

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 Interuniversity 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. Bathchelder (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

FTE	wp1	wp2	wp3	Total
Full professors (HL)	1.07	0.53		1.60
Associate professors (UHD)	0.39	0.77		1.16
Assistant professors (UD)	1.63	1.68	0.79	4.10
Other tenured research staff	0.50			0.50
<i>Total tenured research staff</i>	<i>3.59</i>	<i>2.98</i>	<i>0.79</i>	<i>7.36</i>
Non-tenured research staff		2.12		2.12
Ph.D. students	2.69	7.35	0.86	10.90
Research assistants	0.15	0.94	0.03	1.12
<i>Total non-tenured research staff</i>	<i>2.84</i>	<i>10.41</i>	<i>0.89</i>	<i>14.14</i>
Total	6.44	13.39	1.68	21.50

RESEARCH OUTPUT

1. Academic publications

1.a.1 In refereed journals issued in English

- Bermond, B., Righart, R., Ridderinkhof, K. R., & Moormann, P. P. (2008). Alexithymia and the brain potential P300. *Netherlands Journal of Psychology*, *64*, 65-77.
- Borsboom, D., & Visser, I. (2008). Semantic cognition or data mining? *Behavioral and Brain Sciences*, *31*, 714-715.
- Cohen, M. X., Ridderinkhof, K. R., Haupt, S., Elger, C. E., & Fell, J. (2008). Medial frontal cortex and response conflict: Evidence from human intracranial EEG and medial frontal cortex lesion. *Brain Research*, *1238*, 127-142.
- Colzato, L. S., Bajo, M. T., Wildenberg, W. P. M van den, Paolieri, D., Nieuwenhuis, S. T., Heij, W. la, & Hommel, B. (2008). How does bilingualism improve executive control? A comparison of active and reactive inhibition mechanisms. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, *34*, 302-312.
- Colzato, L. S., Wildenberg, W. P. M van den, & Hommel, B. (2008). Reduced spontaneous eye blink rates in recreational cocaine users: Evidence for dopaminergic hypoactivity. *PLoS ONE*, *3*, e3461.
- Colzato, L. S., Wildenberg, W. P. M van den, & Hommel, B. (2008). Losing the big picture: How religion may control visual attention. *PLoS ONE*, *11*, e3679.
- Duijvenvoorde, A. C. K. van, Zanolie, K., Rombouts, S. A. R. B., Raijmakers, M. E. J., & Crone, E. A. (2008). Evaluating the negative or valuing the positive? Neural mechanisms supporting feedback-based learning across development. *Journal of Neuroscience*, *28*, 9495-9503.
- Field, M., Schoenmakers, T., & Wiers, R. W. (2008). Cognitive processes in alcohol binges: A review and research agenda. *Current Drug Abuse Reviews*, *1*, 263-279.
- Forstmann, B. U., Dutilh, G., Brown, S., Neumann, J., Cramon, D. Y. von, Ridderinkhof, K. R., & Wagenmakers, E. -J. (2008). Striatum and pre-SMA facilitate decision-making under time pressure. *Proceedings of the National Academy of Sciences of the USA*, *105*, 17538-17542.
- Forstmann, B. U., Jahfari, S., Scholte, H. S., Wolfensteller, U., Wildenberg, W. P. M van den, & Ridderinkhof, K. R. (2008). Function and structure of the right inferior frontal cortex predict individual differences in response

