ENDESTAD, *University of Oslo*, & A. LIAN, *Bredtvet Resource Centre*

—Phonological similarity is known to have differential effects on item and order memory in serial recall. Proponents of the phonological loop hypothesis hold that the detrimental effect on positional accuracy (PSE) is a signature effect of the phonological store. The store is assumed to provide transient representations of speech-sounds regardless of their lexical status. Yet Lian, Karlsen and Winsvold (2001) found that PSE reversed with nonwords. The current study tests whether a beneficial effect of phonological similarity on item memory causes that reversal. In two experiments

serial recall was compared to serial reconstruction. PSE occurred for words in both tasks and was reversed for nonwords in serial recall, but not in serial reconstruction. Thus, the signature effect of the phonological store occurs with both words and nonwords, but is veiled in serial recall by a positive effect of similarity on item memory.

LANGUAGE PRODUCTION: DYSLEXIA

(2044)

Morphologically-Based Compensatory Reading Strategy in Adult Dyslexics. PASCALE COLÉ, CHRISTEL LEUWERS, *University of Savoie*, & LILIANE SPRENGER-CHAROLLES, *University of Paris V*

—This study examines the reading skills of college students with childhood diagnoses of dyslexia. In a first experiment we assessed the efficiency of both the orthographic and phonological routes involved in visual word recognition and the phonological abilities associated with reading success of adult dyslexics and of control normal readers. As previously reported, we found persistent word recognition difficulties on both routes and a phonological processing deficit. In a second experiment, both groups participated in a morphological priming experiment in which they made lexical decisions on target words morphologically related to word primes (smoke-smoker) or unrelated (hero-smoker). Both groups exhibited a classical facilitatory morphological priming, but significantly larger effect was obtained with the adult dyslexics. This result suggests that the adult dyslexics use a compensatory reading strategy based on frequency sensitive extraction of the morphemes that make up the complex targets.

(2045)

The Relationship Between Visual Attention Deficits and Developmental Dyslexia: A Neuropsychological Investigation. CHRISTOPHER A. GRIEVE, & LYNNE G. DUNCAN, *University of Dundee*

—The present work investigates the processing of sublexical orthographic units by developmental dyslexics and reading-age controls. In particular, this work examines whether there is any evidence that a visual attention impairment is responsible for the poor reading of orthographically complex words by developmental dyslexics. Children from upper stages of primary school and initial stages of secondary school will be studied. The experimental work to be described investigates whether disrupting the cohesion of orthographic units within words through the use of colour also disrupts the reading of these words. Similarities and differences between the performances of the two reading groups will be discussed. The results of this work will then be related to their performance on standardised tests of visual attention, phonology, and visual memory. Finally, the results will be evaluated in light of recent findings showing an attentional impairment in children with developmental surface dyslexia.

(2046)

The Hierarchy of Phonetic Features Categories in Printed Syllables Matching: Normal Reading and Developmental Dyslexia. SONIA KRIFI, NATHALIE BEDOIN, *University Lyon 2*, & VANIA HERBILLON, *Debrousse Hospital*

—Skilled readers are sensitive to phonetic features shared by consonants within one printed stimulus and between successive stimuli (Bedoin, 2003; Krifi, Bedoin & Mériot, 2003). We investigated the relative weight implicitly granted to voicing, manner and place of articulation to guide responses in a syllable matching task. Subjects presented with a printed target-syllable CV had to select one of two proposed CV syllables, according to intuitively estimated acoustic similarity. Manner and place similarity were pitted against in Experiment 1, manner and voicing

in Experiment 2, place and voicing in Experiment 3. Adult skilled readers' responses were mainly guided by manner similarity, especially for voiced consonants, suggesting a modulator role of voicing upon this effect. Place similarity also guided matches, particularly for back consonants. We depicted the development of these rules in normal reading children. Dyslexic children without phonological impairment did not use phonetic rules for syllables matching, whereas dyslexic children with phonological deficits followed radically opposed phonetic rules.

(2047)

Distinct Cognitive Impairments for Hierarchical Letters and Hierarchical Objects Processing in Phonological and Surface Developmental Dyslexia. NATHALIE BEDOIN, *Université Lumière Lyon 2*, HAGGAR LEVY-SEBBAG, *Orthophoniste, Hôpital La Tronche de Grenoble, Centre de Référence des Troubles du Langage*, & LUC KÉÏTA, *Université Lumière Lyon 2*

—On the basis of previous results from various experiments (Kéïta, Bedoin, Mériot, & Herbillon, this Congress), we elaborated a unique test assessing two kinds of cognitive impairments (atypical hemispheric asymmetry for letter processing; visual attention disorders), which are central for respectively dyslexic children with and without phonological deficits. Object-based and letter-based hierarchical stimuli were presented in divided visual fields: subjects detected targets when focused either at the global or the local level. Progressive improvement of letter processing (not object processing) from 7- to 11-year-old normal readers was observed, but not in dyslexic children (N = 20). Only dyslexic children with phonological deficits presented atypical left-hemisphere dominance for objects, and an inversion of classical interference asymmetry was observed in dyslexic children without phonological impairment (they were strongly disturbed by local interference but not by global interference). This task is proposed for clinical assessment of cognitive disorders in different forms of dyslexia.

(2048)

Learning to Read in Deaf Children: Evidence for Contrasting Profiles in a Longitudinal Study. STÉPHANIE COLIN, ANNIE MAGNAN, *Université Lumière Lyon 2*, JACQUELINE LEYBAERT, *Université Libre de Bruxelles*, & JEAN ECALLE, *Université Lumière Lyon 2*

—Deaf children typically exhibit literacy difficulties. From a remediation point of view, we carried out a longitudinal follow-up (from kindergarten to the second grade) of deaf children educated early or later with Cued Speech ('CS', manual system delivering phonetically augmented speechreading through visual modality) and hearing children of the same age. Our aim was to determine 1/ which deaf children show a deviating score compared to the average score of the hearing children in the various phonological and literacy tests administrated; 2/ which factors distinguish them from the other deaf children. The results observed through a procedure to assess deviance (Ramus et al., 2003) showed that the most of deviating score are obtained by late CS-users. The nature of the phonological input to which the deaf children were exposed since the birth would constitute a critical factor for the development of the early phonological skills and the learning of reading.

(2049)

Haptics in Learning to Read with Children Coming from Low Socio-Economic Status Families. FLORENCE BARA, *University of Savoie*, EDOUARD GENTAZ, *University of Pierre Mendès France*, & PASCALE COLÉ, *University of Savoie*

—This study assessed the effects of a multisensory training on the understanding of the alphabetic principle in kindergarten children coming from low socio-economic status families. Two

interventions were compared, namely HVAM (visual and haptic exploration of letters) and VAM (visual exploration). Results showed that performances in both the tasks of letter recognition and phonemic awareness were higher after HVAM training than after VAM training in kindergarten. Moreover, the improvement in pseudo-word decoding was higher after HVAM, but only significant in first grade. This delayed effect was explained by the poor performances on the language skills necessary to reading acquisition. The visuo-haptic exploration permits first to increase the performances on letter knowledge and phonemic awareness and then allowing better decoding skills.

(2050)

Different Functional Deficits in Pure Alexia. CRISTINA ROSAZZA, *International School for Advanced Studies (SISSA-ISAS), Trieste*, I. APPOLLONIO, V. ISELLA, *University Milano Bicocca, Monza*, & T. SHALLICE, *SISSA-ISAS, Trieste & Institute of Cognitive Neuroscience, London*

—The aim of this study is to investigate whether pure alexia can be caused by different functional deficits. To answer this question, we studied two cases of pure alexia, FC and LDS. The two patients were presented with tasks that can be divided in 2 groups: a) of single letter processing; b) of spatial integration. Results showed different performance for the two patients. FC was able to process letters very rapidly and accurately, whereas LDS was slower and more impaired. By contrast, FC was unable to integrate spatially over letters, while LDS could conjoin groups of letters to read. Data suggest that FC and LDS have two different forms of pure alexia: FC has a higher-level deficit in integrating information across letters, whereas LDS has a lower-level deficit in letter processing. In conclusion, the results present difficulties for models of pure alexia which assume all patients to have a low-level processing deficit.

FACE AND EMOTION RECOGNITION

(2051)

Facial EMG to Faces, Voices and Bodies. MAURICE J.C.M. MAGNEE, *University Medical Center Utrecht & University of Tilburg*, JEROEN J. STEKELENBURG, *University of Tilburg*, HERMAN VAN ENGELAND, CHANTAL KEMNER, *University Medical Centre Utrecht*, & BEATRICE L.M.F. DE GELDER, *University of Tilburg*

—Objective: To show that emotion specific muscle activity obtains not only for viewing facial expressions but also for listening to emotional voices and emotional body postures. Method study I: 12 healthy, male participants (age 23.0; all college students). Stimuli: audio-visual stimulus pairs with a congruent or incongruent affective content. Visual stimuli consisted of happy and fearful faces; auditory stimuli of spoken sentences. Method study II: 13 healthy participants, 9 females and 4 males (age 20.9; all college students). Stimuli: happy and fearful whole bodies and happy and fearful faces. Facial EMG was recorded over corrugator supercilii and zygomaticus major. Results study I: Congruent fearful face-voice interactions evoked increased corrugator activity, whereas happy face-voice interactions significantly increased zygomatic activity, when compared with incongruent face-voice trials. Results study II: Viewing of fearful body postures and fearful faces significantly increased corrugator activity, and viewing of happy body postures and happy faces increased zygomatic muscle activity. Conclusions: The resemblance in emotion-specific activity of the facial muscles regardless of the type of stimulation may constitute a facial motor program mechanism, activated in correspondance to the appropriate affect program.

(2052)

The Perception of Emotion: Electrophysiological Evidence for Rapid Integration of Facial and Bodily Expression. HANNEKE K.M. MEEREN, CORNÉ C.R.J. VAN HEIJNSBERGEN, & BEATRICE L.M.F. DE GELDER, *Tilburg University*

—In our natural world a face is usually encountered as an integrated part of a whole body. Both face and body convey signals that reveal the emotional state of an individual; their correct interpretation is important for the survival and successful adaptation of the observer. We investigated how the emotion expressed by the body influences the perception of facial expression. Photographs of fearful and angry faces and bodies were used to create realistic face-body composite images, with either matched or mismatched emotional expressions. When face and body convey conflicting information, judgement of facial expression was hampered and became biased toward the emotion expressed by the body. Electroencephalographic recordings showed that this face-body emotion conflict is tracked by the brain as early as 110 ms, as reflected in an enhanced occipital P1 and frontal N1-component. This points to a neural mechanisms for ultrarapid evaluation of agreement between facial and bodily expression.

(2053)

Characteristic Motion Signals Facilitate the Recognition of Emotions from Facial Expressions at Long Viewing Distances. NICOLE A. MEINEL, CLAIRE O'MALLEY, TIMOTHY LEDGEWAY, *University of Nottingham*, & STEPHANIE WALKER, *Nottingham Trent University*

—Most studies on emotional facial expression recognition have discounted the importance of facial motion in facilitating recognition. This is because expressions are often readily identifiable from static displays. However, facial motion may provide a particularly important source of information for expression recognition when viewing conditions are sub-optimal or degraded. To test this, the present study examined the effect of motion on expression recognition as viewing distance increased. Participants viewed faces expressing 6 emotions in 2 modes (static, dynamic) at 3 distances (1m, 3m, 6m). Results showed that motion facilitated recognition of two emotional expressions at the closest distance, but facilitated recognition of five emotional expressions at the furthest distance. This shows that motion can facilitate expression recognition, particularly when viewing conditions are degraded. Subsequent experiments investigate the exact mechanism through which motion facilitates expression recognition. Current findings suggest characteristic motion signals (e.g., speed of movement) are important for distinguishing expressions.

(2054)

The Posner's Types of Codes and Recognition of Facial Expressions of Emotions. HANNA K. BEDNAREK, *Warsaw School of Social Psychology & University of Lodz*

—The purpose of the research was to explore the connection between Posner's codes and the efficiency of recognition of facial expressions of emotions. In the context of Posner's research paradigm (1969), it was assumed that depending on the applied coherence criteria: visual, name and semantic differences would occur in the efficiency of recognition of facial emotions. 80 people participated in the research. In accordance with the results obtained by Posner, it occurred that participants more accurately recognize the expression of facial emotions using the visual criterion rather than name or semantic coherence. Furthermore, the results indicate that short/long and sequentially/simultaneously conditions influence the accuracy of recognition of facial emotions. In the

short condition (500 ms), participants more accurately distinguished various facial expressions of emotions using the visual code rather than the name or semantic code.

(2055)

The “Face in the Crowd” Paradigm: A Study on the Facial Expressions among Youngsters with Low/ High Anxiety. SÉRGIO M. PARENTE, & PEDRO B. ALBUQUERQUE, *Universidade do Minho*

—Having as support the paradigm “Face in the Crowd” (Hansen & Hansen, 1988; Ömhan, Lundqvist, & Esteves, 2001) the present study tried to analyse if there were any differences in the selective attention to the threatening faces using true or false anxiety feedback among young adults with low and high anxiety in the State-Trait Anxiety Inventory (Spielberg, 1983). The procedure involved true feedback for both conditions and false feedback. In this last condition, we told the participants with high anxiety that they had low anxiety and the participants with low anxiety that they had high anxiety. General results showed that participants had faster RT to threatening faces when contrasted with a neutral and emotional background. In a true feedback condition, participants showed faster RT for emotional faces than in a false feedback condition.

(2056)

Arousal and Valence Effect in Face Emotion Decoding. A Frequency Band Analysis. MICHELA BALCONI, *Catholic University of Milan*

—The aim of our study was to analyse EEG frequency bands in the emotional decoding process. Event-related synchronization (ERS) in response to neutral and emotional faces were measured in theta and alpha frequency bands in 20 subjects. The effects of the decoding process was evaluated between 200 and 300 ms post-stimulus in relation to the N230 ERP component (Halgren and Marinkovic, 1995). Theta ERS revealed a significant effect by hemisphere interaction for anterior sites indicating a relatively greater right hemisphere ERS for negative and a left hemisphere ERS for positive stimuli in comparison to neutral stimuli. In the alpha band, only emotional stimuli induced ERS increase in posterior sites (O1, O2, Oz). The results obtained along with the earlier observations on EEG correlates (Balconi and Lucchiari 2004) of affective processing shows that emotional decoding from face elicits specific EEG activity, particularly in theta and alpha frequency bands.

