Cognitive development

1. Full title
   Cognitive development

2. Research group
   Developmental Psychology
   Program director: Maurits van der Molen

3. Members of the group
   Senior staff
   Hilde Huizenga, Mariette Huizinga, Brenda Jansen, Mariette van der Molen, Maurits van der Molen, Annemie Ploeger, Maartje Raijmakers, Ger Ramakers, Richard Ridderinkhof, Patrick Snellings, Riek Somsen, Ingmar Visser, Reinout Wiers

   Postdoctoral fellows
   Mike Cohen, Birte Forstmann, Dorothy Mandell, Sanne de Wit, Wery van den Wildenberg

   PhD’s
   Bianca van Bers, Anika Bexkens, Dilene van Campen, Janna Cousijn, Anna van Duijvenvoorde, Bregtje Gunther Moor, Helga Harsay, Sara Jahfari, Marijke van de Laar, Guido Meijnders, Melle van der Molen, Tessa van Schijndel, Verena Schmittmann, Wouter Weeda

4. Membership Research School and other Research Institutes
   Nearly all staff members participate in the Experimental Psychology Graduate School (EPOS) or the Interuniversitary Graduate School for Psychometrics and Sociometrics (IOPS). Wiers participates in the Research School of Experimental Psychopathology (EPP). The staff has close ties with the Cognitive Science Center Amsterdam (CSCA) of the University of Amsterdam.

5. Research topics
   The program focuses on two research themes: Developmental Processes and Brain and Development. Within the context of Developmental Processes the emphasis is on (i) the experimental analysis and advanced modeling of cognitive development during childhood and individual differences in cognitive abilities, and (ii) the construction and application of adaptive signal analysis techniques for the analysis of EEG/MEG and fMRI measurements and
advanced statistical techniques for the analysis of age and individual differences. Our research into *Brain and Development* centers on (i) the development of, and individual differences in, cognitive control during childhood, adolescence and senescence and (ii) the construction and application of experimental tasks for the analysis of age and individual differences. Our research on developmental psychopathology will receive a considerable boost with Wiers cs joining the program. The growing interaction between both themes is facilitated by a shared interest in mental chronometry and neural activity.

6. Program Development

During the past year, the rapprochement between the two themes (i.e., *Developmental Processes* and *Brain and Development*) continued. Hence, the progress made during the past year is presented along the developmental dimension rather than within the confines of research themes. The research on early infancy is focusing on learning mechanisms (e.g., in category learning) and suggests substantial individual differences in learning strategy across developmental trajectories. These findings have strong implications for the study of developmental change in category learning during later stages of development and prompted a collaborative effort examining the neural underpinnings of category learning in youth. Major efforts in our studies of childhood continue to focus on cognitive control (most notably the ability to inhibit) and strategy use. The research on inhibition received considerably input from a guest professorship of Gordon Logan, one of the most prominent researchers in this field. Our studies are concerned with the neural substrate of inhibition, the relation between inhibition and other aspects of cognitive control (e.g., working memory) and individual differences (e.g., inhibitory deficits in ADHD). Studies on developmental change in cognitive strategy focus on the identification of individual differences in strategy use across several domains (e.g., propositional learning, risk taking, causal reasoning, implicit learning). Major questions refer to the mechanisms implicated in the increasing complexity in strategies and the issue of continuous vs. discontinuous developmental change. The mathematical modeling received considerable input from guest professorship of Prof. W.H. Batchelder (University of Irvine) who is one of the founding fathers of mathematical psychology. Finally, our work on dyslexia shifted to an emphasis on fluency allowing for a formal analysis in terms of processing speed. Our work on the adolescence received substantial strengthening by Wiers who joined the research in 2008. His work centers on substance abuse in adolescence using an implicit-cognition framework. This work meshes well with our continuing research on adolescent-risk taking in relation to sensitivity to peer pressure and perceived social acceptance and working-memory deficits in mildly retarded adolescents. Wiers obtained a VICI grant for longitudinal and neurocognitive work on substance abuse in
adolescents. Neurocognitive control is the major focus of our research during adulthood. This work comprises a range of related topics, including context processing, the maintenance and shifting of preparatory set, performance monitoring, reward processing and adaptive decision making. fMRI is used to assess the neural substrate involved in cognitive control. Forstmann was awarded a VENI grant for her work on cognitive control combining descriptive analysis and mathematical modeling with fMRI, DTI and ERP methods. The work during senescence continues to assess developmental change in cognitive ability during aging examining which abilities are relatively spared vs.
deteriorated. An important feature of this work refers to the interaction between emotion/motivation and cognition vis-à-vis age-related changes in the availability of dopamine. Cognitive deficits in the elderly are examined also. A special focus of interest refers to cognitive deficits implicating the basal ganglia (e.g., Parkinson disease).

