

Behavioural Science Institute



In the 'Curious Minds' project, the science and technology capabilities of children were mapped and methods were designed to further develop these skills.

The Behavioural Science Institute (BSI) conducts research on human behaviour. The aim of the institute is both fundamental (to understand behaviour) and applied to societal challenges (to influence behaviour). A distinctive feature of the BSI is an integrative approach to human behaviour that transcends the traditional disciplinary boundaries of psychology, education and communication science.

The BSI, which is the largest research institute of the Faculty of Social Sciences, is accredited as a research school by the Royal Netherlands Academy of Arts and Sciences (KNAW). A two-year Research Master's programme in Behavioural Science (www.ru.nl/master/behaviouralscience) is taught within the BSI Graduate School, which is officially recognized by the Netherlands Organisation for Scientific Research (NWO).

BSI researchers investigate the nature and development of human behaviour. They study the ways in which it is influenced by i) individual factors (cognitive, affective, motivational and psycho-physiological processes), ii) social-contextual factors (home, school, peer groups, work organization and advertising), and iii) the dynamic interplay between these factors. In addition, they study reverse associations, *i.e.*, how human behaviour influences individual factors and the social context. Both 'normal' behaviour and psychopathology are the subject of research which involves laboratory experiments and field studies, large-scale longitudinal studies and randomized controlled trials. Studies include behavioural, self-report, psycho-physiological, neuroscience, genetic and virtual reality measurements.

BSI research is integrated in the following programmes (in alphabetical order):

Communication Science

The production, content, and reception of mediated communication are investigated. Research focuses on *influence* (commercial and social marketing communication), *information* (journalism and

news), and *culture* (media and consumer culture). The group takes a multidisciplinary approach (combining media-psychological with sociological perspectives), which is multi-method (using various quantitative and qualitative research methods), and has a keen interest in developments in the media landscape. There is considerable emphasis on ‘academic social responsibility’, and the group supports several initiatives designed to bridge the academy-society divide.

Developmental Psychopathology

The aetiology of emotional and behavioural problems in children, adolescents and their families are studied. Fundamental research is conducted across multiple levels of analysis, from genetic and neural processes to emotional, cognitive and social mechanisms, through to community and cultural factors. Insights from fundamental studies are applied in developing innovative intervention programmes, which are evaluated in order to strengthen and/or refine them.

Experimental Psychopathology and Treatment

Research focuses on abnormal psychology through the experimental study of cognitive and neuro-biological processes. A multi-modal approach is used and experimental methods (ranging from reaction times and verbal reports to eye-tracking, fMRI, EEG, MEG, and behavioural tests in real and virtual environments) are applied to cognitive processes in psychological dysfunctions. This is done in order to assess patients’ current status, re-train them, as well as predict treatment success and relapse.

Learning and Plasticity

Researchers in this programme explore the micro-analysis of learning and cognitive plasticity. The main focus is on learning and developing communication and cognition in normal and atypical populations. Particular attention is paid to the cognitive constraints related to learning a first and second language – both spoken and written – in terms of representation and control. To gain more insight into the dynamics of learning, the neural principles of brain plasticity are also taken into account.

Social Cognition

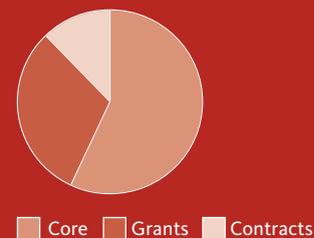
The main theme of this programme is the interaction between automatic and controlled aspects of behaviour. Several aspects are investigated, including the interactions between implicit and explicit components of attitudes, person perception, prejudice and interpersonal relationships and the role of conscious and unconscious processes in decision making and the pursuit of happiness.