(2057)

The Accuracy of Perceptual Memory for Personally Known Faces. CHRISTEL DEVUE, & SERGE BRÉDART, *University of Liège*

—Recently, Ge et al. (2003) reported a very high accuracy of memory for a highly familiar face. Their Chinese participants had to identify the most veridical appearance of Mao’s face among unaltered and transformed (inter-ocular distance was gradually increased or decreased) versions of his portrait. In the present experiment, the same facial transformations were applied to our participants’ faces to evaluate whether this hyperfidelity for familiar faces is specific to famous individuals whose face is mainly known from a standard portrait or if it could generalise to personally known faces (the own face and a close person’s face). Results showed that performance was not different for the two familiar faces in the recognition task, or between the recognition task and a perceptual discrimination task. The high accuracy of memory previously shown for a very famous face generalises to personally known individuals for whom we have a various visual experience.

(2058)

Exploring the Recognition of Faces and Houses and Their Parts in Complete Patterns or as Isolated Fragments. LINE SÆTHER, & BRUNO LAENG, *University of Tromsø*

—Tanaka & Farah (1993) showed that inversion affects faces and houses differentially and the recognition of isolated facial parts is very inaccurate compared to isolated parts of houses. The present study included the above conditions, with the original drawings and photographic stimuli. In a novel condition, a previously seen part was re-presented within a new but complete pattern. In some conditions the stimuli were shown inverted. We observed no differences in accuracy between upright and inverted houses but inverting faces decreased accuracy. However, face parts were recognized equally well as the whole faces when re-presented within a new but complete face. The RTs indicated an advantage for complete faces over complete houses but this advantage was reversed with isolated parts. Inversion had no significant effects on RTs. We conclude that face parts can be encoded and recognized when these are not re-presented as isolated fragments but within a complete pattern.

(2059)

Valence and Arousal Effect on Emotional Face Processing. A Frequency Band Analysis. MICHELA BALCONI, *Catholic University of Milan*

—The aim of our study was to analyse EEG frequency bands in the emotional decoding process. Event-related synchronization (ERS) in response to neutral and emotional faces were measured in theta and alpha frequency bands in 20 subjects. The effects of the decoding process was evaluated between 200 and 300 ms post-stimulus in relation to the N230 ERP component (Halgren and Marinkovic, 1995). Theta ERS revealed a significant effect by hemisphere interaction for anterior sites indicating a relatively greater right hemisphere ERS for negative and a left hemisphere ERS for positive stimuli in comparison to neutral stimuli. In the alpha band, only emotional stimuli induced ERS increase in posterior sites (O1, O2, Oz). The results obtained along with the earlier observations on EEG correlates (Balconi and Lucchiari 2004) of affective processing shows that emotional decoding from face elicits specific EEG activity, particularly in theta and alpha frequency bands.

WORKING MEMORY

(2060)

Working Memory Structure: Baddeley’s Multiple-System Model vs Cowan’s Single-System Model. JAROSLAW ORZECZOWSKI, *Jagiellonian University, Cracow*, & ROBERT BALAS, *Warsaw School of Social Psychology*

—The aim of presented study was to determine which of the two alternative models of working memory (Baddeley’s multiple-system model vs Cowan’s single-system model) explains performance in various types of memory search task better. We have investigated the issue of working memory structure and the possible role of activation mechanism in searching working memory contents. The experiment applied memory search task in which after memorizing a sequence of elements participants had to judge whether the target element was, or was not, present in the sequence. Participants had to memorize stimuli in either one (verbal or visual) or multiple (verbal and visual) modality. The results suggest single-system coding of stimuli, i.e. an unitary structure of working memory system corresponding to Cowan’s theory.

(2061)

Working Memory Capacity: Evidence for a Domain-General View. JOSE L. PARDO-VAZQUEZ, & JOSE FERNANDEZ-REY, *University of Santiago de Compostela*

—Working Memory Capacity (WMC) is limited by the cognitive resources that are available for processing and storing information (Baddeley, 1986). Some authors, such as Engle & Kane (2004), have proposed that these resources are quite domain-general and are involved in every cognitive activity which requires simultaneous processing and storage, whatever its nature. Other authors, such as Shah & Miyake (1996), place greater emphasis on domain specificity, and have proposed two different WM capacities: verbal WMC (V-WMC) and spatial WMC (S-WMC). In this study involving 128 volunteers we analysed the role of V-WMC in a spatial cognitive task (mental image rotation). We found that: a) the correlation between V-WMC and mental rotation is only slightly lower than correlations found, in previous works, between V-WMC and verbal activities as reading comprehension; and b) low span participants (first quartile scores in V-WMC task) obtain lower scores in the mental rotation task than high span participants (fourth quartile). These results support a domain-general view of WM capacity.

(2062)

A Test of Two WMC Models with High and Low Raven Score Groups Comparison. ADAM CHUDERSKI, *Jagiellonian University, Cracow*

—Low and high Raven PM score groups were compared to test two models of WM focus of attention capacity. Cowan (2001) postulates WMC of ~4 items, while McErlee postulates ~1 item. With an assumption that WMC of high score subjects exceeds 4 items, Cowan's model predicts that WM task accuracy of both groups will differ more when memory set size is above 4, because low score subjects can no longer activate additional items in the focus of attention. McErlee's model predicts groups accuracy will differ less with bigger set size, as no subject can activate additional items with attention. A combination of running memory and inclusive n-back tasks was used to test both models. In each of two experiments an interaction of group and n was found: groups differed more in 2-back than in 3, 4, and 5-back conditions. The results support McErlee's WMC estimate.

(2063)

Working Memory Capacity: Spanish Automated Adaptation of Operation Span Task. JOSE FERNANDEZ-REY, & JOSE L. PARDO-VAZQUEZ, *University of Santiago de Compostela*

—The Operation Span Task (OSPAN; Turner & Engle, 1989) is one of the most popular tests for measuring working memory capacity. This paper presents an automated Spanish adaptation of this task, VETAO. Unlike the original version, VETAO does not require the active intervention of the experimenter, and can be administered to groups. Its reliability and validity were investigated in two experiments: In the first it was administered individually to 60 volunteers, and in the second to 134 volunteers in groups of 18-19 each. In the first experiment its Cronbach's α value was .73 and its Pearson correlation with a reading comprehension task was .31. In the second experiment its Cronbach's α value was .69 and its Pearson correlation with another reading comprehension task was .27. Since these values are similar to those reported for other versions of OSPAN, VETAO may be considered as a reliable and valid adaptation of this test.

(2064)

Which Factors Influence Number Updating in Working Memory? The Effects of Similarity and Suppression. BARBARA CARRETTI, CESARE CORNOLDI, *University of Padova*, & SANTIAGO L. PELEGRINA, *University of Jaen*

—Updating information in working memory appears critical in a series of cognitive activities. The study explores the role of two mechanisms implicated in the updating processes using two-digit numbers: item comparison and item substitution. Item comparison mechanism was analysed manipulating the similarity (size distance) between items. Item substitution mechanism was investigated increasing/decreasing the number of updates within trials. Furthermore, since updating processes is heavily influenced by participant's strategies, the role of strategy use was controlled by varying the rate of items presentation. Over three experiments, the results obtained highlighted that updating performance is mainly influenced by suppression request, even when the presentation rate is self-paced. However errors depend on the similarity between items.

(2065)

Visual Working Memory and Visual Perception Processes. MARIAN VAN DER MEULEN, ROBERT H. LOGIE, & SERGIO DELLA SALA, *University of Edinburgh*

—It is widely assumed that processes of visual perception (that involve activation of long term memory) largely overlap with processes of visual working memory. In this view, WM comprises essentially material that is currently activated from LTM. An alternative view points to WM as a 'mental workspace' that is independent and functionally separate from perception and LTM processes. This last model was tested using dual task experiments, in which the interference effect was studied between a WM retention task and a concurrent object recognition task. If indeed perceptual mechanisms are functionally distinct from WM, no mutual interference between the tasks should be observed. In contrast, if WM simply comprised activated material from LTM, an interference effect would be expected, as both experiments require the activation of LTM material. Results suggest that, albeit significant, the interference effect is only very small, especially given the demanding nature of both tasks.

(2066)

Do We Need the Executive Component of Our Working Memory in All Simple-Arithmetic Strategies? INEKE IMBO, & ANDRÉ VANDIERENDONCK, *Ghent University*

—The essential role of the executive working-memory component in solving simple-arithmetic problems has been shown convincingly. However, more recent studies showed that retrieval is not the only strategy used in simple-arithmetic problems: non-retrieval strategies such as count and transform are also used. Present research studied whether the executive working-memory component is used in all strategies, and whether there are strategies that rely on this working-memory component to a larger extent. RegistrantID The Choice/No-Choice method was used to investigate strategy execution and strategy selection characteristics independently. Although executive resources were needed in both retrieval and non-retrieval strategies, they played a larger role in the latter than in the former. The counting strategy relied most heavily on executive resources whereas the retrieval strategy needed least executive resources. Finally, executive working-memory load was also shown to influence strategy selection in reducing the amount of adaptive strategy choices.

(2067)

Processing Spatial and Temporal Order of Pictures and Words in Short-Term Memory. ZAIRA CATTANEO, *University of Pavia*, ALBERT POSTMA, *University of Utrecht*, & TOMASO VECCHI, *University of Pavia*

—The effects of stimulus modality on short-term memory for spatial and temporal order was tested by requiring to reconstruct alternatively the original spatial configuration, the temporal sequence of presentation or both the aspects of different series of

coloured icons or words. The interrelation between processes encoding the different features was also investigated. Icons exceeded words in all the conditions. Such pictorial advantage was unexpected in the temporal order task given the frequency with which we retain sequences of words in memory. We hypothesise that the picture superiority effect found depended not only on a dual-code strategy adopted with icons but also upon the specific task demands that probably resembled – with icons – highly familiar mechanisms. Finally, spatial and temporal processes seem to be functionally independent and to not behave as additive cues.

(2068)

Phonological Priming of Tip of the Tongues: Effect of Prime Time. VALERIE E. LESK, *SISSA-ISAS, Trieste*, & STEPHEN P. WOMBLE, *Trinity College Dublin*

—A study was performed involving phonological priming and tip-of-the-tongue states (TOTs) where participants took either 200mg of caffeine, or a placebo. Results show a clear positive priming effect produced for the caffeine group when primed with phonologically related words. When primed with unrelated words the caffeine subgroup produced a significant increase in the number of TOTs. This contrasting effect provides evidence that the positive priming of caffeine was not because of caffeine's well-known alertness effects. For placebo, a significant negative effect occurred with the related word priming condition. The results support the novel hypothesis that the blocking of A1 adenosine receptors by caffeine induces an increased short-term plasticity (STP) effect within the phonological retrieval system. To test further the time dependent STP-caffeine hypothesis, here the prime-target interval is lengthened. We show that when the prime-target interval is increased to outside STP time the priming effect is disappears, confirming the short-term nature of the effects.

HIGHER MENTAL PROCESSING AND NUMERICAL JUDGMENT

(2069)

Automatic Number Processing: Memory-Based and Algorithm-Based. TOM VERGUTS, FILIP VAN OPSTAL, & WIM FIAS, *Ghent University*

—The size congruity effect in numerical cognition suggests that a number is automatically compared to a referent, even when not necessary for the task at hand. This supports an algorithm-based view of automaticity. Choplin and Logan (in press) proposed a memory-based alternative theory. They reasoned that presentation of a single number would eliminate size congruity under the algorithmic model. Since size congruity effects were obtained, they argued against an algorithm-based account. In contrast, we show that a single number evokes a “small” or “large” response depending on the range of numbers used in an experimental block. For example, number 5 evokes a “large” response when numbers are from the range 1-5, but a “small” response when numbers are in the range 5-9, showing that the number was automatically compared to the mean of the range. This happens even when the number is irrelevant, providing evidence for algorithm-based automatic number processing.

(2070)

Big and Small vs. Before and After: Numerical Judgment Mechanisms. NITZA MARK-ZIGDON, ORLY RUBINSTEN, & AVISHAI HENIK, *Ben-Gurion University of the Negev*

—We investigated whether magnitude judgments and order judgments are subserved by the same or different mechanisms. To this end we studied whether task modulates the distance effect. Participants were presented with a single number between 1 and 99, and were asked to compare it to a single standard (i.e., 55). One

group of participants was asked to decide whether the number was smaller or larger than 55, and the other group, whether the number was before or after 55. There was a distance effect and a congruency effect in both tasks (e.g., 73 produces an incongruent stimulus since this number is larger than 55 but its units digit is smaller than the units digit of 55). However, task also modulated performance. Order judgments were faster than magnitude judgments and it seems that the congruency effect was larger for magnitude judgment than for order judgment.

(2071)

Physical and Symbolic Distances in the Representational Space: Evidence from Scanning Visual Images. GELSOMINA PERRONE, MARIA DOLORES DE HEVIA, EMANUELA BRICCOLO, & LUISA GIRELLI, *University of Milano-Bicocca*

—The intuition that number representation may be spatially-organized has received a growing amount of experimental evidence, which is formally interpreted in favour of the ‘mental number line’ hypothesis (Dehaene, 1992). This study investigates the relationships between numerical and spatial representations by means of images scanning. Following Kosslyn's classic paradigm (1973), we explore whether visual images preserve spatial information by contrasting the time required to scan longer and shorter physical distances across visual images. Further, we manipulate the numerical distance between initial focus point and target to test whether the symbolic distance can modulate scanning time. The results indicate that both physical and symbolic distances affect performance, although they do so in an opposite way: scanning time increases with the former and decreases with the latter. These results suggest that symbolic and physical distances may operate differently at the representational level and that analogies between the two should be cautiously advocated.

(2072)

On the Status of Zero on the Mental Number Line. MICHAL PINHAS, & JOSEPH TZELGOV, *Ben-Gurion University of the Negev*

—Participants performed numerical size comparisons, or physical size comparisons of numbers differing in physical size and numerical value. The stimulus set consisted of four types of positive-positive, negative-negative, zero-positive and zero-negative pairs. One group of participants was presented with a single block containing all types of stimulus pairs (mixed presentation). Another group was presented with two blocks: 1) positive-positive and zero-positive pairs, and 2) negative-negative and zero-negative pairs. Numerical comparisons resulted in mixing cost and distance effects for all pair types. A size congruity effect was found for all pair types in physical comparisons, and was inverted for pairs that included negative numbers. A distance effect was found for pairs containing zero in the mixed presentation, implying that zero is sensitive to the mode of presentation. Furthermore, the result obtained for mixed presentation implies that zero may serve as the smallest number on the number mental line of natural numbers.

(2073)

The Presentation of Numbers in a Division Format Leads to Activation Spreading in a Multiplication-Like Network. JOLIEN DE BRAUWER, & WIM FIAS, *Ghent University*

—This study explored the possibility of obtaining an automatic activation of multiplicatively related numbers when presented with numbers in a division-like format. We made use of the matching task (Lefèvre, Bisanz & Mrkonjic, 1988): participants have to decide whether a presented target number has or has not been presented before as a cue number. Target numbers could be (a) the division of both numbers in the cue (e.g. cue “21 7” and target “3”);

(b) a number that belongs to the multiplication network and is close to the multiplication that has been activated (if one supposes a single network for both division and multiplication) (e.g. cue "21 7" and target "35") or (c) a number that belongs to the multiplication network and is far from the supposedly activated multiplication (e.g. cue "21 7" and target "9"). The results reflect these multiplicative relationships and will be discussed in terms of activation spreading in a multiplication network.

