

EGPROC Meeting 2015

Annual Meeting of the European Group of Process Tracing Studies

Uncovering the cognitive processes
underlying judgment and decision making

16. April 2015 to 18. April 2015 at the

Max Planck Institute for Human Development

Program

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Preface

Background and Objectives

We are delighted to welcome you to the EGPROC 2015 meeting at the Max Planck Institute for Human Development in Berlin. The EGPROC meeting has a long-standing tradition going back to 1982. Since then it brought together leading European researchers working with process tracing methodologies and theories in the context of judgment and decision making.

We aim at creating an exchange platform for scientists from two areas of process tracing research. On the one hand researchers investigating and developing process tracing methods and, on the other hand, those investigating cognitive process models to formalize or predict decision processes. By combining these approaches, we believe, that both sides can gain a better understanding of the others' point of view.

We are looking forward to keynotes from eminent figures in the process tracing world shedding light on process tracing methods (Professor Jon Freeman) and the building of process models (Professor Ralph Hertwig). On Thursday, a workshop on the relatively young method of mouse-tracing will not only introduce this method but also offer hands-on experiences.



Wordcloud of the abstracts, titles, and methods from EGPROC 2015

On Friday and Saturday, the conference sessions will take place in one conference track with two talk formats: short (10 minutes talk + 10 minutes discussion) for new ideas, and long (15 minutes talk + 15 minutes discussion) for finished projects and elaborate evaluation of results.

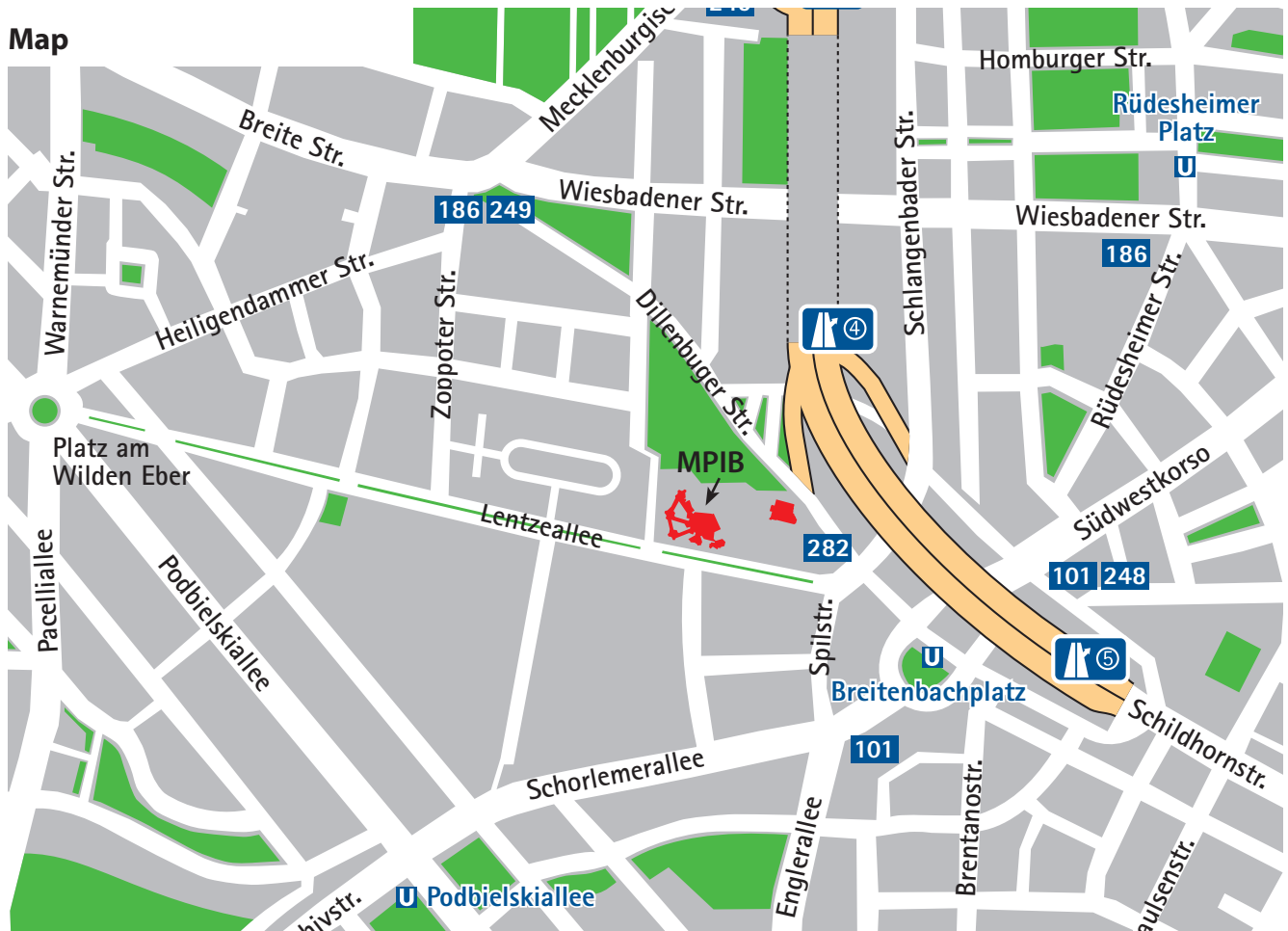
We wish you all a pleasant and informative stay at the Max Planck Institute for Human Development!