Social Development

Fundamental processes of both typical and atypical social development and related cognitive processes over the human life span are studied from a behavioural, psychobiological and neuroscientific perspective. Clinical applications are also investigated. Areas of

Staff

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Prof. J.L.H. Bardoel (p)	Prof. R. Vonk (p)
Prof. E.S. Becker (o)	Prof. D.H.J. Wigboldus (o)
Prof. A.M.T. Bosman (p)	Prof. C.L.M. Witteman (o)
Prof. J.A.M. Bransen (o)	
Prof. M.A. Buijzen (o)	
Prof. A.H.N. Cillessen (o)	Tenured
Prof. H.P.J.M. Dekkers (p)	Full Professors 10.3 FTE
Prof. H.C.M. Didden (e)	Associate Professors 6.6 FTE
Prof. A.J. Dijksterhuis (p)	Assistant Professors 21.1 FTE
Prof. J.L.M. Egger (e)	Researchers 0.4 FTE
Prof. R.C.M.E. Engels (o)	
Prof. S.A.E. Geurts (p)	Non-tenured
Prof. I. Granic (p)	Researchers 13.7 FTE
Prof. J.G. van Hell (p)	Doctoral candidates 77.7 FTE
Prof. G.J.M. Hutschemaekers (p)	
Prof. C.A.J. de Jong (e)	Research funding
Prof. H.E.T. Knoors (e)	
Prof. M.A.J. Kompier (o)	
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research include early child development and child care, peer relationships, ADHD, cognitive and motor processes in sighted and visually impaired children, as well as successful aging among older adults.

Work, Stress and Health

The fundamental goal here is to advance knowledge of the cognitive, motivational and physiological processes that underlie task behaviour and performance. The applied goal is to provide evidence-based guidelines, which can be used to design healthy work, prevent stress, and promote recovery, motivation, learning and performance in the context of work and sports. This research programme comprises three interrelated research themes: 1) stress, fatigue and recovery, 2) new systems of work organisation, and 3) motivation, learning and performance.

Research facilities

The Behavioural Science Institute has excellent research facilities:

- A Virtual Reality Lab for immersive, three-dimensional computer-generated environments
- Mobile labs to accommodate various experimental setups outside the university

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- A Physiological Measurements lab, shared with the Donders Centre for Cognition, for measuring neurocognitive and biomechanical data
- Eye-trackers for measuring visual attention and eye movements
- Stabilometric platforms for research on freeze-approach-avoidance behaviour
- Observational labs with one-way screens and multiple cameras
- A computer lab with 22 identical cubicles for computerized experiments
- A Bar Lab for observational studies of social behaviour in a natural setting
- A Sport Lab for behavioural and psychophysiological measures during exercise
- Through its participation in the Donders Centre for Cognitive Neuroimaging (DCCN), the BSI has full access to neuroimaging facilities.

In 2013 the BSI invested in updating its lab facilities. This will continue in 2014, resulting in the replacement of much of the equipment.

Collaboration

Researchers within the BSI collaborate with numerous international and national partners. A number of these are linked to the BSI as international fellows. The Institute's strategy is to link these renowned scholars to Nijmegen. They visit at least once a year to give workshops, lectures and to work on joint publications. Some of the PhD students working at the BSI conduct part of their projects in the labs of these fellows. Currently, Profs. Charles Perfetti (Pittsburgh University), Alex Todorov (Princeton University), Janet van Hell (Pennsylvania State University), Mitchell Prinstein (University of North Carolina), Marcel Brass (University of Ghent), William Bukowski (Concordia University), Stefan Hofmann (Boston), Jasper Smits (Dallas), Emmanuel Kuntsche (Lausanne) and Goran Kecklund (Stockholm University) are BSI fellows.

There are formal collaboration arrangements with numerous international universities (*e.g.*, University of Cologne, Australian Catholic University, Indiana University, University of Virginia), research laboratories (*e.g.*, Haskins Laboratories in New Haven), multiple Dutch Universities, and institutes for applied research (*e.g.*, Trimbos Institute, TNO). Within Radboud University there are formal collaboration arrangements with the Medical Centre, the Donders Centres for Cognition (DCC) and Cognitive Neuroimaging (DCCN), and the Max Planck Institute for Psycholinguistics. The BSI also employs two Principal Investigators at DCCN (Dr Alan Sanfey and Prof. Karin Roelofs).

The BSI hosts the ZonMw-funded centre of excellence 'Academic Centre Youth Nijmegen', which is a consortium of 14 knowledge, policy and clinical institutions in the Nijmegen region. The aim is to improve the prevention and care of internalizing problems in youth.