(2074)

Evaluating the Neuropsychological Consequences of Cardiopulmonary Bypass. FIONNULA FLANNERY, SAM HUTTON, *University of Sussex*, UDAY TRIVEDI, *Brighton and Sussex University Hospitals NHS Trust*, & JENNIFER RUSTED, *University of Sussex*

—Cardiothoracic surgery involving cardiopulmonary bypass has been found to cause post-operative neuropsychological deterioration in a significant proportion of patients. Previous work in the area has tended to focus on the incidence of patients declining, albeit without any agreed definition of a clinically meaningful deficit and usually without reference to a comparison group. The argument of the present study is that these methodological limitations have led to a general overestimation of the impact of surgery on cognition. A battery of neuropsychological tests is being administered to 120 patients pre-operatively, then again post-operatively at 2 and 6 months. A comparison group of 30 age-matched volunteers is being tested at similar intervals. Results for the pre-operative and early post-operative measures have revealed no significant between-group differences and the 6 month data is showing the same trend. These findings have implications for best practice in the design and analysis of future studies.

LONG TERM MEMORY: FALSE RECALL/ INDUCED FORGETTING/ CONSISTENCY TRAUMATIC MEMORY

(2075)

Retrieval-Induced Forgetting in Eyewitness Memory. MALEN MIGUELES, & ELVIRA GARCÍA-BAJOS, *University of the Basque Country*

—Memory research has shown that the act of remembering itself appears sufficient to inhibit the retrieval of related items in memory. If repeated testing can modify our memory, enhancing the recall of certain details while inducing the forgetting of other details, its implication in real situations, as eyewitness memory, is evident. Few studies have explored retrieval-induced forgetting in eyewitness memory (see MacLeod, 2002; Shaw, Bjork & Handal, 1995). Witnesses to a crime are repeatedly questioned about the event, but their recall often constitute an incomplete retrieval task as the questions tend to be limited to specific aspect of the event. To determine what conditions and contents are prone to generate retrieval induced forgetting under eyewitness situations we selected a sequence of a bank robbery. The level of retrieval-induced forgetting for actions, people, and details involved in the event were examined. The implications for eyewitness memory are discussed.

(2076)

Integration, Interference and Retrieval Inhibition. SANTIAGO PELEGRINA LOPEZ, M. TERESA LECHUGA GARCIA, CARLOS J. GOMEZ-ARIZA, ANTONIO SUÁREZ CARRASCO, *University of Jaen*, & TERESA BAJO, *University of Granada*

—Several studies have shown that retrieval-induced forgetting (RIF) can be obtained with different types of materials. Moreover, some of them suggest that integration of related information is a boundary condition for this effect. Integration processes reduce or

eliminate the interference coming from competitor items and, consequently, they also reduce the need for inhibition. Recently, Gómez-Ariza et al (in press) found significant RIF effects with both thematically related and unrelated sentences. However, no integration effects were observed in the thematic condition despite the fact that many previous studies have shown integration with this type of materials. In several experiments, we further explore the role of encoding conditions to produce integration and to reduce the RIF effect. Our data parallel those found in other studies showing integration may depend on the type of presentation (random vs. organised) and on the instructions provided to the participants. These results may shed some light on the relation between integration and interference processes.

(2077)

The Impact of Perceptual Change of Items on the Electrophysiological Indices (ERPs) of Directed Forgetting Effect. JULIO MENOR, M^a DOLORES PAZ-CABALLERO, & JUAN MANUEL JIMENEZ, *University of Oviedo*

—The behavioral and electrophysiological (ERPs) correlates of changing perceptual features (color) of items between study phase and recognition test by using directed forgetting procedure (item method) were analysed. In the same color condition, lower accuracy and larger RTs were obtained for items to be forgotten (TBF) compared to items to be remembered (TBR). Furthermore, TBF items provoked more positivity than TBR and new items on 200-300 msec period (early effect) and 500-700 msec period at left frontal electrode sites (late effect). The change of color of the items attenuated directed forgetting effect on RTs measures and removed the early effect. Thus, two ERPs correlates of directed forgetting effect were observed. The early effect seems to reflect the perceptual discrepancy between that learned in the study phase (forget items followed to F-cue) and the answer required in the recognition test. The left-frontal effect seems to reflect evaluation and verification processes specifically engaged during an attempt to retrieve TBF-items.

(2078)

A Probabilistic Model for Separating Cognitive Processes in the Remember-Know-Paradigm. CHRISTINE SATTLER, & THORSTEN MEISER, *University of Jena*

—The remember-know-paradigm investigates the subjective experience when retrieving from memory: Each item called old must be categorised as recollected from the encoding situation vs. simply familiar. Analysis typically focuses on target items. Thus, possible differences between experimental conditions regarding recognition performance and response bias in the old-new-decision are ignored, which may lead to wrong conclusions concerning retrieval experience. This study uses measures of retrieval experience specified as conditional probabilities given actual recognition versus guessed "old"-responses. Recognition performance and response bias are analysed as well. Experiment 1 varied the proportion of targets in the test. As hypothesised, this selectively influenced response bias and not retrieval experience. Two further experiments aimed at manipulating memory performance. Divided attention and phonetic (compared to semantic) processing impaired recognition performance without affecting retrieval experience for actually recognized items. This measurement model renders it possible to investigate more specifically than before which factors influence retrieval experience.

(2079)

DRM in Children: the Advantage of Applying Associative Lists Specific to Children's Age in False Recall. PAULA M. CARNEIRO, *Universidade Lusófona*, PEDRO B. ALBUQUERQUE, *Universidade Do Minho*, ANGEL

FERNANDEZ, *Universidad de Salamanca*, & FRANCISCO ESTEVES, *Universidade Lusófona*

—The present study used the DRM paradigm to investigate the effect of age-specific associative lists on the production of false recall in children. The effect of the length of the lists was also analysed. Sixty-four children (32 aged 3-4, and 32 aged 11-12) were tested with word lists specially built from free-association norms previously obtained for each age group. The main results showed that older children recalled significantly more critical intrusions than younger children, and that the level of false recall was significantly higher in both groups when age-specific lists were used. Additionally, shorter lists (8 items) produced more correct recall than longer lists (12 items), but list length had no effect on false recall. Besides demonstrating robust false recall in children of different ages, the results suggest that, in order to increase false memory levels with the DRM paradigm, lists particularly adapted to the children's age should be used.

(2080)

False Memory and Phenomenological Awareness: Test and Critical Item Repetitions in the Post Event Information. NURHAN ER, GÜL ALPAR, & FATMA UÇAR, *Ankara University*

—This study investigated misinformation effects of the critical item and test repetition conditions under the original or misleading post event information. After the participants viewed criminal event slides exposed to post event information in narrative forms and then received recall test and also completed remember/know decision test. They were also warned about the narratives due to isolate the effects of retrieval blocking. Study was conducted by 2 (critical item type) x 2 (critical item repetition) x 3 (recall and remember/know decision tests repetitions) factorial design that was manipulated within subjects. According to the results, paradoxical repetition effect was found on the false recall. It was also obtained interaction effect of critical item repetition and critical item type on the remember decision scores. These findings implied that eyewitness memory was easily distorted by misleading information and this misleading information effect was also reflecting to the phenomenological awareness of the participants.

(2081)

Emotionally Positive and Negative Real and Imagined Events in Three Reminiscence Bumps. NURHAN ER, *Ankara University*

—Autobiographical retrieval curve from the life span have been demonstrated in many studies using different wide range of procedures. According to literatures, 10-20, 20-30 and 40-50 ages are composed of critical periods that showed reminiscence bumps in this curve. Present study compared the memory characteristics of emotionally positive and negative recollections associated with real life and imagined events in 3 age periods. Study was conducted to successive stages for controlling the retrieval time of recollections. Participants selected from Vividness of Visual Imagery Questionnaire (VVIQ) based on the imaginary vividness scores. After the description of event contents, they were asked to rate the autobiographical memory features of the real life and imagined events. Results showed that some memory characteristics of the events were interacted with the age of recollections for real and imagined positive and emotional events, such as flashbulb memories, impact of the events, and richness of the sensory details.

(2082)

Dissociating Veridicality, Consistency and Confidence in Autobiographical and Event Memories for the Columbia Shuttle Disaster. EMANUELE COLUCCIA, *University of Rome – La Sapienza*, CARMELA BIANCO, & MARIA ANTONELLA BRANDIMONTE, *Università degli Studi Suor Orsola Benincasa*

—Six hundred seventy eight students were tested for their event memories and autobiographical memories of hearing about the Columbia shuttle disaster of February 1st, 2003. Four different groups were tested either 2, 18, 27 or 51 days after the event. All participants were then re-tested after 5 months (second session) and again after one year (third session) from the first interview. Dissociations between consistency and confidence and between event components and autobiographical components were found. Autobiographical memories showed lower consistency but higher confidence than event memories. Rehearsal selectively affected autobiographical memories, while "Delay of Indexing" (i.e., the number of days between the event and the first interview) selectively affected event memories. Veridicality was inversely correlated to consistency. Implications for current models of Flashbulb Memories are discussed.

LONG TERM MEMORY/ SHORT TERM MEMORY IN ADHD AND SCHIZOPHRENIA

(3001)

On the Influence of Recognition and Cued Recall upon a Delayed Free Recall Test Using Educationally Relevant Material. SALOMÉ PINHO, & SIMÕES R. MÁRIO, *University of Coimbra*

—It is well documented in literature from basic memory research that testing that occurs relatively shortly after learning material enhances performance on subsequent tests. But this positive effect is not of the same magnitude for all prior memory tasks. The aim of the current study was to examine how retention of educationally relevant material was affected by the kind of test administered after study. A hundred sixteen Faculty of Psychology (University of Coimbra) undergraduates participated in this investigation. They were presented with a set of twelve statements to study for an upcoming recognition or cued recall task. A delayed free recall task was performed for all participants, seven days later, at a moment's notice. Results were framed in the context of cue relevance, transfer appropriate processing, and more generally considering the relationship between recall and recognition. Limitations and future directions of research were also addressed.

(3002)

Modeling Alphabetic Retrieval and Search. HEDDERIK VAN RIJN, & LIESBETH FLOBBE, *University of Groningen*

—Retrieval of letters from the alphabet can be seen as a prototypical instance of retrieval from overlearned series. Klahr et al. (1983) showed that alphabetic retrieval is best described by a serial search process in which first a chunk containing multiple letters is selected, which is then searched for the target letter. Scharroo et al. (1994) challenged this view by arguing that a Dutch replication did not show any effects of serial search. Instead, they proposed an explanation based on associations that are stronger for initial than later letters. We conducted a new Dutch replication study. Analyses of mixed effect models of these data show a preference for a model that includes a factor related to Klahr's alphabetic chunk notion. However, a computational model of this task showed that both associations and serial search are necessary to account for the human data.

(3003)

Impairment of Inhibitory Processes in Memory in Schizophrenia. MARIA F. SORIANO, PATRICIA ROMAN, *University of Granada*, JUAN F. JIMENEZ, *St. Cecilio Hospital, Spain*, & TERESA BAJO, *University of Granada*

—The locus of the cognitive deficits observed in schizophrenic patients has been the focus of recent research. However, it is not clear yet what cognitive deficits underlie the typical schizophrenic symptoms. In this study 30 schizophrenic patients and 20 matched healthy controls were administered three different tasks. These tasks were designed to tap different inhibitory memory processes. Regression analysis showed that formal thought disorders were significantly related to abnormalities in inhibitory automatic processes in semantic memory, while the presence of hallucinations was related to impairment in inhibitory controlled processes in episodic memory. These results suggest that specific cognitive impairments lead to specific symptoms in schizophrenia, and they provide evidence against the hypothesis that a common deficit underlies most of the schizophrenic symptoms. These findings have important implications for rehabilitation, since they suggest that different programs for cognitive rehabilitation are needed for patients that display different symptoms.

(3004)

Effects of White Noise in ADHD Performance. GÖRAN B.W.

SÖDERLUND, *Stockholm University*, & SVERKER SIKSTRÖM, *Lund University*

—Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder characterized by inattention, impulsivity, and hyperactivity. Dopamine is proposed to play a crucial role in explaining impairments in ADHD. We examine, whether white noise has a positive effect of ADHD symptoms. Children with ADHD and matched controls were exposed to a sub threshold auditory stimulus (signal) together with white noise. A Stroop test was also conducted with and without external white noise. The phenomenon of Stochastic Resonance (SR) is that sub threshold signals can be detected if noise is added to the target signal. SR has yet not been discussed in the context of ADHD and the aim of present experiment is to purpose such link. SR theory suggests that ADHD has a narrower span of optimal noise level compared to controls. Performance in the Stroop test is also predicted to be enhanced for the ADHD-group but not for controls when exposed to external noise.

(3005)

Neuropsychological Assessment of Williams Syndrome: Characterization of Its Unique Cognitive Profile. ADRIANA C.S. SAMPAIO, MONTSE F. PRIETO, ÓSCAR F. GONÇALVES, *University of Minho*, MARGARIDA R. HENRIQUES, *University of Porto*, NUNO SOUSA, *University of Minho*, MARGARIDA R. LIMA, *Genetic Medical Institute, Portugal*, MANUEL FUSTER, & ÁNGEL CARRACEDO, *University of Santiago*

—Williams Syndrome is a rare neurodevelopmental disorder, occurring 1 in 20 000 live births, which is due to a deletion in chromosome band 7q11.23. Subjects with Williams Syndrome have distinctive profile characteristics, which include physical features, a variety of cardiovascular deficits, a specific pattern of developmental and personality attributes and an unique cognitive profile. This is a well documented model for human cognition because it's characterized by a pattern of specific abilities in language functions and face recognition despite the presence of severe deficits in visuo-spatial cognition. Given the striking peak and valleys in neurocognition of WS, our aim in this study is to characterize this cognitive phenotype in a 12 WS participant group. Also, we want to see the variability across the group in specific areas of neuropsychological assessment. In order to do this, they are evaluated by Luria Neuropsychological Diagnosis, which allows us to delineate their neuropsychological profile.