- inhibition: A model-based approach. *Journal of Neuroscience*, 28, 9790-9796.
- Forstmann, B. U., Wildenberg, W. P. M van den, & Ridderinkhof, K. R. (2008). Neural mechanisms, temporal dynamics, and individual differences in interference control. *Journal of Cognitive Neuroscience*, 20, 1854-1865.
- Forstmann, B. U., Wolfensteller, U., Derrfuss, J., Neumann, J., Brass, M., Ridderinkhof, K. R., & Cramon, D. Y. von (2008). When the choice is ours: Context and agency modulate the neural bases of decision-making. *PLoS ONE*, 3, e1899.
- Gaal, S. van, Ridderinkhof, K. R., Fahrenfort, J. J., Scholte, H. S., & Lamme, V. A. F. (2008). Frontal cortex mediates unconsciously triggered inhibitory control. *Journal of Neuroscience*, 28, 8053-8062.
- Grenard, J. L., Ames, S. L., Wiers, R. W., Thush, C., Sussman, S., & Stacy, A. W. (2008). Working memory moderates the predictive effects of drug-related associations. *Psychology of Addictive Behaviors*, 22, 426-432.
- Kreukels, B. P. C., Dam, F. S. A. M. van, Ridderinkhof, K. R., Boogerd, W., & Schagen, S. B. (2008). Persistent neurocognitive problems after adjuvant chemotherapy for breast cancer. *Clinical Breast Cancer*, 8, 80-87.
- Kreukels, B. P. C., Hamburger, H. L., Ruiters, M. B. de, Dam, F. S. A. M. van, Ridderinkhof, K. R., Boogerd, W., & Schagen, S. B. (2008). ERP amplitude and latency in breast cancer survivors treated with adjuvant chemotherapy. *Clinical Neurophysiology*, 119, 533-541.
- Mandell, D. J., & Sackett, G. P. (2008). A computer touch screen system and training procedure for use with primate infants: Results from pigtail monkeys (*Macaca nemestrina*). *Developmental Psychobiology*, 50, 160-170.
- Ploeger, A., Maas, H. L. J. van der, & Raijmakers, M. E. J. (2008). Is evolutionary psychology a metatheory for psychology? A discussion of four major issues in psychology from an evolutionary developmental perspective. *Psychological Inquiry*, 19, 1-18.
- Ploeger, A., Maas, H. L. J. van der, & Raijmakers, M. E. J. (2008). Is evolutionary developmental biology a viable approach to the study of the human mind? Reply. *Psychological Inquiry*, 19, 41-48.
- Straatemeier, M., Maas, H. L. J. van der, & Jansen, B. R. J. (2008). Children's knowledge of the earth: A new methodological and statistical approach. *Journal of Experimental Child Psychology*, 100, 276-296.
- Veen, F. M. van der, Mies, G. W., Molen, M. W. van der, & Evers, E. A. (2008). Acute tryptophan depletion in healthy males attenuates phasic cardiac slowing but does not affect electro-cortical response to negative feedback. *Psychopharmacology*, 199, 255-263.

Wagemans, J., Winter, J. de, Beeck, H., Ploeger, A., Beckers, T., & Vanroose, P. (2008). Identification of everyday objects on the basis of silhouette and outline versions. *Perception*, 37, 207-244.

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

Houben, K., Schoenmakers, T., Thush, C., & Wiers, R. W. (2008). Impliciete cognitie en verslaving. *Gedragstherapie*, 41, 169-182.

Thush, C., & Wiers, R. W. (2008). Een dubbele kijk op minder drinken. De invloed van expliciete en impliciete alcoholgerelateerde processen en vroege interventie bij jongeren. *Psychologie & Gezondheid*, 36, 273-283.

Wiers, R. W. (2008). Een noodlottige zelfoverschatting van het bewustzijn. Het ontstaan van verslavingsgedrag bij jongeren. *De Psycholoog*, 43, 210-217.

1.b In other journals

-

1.c Book chapters

Raijmakers, M. E. J. (2008). Modelling cognitive developmental transitions in neural networks: Bifurcations in an adaptive resonance theory model. In D. Mareschal, S. Sirois, G. Westermann & M. Johnson (Eds.), *Neuroconstructivism: Perspectives and prospects, Volume 2* (pp. 99-128). Oxford: Oxford University Press.