Research results

Within the Communication Science programme, researchers found that marketing techniques can be used to promote healthier behaviour. However, they concluded that great care should be taken by health practitioners, because video games containing any type of food cue – including healthy ones – stimulate unhealthy snacking. Researchers found that competitive pressure in newsrooms increases the influence of television news on viewers. They also recommended that in the contemporary media environment journalists should improve transparency and accountability towards the public. Another finding was that medical practitioners – depending on their level of experience – relate in very different ways to morality-related issues in television entertainment programmes.

Within the Developmental Psychopathology programme, a series of studies stressed the impact of the way in which children imitate food intake and food purchasing patterns, and the processes underlying this. These studies were used to develop an intervention programme. Two large randomized controlled prevention trials focusing on programmes to train parents to effectively educate their children to refrain from smoking and drinking did not produce significant effects. These studies provided important insights about the timing and content of substance use prevention programmes. On the other hand, a smoking cessation intervention was clearly shown to be effective. Mixed findings in a series of longitudinal studies on gene-environment interactions related to loneliness, smoking and marijuana use in adolescents illustrated the complex nature of the interplay between genetic vulnerability factors and the environmental factors which affect psychopathology.

Members of the Experimental Psychopathology and Treatment programme identified factors that predict which alcoholics will profit from a relapse-reducing joystick training. They found that social stress reactions can be reduced by a training using a joystick to select smiling faces. A novel task was developed to investigate approach-avoidance tendencies in decision making. It was found that, for those with a genetic vulnerability to affective disorders, there is reduced downregulation of the amygdala by the prefrontal cortex, and that in patients with remitted depression, carriers of risk genes affect cognitive processes if they have experienced childhood trauma. The *Wall Street Journal* published an article on Bernd Figner's work on risky decision making.

Within the Learning and Plasticity programme, the focus was on neurocognitive and social markers in the learning and development of sensory, motor, visio-spatial, speech, language, literacy, mathematics, and science abilities, following experimental and quasi-experimental designs to test predefined hypotheses in both children and adults. Moreover, the development of such abilities in children with cognitive disorders or specific language, hearing or vision impairment was examined in prospective studies as well as in intervention studies. Finally, the impact of construction in educational



Prof. Moniek Buijzen (Professor of Communication Science) received an ERC Consolidator grant for her research on applying social media in health campaigns targeting young people in order to encourage exercise and eating healthier food.

gaming – and the role of teacher beliefs and school diversity – on student learning were studied.

In the Social Cognition programme, researchers working in the Person Perception Lab validated seven computational models for the social judgment of faces (identifying characteristics such as attractiveness, competence, dominance, extroversion, likability, threat and trustworthiness). The validated stimuli have been made available for use by other researchers. Research on social influence expanded on classic findings on obedience and showed that defying authority is more exhausting for individuals high in need for closure, than for people low in need for closure. Researchers working in the Decision Neuroscience lab showed for the first time that top-down strategies such as reappraisal strongly affect socio-economic decisions.

In the Social Development programme, the effects of maternal prenatal stress on infants' stress responses and later development were investigated. Also, the conditions under which stressful environments do or do not impair cognitive development were examined. It was demonstrated that parental behaviours may increase adolescents' susceptibility to deviant peer influence and risk. The implicit processes that may underlie peer influence among adolescents were investigated and friendship network types and their predictors in the second half of adult life were also examined. Research on ADHD showed consistently reduced activation of the ventral striatum during reward anticipation.

In the Work, Stress and Health programme, longitudinal and intervention studies on the association between psychosocial work characteristics and sleep quality were reviewed. It was concluded that demanding work and a low degree of control at work predict

poor sleep quality. In one of a series of studies on modern working life, the goal was to identify trends in the prevalence of physical workplace violence across Europe, as well as to reveal factors that may explain trends. It was found that workplace violence has increased significantly. Violence appears to be particularly prevalent in jobs involving regular use of computers. This may be because the nature of making contact with clients is changing.