LONG TERM MEMORY: KNOWLEDGE REPRESENTATION

(3006)

Do Extrovert People Have a Better Prospective Memory? SERENA MASTROBERARDINO, VALERIA NATALI, & FRANCESCO S. MARUCCI, *University of Rome*

—The aim of the present study was to further investigate the relationship between Prospective Memory capacity and subject's introversion/extroversion as measured by performance in the "Eysenck Personality Questionnaire" scale. We used a prospective memory task to evaluate prospective memory and an external aid use questionnaire taken from J.H. Harris (1980). We found a main effect for the prospective memory task, showing that subjects' performance decreased with time. Moreover we found a negative correlation between the Eysenck scale and the results on the prospective memory task, and between the self-evaluation questionnaire and Harris', showing that the more subjects were confident with their memory the less they used external aids.

(3007)

The Fractionation of Executive Functions Involved in

Prospective Memory. KAREN CAEYENBERGHS, WIM DE BRUYCKER, LIEVE Helsen, & GÉRY D'YDEWALLE, *Katholieke Universiteit Leuven*

— Prospective memory (PM) involves remembering to perform future intentions, and is assumed to rely on central executive functions (EF). Since few theoretical concepts specify which EF's contribute to PM performance, we investigated which executive measures are the best predictors of PM. 180 participants completed a computer-based driving task designed to assess both time-based and event-based PM. The time-based task involved monitoring the level of available fuel and to refuel on time, while the event-based task required refilling oil whenever an indicator lit up. Task complexity was varied by manipulating ongoing task load but holding constant PM instructions. Three tests of EF were also administered: Wisconsin Card Sorting Task, Controlled Oral Word Association Test, and Tower of London. Given the highly integrated nature of these tasks, we further collected three executive component measures: mental shift, updating, and inhibition. Finally, tests of sustained attention (CPT) and time production were administered. Analyses show a significant correlation between time-based and event-based PM. Correlations between complex executive tests and component tasks were generally low. Furthermore, time-based and event-based prospective memory seem to rely on different executive processes. There was only an effect of task complexity on the background task.

(3008)

Semantic Facilitation in Prospective Memory. LAURA PIERONI, SERENA MASTROBERARDINO, ELENA SECCI, *University of Rome*, & Marco Costanzi, *CNR Rome*

—Event-based prospective memory refers to remembering to perform a particular action upon the presentation of a particular cue in the environment. In order to investigate how retrospective memory processes differ from prospective memory involvement, we used a task that implies verbal processing of information in both types of memory. According to our experiment, thirty-two university students have been asked to study a list of words and then perform a recognition task (retrospective task). In the latter task the subject had to perform a semantic association when a target word occurred (prospective task). The results of the regression analysis are discussed in terms of the independence of the processes involved in prospective and retrospective memory. The effect of the semantic association on the recall of prospective items has also been investigated.

(3009)

Importance of Motor Representations in Emergence of Knowledge. GUILLEMETTE BADARD, ELODIE LABEYE, ALI OKER, & RÉMY VERSACE, *Université Lyon 2*

—The main goal of this study was to demonstrate the importance of motor representations in emergence of semantic knowledge. We used a short term motor priming paradigm in which participants had to categorize target pictures as tools or kitchen utensils. The prime picture belonged either to the same semantic category or to a different category than the target, and represented an object associated with a motor representation (according to the use of the objects) either similar or different from that of the target. The SOA between prime and target was either 100 ms or 300 ms. The results showed an additive effect of the semantic category and gesture at 100 ms interpreted as a separate activation of the components of the prime whereas at 300 ms, we observed an interaction interpreted as an integration of these various components.

(3010)

The Role of Actions Denoted by Verbs or Evoked by Tool Names in Conceptual Development. KATIA DUSCHERER, & PIERRE MOUNOUD, *Université de Genève*

—The present study investigates how action representations relate to the representations of concrete objects at a conceptual level and how these relations evolve through childhood. We used a cross-modal semantic priming paradigm, in which participants (i.e., 5-, 7-, 9-, and 11-year-old children, as well as a group of young adults) were asked to name a target picture of a concrete object preceded by a spoken word prime. In the related conditions, the word prime was either a verb describing an action that could be executed on the object (CLIMB-WALL) or a name of a tool involved in the execution of the same action (LADDER-WALL). Significant priming effects were found both for related verb and noun primes, related verbs providing slightly more facilitation than related nouns. This advantage for the verb primes was especially important for the younger children.

(3011)

Diagnosticity of Visual and Action Features Drives Representation of Novel Objects: ERP Evidence for Modality-Specific Semantic Representations. EUN-JIN SIM, SARAH LIEBICH, *University of Ulm*, JAMES TANAKA, *University of Victoria*, & MARKUS KIEFER, *University of Ulm*

—We investigated whether feature relevance for category membership (shape: visual category / action: action category) determines the emergence of category-related effects in modality-specific brain regions. Within 16 training sessions, participants acquired knowledge on 64 novel objects ('nobjects') which had nonsense names and were distinguished according to their shapes and actions. After the training, ERPs were recorded, while participants had to decide whether a given feature name (shape or action) matches with the nobject name. Visual categories elicited a strong ERP response over occipital cortex independent of the task. Action categories evoked strong occipital activity only in the shape task. Over frontal regions, action categories were associated with a more negative potential particularly in the action task. The observed interactions between task and category suggest that feature diagnosticity drives the formation of object representations. The topography of these effects supports the view that object knowledge is represented in modality-specific systems.

PERCEPTION AND ACTION III

(3012)

Effect Anticipation in Action Planning: Interference between Anticipated Effects and Affordances Evoked by Stimuli Presented during Action Planning. MICHAEL ZIESSLER, *University of Sunderland*, DIETER NATTKEMPER, *Humboldt University Berlin*, & STEFAN VOGT, *Lancaster University*

—Recent evidence suggests that the presentation of learned effects during response preparation facilitates the response. Usually this is taken as evidence for the inclusion of effect codes in response planning. However, it might be argued that the participants just use the presented effects as additional stimulus to activate the response. We developed a new paradigm in which the anticipated effects might interfere with the affordances evoked by a stimulus presented during response planning. First, participants learned that left or right key-presses produce a hand in a horizontal or vertical grasping position on the screen. Later, a horizontal or vertical bar was presented after the imperative stimulus. According to the affordance concept, the bar should activate a grasping response depending on its orientation. Even so the orientation of the bar was irrelevant for the response, the compatibility between the anticipated "effect hand" and the orientation of the bar affected the RTs.

(3013)

Perceptual Illusion Effects upon Different Kinds of Actions. FRANCESCA D'OLIMPIO, *Second University of Naples*, ANNA

MARIA GIANNINI, & FABIO FERLAZZO, *University of Rome*
—Research on effects of perceptual illusions upon visuo-motor tasks has produced contrasting outcomes, probably due to the scarce consideration of the locus of illusory effects within the visual system. In order to investigate simultaneously different illusions and different visuo-motor tasks, in the present study observers were asked to trace a number of different perceptual illusions using their eyes, a hand-controlled cursor, or a pen. Results show a strong effect of most of the perceptual illusions upon action programming and execution, suggesting that the dorsal and ventral visual systems are far more integrated than probably previously expected, depending on the specific action required.

(3014)

Action Related Effects in Visual Search. AAVE HANNUS, FRANS W. CORNELISSEN, *University of Groningen*, & HAROLD BEKKERING, *Radboud University Nijmegen*

—We investigated the underlying mechanism of action-related bias in visual attention. Previous research has implied that discrimination of a visual feature is selectively enhanced for action-relevant dimension. However, our last results suggest that the action effect is more likely to bias the competition between different visual features. Therefore we manipulated the bottom-up components in visual search tasks to disentangle the interaction between top-down and bottom-up information. The visual search task required searching for a conjunction of a particular color and orientation, and either grasping the target or pointing at the target. Subjects viewed stimuli on a screen while their gaze was tracked to determine the end-position of the first saccade. The bottom-up information was biased either toward the color or orientation of stimuli. Results suggest that action intention does not affect the processing of action-relevant visual feature directly; it rather has an effect on the competition between the visual features.

(3015)

The Direction of Script Generates a Spatial Code Only When Reading. BARBARA TRECCANI, *University of Padua*, ROBERTO CUBELLI, *University of Urbino*, SERGIO DELLA SALA, *University of Edinburgh*, & CARLO A. UMILTÀ, *University of Padua*

—Reading requires the early processing of the word orientation. If the computation of the script direction generates a spatial code this could interfere with the response selection in a Simon-like paradigm. To test this prediction, participants were asked to press a left- or a right-sided key to indicate whether a standard oriented or a mirror reversed letter string was a word or a non-word (Exp. 1) or an animal or a vegetable name (Exp. 2). Left responses were faster and more accurate with standard oriented stimuli, right responses with mirror reversed ones. Therefore, reading requires early computation of initial letters' spatial position. Two further experiments, whereby participants were required to respond to the colour (red/green) or to the style (normal/bold) of the letters, ruled out that this spatial code is automatically triggered by alphabetic stimuli. In sum, spatial coding of letter string is strategic and requires the intention to read.

(3016)

Pre-Attentive Spatial Encoding in Hand Recognition. GIOVANNI OTTOBONI, ROBERTO CUBELLI, *University of Urbino*, & Carlo A. Umiltà, *University of Padua*

—According to the model recently proposed by Ottoboni et al. (2005), hand recognition requires the early encoding of its sidedness, i.e. its spatial location relative to a (real or imagined) body to which the hand belongs. The model predicts that the processing of the hand sidedness is pre-attentive and independent of (1) the posture of participants' responding hand, (2) the direction of the forearm attached to the stimulus, and (3) the orientation of

the stimulus hand. In this study, three Simon-like experiments were carried out testing these assumptions. In all experiments, a significant interaction was found between view (palm and back view) and correspondence (pairings between stimulus handedness and response location). Results are consistent with the notion that the hand position is pre-attentively coded and that different body images are elicited by different hand postures.

(3017)

High Intelligence Enhances "Debinding" across Perception and Action. LORENZA S. COLZATO, NELLEKE C. VAN WOUWE, TRISTAN J. LAVENDER, & BERNHARD HOMMEL, *Leiden University*

—Several studies suggest that feature binding across perception and action is mediated by neural synchronization. Synchronous oscillations of low frequencies (theta and beta band) are thought to couple distant brain areas, whereas high frequencies (gamma band) are important for short range, local bindings. The aim of this study was to test whether high intelligence, which is associated with theta band synchronization, enhances the binding of visual and action features. Forty-nine volunteers were assigned to different groups according to their IQ, measured by the Raven's SPM. In addition, they participated in a binary-choice task that measures after-effects of feature integration. The results suggest two conclusions: high intelligence facilitates the unbinding (or re-binding) of features and it selectively affects the (un)binding of visual and action features but not visual-visual bindings.

(3018)

Onset and Offset Events in the Simon Task. LUCIA RIGGIO, *Università di Parma*, JUAN LUPIÁÑEZ, *Universidad de Granada*, ELENA GHERRI, *Università di Modena e Reggio Emilia*, & FRANCESCA RODÀ, *Università di Parma*

—The Simon task was used in two experiments in which onset and offset events were compared when the target could not be pre-processed. In Experiment 1, participants had to respond to the shape of a new object that appeared (onset) in one of the two marked locations, or to the shape of the background object revealed by the disappearance (offset) of the overlapping figure. Therefore some objects always occupied the two target locations. On the contrary, in Experiment 2 the target location was empty before the appearance (onset) of the target or the target location became empty after the disappearance (offset) of the target. Participants had to respond to the shape of the disappearing or the appearing figure. In both experiments onset and offset events produced comparable results in relation to various aspects of the Simon task. However the Simon effect was larger when a target of the same type (onset or offset) preceded the current target.

(3019)

Tracing the Feedforward Dynamics of Primed Pointing Movements. THOMAS SCHMIDT, SILJA NIEHAUS, & ANNABEL NAGEL, *University of Göttingen*

—Single-cell recordings indicate that a visual stimulus elicits a wave of rapid neuronal activation that propagates so fast that it might be free of intracortical feedback. In contrast, conscious perception is supposed to be possible only with recurrent processing. We traced the time-course of early feedforward activation by measuring pointing responses to color targets preceded by color stimuli priming either the same or opposite response as the targets. Early pointing kinematics depended only on properties of the primes, independent of motor and perceptual effects of the actual targets, indicating that initial responses are controlled exclusively by feedforward information. Our findings provide a missing link between single-cell studies of feedforward processing and psychophysical studies of recurrent processing in visual awareness.

DECISION MAKING II

(3020)

Decision Making and Regret: Does Responsibility Lead People to Choose Risky or Safe Options? CINZIA GIORGETTA, *University of Rome & University of Naples II*, & FRANCESCA D'OLIMPIO, *University of Naples II & University of Rome*

—The purpose of this study was to investigate the role of responsibility in the relationship between regret and decision making, in a full feedback gambling task consisting of 10 consecutive trials in three different conditions of responsibility. In two conditions participants prepared for a competition with other teams, as the last player. The goal was to win 100 points in order to earn 600 euro. Participants could start to play with 90 (high responsibility condition) or 40 (middle responsibility condition) points. The third group was prepared only for an uncompetitive gambling task, in order to decide whether taking part to the competition (low responsibility condition). As expected, the responsibility was found to play an important role in decision making because subjects with highest responsibility reported more regret and a tendency to make more risk aversion than risk seeking choices. This study represent a further extension of regret theory.

(3021)

Does “000.000” Matter? Psychological Effects of Turkish Monetary Reform. YURDAL TOPSEVER, *Izmir University of Economics*, ROB RANYARD, *University of Bolton*, SONIA AMADO, & MERT TEKÖZEL, *Ege University* (presented by Sonia Amado)

—In this study, we investigated the “anchoring effect” and “money illusion” in relation to Turkish Monetary Reform. Turkish Monetary Reform, which took effect in January 2005 depends on the deletion of 6 zeros from the currency. An experimental study conducted in December 2004 -just before the reform- showed that introduction of the New Turkish Lira would have some effects on people's price estimations. Following the Mussweiler and Englich's anchoring procedure, (2003) subjects (202 university students) who were presented with high or low anchor values estimated the price of an “average cost of a new middle-size Turkish car” using different currencies: Turkish Lira (TL), New Turkish Lira (NTL) or Euro. Subjects were randomly assigned to anchor and currency conditions in a 2x3 between subjects factorial design. Results showed significant anchor and currency main effects but no significant interaction. We interpreted this finding as the introduction to NTL may not result in uncertainty due to its easy conversion property. Euro as well, was not influenced more by a salient anchor compared to other currencies. That is it did not produce a greater anchoring effect due to its predicted uncertainty. On the other hand, estimations in Euro were significantly higher than estimations in TL, and NTL higher than TL. Money illusion, thinking in nominal terms more than real terms in economic transactions, may explain the currency effects. Subjects might have made higher estimations with these currencies because nominal values of Euro and NTL were lower than TL (1 million times smaller than NTL and 500.000 times smaller than EURO).

