

JÖRG GROSS

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ACADEMIC POSITION

Postdoctoral Research Fellow, University of Amsterdam, The Netherlands 2015 –

PhD Student, Maastricht University, The Netherlands 2010 – 2014

Thesis: *From Simple Choice to Social Decisions –
On the Neurobiological and Evolutionary Roots of Decision Making*

Thesis Advisors: *Arno Riedl, Rainer Goebel*

RESEARCH INTERESTS

Behavioral Economics, Neuroeconomics, Agent Based Simulation, Machine Learning, Bayesian Statistics.

PRE-DOCTORAL EDUCATION

MSc in Psychology, University of Frankfurt, Germany 2010

Thesis: *Neural and Behavioral Explanations for Altruistic Punishment*

BSc in Psychology, University of Frankfurt, Germany 2007

ADDITIONAL EDUCATION

Human Brain Mapping Conference Workshop, Beijing, China 2012

Advanced fMRI Modeling, Maastricht University, The Netherlands 2012

Workshop on Brain Connectivity, Maastricht University, The Netherlands 2011

Workshop on Machine Learning, Maastricht University, The Netherlands 2011

Applied Game Theory Course, Maastricht University, The Netherlands 2010
fMRI Spring School, Bender-Institute, University of Giessen, Germany 2008

WORK EXPERIENCE

Internship, Department for General Psychiatry, 2009
University Hospital, Heidelberg, Germany

Internship, Leibniz Institute for Educational Research, 2008
Frankfurt, Germany

Internship, Institute for Developmental Psychology, 2007
Frankfurt, Germany

Freelance work, 2007 – 2009
Statistical and Methodological Thesis-Consultation

PEER-REVIEWED PUBLICATIONS

under review

Jörg Gross, Zsombor Meder, Sanae Barth, Arno Riedl
Building the Leviathan – Voluntary Centralisation of Punishment Power Sustains Cooperation in Humans.

Jörg Gross, Carsten De Dreu
Oxytocin Reduces Maladaptive Rule Adherence.

2015

Jörg Gross, Eva Woelbert, Martin Strobel.
The Fox and the Grapes – How Motor Constraints Affect Value Based Decision Making. Plos ONE, volume 10, issue 6.

Sabrina Strang, Jörg Gross, Teresa Schuhmann, Arno Riedl, Bernd Weber, Alexander Sack.
Be Nice if You Have to – The Neurobiological Roots of Strategic Fairness, Social Cognitive and Affective Neuroscience, volume 10, issue 6.

2014

Jörg Gross, Eva Woelbert, Jan Zimmermann, Sanae Barth, Arno Riedl, Rainer Goebel.
Value Signals in the Prefrontal Cortex Predict Individual Preferences across Reward Categories, The Journal of Neuroscience, volume 34, issue 22.

WORK IN PROGRESS

Zsombor Meder, Jörg Gross, Yukihiko Funaki

Cultural Differences in the Willingness to Transfer Power.

Jörg Gross, Carsten De Dreu

Switch or Punish – What Do Cooperators Prefer in Selective Play?

Jörg Gross, Franziska Dambacher, Alexander Vostroknutov, Alexander Sack

Manipulation of Rule Following Through Direct Current Stimulation.

Sander Aarts, Jörg Gross, Christine Gutekunst

Conflict Escalation – Can Economic Growth Prevent Conflicts?

Carsten De Dreu, Michael Griffin, Jonathan Krikeb, Eliska Prochazkova, Simon Columbus, Jörg Gross, Zsombor Meder

Parochial Altruism Evolves to Defend against Predation and Needs No Norm Enforcement

OTHER PUBLICATIONS

Jörg Gross

Statistik Reader, German introduction to basic concepts of statistics used in bachelor level education at the University of Frankfurt.

Jörg Gross & Benjamin Peters

R Reader, German introduction to the statistical programming language R used in graduate level education at the University of Frankfurt.

TEACHING

Lecture on Neuroeconomics, 2015
University of Amsterdam

Lecture on Consilience in Decision Making Research, 2014
Maastricht University

Economic Psychology, 2011 – 2013
Tutor, Maastricht University

Economy Game, 2011 – 2013
Tutor, Maastricht University

Introduction to Behavioral Economics, 2012
Tutor, Maastricht University

Lecture on the History of Psychology, Maastricht University	2012
R Seminar, Tutor and Organizer, University of Frankfurt	2009 – 2010
Introduction to statistics, Tutor and Organizer, University of Frankfurt	2008 – 2010
Theory of Psychological Tests, Tutor, University of Frankfurt	2008
Introduction to SPSS and Excel, Tutor and Organizer, University of Frankfurt	2008
Practical course on Experimental Psychology, Supervision of student groups, University of Frankfurt	2007 – 2009

CONFERENCE AND SEMINAR TALKS, POSTERS

<i>14th TIBER Symposium on Psychology and Economics, Tilburg</i> <i>6th Meeting of the Social Dilemma working group, Providence</i> <i>Invited talk, Department of Basic Psychological Research, Vienna</i>	2015
<i>Invited talk, Behavioral Economics seminar, Bonn</i> <i>Maastricht Lecture Series in Economics (MLSE) Seminar, Maastricht</i> <i>7th Maastricht Behavioral and Experimental Economics Symposium, Maastricht</i> <i>PhD Colloquium, Maastricht</i>	2014
<i>NeuroPsychoEconomics Conference, Bonn</i> <i>Neuroeconomics Conference, Lausanne</i> <i>8th Annual Conference of the European Human Behaviour and Evolution, Amsterdam</i> <i>Neuroeconomics Meetings, Maastricht</i>	2013
<i>Invited talk, Glimcher Lab, New York</i> <i>Neuroeconomics Conference, Miami</i> <i>Neuroeconomics Meetings, Maastricht</i> <i>Invited talk, Center for Economics and Neuroscience, Bonn</i> <i>5th Maastricht Behavioral and Experimental Economics Symposium, Maastricht</i> <i>18th Annual Meeting of the Organization for Human Brain Mapping, Beijing</i>	2012