Awards and acknowledgments

- Prof. Moniek Buijzen received an ERC Consolidator Grant for the project *Social Network Implementation of Health Campaigns*.
- Prof. Karin Roelofs received an NWO Vici grant for the project *Police in Action: The role of freeze-flight-flight in posttraumatic stress symptoms*.
- Profs. Toon Cillessen, Isabela Granic, Karin Roelofs, and Daniel Wigboldus each received an NWO Onderzoekstalent grant.
- Prof. Ron Scholte received a ZonMw grant for research on the effectiveness of the social network strategy in societal youth care.
- Prof. Rutger Engels received an Achmea grant for developing and testing a resiliency programme on residential youth care.
- Prof. Moniek Buijzen, Dr Simone de Droog, and Dr Esther Rozendaal received an NWO Meerwaarde Plus Valorisation Grant for their project *The World of the Veggiefruities*.
- Dr Gero Lange received a German Research Foundation (DFG) Starting Grant.
- Prof. Cilia Witteman received a grant from Fonds Kinderpostzegels to study the assessment of child abuse.
- Dr Monique van de Ven received a grant from the Stichting Astmabestrijding to study automatic processes in the medication adherence of adolescents with asthma.
- Dr Sabine Stoltz received a Jacobs Foundation research grant.

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Key publications

Andics, A.V., McQueen, J.M. & Petersson, K.M. (2013). Mean-based neural coding of voices. *Neuroimage*, 79, 351-360.

Bossche, S.N.J. van den, Taris, T.W., Houtman, I.L.D., Smulders, P.G.W. & Kompier, M.A.J. (2013). Workplace violence and the changing nature of work in Europe: Trends and risk groups. *European Journal of Work and Organizational Psychology*, 22(5), 588-600.

Broek, G.S.E. van den, Takashima, A., Segers, P.C.J., Fernandez, G.S.E. & Verhoeven, L.T.W. (2013). Neural correlates of testing effects in vocabulary learning. *Neuroimage*, 78, 94-102.

Folkvord, F., Anschutz, D.J., Buijzen, M.A. & Valkenburg, P.M. (2013). The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children. *American Journal of Clinical Nutrition*, 97(2), 239-245.

Grecucci, A., Giorgetta, C., Wout, M. van 't, Bonini, N. & Sanfey, A.G. (2013). Reappraising the Ultimatum: an fMRI study of emotion regulation and decision-making. *Cerebral Cortex*, 23(2), 399-410.

Horst, A.C. ter, Lier, R.J. van & Steenbergen, B. (2013). Mental rotation strategies reflected in event-related (de)synchronization of alpha and mu power. *Psychophysiology*, 50(9), 858-863.

Laethem, M. van, Beckers, D.G.J., Kompier, M.A.J., Dijksterhuis, A.J. & Geurts, S.A.E. (2013). Psychosocial work characteristics and sleep quality: a systematic review of longitudinal and intervention research. *Scandinavian Journal of Work, Environment & Health*, 39(6), 535-549.

Lansu, T.A.M., Cillessen, A.H.N. & Bukowski, W.M. (2013). Implicit and Explicit Peer Evaluation: Associations With Early Adolescents' Prosociality, Aggression, and Bullying. *Journal of Research on Adolescence*, 23(4), 762-771.

Otten, R. & Engels, R.C.M.E. (2013). Testing bidirectional effects between cannabis use and depressive symptoms: moderation by the serotonin transporter gene. *Addiction Biology*, 18(5), 826-835.

Strien, T. van, Roelofs, K. & Weerth, C. de (2013). Cortisol reactivity and distress-induced emotional eating. *Psychoneuroendocrinology*, 38(5), 677-684.

Todorov, A.T., Dotsch, R., Porter, J.M., Oosterhof, N.N. & Falvello, V.B. (2013). Validation of Data-Driven Computational Models of Social Perception of Faces. *Emotion*, 13(4), 724-738.

Vergeer, M.R.M. & Hermans, E.A.H.M. (2013). Campaigning on Twitter: Microblogging and Online Social Networking as Campaign Tools in the 2010 General Elections in the Netherlands. *Journal of Computer-Mediated Communication*, 18(4), 399-419.