(3022)

General Intelligence and Efficacy of Category Change. SYLWIA SLIFIERZ, *Jagiellonian University*

—The research investigates hypothesized relationship between general intelligence and efficacy of learning category after change. Rule-based and information-integration category learning is examined. In the presented experiments a modified procedure of categorial decisions, proposed by Bruner is involved. The modification relies on dividing the procedure into three parts: learning category with feedback, category change and learning a modified category. The study includes manipulation with category

range and the character (implicit vs. explicit) of change. The study aims at verifying the hypothesis that higher general intelligence positively influence the efficacy of coping with category change in rule-based task, especially in condition of extensive category range and implicit character of change. Generally the study is expected to shed light on the connection between intelligence and category change efficiency.

(3023)

Inhibitory Control Also Affects Decision Making: Evidence from the Retrieval Practice Paradigm. SERGIO IGLESIAS-PARRO, TERESA LECHUGA GARCIA, & CARLOS J. GOMEZ-ARIZA, *University of Jaen* (presented by Teresa Lechuga Garcia)

—Decision making requires the recruitment of several cognitive processes. So far, however, few studies have dealt with the role of inhibitory control in this domain. In this work, we aim to study this issue in a memory-based decision task by using an adaptation of the retrieval practice paradigm (Anderson, Bjork and Bjork, 1994). The retrieval-induced forgetting found through this task is normally explained in terms of inhibition. Specifically, we analyze how the retrieval practice may affect what alternatives are selected as well as the choice probability and attribute recall. Our data show that repeatedly retrieving a subset of non diagnostic attributes gives rise to biased decisions. This finding suggests that inhibitory mechanisms should be taken into account in theories on decision making.

(3024)

The “Take the Best” Configural Heuristic: A Fast and Frugal Heuristic That Processes Compound Cues as Configurations. ROCIO GARCIA-RETAMERO, *Max Planck Institute For Human Development, Berlin*, & ULRICH HOFFRAGE, *Université de Lausanne*

—Take The Best (TTB) is a fast and frugal heuristic for paired comparison that has been proposed as a model of bounded rationality. This heuristic does not take compound cues into account to predict a criterion. However, causal knowledge about the relationship between the criterion and several cues may suggest that processing cues as configurations could be adaptive in a particular environment. In a series of simulations, we show that an extension of TTB, namely TTB-Configural, outperforms both the more frugal TTB and a more demanding benchmark. Moreover, we also present empirical evidence that people process cues as configurations when equipped with the corresponding causal knowledge.

(3025)

Optimality Theory and the Processing of Coordinated Structures. JOHN C.J. HOEKS, & PETRA HENDRIKS, *University of Groningen* (presented by Petra Hendriks)

—In line with recent studies we propose a model of human sentence processing based on Optimality Theory (OT). Rather than explaining parsing preferences through extralinguistically motivated parsing strategies, or frequencies in the hearer's linguistic environment, our model explains these preferences as the result of the incremental application of our OT grammar. In contrast to most other current OT-approaches, we use constraints from OT-semantics rather than from OT-syntax to explain comprehension. In this paper we will focus on the comprehension of coordination (e.g., “A and B”), a phenomenon which is ill-understood from a competence perspective and sparsely investigated from a processing perspective. The psycholinguistic evidence that is currently available strongly suggests that the on-line comprehension of coordinate structures is influenced by constraints from many different information sources: pragmatics, discourse semantics, lexical semantics, and syntax. We will show

that OT is well suited to formalize this cross-modular constraint interaction in language comprehension.

(3026)

Planning Process in the Traveling Salesman Problem: A Computational Model Simulating Human Performance. SIMONE CUTINI, *University of Padua*, DEMIS BASSO, *University "la Sapienza" of Rome*, ANDREA DI FERDINANDO, PATRIZIA S. BISACCHI, & MARCO ZORZI, *University of Padua* (presented by Demis Basso)

—Planning is the ability of guiding behavior in order to achieve a goal in an efficient manner. The process has been investigated using the Traveling Salesman Problem (TSP), a paradigm in which the solution requires subjects to plan a route and to enforce strategy choices. Subjects were asked to visit all cities shown in the map, finding the shortest path in the shortest time. The computational model, based on several biological constraints, simulates bottom-up and top-down influences observed in the execution of the TSP. Performance of the model and human subjects have been compared to verify the efficacy of the model. Results indicated that the paths produced by the model corresponded to the most frequent solutions produced by the human participants. Moreover, a lesion to the network's units corresponding to the prefrontal cortex resulted in a decrease of strategy changes similar to that observed in frontal injured patients.

LANGUAGE PRODUCTION/ PERCEPTION III

(3027)

A Method for Detecting Psychological Causality in Cognitive Processing in fMRI Data. ALESSANDRO LONDEI, DEMIS BASSO, ALESSANDRO D'AUSILIO, & MARTA OLIVETTI BELARDINELLI, *University "la Sapienza" of Rome* (presented by Demis Basso)

—Higher cognitive processes rely on a complex dynamics of activities in the brain, temporally and spatially segregated. However, the contemporary description of both timing and causality is lacking in fMRI methods. At the scope we devised a new technique using a data-driven approach in 2 steps: 1-the Independent Component Analysis is applied to extract the independent functional activities; 2-the Granger Causality Test is applied to the IC most correlated with the stimuli, to show the causal relation between this and the other ICs. FMRI data from passive auditory of high imaginative words were analyzed with this method. The activity flow proceeds from bilateral auditory cortex and Wernicke area, to BA45/46 and SMA, finally influencing the posterior-superior parietal lobule. This causal succession is consistent with the parieto-frontal circuit involved in recognition and integration processes. Therefore, the method is effective in revealing cognitive causal relationships, not evidenced by conventional fMRI analysis approaches.

(3028)

Prosodic Disambiguation in Child-Directed Speech. VERA KEMPE, SONJA BIERACK, & GEMMA J. POTTS, *University of Stirling*

—Snedeker & Trueswell (2003) demonstrated that when the referential context supports various interpretations of a syntactically ambiguous sentence, speakers disambiguate using prosody. In this study we explore whether prosodic cues are more pronounced in child-directed speech (CDS) compared to adult-directed speech. Mothers were asked to address sentences with an ambiguous prepositional phrase attachment such as in 'Touch the frog with the flower.' to an adult interlocutor or to their small child. The mothers were presented with pictures depicting the intended meaning of each sentence, and had to instruct the interlocutor or the child to carry out the target action using an array

of objects corresponding to the pictures. Preliminary findings suggest that prosodic cues such as pauses and pitch accents are exaggerated in CDS lending support to the idea that CDS tends to provide prosodic information that reflects syntactic structure. Results are discussed with respect to the prosodic bootstrapping hypothesis.

(3029)

The Temporal Properties of Spontaneous Speech in Alzheimer's Disease. ILDIKÓ HOFFMAN, DEZSO NEMETH, & JÁNOS KÁLMÁN, *University of Szeged*

—The main purpose of this research is to study the temporal properties of the spontaneous speech in different stages of Alzheimer's disease compare to anterior, posterior aphasic and normal control. The following parameter were measured: speed of articulation, speed of speech, number and length of filled pauses, number and length of empty pauses, place of the pauses, the ratio of pauses and signal time. The temporal features of anterior aphasic speech are similar to those of patients in a severe stage of AD. The temporal features of posterior aphasic speech are similar to those of patients in a mild or moderate stage of AD. The AD in mild stage is different from normal control in the ratio of pause and signal time. These findings are helping us to map the relationship between language processes and memory systems.

(3030)

Modulation of the Motor System in Language Understanding. GIOVANNI BUCCINO, LUCIA RIGGIO, MARC SATO, MARISA MENGARELLI, & VITTORIO GALLESE, *University of Parma*

—Traditionally, language processing is thought to be based on symbolic representations and disconnected from any body experience. However, there is increasing evidence that language processing may rely on embodiment. To check this view, we asked participants to carefully listen to action-related and abstract sentences and to give a response using either the right hand or the right foot when the sentence expressed a motor content. Responses given with the hand were slower in relation to hand-related sentences. Responses given with the foot were slower in relation to foot-related sentences. In a second experiment, using acoustically presented and visually presented action-related and abstract verbs, we found a similar pattern with manual response. Altogether, these results support the view that language processing, at least for action-related material, modulates the activity of the motor system depending on the effector used in the linguistic stimuli.

(3031)

Early Knowledge of Derivational Morphology in English and French: A Preliminary Cross-Language Comparison. LYNNE G. DUNCAN, *University of Dundee*, PASCALE COLÉ, *Université de Savoie*, & SÉVERINE CASALIS, *Université de Lille 3*

—Studies of children's knowledge of derivational affixes are beginning to assemble a picture of how and when children become sensitive to this aspect of morphology. To date, however, relatively few cross-linguistic studies have appeared in this field. We will present some preliminary data from a cross-linguistic comparison of morphological development in two European languages, French and English. The study focuses on early manipulation of suffixes in oral language games and relates this to chronological age, vocabulary development and year of schooling (Year 1, Year 3). Morphological development was found to be accelerated in French relative to English. The French advantage encompassed knowledge of a broader range of derivational suffixes and a markedly greater facility in generalising morphological knowledge to novel contexts. These initial results can be interpreted in accordance with the properties of the morphological systems of English and French, and the methods of reading instruction in each country.

(3032)

Semantic Effects in the Production of Nouns and Verbs. SIMONA COLLINA, *Università degli Studi Suor Orsola Benincasa*, PATRIZIA TABOSSI, & SERENA ZANUSSI, *Università di Trieste*

—A common phenomenon observed in picture-word interference studies is the interference effect that a semantically related distracter (e.g. fox) has in the naming of a target picture (e.g. cat). According to the current view of lexical production this effect is the result of a competition process to select the appropriate lemma to produce a word. However, some recent results have cast doubts on this interpretation. To explore the issue, a series of picture-word interference studies were conducted with nouns and verbs. Targets (e.g. mouse) were presented along with distracters that could be quasi-synonym (e.g. rat), semantically related (e.g. dog) or unrelated words (e.g. dress). Results showed a pattern of inhibitory and facilitatory effects. The interpretation of the semantic effects and their implications for current models of language production are discussed.

(3033)

Naming Two-Digit Arabic Numerals Investigated with Masked Priming. ELIE RATINCKX, *Ghent University*, MARC BRYSBART, *Royal Holloway University of London* & WIM FIAS, *Ghent University*

—We investigated how two-digit Arabic numerals are named by looking at the effects of masked primes on the naming latencies. Target numerals were named faster when prime and target shared a digit at the same position (e.g., the target 28 primed by 18 and 21). In contrast, naming latencies were slower when prime and target shared one or two digits at non-corresponding places (e.g. the target 28 primed by 82, 86, or 72). Follow-up experiments showed that these priming effects were situated at the level of the verbal production of the Arabic numerals. The data point to a non-semantically mediated route from visual input to verbal output in the naming of two-digit Arabic numerals.

(3034)

High Level Thought Processes Affect Utterance Form. JAMIE PEARSON, MARTIN PICKERING, HOLLY BRANIGAN, JANET MCLEAN, *University of Edinburgh*, CLIFFORD NASS, & JOHN HU, *Stanford University*

—Beliefs about an interlocutor can affect some aspects of linguistic behavior (e.g., topic choice), but little is known about how far such influences extend. We present four experiments using Human-Computer dialogues that examine the influence of beliefs about an interlocutor on lexical and syntactic choice. Participants believed that they were interacting with another person or a computer, or a basic or advanced computer. There was an overall pervasive alignment with both the “person” and “computer” interlocutors, which is compatible with an automatic component to alignment. However, the higher degrees of alignment with “computer” than “person” interlocutors, and with “basic” than with “advanced” computer interlocutors, is incompatible with a simple cognitive economy account. It is also incompatible with explanations stressing shared mental states or social affect, since computers presumably do not have mental/emotional states. Instead, the differences in alignment suggest a strategic component based upon assumptions of ability to respond flexibly. These findings extend existing evidence of higher order effects, showing that high level thought processes affect utterance form.

LANGUAGE PERCEPTION: PICTURE-WORD RELATIONS

(3035)

Both Good and Poor Readers Activate Phonological Information Automatically During Reading: Evidences from Word-Picture Masked Priming. JOSÉ M. RODRÍGUEZ-SANTOS, SANTIAGO TORRES, JAVIER GARCÍA-ORZA, MAURICIO IZA, & MARINA CALLEJA, *Universidad de Málaga*

—Several experiments have been carried out in different languages and with different paradigms to explore whether deaf people can automatically activate phonological representations during reading. However, evidences remain controversial and, generally, are based in experimental paradigms that are not free of criticisms (see Perfetti and Sandak, 2000, for review). Two word-picture masked priming experiments, using a short SOA (64 ms.), explored the automatic activation of phonological codes in two samples of severe to profound Spanish deaf people educated in an oral method. Despite reading levels, both good and poor deaf readers named the target pictures significantly faster when the targets were preceded by words (experiment 1) or homophone pseudowords (experiment 2) that sounded as the targets pictures did. This demonstrates that phonological codes are automatically activated by deaf participants when a word is presented. It is argued that only basic grapheme/phoneme decoding skills are needed to automatically activate phonology during reading.

(3036)

A Differential Impact of Morphological and Semantic Distractors on Picture Naming. PETRA DOHMES, PIENIE ZWITSERLOOD, & JENS BOELTE, *University of Muenster*

—Numerous picture-word studies demonstrated that distractor words interfere with picture naming, when they were members of the same semantic category as the pictured object (e.g., apple - picture of a banana, canary - picture of a bird). The semantic interference effect is usually explained by competition for selection between lemmas that can be potential responses, for example, those belonging to the same semantic category. With distractor words that are both category members and morphologically related to the picture name (e.g., hummingbird - BIRD), we always obtained facilitation. This is rather astonishing, because, given that it is an appropriate response, hummingbird should compete with bird just as much as canary does. We addressed this issue by comparing effects of morphological-and-semantic relationship (sunflower - FLOWER) with effects of mere semantic relatedness (coordinate (tree - FLOWER) vs. subordinate relation (orchid - FLOWER)). The data reveal interference for semantic and facilitation for morphological distractors.

(3037)

Do Perceived Objects Automatically Activate Representations in the Phonological Output Lexicon? JOERG D. JESCHENIAK, FRANK OPPERMAN, ANSGAR HANTSCH, VALENTIN WAGNER, *University of Leipzig*, & HERBERT SCHRIEFERS, *Radboud University Nijmegen*

—Recently, Morsella and Miozzo (JEP: LMC, 28, 555-563 (2002)) have reported that to-be-ignored context objects become phonologically activated in the context of a picture naming task, supporting cascaded models of lexical retrieval in speech production. In a replication and extension of their experiment, we have failed to obtain evidence that context objects phonologically related to a to be named target object affect naming latencies although we could show that corresponding context words (i.e., the names of the respective objects) reliably facilitated the naming process. This and findings from other related experiments (see conference contribution by Meyer and Damian) call into question

the generality of the claim advanced by Morsella and Miozzo that perceptual processing of objects automatically leads to the activation of corresponding lexical-phonological codes.