Ramakers, G. J. A. (2008). Basic neuroscience in individual differences in brain and cognitive development. In I. van Keulen (Ed.), *Brain visions. How the brain sciences could change the way we eat, learn, communicate and judge* (pp. 291-301). The Hague, The Netherlands: STT Netherlands, Study Center for Technology Trends.

1.d Edited books

-

2. Monographs

-

3. Ph.D. Theses

3.a Internally prepared

Ploeger, A. (December 2008). *Towards an integration of evolutionary psychology and developmental science: New insights from evolutionary developmental biology* (pp. 154). Universiteit van Amsterdam. Promotor: H. L. J. van der Maas; co-promotores: F. Galis & M. E. J. Raijmakers.

3.b Externally prepared

-

3.c Doctorates at other faculties/universities, co-supervised by program members

-

4. Professional publications

Crone, E. A., & Molen, M. W. van der (2008). Neurocognitive development of performance monitoring and decision making. In Ch. A. Nelson & M. Luciana (Eds.), *Handbook of developmental cognitive neuroscience (Second edition)* (pp. 883-895). Cambridge, MA: The MIT Press.

Ridderinkhof, K. R., Stallen, M., & Winden, F. van (2008). Never trust a stranger - Work on ties that bind. *VOX: Research-based policy analysis and commentary from leading economists, Oct. 13th*.

Wiers, R. W., & Engels, R. (2008). Middelennisbruik en verslaving. In P. Prins & C. Braet (Eds.), *Handboek klinische ontwikkelingspsychologie* (pp. 529-553). Houten: Bohn Stafleu van Loghum.

5. Popular publications

-

OTHER PROOFS OF PRODUCTIVITY

6. Editorships

Molen, M. W. van der
Neuropraxis

Wiers, R. W.
Addiction (Senior Editor)

7. Organisation of conferences and symposia

Mandell, D. J. (2008). Planning and organization committee for the *2008 Meeting of the American Society of Primatologists*, West Palm Beach FL, USA, June.

Mandell, D. J. (2008). Reviewer for the *Society for Research in Child Development Biennial Meeting*, Denver CO, USA, April.

Raijmakers, M. E. J., & Huizinga, M. (2008). Organisation of the *Inaugural conference of the Dutch Organization of Developmental Psychology*, Wageningen, May.

Taal, M., & Snellings, P. (2008). Organisation of the symposium *Schoolpsychological Interventions for children with learning problems for the 30th ISPA Conference*. Utrecht, the Netherlands, July.

Weltevreden, G. M. (2008) Organisation of the congress *Sport psychology, from science to practice, for the Dutch Society of Sport Psychology*, Amsterdam, The Netherlands, February.

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.*'

Forstmann, B. U. (1.11.2008-31.10.2012). NWO Veni grant for '*Structural and neural correlates of individual differences in inhibition across the adult lifespan.*'

Wiers, R. W. (2009-2013) NWO VICI Grant for '*Implicit Cognition and Addiction: Changing perspectives and new interventions.*'

9. Keynote speeches at conferences

Visser, I. (September 2008). *A framework for modeling discrete change*. Invited keynote lecture at the Individual Pathways of Change conference, PennState University, State College, Pennsylvania

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.*

Forstmann, B. U. (2008 - present). Collaboration with Cramon, D. Y. von; Max Planck Institute for Neurological Research, Cologne, Germany. *Structural correlates of individual differences in decision-making processes across the adult lifespan.*

Forstmann, B. U. (2008 - present). Collaboration with Turner, B. von, Lohmann, G. & Neumann, J.; Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany. *Structural correlates of individual differences in inhibition across the adult lifespan.*