Michael Schulte-Mecklenbeck

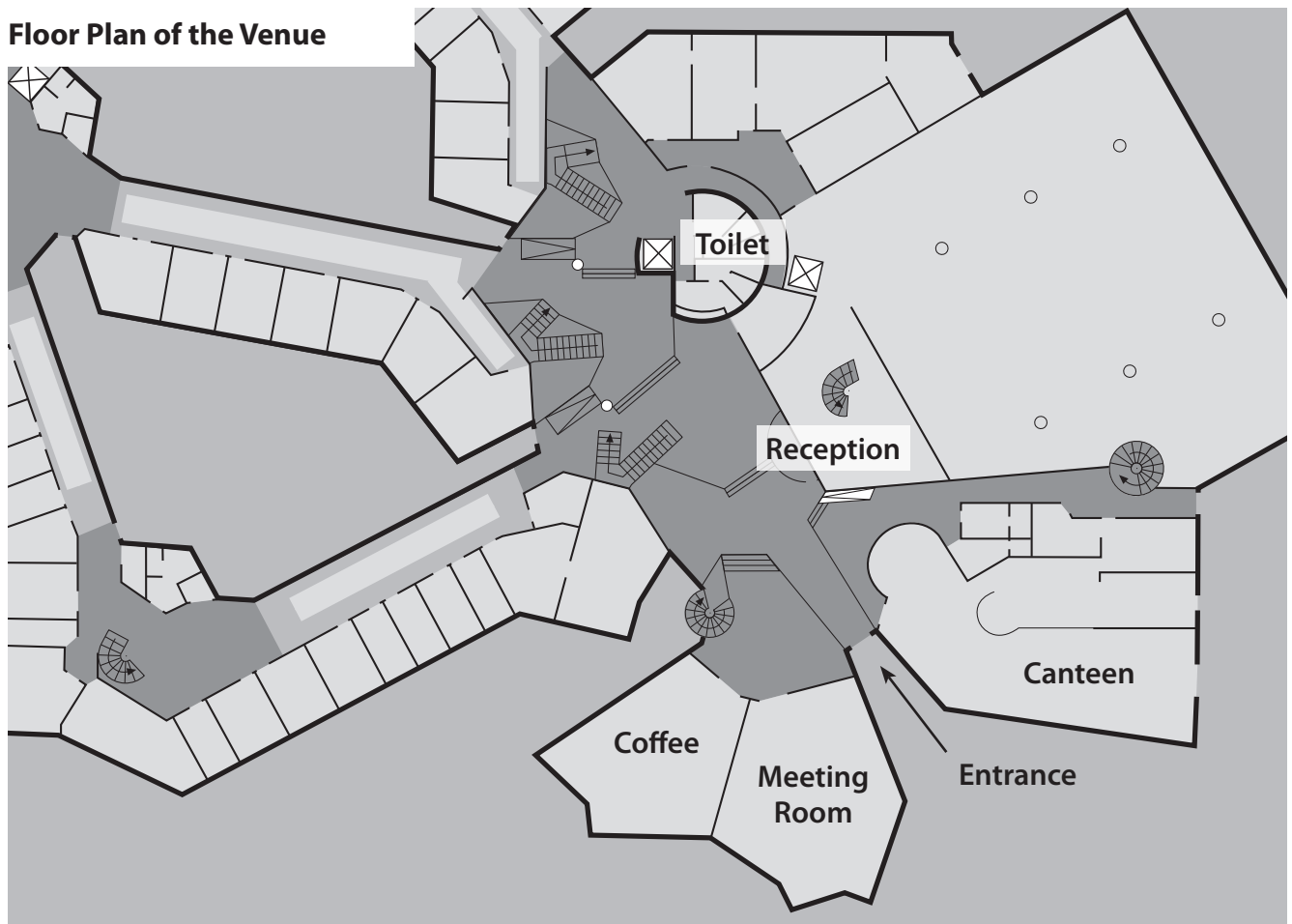
Jana Jarecki

Eveline Söder

Map



Floor Plan of the Venue



Venue

Max Planck Institute for Human Development
Lentzeallee 94
14195 Berlin
Germany
Tel.: +49 30 82406-0
Fax: +49 30 8249939
E-mail: berlin2015@egproc.org

Reception opening hours

Mon-Thu	7.30 AM – 7.45 PM
Fri	7.30 AM – 7.00 PM
Sat	9.00 AM – 1.00 PM

How to get to the MPI

Take the U3 going to Krumme Lanke, and get off at Breitenbachplatz station (find an underground plan on page 34).

The venue is a 6 to 10-minute walk from Breitenbachplatz (see map on the left).

Take the exit in the middle of the station (there are three exits) and go left along Dillenburger Straße. As soon as you cross Lentzeallee, turn left again, and follow this street for about 350 meters until you find the Max Planck Institute to your right.

WI-FI at the Max Planck Institute

Connect to the network 'MPIB-GUEST'.

When opening any website you will be asked to enter the username (capitalized) and password.

User:	MPIB-GUEST
Password:	minerva!

Alternatively, use the network 'eduroam' and your institutions login credentials.

Conference program

The last speaker of every session is scheduled as session chair and indicated by a *.
Find numbers for timekeeping at the end of this booklet.

	Thursday 16 th of April
9:30 AM	Registration
10:00 AM	Pre-Conference Workshop „Mouse Tracking“ – Part 1 Introduction History and theoretical background
11:15 AM	Coffee break
11:30 AM	Pre-Conference Workshop „Mouse Tracking“ – Part 2 Technique and method Software and applications
1:00 PM	Lunch break
2:30 PM	Pre-Conference Workshop „Mouse Tracking“ – Part 3 Experiment and hands-on exercise Questions and discussion
4:30 PM	Registration
5:00 PM	Welcome and Keynote: <i>Professor Ralph Hertwig</i>
6:00 PM	Welcome Buffet