(3038)

People's Name vs Concrete Words Production: One or Different Cognitive Systems? An ERP Study. GIULIANA LUCCHI, VALERIA A. ROSMARINO, SARA IACONELLI, & ADRIANO GENTILOMO, *University of Rome "la Sapienza"*

—Famous people's names, proper names and objects names make up different linguistic categories. Objects names can access all occurrences of that name in the world, the ratio is one to infinite (the word "man" refers to all men in the world). Proper names can access all people with that name, the ratio is not one to infinite (the name Andrea refers to all Andrea existing, but there are more men than people named Andrea in the world). Famous people's name access just one person with that name, the ratio is one to one. Neuropsychological dissociations indicate that different systems are involved in different names production. In our work we tried to establish if there are different cognitive systems for names and words production by using event-related potential technique. We found complex electrophysiological pattern indicating that at least two different processes are involved in our three name categories.

(3039)

Regular and Reversed Length Effects in Picture Naming. CHRISTINE HAECKER, ANTJE S. MEYER, *University of Birmingham*, EVA BELKE, *Aston University*, JULIA HOLZGREFE, *University of Potsdam*, & LINDA MORTENSEN, *University of Birmingham*

—Speakers naming two objects ("cat, chair") have been found to look for longer at the second object to be named before speech onset when the name of the first object is short than when it is long (Griffin, 2003, *Psych. Bull. Rev.*). In Experiment 1, we replicated this reversed length effect for the pre-speech gaze duration for the second object and found a regular word length effect for the gaze duration for the first object. In two follow-up experiments we ruled out that the alleged reversed length effect was due to differences in speech planning time for long and short words. The results imply that speakers have rapid access to information about the length of utterance-initial words and can use this information in deciding how extensively to prepare non-initial words before speech onset.

(3040)

The Effect of Grammatical Gender on the Categorization of Words and Pictures. DANIELA PAOLIERI, *University of Urbino*, LORELLA LOTTO, *University of Padua*, ROBERTO CUBELLI, *University of Urbino*, & REMO JOB, *University of Trento*

—Using the picture-word interference paradigm, Cubelli et al. (2005) showed that grammatical gender affected naming times even if gender was irrelevant for performing the task. To account for this result, it was proposed that (a) a noun's abstract representation (lemma) specifies both lexical-semantic and lexical-syntactic information and (b) the competition at both levels is resolved independently, with its outcome triggering the selection of a lexical form. This study provides evidence supporting this interpretation. Participants judged whether or not two Italian nouns (Exp. 1) or the two corresponding pictures (Exp. 2) belonged to the same category. Half of the pairs were gender congruent and half gender incongruent. Manual responses were faster when the stimuli were of the same grammatical gender. These results indicate that the grammatical gender is processed even in the absence of overt verbal production, and that categorisation of pictures relies on lexical-semantic rather than lexical-conceptual information.

(3041)

Place vs. Feature-Based Spatial Memory Strategies in Great Apes and Children. DANIEL HAUN, *Max Planck Institute For Psycholinguistics*, & JOSEP CALL, *Max Planck Institute for Evolutionary Anthropology*

—The interaction between language and other cognitive functions is a ferociously discussed topic in the cognitive sciences. While some see cognition in its basic form as a set of innate concepts, which find nothing but their communicative expression in language, others believe language to have a restructuring impact on the rest of cognition. One neglected aspect in this discussion is the investigation of the structure of language-independent cognition. In order to investigate 'restructuring' we need to understand the initial structure. In this experiment we compared great apes and 3-year-old children in a spatial memory task in which they display similar overall performance levels. However, while apes prefer a place-based strategy, children outperform apes in feature-based spatial memory. Previous research has reported language-dependence of feature-based memory in contrast to memory for location. Our data suggest that in non-linguistic tasks, children display an advantage over equally capable apes in strategies which are impacted by language.

EMOTION

(3042)

Hemispheric Differences, Emotional Valence, and Stimulus Body Relatedness. RICHARD MARTINEZ, & OLIVIER KOENIG, *University Lyon 2, EMC Laboratory*

—Our study was aimed to investigate hemispheric differences for the processing of the emotional valence of nouns that differed in terms of human body relatedness. We used eighty nouns classified according to emotional valence (positive vs negative) and to body relatedness (high vs weak). Each noun was presented briefly to the right or to the left visual field. Forty eight participants were asked to judge the emotional valence of stimuli. Results revealed that participants responded faster a) for stimuli presented to the left than to the right hemisphere; b) for positive than for negative stimuli; and c) for stimuli closely related to the body. However, this last effect was observed for negative stimuli only. Results are discussed in terms of multi-origin hemispheric differences that combine cerebral hemisphere asymmetry for the processing of words, emotional content, and body relatedness.

(3043)

Developmental Features of Information Processing of Speech Emotional Stimuli of Different Durations. ELENA S. DMITRIEVA, *Inst. of Evolutionary Physiol. & Biochem. Russian Ac. of Science*, & VICTOR Y.A. GELMAN, *St-Petersburg Medical Academy of Postgraduate Studies*

—The ontogenetic features of emotions' perception in speech were studied by comparing the reaction times (RT) and accuracy of recognition (AR) in children of 7-17 years old. They were exposed to the stimuli of positive and negative valences that varied in duration (T) from 0.5s to 3s and were presented either on right or left ear of the subject. The ANOVA of the data obtained revealed that 'age', 'type of emotion' and 'stimuli duration' factors were highly significant in the process of speech emotions' recognition. 7-10 year olds showed significantly poorer performance in speech emotional processing as compared to 11-17 year olds. T=0.5 s was shown to be threshold duration for all age groups; after T=2 s the accuracy of recognition did not change. Analysis of RT dependence on the time of emotional stimuli allowed estimating the volume of echoic memory. Supported by the grant of RFH 04-06-00367a.

(3044)

Attentional Bias for Snakes and Spiders After an Aversive Conditioning Procedure. FRANCISCO G. ESTEVES, *Lisboa*, PAULA C.N. MIGUEL, *Universidade Lusófona, Lisboa*, & ANDERS FLYKT, *Mid Sweden University*

—Previous research has shown an attentional bias for a more efficient detection of threatening stimuli (e.g., snakes) among control pictures (e.g., flowers) than the reverse. In the present study, this advantage for the detection of fear-relevant stimuli was investigated using a visual search task, with snakes and spiders as threatening stimuli and flowers and mushrooms as control pictures. After running half of the visual search trials, an aversive classical conditioning procedure was introduced in order to enhance the threatening significance of one of the fear-relevant pictures. Thus, one of the fear-relevant stimulus categories (e.g., snakes) was paired with an aversive noise (UCS), while the other (spiders in this case) was used as the control condition. The results replicated the general bias for more efficient detection of threatening pictures (snakes and spiders) compared to neutral pictures, and showed that the effect was more pronounced with the stimulus associated with the UCS.

(3045)

Attentional Biases in Subclinical Trait Anxiety: Inhibition of Return in an Emotional Categorization Task. CAROLINA PÉREZ DUEÑAS, ALBERTO ACOSTA, & JUAN LUPIÁÑEZ, *University of Granada*

—A variety of tasks have been used to examine attentional biases in anxiety. However, these tasks do not allow for a fine dissociation between different types of attentional bias (i.e. attentional capture by threat-related stimuli vs. a deficit in disengaging attention from threatening information). To explore this issue we used a standard spatial cueing procedure suitable to observe Inhibition of Return (IOR), in which participants were to categorize the emotional valence of the target word. The stimulus used were words (positive, negative, neutral and strings of “xxxx”) in Experiment 1 and faces (positive, negative and neutral) in Experiment 2. The typical IOR effect was observed with non emotional and positive stimulus in both experiments, and for both the low and the high trait anxiety group. In contrast, the pattern of results for negative stimuli was different. The IOR effect was absent for negative words (Exp. 1) in the high trait anxiety group, although it was present in the low trait anxiety group. With negative faces (Exp. 2), however, neither the low nor the high trait anxiety group showed IOR. It is concluded that threatening stimuli captures attention to the extent of overcoming other cognitive effects such as IOR. The absence of group differences with faces could be due to the fact that threatening faces are phylogenetically learnt stimuli whereas words are ontogenetically learnt stimuli.

(3046)

Negative Attentional Bias in Depression with Longer Stimulus Presentation Times. AGATA BLAUT, & BORYSLAW PAULEWICZ, *Jagiellonian University*

—Experiments aimed at detecting attentional bias in depression or lowered mood usually do not provide conclusive results. Some researchers believe that only anxiety disorders are associated with attentional bias, whereas depression is connected with memory or interpretational bias. It is sometimes argued that short stimulus presentation times might be responsible for the failure to detect the bias. According to other, occasionally proposed hypothesis, depression is associated with greater attention disengagement difficulty. We conducted an experiment with three computer tasks, two of which were designed specifically for this occasion, the third being a classical Posner's attention disengagement task. The sample of size 42 was taken from depressive clinical patients together with 42 controls. Results show that attentional bias in

depression for both verbal and nonverbal stimuli can be reliably detected when stimulus presentation times are long enough (1000 msec). Some conclusions regarding attention disengagement difficulty in depressive patients can also be drawn.

(3047)

The Influence of Emotion on Integration Mechanism. MARYLÈNE ROSE, RÉMY VERSACE, PIERRE JACQUET, & HÉLÈNE VIOUX, *Université Lyon 2*

—The main purpose of this research was to investigate how emotion could influence integration process during a multi-dimensional encoding task. In order to replicated the context effect shown by Peris & Thibergien (1984), pictures from the IAPS (Lang & al, 1997) were used to induced participants either in a neutral or a negative emotional state. In each trial, participants saw emotional picture before a face picture associated simultaneously with an oral presentation of a first name. They had to memorize either the face or the first name with an aim of recognize them in a second phase. Our results only showed a context effect for slowest response latencies for the faces recognition. The lack of main emotional effect seems to demonstrate that it requires a stronger link between information and its context to appear. A new experiment being analysed tends to confirm this interpretation.

LONG TERM MEMORY

(3048)

False Memories and Time to Answer: Correctness, Episodic Access and Certainty. PEDRO B. ALBUQUERQUE, JOSEFA N. PANDEIRADA, & CLÁUDIA P. SOUSA, *Universidade do Minho*

—Memory is one of the most reliable cognitive mechanisms of human processing. Though instead of that reliability, there are many problems that can occur during the acquisition, storage and retrieval of information. The study of false memories in the laboratory was clearly developed after the Roediger and McDermott (1995) paper, a paradigm used in our study. In that paper, the authors showed that the presentation of lists of words related to a critical non-presented lure, produce false recall and false recognition of the critical word. Our research replicates the findings of R&M paper and evaluates the time to answer the recognition test. Results showed: (1) a clear false recall and false recognition of the critical lures; (2) the response time is strongly correlated with the answer correctness (hit or rejection), episodic access (clear remembering of the word presentation), and memory certainty (evaluated in a 4 point scale).

(3049)

False Memories and the Recency Inhibition. EDUARDA M. PIMENTEL, *Escola Superior de Educação de Paula Frassinetti*, & PEDRO B. ALBUQUERQUE, *Universidade do Minho*

—The aim of the present study was to evaluate the production of false memory illusions based on the experimental DRM procedure developed by Deese (1959), Roediger and McDermott (1995). We used lists of semantically associated words to a critical item, developed in the Portuguese context by Albuquerque (2001). The design involved the manipulation of the recency effect and the administration of two distinct recognition tests as a function of the association degree of words preceding the critical items. In the recall test it was possible to confirm that the inhibition of recency effect increased the production of memory illusions by enhancing the retrieval of the most associated words to the critical item and its activation. In the recognition test one could observe a slight activation of the critical item when preceded by non present associated words. The present study stresses the role of the retrieval process in the formation of memory illusions in DRM lists.

(3050)

Learning 1200 Pictures: Do Standing's Findings Stand the Test of Time? MORTEN ØVERVOLL, BRUNO LAENG, & ODDMAR O. STEINSVIK, *University of Tromsø*

—Previous research has found memory for images to be close to perfect, with accuracy rates of about 90% (e.g., Standing, 1973). In the present study, subjects were shown a large picture set, before taking a recognition test where they had to indicate whether individually presented images had been seen before or not. In clear contrast to the previous findings, we found high error rates and a high number of false alarms. Furthermore, using a lateralized presentation in the recognition test, there were fewer errors and faster responses for images presented to the left visual field. This provides evidence for the hypothesis that there is a right hemisphere advantage in encoding objects at an exemplar level. One reason for previous overestimations of memory capacity could be that forced two-choice recognition tasks were used, whereas the measure used here (old/new) might reflect more realistically the capacity of human visual memory.

(3051)

Reality Monitoring and Resistance to Forgetting under Short Delay Intervals. NICOLA MAMMARELLA, BETH FAIRFIELD, *University of Chieti*, & CESARE CORNOLDI, *University of Padua*

—Reality monitoring refers to processes by which people attribute a memory to an external or an internal source (Johnson & Raye, 1981). For example, a basic reality monitoring ability is required when people are either exposed to an event or asked to imagine it, and are later required to decide whether the event was actually perceived or imagined. In two experiments, participants were asked to perform or to imagine performing simple action statements in a single study session. In a test session that occurred 1 h, 24 hrs or 48 hrs later, participants were instructed to tell whether the action statement had been carried out or imagined. The primary finding was that recognition decreased with the passage of time, whereas reality monitoring did not. The results add evidence to the hypothesis that recognition and source identification rely on different aspects of memories and may involve different rates of forgetting.

(3052)

The Effects of Emotion on Memory: The Contribution of the Cognitive Interview. CLÁUDIA P. SOUSA, & PEDRO B. ALBUQUERQUE, *University of Minho*

—In this study, we evaluated the participant's memory of a witnessed event – interruption of a lesson – depending on its emotional characteristics (neutral event vs. emotional event). Two delayed memory tasks (50 minutes) were used in a counterbalanced way: free recall and recognition. Long after eyewitnessing the event (14 to 20 days), participants were invited to a Cognitive Interview in order to evaluate how recall depended on the event's emotional characteristics and on the previous accomplishment of the two memory tasks. Results showed that the emotional event condition benefits the most with the Cognitive Interview instructions since its participants recalled the largest amount of correct items and the smallest amount of false memories. Thus, the "Cognitive Interview" seems to be an effective procedure for the acquisition of an eyewitness testimony of an emotional event.