A running thread through all this work refers to the development and application of sophisticated statistical and formal models that are applied in the analysis of developmental change (e.g., latent class analysis, Markov modeling) and the analysis of brain-behavior analysis (e.g., procedures based on likelihood estimation, model-based fMRI and MRI methods).

7. Composition of research input of academic staff in 2008

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RESEARCH OUTPUT

1. Academic publications

1.a.1 In refereed journals issued in English


1.a.2 In refereed journals issued in other languages


1.b In other journals

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1.c Book chapters


1.d Edited books

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2. Monographs

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3. Ph.D. Theses

3.a Internally prepared

3.b Externally prepared
-
3.c Doctorates at other faculties/universities, co-supervised by program members
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4. Professional publications


5. Popular publications
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OTHER PROOFS OF PRODUCTIVITY

6. Editorships

Molen, M. W. van der
*Neuropraxis*

Wiers, R. W.
*Addiction (Senior Editor)*

7. Organisation of conferences and symposia


8. Research grants

Burle, B., Wildenberg, W. P. M. van den, & Forstmann, B. U. (2009-2010) NWO van Gogh Grant for ‘Inhibition or suppression in interference tasks? A combined neuroimaging approach to study cognitive control.’


9. Keynote speeches at conferences


10. Collaborations

Forstmann, B. U. (2008 - present). Collaboration with Cools, R.; F.C. Donders Institute, Nijmegen, the Netherlands and Ivry, R.; University of California, Berkeley, USA. *The anatomical and neurochemical foundations of decision-making under time pressure.*


Molen, M. W. van der (2005 - present). Collaboration with Veen, F. M. van der; Erasmus Medical Center, Rotterdam. *Feedback processing in depression.*


Wiers, R. W. H. J. (2007 - present). Collaborations many clinics in The Netherlands and abroad (e.g. Salus Klinik, Lindow, Dr. Lindenmeyer). *Test of new behavioral modification techniques for addictive behaviors.*


Wildenberg, W. P. M. van den (2002 - present). Collaboration with Burle, B; Laboratoire de Neurobiologie de la Cognition, CNRS et Université de Provence, Marseille. *Neurobiology of cognitive control.*


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Other Research

Social Cognitive Development
Professor Oppenheimer’s research focuses on social cognitive development and is part of the Institute for the Study of Education and Human Development (ISED), the Cross-Cultural Research Program on Children and Peace (CRPCP), and the Cross-National Research Project on the Development of Enemy Images. The main accomplishments and outcomes of this research are briefly summarized below.

The main themes of this research are:

*Development of the Self-Concept*

The organization and structure of self-relevant information across age and in relation to behavior regulation. In addition, the role of society, parenting, and
friendship relations in the development of self, relevant information and its impact on the development of belief structures and feelings of well-being.

Development of Enemy Images
The development of the understanding of enemy and the emergence of enemy images. In addition, the development of the understanding of terrorist and the role of cross-generation transfer of stereotypes and negative emotions toward a particular group or nation.

General Social-Cognitive and Cultural Issues
The development of personal and social responsibility and cultural variables in development.

In 2008 the program resulted in the following international publication:


Finally, Louis Oppenheimer is co-director of the Cross-Cultural Research Program on Children and project leader of the Cross-National Research Project on the Development of Enemy Images.