COMPUTER SKILLS

Programming Languages
Markup Languages / Databases
Software

R, PHP, Python, JavaScript, C, Objective-C
HTML/CSS, XML, LaTeX, MySQL
SPSS, PsychoPy, BrainVoyager, MatLab, LISREL

ACADEMIC REFERENCES

Arno Riedl

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ABSTRACTS

Oxytocin Reduces Maladaptive Rule Adherence

Rules, whether in the form of norms, taboos, or laws, regulate and coordinate social life. Some rules, however, are arbitrary and adhering to them can be personally costly. Rigidly sticking to such rules can be considered maladaptive. Here we test whether, at the neurobiological level, (mal)adaptive rule adherence is reduced by oxytocin – a hypothalamic neuropeptide that biases the biobehavioral approach-avoidance system. Participants (N=139) self-administered oxytocin or placebo intranasally, and reported their need for structure and approach-avoidance sensitivity. Next, participants made binary decisions and were given an arbitrary rule that demanded to forgo financial benefits. Under oxytocin, participants violated the rule more often, especially when they had high need for structure and high approach sensitivity. Possibly, oxytocin dampens the need for a highly structured environment and enables individuals to flexibly trade-off internal desires against external restrictions. Implications for the treatment of clinical disorders marked by maladaptive rule adherence are discussed.

Building the Leviathan – Voluntary Centralisation of Punishment Power Sustains Cooperation in Humans

The prevalence of cooperation among humans is puzzling since cooperation can be exploited by free riding. Although peer punishment can maintain cooperation it has to be directed dominantly against free riders. More importantly, punishment has to be powerful, meaning that the effect of punishment has to be sufficiently higher than its cost. Since group members can refrain from punishing their non-cooperative peers, peer punishment poses a social dilemma in itself. Here we show how voluntary transfer of punishment power can circumvent the disadvantages of decentralized peer punishment. By exploring a novel experimental setup, we find that participants are willing to transfer their punishment power to individuals who act in the interest of the group. This endogenous establishment of power hierarchies sustains cooperation, and solves the social dilemma inherent to peer punishment. We suggest that the centralization of power serves as a mechanism that allows cooperators to combat free riding.

The Fox and the Grapes – How Motor Constraints Affect Value Based Decision Making

One fundamental question in decision making research is how humans compute the values that guide their decisions. Recent studies showed that people assign higher value to goods that are closer to them, even when physical proximity is irrelevant for the decision. Puzzling from a normative perspective on decision making, this phenomenon seems reasonable from an evolutionary perspective. Most foraging decisions of animals involve the tradeoff between the value that can be obtained and the associated effort. Processes underlying the computation of value and effort could therefore be closely intertwined to an extent that anticipated effort for physically obtaining a good is automatically integrated in the value-computation process. To test this, we let participants state their valuation for snack food while the effort that would be incurred when reaching for it was manipulated. Even though reaching was not required during

the experiment, we find that willingness to pay was significantly lower when subjects wore heavy wristbands on their arms. Thus, items that were more difficult to grasp were perceived as less valuable. Importantly, this was only the case when items were physically in front of the participants but not when the items were presented as text on a computer screen. Our results suggest automatic interactions of motor and valuation processes which are unexplored to this date and can account for irrational decisions that occur when reward is particularly easy to reach.

Be Nice if You Have to – The Neurobiological Roots of Strategic Fairness

Social norms, such as treating others fairly regardless of kin relations, are essential for the functioning of human societies. Their existence may explain why humans, among all species, show unique patterns of prosocial behaviour. The maintenance of social norms often depends on external enforcement, as in the absence of credible sanctioning mechanisms prosocial behaviour deteriorates quickly. This sanction-dependent prosocial behaviour suggests that humans strategically adapt their behaviour and act selfishly if possible but control selfish impulses if necessary. Recent studies point at the role of the dorsolateral prefrontal cortex (DLPFC) in controlling selfish impulses. We test whether the DLPFC is indeed involved in the control of selfish impulses as well as the strategic acquisition of this control mechanism. Using repetitive transcranial magnetic stimulation, we provide evidence for the causal role of the right DLPFC in strategic fairness. Because the DLPFC is phylogenetically one of the latest developed neocortical regions, this could explain why complex norm systems exist in humans but not in other social animals.

Value Signals in the Prefrontal Cortex Predict Preferences Across Categories

Humans can choose between fundamentally different options such as watching a movie or going out for dinner. According to the utility concept, put forward by utilitarian philosophers and widely used in economics, this may be accomplished by mapping the value of different options onto a common scale, independent of specific option characteristics. If this is the case, value-related activity patterns in the brain should allow predictions of individual preferences across fundamentally different reward categories. We analyze fMRI data of the prefrontal cortex while subjects imagine the pleasure they would derive from items belonging to two distinct reward categories: engaging activities (like going out for drinks, daydreaming or doing sports) and snack foods. Support vector machines trained on brain patterns related to one category reliably predict individual preferences of the other category and vice versa. Further, we predict preferences across participants. These findings demonstrate that prefrontal cortex value signals follow a common scale representation of value that is even comparable across individuals and could in principle be used to predict choice.