(3053)

The Effects of Scripts on Retrieval-Induced Forgetting. ELVIRA GARCÍA-BAJOS, & MALEN MIGUELES, *University of the Basque Country*

—Memory research has demonstrated that the act of remembering can prompt temporal forgetting or inhibition of related contents in memory. This study extends the retrieval-induced forgetting

procedure to event memory. Based on a normative data study high and low typicality actions of a mugging event were selected. The participants studied 8 verified facts (high-typicality actions mentioned by over 25%) and 8 non-verified facts (low-typicality actions produced by less than 5%). Then, they practiced retrieving half of the high or low typicality actions of the event, and a non-practice control group was added. In the final test the three groups tried to recall both verified and non-verified facts of the event. The conventional retrieval-induced forgetting was found for low typicality actions, but a comparable forgetting effect did not emerge in the high typicality actions. This finding suggests that the activation of scripts may inoculate typical event information from retrieval-induced forgetting.

(3054)

True and False Autobiographical Memories: Can We Tell the Difference? JOSEFA N.S. PANDEIRADA, & PEDRO B. ALBUQUERQUE, *University of Minho*

—In the past years many questions about true and false recalls emerged in the literature. Studies have searched for individual differences related to the creation of false memories, for variables that enhanced their creation, and many other factors. However, few have tried to differentiate true from false autobiographical reports. Can we tell the difference? Based on information obtained from two significant sources, we asked several students about three true childhood experiences, and suggested a plausible false childhood event, through 2 or 3 interviews. On the first interview 19.7% created a false memory for the suggested event. For these subjects, comparisons were made between the description of the true and false events on several measures: details described, number of words used to report the event, vividness of their memory, confidence on the reported memory and importance of the event. Results show significant differences on the majority of these measures.

(3055)

Knowledge, Imagination and False Memory. JUSTYNA M. OLSZEWSKA, *Polish Academy of Sciences & Academy of Management*

—The purpose of this study is to present how our prior knowledge affects current information. Memory distortions were the basis on which Bartlett developed his theory of memory as reconstructive process guided by schemata. Therefore, naturally occurring memory distortions (Mazzoni, 2002) are the basis of the research. The main independent variables were 1) prior knowledge (Text 1) or lack of knowledge and 2) extent to which cognitive processes were engaged during retrieval information from Text 2, in the way of asking questions: recall or recognition. The dependent variable was the number of false recall or false recognition inferred on the basis of the Text 1. The results showed that prior knowledge affects information currently remembered in a condition under which participants recalled information. Thus, they engaged in cognitive processes to the larger extent than during recognition. Therefore, during recognition there was no such effect of false memory.

(3056)

Cognitive Distractibility and Individual Differences in the Experience of Intrusive Memories. JOHAN R.L. VERWOERD, & INEKE WESSEL, *University of Groningen*

—People differ in the extent to which they report involuntary memories of a personally experienced traumatic event (i.e., intrusive memory). The question rises whether intrusive memory development is associated with relatively weak cognitive control in general (i.e., the propensity to become distracted by irrelevant information during task performance). The present study was intended as a first step to explore this hypothesis in a large sample

of undergraduate students ($n = 489$). The results show that self-report measures of intrusive memory and distractibility were significantly related. Positive and negative memories showed no differences in their relationship with distractibility. As cognitive control may be sensitive to circadian variation, time of day effects in the experience of intrusions were also tested. No significant relations emerged. These findings partly support the idea that a general deficit in inhibitory functioning may account for individual differences in the experience of intrusive memories.

(3057)

Cue Utilization in Repeated Judgements of Learning. LUTZ CÜPPER, & MONIKA UNDOERF, *University of Mannheim*

—Judgements of learning (JOLs) typically underestimate the degree to which recall performance increases with practice. We investigated how internal, mnemonic cues (e.g., perceived fluency) moderate this effect, also known as underconfidence-with-practice effect. Participants studied paired associates in two study-test cycles and gave delayed JOLs within each cycle. The cue word presentations during JOL were accompanied by masked presentations of target words in experiment 1 and unrelated words in experiment 2, respectively. In both experiments trials with masked strings of consonants served as controls. In experiment 1, target word priming reduced underconfidence in the second cycle but not in the first. Experiment 2, where unrelated words served as primes, did not show this effect. Our results support the hypothesis that internal, mnemonic cues gain impact on JOLs with practice. Furthermore retrieval fluency not the mere availability of an arbitrary word seems to be the driving force leading to higher JOLs.

(3058)

Are Odor-Evoked Autobiographical Memories More Emotional Than Verbally Evoked Memories? JOHAN WILLANDER, & MARIA LARSSON, *Stockholm University*

—Previous evidence suggests that odor-evoked memories are more emotional than memories evoked by other cue types. However, it is still unclear whether it is the perceptual experience rather than the evoked memory itself that produces the increased emotional arousal. In the present experiment the participants (70-80 years of age) were exposed/not exposed to retrieval cues (i.e., words and odors) while they rated the retrieved memories. Memories were rated on emotional valence, intensity, the feeling of being brought back in time, vividness, and vantage point (i.e., observer or field). Further, the evoked events were sorted according to their general emotionality, emotional valence and importance in descending order. The data collection is under progress and the results will be presented at the meeting.

(3059)

Disentangling Memory Systems and Memory Processes: What Dissociations Reveal. Marco A. VASCONCELOS, *Purdue University, USA*, & PEDRO B. ALBUQUERQUE, *University of Minho*

—Different memory systems and memory processes have been proposed as the underlying cause of several dissociation patterns. We report two experiments that test the applicability of the memory systems account and the processes account. In Experiment 1, normal participants performed four memory tasks: free recall (explicit and conceptual), graphemic cued recall (explicit and perceptive), word fragment completion (implicit and perceptive), and a general knowledge task (implicit and conceptual). The manipulation of the levels of processing enhanced performance in the explicit memory tasks, but had no effect on the implicit memory tasks; this effect was independent of the perceptive or conceptual nature of the tasks. Experiment 2 used memory-impaired subjects and revealed normal performance in the implicit

memory tasks and impaired performance in the explicit memory tasks, again independently of the processes required by them. These findings suggest that dissociations among memory tasks are better explained by a memory systems approach.

(3060)

Typing Skills: Differential Implication of Anticipation and Memorisation Processes Hypothesis. SÉVERINE LEGRAND-LESTREMAU, & VIRGINIE POSTAL, *Université Victor Segalen, Bordeaux 2*

—The goal of this study is to examine transcription typing and the implication of anticipation and memorisation processes. Copying, eye-hand and stopping spans were used to measure the number of characters simultaneously processed during transcription typing stages (Bosman, 1993). In the first experiment, 60 typists (20 beginners, 20 skilled and 20 experts) performed tasks in order to estimate typing-related span capacities. The results demonstrate that span capacities increase as a function of typist expertise and the anticipatory processing of a large number of characters also appears to improve typing speed. Concerning memorisation processes, the results show group differences only in the working memory task most related to typing (experiment two). Expert performance can be explained by an increase in specific working memory capacity but not by an increase in general or short term memory capacity. These results are interpreted according to skilled memory theory (Chase et Ericsson, 1982) and relative to recent theories concerning working memory (Baddeley, 2000; Gobet & Waters, 2003).

WORKING MEMORY: SPATIAL LOCATIONS

(3061)

The Relationship between Spatial Attention and Spatial Working Memory: A Study Using High Density Event-Related Potentials. M^a CONCEPCIÓN CASTELLANOS, & PÍO TUDELA, *University of Granada*

—Different measures have been used to study the relationship between spatial attention and spatial working memory. Behavioral data show that performance in spatial working memory tasks is either benefited or harmed as a function of the focus of attention; an improvement is observed when attention is focused on the memorized position during retention interval but if it is focused on a different position, a deterioration is found. Neuroimaging data show similar parietal and frontal activation for spatial working memory and spatial attention tasks. These results give support to the hypothesis that spatial attention is a key component in the rehearsal stage of spatial working memory (Awh & Jonides, 2001). We register cerebral activity by using a high density event-related potential system during a working memory task and an attentional task to compare electrophysiological responses associated with these processes. Results are discussed in the presented framework.

(3062)

Phonological Loop and Morphological Complexity. DEZSO NEMETH, *University of Szeged*, ROZALIA IVADY, *Budapest University of Technology and Economics*, MARTON MIHALTZ, *Morphologic, Hungary*, & CSABA PLÉH, *Budapest University of Technology and Economics*

—The main purpose of this research is to study the relationship between verbal working memory and morphological complexity of words. Hungarian as an agglutinative language is of special interest for psycholinguistic inquiries in morphology. The authors present three word recall experiments. The recall of words was measured by the classical span design. The item lists consisted of 2 syllable stems and 2 syllable morphologically complex words (stem+suffix). Within one list the words were of the same length, the same phonological structure (CVCVC), the same frequency and

the same concreteness. The experimental design was the same with 3 syllable words as well. The capacity of the phonological loop was measured by digit span and non-word repetition. Results indicated that morphological complexity has a significant effect on word span. Partial correlation analysis suggests that the effect of the phonological loop on morphologically complex words is mediated by stems rather than suffixes.

(3063)

Working Memory Capacity and Retrieval Inhibition: Interference and Controlled Resources. PATRICIA E. ROMÁN, MARÍA F. SORIANO, ANTONIO J. IBÁÑEZ, & TERESA BAJO, *University of Granada*

—Research has shown the relationship between working memory (WM) and the ability to inhibit irrelevant information. We explored if this relationship extends to retrieval induced inhibition using directed forgetting and retrieval-induced forgetting paradigms. Surprisingly, inhibition was only found for low WM span participants. We inferred that inhibition depends on the presence of interference from competing memories and high span individuals could be less susceptible to interference. Thus, increasing the cognitive demands imposed by the task reversed the pattern of results. When conditions were highly demanding, participants of high WM span showed retrieval inhibition, whereas low WM individuals did not. The greater amount of interference in this highly demanding conditions triggered inhibition for the high span participants, whereas overloaded the WM resources for the low span individuals, impeding the functioning of inhibitory processes. This findings suggest that retrieval induced inhibition depends both on the presence of interference and on the availability of controlled resources.

(3064)

Common Region and Spatial Performance Using Map-Like Displays. KAREL M. HURTS, *Leiden University*

—Three techniques of perceptual grouping were compared in terms of their effect on people's ability to read maps that always remained visible. The techniques differ in the way they create clusters of cities in schematic, geographic 2D maps: by using boundary lines to form adjacent countries (Common Region), by coloring object city symbols that belong to the same, contiguous, country in a unique way (Adjacent Color), or by making same-colored cities not adjacent, but randomly spread across the map (Color Only). Subjects were asked to judge the horizontal orientation of cities and to make distance estimations for pairs of cities. Results show that the times needed to verify orientation statements were faster for same-cluster cities than for different-cluster cities, but only in the Common Region condition. Distance estimations were not affected. The implications of these results are discussed from the point of view trying to better understand the nature of spatial cognition.

(3065)

Is Serial Information Ordered During Input Presentation or Output Retrieval? MARIA CHIARA FASTAME, *University of Pavia*, & GRAHAM J. HITCH, *University of York*

—Since the time of Ebbinghaus (1913), two immediate recall tasks have been studied: forward and backward serial recall. Strong experimental evidence shows that a greater amount of items are recalled in forward than in backwards immediate recall (Dempster, 1981). This effect leads one to wonder whether serial information is encoded during input presentation or output recall. Different theorists have addressed this issue: according to the Complexity view, order information is encoded during stimulus presentation, hence the same process is used to order stimuli in forward and backward recall conditions (e.g., Ashman & Das, 1980; Jensen & Figueroa, 1976). On the contrary, the Representational view (see

Rosen & Engle, 1997) proposes different types of representation to encode stimuli in forwards and backwards recall (e.g., Conrad, 1972; Li & Lewandowsky, 1995). The present study used an adaptation of Hebb's serial repetition procedure to investigate the mechanisms underlying backwards serial recall and to explore whether cross-linguistic effects influence forward and backward serial recall. Results are interpreted in terms of current theoretical accounts of immediate serial order recall.

WORKING MEMORY: AGING EFFECTS

(3066)

Individual and Developmental Differences in Working Memory Span. NATHALIE GAVENS, & PIERRE BARROUILLET, *University of Burgundy* (presented by Pierre Barrouillet)

—The aim of the present study was to compare relative effect of equating the difficulty of the processing component on developmental and individual differences in working memory spans. Children aged 8 and 11 were presented with a reading digit span task in which they were asked to read series of digits successively presented on a screen while maintaining letters to be recalled. The difficulty component (reading digits) was equated across ages and individuals by manipulating the pace at which digits to be read were presented, while the total duration of their presentation remained unchanged. Each child in the experimental groups was asked to read digits at the fastest pace she or he was able to cope with. Our results along with those of previous studies which suggested that developmental and individual differences are not entirely underpinned by the same factors.

(3067)

Cognitive Inhibition and Everyday Experience of Interference: Are There Age-Related Differences? ERIKA BORELLA, ROSSANA DE BENI, & BARBARA CARRETTI, *University of Padova*

—It is largely assessed that elderly are less likely to detect and inhibit irrelevant information from working memory. However, little is known about the contribution of inhibitory functions to everyday problems that people encounter. A sample of young (range: 18-31 years), young-old (range: 60-74 years), old-old adults (over 75 years) performed a working memory task and the White Bear Suppression Inventory. This questionnaire measures the tendency to suppress thoughts and the incidence of unwanted thoughts. Results showed a linear age-related decline in working memory. This trend was not confirmed for the intrusions errors, expression of efficient inhibitory mechanisms. Only old-old committed a higher number of intrusions, reported a higher frequency of unwanted thoughts and a higher use of suppression techniques than young and young-old. These results suggest a maintenance of inhibitory processes till late adulthood showing a parallel between everyday experience of interference and a standard laboratory measure of inhibition.

(3068)

Attentional Control and Working Memory: A Study of Age and Individual Differences Using the Hayling Task. CATHERINE LUDWIG, *University of Geneva*, ERIKA BORELLA, *University of Padova*, DELPHINE FAGOT, & ANIK DE RIBAUPIERRE, *University of Geneva*

—Several studies have shown that individual differences in working memory (WM) reflect the ability to control attention to prevent interference. The present experiment aimed at specifying the role of both age and individual differences in WM capacity in resisting interference in the Hayling task. High and low WM span participants were identified within each of two age groups, young and older adults (60+), each originally consisting of 155

participants. Participants were required to complete high cloze sentences with either expected words (control condition) or words providing no meaning to the sentences (interference condition). Older adults produced less correct responses than younger ones and were particularly hampered in the interference condition. Low span participants produced less correct responses than high span ones, but only in the older group. Results suggest that both age and individual differences in WM capacity participate to age-related differences in resistance to interference.

