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### **Authors**

Abler, Birgit  
Ciaramidaro, Angela  
Deppe, Michael  
et al.

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## Neuroeconomics and the Social Brain

**Henrik Walter (h.walter@med.uni-frankfurt.de)**

Department of Psychiatry, JWG University of Frankfurt  
D-60528 Frankfurt, Germany

**Peter Kenning (02peke@wiwi.uni-muenster.de)**

Department of Economics, University of Münster  
D-48143 Münster, Germany

Neuroeconomics investigates economically relevant behavior using neuroscientific methods. Subjects investigated are for example the processing of financial rewards, social interaction or brand information. In this symposium we will present recent neuroimaging (fMRI) research on these topics that shows that decision making in neuroeconomical contexts goes together with activation of brain regions that are involved in processing socio-emotional information like the ventral striatum, the medial prefrontal cortex, the orbitofrontal cortex or the insula. A common conclusion of the contributions is that economy related behavior is based primarily on fast and automatic neural mechanisms that have evolved to solve problems in social contexts fast and efficiently.

### **The role of the medial prefrontal cortex in risk modulated processing of implicit information during choice tasks**

**Hilke Plassmann (02hipl@wiwi.uni-muenster.de)**

Department of Economics, University of Münster  
D-48143 Münster, Germany

We targeted the question whether risk information can modulate the activity within the medial prefrontal cortex (MPFC) in economic choice tasks based on a natural sample of real-life decisions. We could find highly significant interactions between both, brand information and risk information processing. The information processing related to the favorite brand was correlated with increased activation in the MPFC during choices under high-risk information. This region is normally involved in processing of reward and self-relevant information.

### **When are we biased? Prejudgments, a phenomenon of limbic assessments**

**Michael Deppe (deppe@uni-muenster.de)**

Department of Neurology, University of Münster  
D-48149 Münster, Germany

We wanted to study whether information that is formally irrelevant to a subsequent decision would nonetheless influence that decision. Actually, we were able to demonstrate this effect. The amount of activation in the anterior cingulate cortex and right lateral orbitofrontal cortex induced by

processing the formally irrelevant information prior to the actual decision task predicted the degree to which an individual is susceptible for a subsequent biased judgment. We conclude that personal attributes like “labile” or “unsteady” may be rooted deeply in the person’s neuronal characteristics of a phylogenetically old neural network which not only relates facts into behavioral consequences but also assesses the potential relevance of information, even if this is formally unspecific and irrelevant.

### **Social Interaction and the Theory-of-Mind-Network**

**Angela Ciaramidaro**

**(angela.ciaramidaro@psych.unito.it)**

Center of Cognitive Science, University of Turin  
I-10123 Torino, Italy

Recently, we have shown that the activation of a subregion of the MPFC, the anterior paracingulate cortex, is modulated by the amount of social interaction present in Theory-of-Mind (TOM) tasks. Compared to baseline, cortical midline structures exhibit decreasing deactivation whereas superior temporal sulcus (STS) showed increasing activation with increasing social interaction. Moreover, left and right STS differed in sensitivity to the degree of social interaction: Only the right STS is sensitive to different types of intentions varying in the amount of social interaction, whereas the left STS is activated primarily when processing communicative intentions.

### **Neural Correlates of Frustration**

**Birgit Abler (birgit.abler@medizin.uni-ulm.de)**

Department of Psychiatry, University of Ulm  
D-89075 Ulm, Germany

In a monetary incentive delay task we could replicate findings that nucleus accumbens activation correlates with the amount of expected monetary reward. Moreover, we found that the omission of an expected reward does lead to activation in the right inferior prefrontal cortex and anterior insular cortex. These regions are also activated when humans experience physical or social pain. We interpret our findings as neural correlates of the subjective phenomenon of frustration.