Volman, I.A.C., Verhagen, L., Ouden, H.E.M. den, Fernandez, G.S.E., Rijpkema, M.J.P., Franke, B., Toni, I. & Roelofs, K. (2013). Reduced Serotonin Transporter Availability Decreases Prefrontal Control of the Amygdala. *Journal of Neuroscience*, 33(21), 8974-8979.

Vorst, H. van der, Krank, M., Engels, R.C.M.E., Pieters, S., Burk, W.J. & Mares, S.H.W. (2013). The mediating role of alcohol-related memory associations on the relation between perceived parental drinking and the onset of adolescents' alcohol use. *Addiction*, 108(3), 526-533.

Weerth, C. de, Fuentes, S., Puylaert, P. & Vos, W.M. de (2013). Intestinal Microbiota of Infants With Colic: Development and Specific Signatures. *Pediatrics*, 131(2), E550-E558.

Dissertations:	32
Scientific publications:	415
Professional publications:	71

Societal impact

Within BSI fundamental research, for example on addiction, occupational stress, reading acquisition, anxiety and depression, is translated into practical prevention guidelines and interventions. These interventions, in turn, are subjected to scientific investigation, if possible in randomized controlled trials. On the other hand, societal issues, such as adolescent alcohol consumption and children's reading problems, serve as the starting point for a more fundamental understanding of such topics. Most research

conducted at BSI stems from societal questions and/or is designed to answer societal questions. Four examples of this are:

1. The Dutch national government decided to raise the minimal drinking age from 16 to 18. The BSI line of longitudinal studies on the role of parental rule setting and drinking, conducted over the past ten years, contributed to rational support for this decision. This far-reaching change in policy has a potentially huge impact on the detrimental consequences of early-age drinking.

Director: Prof. Toon Cillessen

Toon Cillessen has been Professor of Developmental Psychology at Radboud University Nijmegen since 2006. He previously held appointments at Duke University and the University of Connecticut. His research interests include the development of social competence, aggression and antisocial behaviour, social dominance and peer influence, and quantitative methods for developmental research (sociometric methods, social network analysis and longitudinal data analysis). He is a Consulting Editor for the journals *Developmental Psychology*, *International Journal of Behavioural Development*, *Merrill-Palmer Quarterly* and *Social Development*.



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2. An intelligence test for detecting mild intellectual disabilities was published: 'SCIL; Screener for intelligence and light intellectual disability'. It has been estimated that about 15 to 25% of prison inmates in the Netherlands may have mild or more serious intellectual disabilities. The SCIL helps gain more insight into the prevalence of intellectual disabilities among prisoners and forensic patients, and to detect individuals who need specific care and treatment.
3. Researchers working on the Curious Minds project examined children's science and technology learning in relation to communication and language learning. In collaboration with 'Expertisecentrum Nederlands', part of children's discovery learning in the classroom was videotaped and brought together in a nation-wide web-based learning environment (www.samen-onderzoeken.nl), which is available to teachers wishing to implement science and technology lessons for school children.
4. In 2013 the project *The World of the Veggies* was set up. This is an NWO-funded health intervention designed to encourage preschool children to eat more fruit and vegetables. The output is a series of reading books promoting fruit and vegetables with the help of animal characters (the Veggies), a Facebook page, a school fruit and vegetable project, and an interactive reading app for pre-schoolers and parents. Next year the programme will be launched nationwide.

Future research

In the next few years BSI will continue to deliver top-level behavioural research with societal relevance. Most of the grants acquired provide researchers with money for research that is closely linked to societal problems. This link will continue to lead to innovative new projects. The BSI is working on a new structure of research themes, designed to encourage even more internal and external collaboration. This new structure will be flexible so that BSI can focus its research on current topics of interest in society, without losing its solid basis in fundamental research. One of the ways to keep investing in fundamental research and in new ideas is through the annual BSI graduate school round, in which promising candidates are selected to start their own PhD project. BSI will maintain these graduate school positions in the future. The BSI sees significant opportunities in Challenge 1, 6 and 7 in the EU Horizon 2020 research programme. A 'warm-up' information session was held in 2013 and this will be followed by more plenary and individual sessions for BSI researchers. The aim is to encourage all researchers to participate in international consortia that apply for EU funding.