(3069)

Temporal Information Processing and Aging: Involvement of Attention, Working Memory and Central Executive. ALEXIA BAUDOUIN, SANDRINE VANNESTE, & MICHEL ISINGRINI, *University of Tours*

—Time estimation aging is accounted by age-related decrease in cognitive processes involved in temporal information processing as working memory capacity and attentional resources. The present study compared performances of young and older adults in a duration reproduction task realised both in a single and in a concurrent condition. Participants were also administered classical working memory spans and central executive measures. The results showed differences between the two age groups in temporal task performed both in single and dual tasks and revealed that older adults were more sensitive than younger adults to the concurrent condition, suggesting that the decrease of attentional resources may be an important factor to account for age-related deficit in time estimation. Moreover, regression analysis showed that control of working memory active storage accounted for a great part of age-related variance observed in the single temporal task, whereas central executive dysfunctioning explained age-related modifications in the dual task.

(3070)

Aging Effects in Subliminal Perception: Neuro-Imaging Evidence. LUDOVIC FABRE, & PATRICK LEMAIRE, *University of Provence, LPC*

—A briefly presented stimulus (i.e., during 43 ms) could be identified and treated with no conscious awareness. This phenomenon could be observed with the subliminal priming paradigm. Subliminal priming is used to explore and understand how a prime stimulus could be treated and influence the processing of a target stimulus. In our study, we have used a combination of behavioural and brain-imaging techniques with a judgment parity task. Participants had to decide whether a target number was odd or even. Our findings have implications for further understanding (a) cognitive mechanisms underlying subliminal priming, and (b) neural bases of these mechanisms, and (c) age-related differences in these.

(3071)

Reasons for the Growth of Traditional Memory Span across Age. ERNST OTTEM, ARILD LIAN, *Bredtvet Resource Center*, & PAUL J. KARLSEN, *New York University*

—Three studies, covering together the age range from 4 to 16 years, show the relationships between age, short-term memory span, and language skills. The growth of the traditional memory span in childhood is systematically related to a concomitant growth of language skills as tested with CELF-3 Screening, two tests of Word knowledge, a test for reception of grammar (TROG-2) and the British Picture Vocabulary Test (BPVS). Linear regression and ANCOVA analyses show that the growth of memory span is fully explained by the growth of language skills in the three studies that covered different sub-samples of children. In a confirmatory factor analysis a two-factor model fits the data well and shows that a 'crystallized' language factor is strongly related to age, while a 'fluid' short-term memory factor is unrelated to age. In the current

study fluid short-term memory capacity remains constant across age, whereas chunking capacity, highly dependent on language skills, causes an increase in traditional memory span with age. It is argued that the two-factor model gives support to Baddeley's multi-component model of working memory.

WORKING MEMORY: NEURAL SUBSTRATES

(3072)

Neural Substrates of Working Memory Maintenance vs. Manipulation: Dissociable Developmental Trajectories? EVELINE A. CRONE, LINDA VAN LEIJENHORST, *Leiden University*, CARTER WENDELKEN, SARAH E. DONOHUE, & SILVIA A. BUNGE, *University of California, Davis*

—Improvements in working memory throughout childhood are more extended for tasks that require manipulation of mental representations than those that merely require maintenance (Hitch, 2002). In the cognitive neuroscience literature, a widely – although not universally – accepted view is that maintenance and manipulation are separable cognitive processes that rely on ventrolateral and dorsolateral regions of prefrontal cortex (VLPFC and DLPFC), respectively (e.g. Smith & Jonides, 1999). The current study sought to test the hypothesis that developmental improvements in maintenance are correlated with changes in VLPFC activation, whereas developmental improvements in manipulation are correlated with changes in DLPFC activation. Participants (8-12-year-olds, n=12; 13-17-year-olds, n=12; 18-25-year-olds n=18) performed a task in the fMRI scanner in which three objects were presented in sequential order, followed by a 'forward' or 'backward' sign (Sakai et al., 2003). The forward condition required the maintenance of a sequential order, whereas the backward sign required participants to re-order the information. Performance results show that manipulating information in the backward order results in decreased accuracy, but this decrease is much more pronounced for the 8-12-year-olds (forward: 89 % correct, backward: 74 % correct) than for the 13-17-year-olds (forward: 96 % correct, backward: 93 % correct) and the young adults (forward: 98 % correct, backward: 92 % correct). Neuroimaging data show that children recruit VLPFC to a similar extent as adolescents and adults during the forward delay period, but recruit DLPFC less than adolescents and adults during the backward delay period. These data support the hypothesis of dissociable contribution of VLPFC and DLPFC to working memory maintenance and manipulation across development.

(3073)

An rTMS Study on the Neural Correlates of Verbal Short-Term Memory. LEONOR J ROMERO LAURO, COSTANZA PAPAGNO, *University of Milan-Bicocca*, & VINCENT WALSH, *Institute of Cognitive Neuroscience - UCL, United Kingdom*

—The short-term verbal memory allows the retention of verbal information over a limited time period (seconds). It comprises both a phonological store, which holds information in phonological form, and a rehearsal process, which maintains items in memory using subvocal articulation. Converging evidence from neuropsychological and neuroimaging studies suggests that two discrete regions in the left hemisphere are the anatomical correlates of the phonological store (inferior parietal lobule) and of the rehearsal process (inferior frontal gyrus). In this study we use rTMS to investigate the role of left BA40 and left BA44 in tasks involving separately the phonological store and the rehearsal component.

(3074)

Memory and Attention/ Executive Functions: Which Relationships? SIMÕES R. MÁRIO, & SALOMÉ PINHO, *University of Coimbra*

—The present study was designed to evaluate the relationship between executive and attention functions and memory performance. Memory was explored by the Verbal Learning Test, scores like immediate memory span, learning and learning strategies, retroactive and proactive interference, and comparisons of types of errors (intrusions, perseverations). The subjects (N=120) were recruited from a large standardization sample of children. Results on the Verbal Learning Test were examined in four groups: normal and impaired subjects performance on executive functions and normal and impaired subjects attention performance. Tower of London and Trail Making Test B and Piéron Cancellation Test are the tasks that were administered among a battery of other neuropsychological tests. Verbal Learning Test consists of a semantic related word list and a similar interference list. The results indicated that specific executive and attention abilities appear to contribute differentially to particular aspects of memory performance.

(3075)

Conscious and Unconscious Information Processing in Working Memory: A Dual-Task Investigation. STEFANIE SCHIFFER, *University of Aachen*

—The “process dissociation procedure” was developed to separate conscious and unconscious memory processes. Despite essential methodological improvements of the original procedure, its theoretical embedding in established memory models is still missing. On the other hand, the well-founded working memory model of Baddeley & Hitch (1974) supposes that the central executive is responsible for conscious information processing without providing adequate empirical evidence for this assumption and without considering unconscious processes. Linking these two research areas, we used word-stem completion tasks in combination with different secondary tasks putting load on central executive (CE) or phonological loop (PL) to investigate the role of CE and PL in un-/conscious information processing. In addition, we manipulated the input and output modality of the items. The data suggest that the CE indeed plays an important role in conscious information processing. Moreover, CE and especially PL seem to be involved in unconscious information processing.

(3076)

Keeping the Context in Mind: Working Memory Maintenance and Prior Experience. NELLEKE C. VAN WOUWE, *Leiden University*, RICHARD K. RIDDERINKHOF, *University of Amsterdam*, & GUIDO P.H. BAND, *Leiden University*

—There are several theoretical approaches to clarify the underlying mechanisms of cognitive control in context processing. A naturalistic version of the continuous performance task was used to test how context information is applied in making a response decision. The subjects’ task was to respond on a target probe, given a specific context. Firstly, the dopamine context processing model proposes that the dopamine system, including the prefrontal cortex, helps to maintain context information in working memory for evaluating the context-target relationship. Secondly, according to the theory of event coding (TEC), context and target are bound into an event file. Prior experience can affect the speed of a response to a familiar target that is now presented in a different context. Performance is compared between young and old subjects in order to evaluate the role of dopamine. The poster will discuss whether both theories can be integrated.

(3077)

Cognitive and Neuroimaging Correlates of Sequential Generation of General and Specific Mental Images. SIMONA GARDINI, *University of Padua & University of Hull*, CESARE CORNOLDI, ROSSANA DE BENI, *University of Padua*, & ANNALENA VENNARI, *University of Hull*

—The aim of this event-related functional Magnetic Resonance Imaging (fMRI) study was to verify whether more complex images (i.e. specific) are generated by enriching with details more global, general images. In this paradigm, participants were required to sequentially generate either a general image followed by a specific one for the same word or viceversa. Generation times and brain activation were measured. Generation times revealed that specific images, when generated as second, took shorter than when they were generated as first. General images activated right parietal areas deputed to visuo-spatial processing. Specific images activated frontal and thalamic regions, more specifically related to conceptual and detail knowledge. There were differences in the pattern of activation for both general and specific images, depending on the order of generation. This latter finding indicates that not all generation operations are done starting from a prototypical general image, but cognitive operations differ depending on which image is generated first.

(3078)

Neural Correlates of Intrinsic and Relative Frames of Reference. GABRIELE JANZEN, DANIEL B.M. HAUN, & STEPHEN C. LEVINSON, *Max Planck Institute for Psycholinguistics*

—Underlying spatial memory and spatial language is a coordinate system often called frame of reference. With an event-related functional Magnetic Resonance Imaging (fMRI) experiment we investigated the neural correlates of intrinsic and relative frames of references. Fourteen participants saw pictures with a car at an intersection and should decide if the car needs to turn left or right to reach a square. They should either decide from their own viewpoint (relative) or from the perspective of the car (intrinsic). Increased neural activity for relative as compared to intrinsic trials was observed in the cingulate gyrus and in the parietal lobe. Intrinsic trials however showed increased activity in the insula and in the precentral gyrus. The present results show differential patterns for both frames of reference and confirm neurophysiological studies which report the parietal lobe to be involved in relative coding whereas the precentral motor area is involved in intrinsic coding.

(3079)

Development of Relational Integration and Rostrolateral Prefrontal Cortex. LINDA VAN LEIJENHORST, EVELINE A. CRONE, *Leiden University*, RYAN D. HONOMICHL, CARTER WENDELKEN, *University of California, Davis*, KALINA CHRISTOFF, *University of British Columbia*, & SILVIA A. BUNGE, *University of California, Davis*

—The ability to consider multiple relations simultaneously is a key aspect of higher order cognitive functions, such as analogical reasoning and transitive inference (Hummel & Holyoak, 1997). The Raven’s Progressive Matrices (RPM) is a commonly used test that requires integration of relations depicted within a spatial pattern. Adult fMRI studies involving RPM-like problems suggest that rostrolateral prefrontal cortex (RLPFC) may be recruited specifically during problems that require consideration of increased relational complexity (2 relations > 1 > 0; e.g. Christoff et al., 2001). Children aged 5 and older can consider multiple relations simultaneously (Halford et al., 1998), but improvements in relational integration are observed throughout childhood (Sternberg & Rifkin, 1979). Little or nothing is currently known about the functional brain changes underlying these developmental changes. As such, we are conducting an fMRI study of relational integration in 8- to 12-year-olds and young adults, with a similar paradigm to Christoff et al.’s slow event-related design (2001). Pilot testing showed that children as young as 8 were capable of correctly answering even the most difficult problems (i.e., 2-relation) within 12 seconds. Two alternative hypotheses will be considered: 1)

children will not recruit RLPFC during even the most difficult problems, suggesting that the adult functional circuitry is still developing, or 2) children will recruit RLPFC on 1-relation and possibly 0-relation problems in addition to 2-relation ones, suggesting that children recruit the same neural circuitry as adults for relational reasoning, but that the recruitment of this circuitry becomes more efficient with age.

(3080)

When Language Meets Action: The Neural Integration of Gesture and Speech. ROEL M. WILLEMS, *F. C. Donders Centre for Cognitive Neuroimaging, Radboud University Nijmegen*, ASLI ÖZYÜREK, *F. C. Donders Centre for Cognitive Neuroimaging & Max Planck Institute for Psycholinguistics*, & PETER HAGOORT, *F. C. Donders Centre for Cognitive Neuroimaging & Nijmegen Institute for Cognition and Information, Radboud University Nijmegen & Max Planck Institute for Psycholinguistics*

—Although generally studied in isolation, language and action often co-occur in everyday life. Here we investigated one particular form of simultaneous language and action, namely speech and gestures. In two separate fMRI and EEG studies we assessed the neural integration of iconic gestures and accompanying speech. Verbal and/or gestural semantic content matched or mismatched the content of the preceding part of speech. In the fMRI study we found that an increase in integration load of verbal and gestural information into prior speech context both activated Broca's area (specifically left inferior frontal gyrus). Intraparietal and superior temporal regions showed stronger activations for gesture and speech respectively. Importantly, a classical language area, Broca's area, is not only recruited for the integration of meaning within the language modality, but also when action observation is integrated with speech. In the EEG study we found increased integration load to be reflected in a stronger N400 effect both for speech and gesture integration. Importantly, the N400 effects for both conditions did not differ significantly in their onset latencies or amplitudes. In summary, our results provide strong evidence for semantic information conveyed through the action and language

domains to be integrated into a prior sentence context in highly similar ways. By employing neuroimaging methods with an optimal resolution in spatial (fMRI) and temporal (EEG) terms, we were able to show similarity in the locus as well as in the timecourse of the neural integration of action and language information.

(3081)

Neural Correlates of Attention and Encoding into Visual Working Memory – Evidence for Interference. JUTTA S. MAYER, ROBERT A. BITTNER, *Johann Wolfgang Goethe University, Frankfurt*, DANKO NIKOLIĆ, *Max Planck Institute for Brain Research, Frankfurt*, & DAVID E.J. LINDEN, *University of Wales*

—Selective attention and visual working memory (WM) are fundamental cognitive mechanisms, both operating at the interface between perception and action. Their respective neural correlates are difficult to investigate with functional magnetic resonance imaging (fMRI) because they overlap in time in conventional WM tasks. To directly compare their activation patterns we designed a paradigm that separated attention and encoding in time and allowed for an orthogonal manipulation of the two. Participants selected a subset from a large stimulus array by scrutinizing one set of features of each object and, upon detection of the target objects, encoded another set of their features into WM. Visual attention was manipulated by the presence of perceptual pop-out, and WM load was varied parametrically (load 1 vs. load 3). Differences in the activity patterns were mainly observed within prefrontal regions with encoding-related activity lateralized to the left side and attention-related activity lateralized to the right side. Areas in prefrontal, parietal and occipital regions were involved in the modulation of both attention and WM encoding. Only a subset of these areas including posterior and left frontal regions showed an interaction effect indicating that attentional mechanisms interfered with subsequent encoding into WM. Thus, successful encoding into WM seems to be constrained by attentional mechanisms with the bottleneck most likely to be in posterior and left frontal regions.

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