- Mandell, D. J. (2007 - present). Collaboration with G.P. Sackett & T. Burbacher; The Washington National Primate Research Center, Seattle, WA, USA. *Investigating the role of early infant vaccinations on the development of Autism-like behavior in rhesus monkeys.*
- Molen, M. W. van der (1983 - present). Collaboration with Jennings, J. R.; WPIC, University of Pittsburgh, Pittsburgh. *Cardiac concomitants of information processing.*
- Molen, M. W. van der (2004 - present). Collaboration with Boxtel, G. J. M. van; Faculteit Sociale en Gedragwetenschappen. *Electrocortical and EMG analysis of S-R compatibility.* Universiteit van Tilburg, Tilburg.
- Molen, M. W. van der (2005 - present). Collaboration with Veen, F. M. van der; Erasmus Medical Center, Rotterdam. *Feedback processing in depression.*
- Molen, M. W. van der (2006 - present). Collaboration with Crone, E.; Faculteit Sociale Wetenschappen, Universiteit Leiden, Leiden. *Developmental change in decision making.*
- Ploeger, A. (2004 - present). Collaboration with Galis, F.; Department of Biology, Leiden University. *An evolutionary developmental perspective on mental disorders.*
- Raijmakers, M. E. J., & Visser, I. (2005 - present). Collaboration with Lea, S. E. G. & Wills, A. J.; School of Psychology, University of Exeter. *A comparative analysis of learning.*
- Raijmakers, M. E. J., & Visser, I. (2005 - present). Collaboration with Pothos, E. M.; Department of Psychology, University of Wales, Swansea, UK. *Latent groups in implicit learning.*
- Wiers, R. W. H. J. (1996 - present). Collaborations with Sher, K. and colleagues; University of Missouri at Columbia. *Development of addictive behaviors.*
- Wiers, R. W. H. J. (2001 - present). Collaborations with Stacy A. and his research group (Ames, Grenard); University of Southern California (USC-LA). *NIDA – N.W.O. grant implicit cognition and addiction.*
- Wiers, R. W. H. J. (2003 - present). Collaborations with Houwer, J. de; University of Gent. *Implicit cognition and health psychology*, special issue Journal Behavior Therapy and Experimental Psychiatry.
- Wiers, R. W. H. J. (2003 - present). Collaborations with Jones, B.; University of Glasgow. *Assessment strategies for attentional bias in alcohol/drug use.*
- Wiers, R. W. H. J. (2005 - present). Collaborations with Cox, M.; University of Bangor. *Changing implicit cognitive processes in addiction.*

- Wiers, R. W. H. J. (2006 - present). Collaborations with Nosek, B.; University of Virginia. *Implicit cognition assessment over internet.*
- Wiers, R. W. H. J. (2006 - present). Collaborations with Field, M.; University of Liverpool. *Attentional bias and acute alcohol effects.*
- Wiers, R. W. H. J. (2006 - present). Collaborations with Engels, R., Vorst, H. van der, Pieters, S.; Radboud Universiteit Nijmegen. *Stress and alcohol use in adolescence.*
- 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.*
- Wiers, R. W. H. J. (2008 - present). Collaborations with MacLeod, C. & Stritzke, W.; University of Western Australia, Ph.D. project Jason Sharabee. *Mechanisms underlying attentional bias for alcohol.*
- Wiers, R. W. H. J. (2008 - present). Collaborations with Houben, K., Roefs, A., Havermans, R., Jansen, A., Vries, H. de & Elffadali, I.; Universiteit Maastricht. *Implicit cognition and psychopathology.*
- 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.*
- Wildenberg, W. P. M. van den (2005 - present). Collaboration with Wylie, S.A; Neurology Department, University of Virginia. *Cognitive deficits in Parkinson's disease.*
- Wildenberg, W. P. M. van den (2005 - present). Collaboration with Boxtel, G.J.M. van; Psychonomie, Universiteit van Tilburg. *Psychophysiology of inhibitory control.*

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:

Oppenheimer, L., & Mandemaker, E. (2008). Children's conceptions of terrorists: Exploratory studies. *Peace and Conflict: Journal of Peace Psychology, 14*, 193-213.

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.