	Friday 17th of April
	Session 1 – Probabilities and risk
9:00 AM	Personal experience of a small-probability event with severe consequences ... <i>Anna Polec</i>
9:20 AM	Revisiting the Allingham and Sandmo-Model of tax evasion ... <i>Christoph Kogler</i>
9:40 AM	Decisions based on probabilities estimated from experience ... <i>Kamil Fuławka*</i>
10:00 AM	Coffee break
	Session 2 – Processing and motivation
10:15 AM	Cognitive conflict in social dilemmas: An analysis of response dynamics <i>Pascal J. Kieslich</i>
10:35 AM	How to make people more interested in information about probability? <i>Agata Sobkow</i>
10:55 AM	Strategies in Mindreading – a process approach <i>Thomas Scherndl*</i>
11:15 AM	Coffee break
	Session 3 – Mousetracing
11:35 AM	Analysis of consumer behaviour regarding the purchase ... <i>Sonja Perkovic</i>
11:55 AM	Investigation of the food choice process using hand movements ... <i>Zoe van Dyck*</i>
12:15 PM	Lunch break
	Session 4 – Mousetracing
2:00 PM	Dual processes in decision making: Minute-long mouse-tracking ... <i>Eoin Travers</i>
2:30 PM	Information search in the sampling paradigm: A mouse tracing study <i>Dirk Wulff</i>
2:50 PM	Real world implementation of Newcomb's paradox using ... <i>Maryam Tabatabaeian*</i>
3:10 PM	Coffee break

	Session 5 – Mousetracing
3:30 PM	From decision-outcomes to decision-making: Harvesting the dynamics ... <i>Stefan Scherbaum</i>
4:00 PM	Thinking while doing: Investigating decision making dynamics <i>Avril Hand</i>
4:20 PM	Detecting different trajectory types in motor-tracing data <i>Jonas M. B. Haslbeck*</i>
4:40 PM	Short break
4:45 PM	Keynote: <i>Professor Jon Freeman</i>
7:00 PM	Dinner

	Saturday 18th of April
	Session 6 – Theoretical contribution related to process tracing
9:00 AM	The process behind magnitude priming in the non-numerical anchoring ... <i>Paweł Tomczak</i>
9:20 AM	Impulsive people have a compulsion for immediate gratification ... <i>Piotr Zielonka</i>
9:40 AM	Intransitivity or transitivity of preferences? Process and structural accounts <i>Rob Ranyard*</i>
10:00 AM	Coffee break
	Session 7 – Eye-tracking
10:15 AM	Decision making styles and new product evaluation <i>Thorsten Teichert</i>
10:35 AM	The role of numeracy in processing simple lotteries: An eye-tracking study <i>Jakub Traczyk*</i>
10:55 AM	Coffee break
	Session 8 – Eye-tracking
11:10 AM	Predicting (risky) choices from (open) samples: How much do process ... <i>Felix Henninger</i>
11:30 AM	Framing persuasive appeals over time: Can eye-tracking uncover ... <i>Sean Nicolas Brüggemann</i>
11:50 AM	Watching diagnoses develop: Eye movements reveal symptom processing ... <i>Agnes Scholz*</i>
12:20 PM	Lunch break
	Session 9 – Eye-tracking
2:00 PM	Eye movements reveal memory processes during similarity- and rule-based ... <i>Bettina von Helversen</i>
2:30 PM	Individual differences in reward and loss processing – an fMRI and ... <i>Alexander Niklas Häusler</i>
2:50 PM	Temporal dynamics of cheating: Arousal and attention analysis <i>Susann Fiedler*</i>
3:10 PM	Coffee break

	Session 10 – Eye-tracking
3:30 PM	Areas of interest as a signal detection problem in behavioral ... <i>Jacob L. Orquin</i>
4:00 PM	What is reported in eye-tracking research? – Developing transparency ... <i>Frank Renkewitz*</i>
4:20 PM	Integration of Concepts Session & Future of EGPROC Discussion: Process Modelling and Tracing Feedback, Future of EGPROC
6:45 PM	Boat Tour and Dinner

* session chairs

Dinner and boat tour locations

Friday, 7:00 PM

Dinner

Address:

Baba Angora
Schlüterstraße 29
10629 Berlin
Tel. +49 30 / 323 70 96

Station:

S Savignyplatz (S5, S7, S75)
Mommсенstr. (BUS 101) or Schlüterstraße (BUS M49, X34)

Saturday, 6:45 PM

Boat tour

Address:

Anlegestelle Märkisches Ufer/Jannowitzbrücke Märkisches Ufer
10179 Berlin

Station:

S+U Jannowitzbrücke (S5, S7, S75, U8)
U Klosterstraße (U2)

Saturday, 8:00 PM

Dinner

Address:

Zur Gerichtslaube
Poststraße 28
10178 Berlin
Tel. +49 30 / 241 56 98; +49 30 / 241 56 97

Station:

U Klosterstraße (U2)
Berliner Rathaus (BUS 248, M48, N40, N42, N65, N8)

Friday, 17th April

9:00 AM

Personal experience of a small-probability event with severe consequences influences willingness to buy insurance: The mediating role of worry and subjective probability.

Jakub Traczyk, Agata Sobkow, Anna Polec

University of Social Sciences and Humanities Faculty in Wroclaw, Poland

Past research has shown that personal experience plays a significant role in the process of insurance decision making. Nevertheless, the conclusions drawn from these studies are highly limited due to their correlational rather than experimental designs. In the present study, we tested the hypothesis that personal experience of a small-probability natural disaster with severe negative outcomes would increase feelings of worry and subjective probability which in turn would influence willingness to pay for insurance. Seventy participants played a simple game, in which they had to build and protect a cardboard house during several virtual years. Depending on the experimental condition, their cardboard house could be destroyed by a windstorm resulting in a high financial loss. However, participants had an opportunity to protect against this loss by purchasing an insurance policy. We found that participants who experienced a disaster were willing to pay more for the insurance policy. Additionally, willingness to pay for an insurance was mediated by increased feelings of worry and a higher subjective probability that evoked from the personal experience of the disaster. Our study offers a novel approach to trace cognitive and affective processes in insurance decisions.

Friday, 17th April

9:20 AM

Revisiting the Allingham & Sandmo-Model of Tax Evasion as a Decision under Risk: An Eye-Tracking Approach

Christoph Kogler¹, Jerome Olsen¹, Anton Kühberger², Erich Kirchler¹

¹University of Vienna, Austria;

²Department of Psychology & Center for Neurocognitive Research, University of Salzburg, Austria

In recent years tax evasion has evolved to become one of the most important research fields in economic psychology. Although research on tax compliance and tax evasion has long been dominated by economists, in recent years, sociologists, political scientists, legal scholars, philosophers, anthropologists, and psychologists in particular have contributed substantial knowledge to this field. One line of research focusing on judgment and decision processes is based on the economics-of-crime paradigm (Becker, 1968). Applying this paradigm to income tax compliance, Allingham and Sandmo (1972) define tax evasion as a decision under risk. Taxpayers face the option of either abiding by the law and paying taxes honestly or cheating and taking the risk of being caught and fined. It is assumed that the probability of audits, penalty rates, individual income levels, and the tax rate de-

termine citizens' decisions to comply or not to comply. According to this neoclassical economic approach, taxpayers are driven by profit-maximizing motives, rationally comparing possible options based on expected values and choosing the option that promises the highest expected profit. In the planned experiment, participants make compliance decisions in repeated rounds (ca. 40) with differing income, tax rate, audit probabilities and fines, which are presented unambiguously. The resulting payoff is determined at the end of the experiment by randomly selecting one period and paying participants according to their choice and the occurrence of an audit in that particular round. We investigate whether compliance decisions are in line with predictions based on the expected value of evading taxes compared to the outcome of the sure option, i.e. being honest. In one treatment we explicitly present expected values, whereas we do not present this information in the other condition. Research on tax behavior as well as experimental evidence in the area of gambling suggest that decisions might deviate from calculated expected values (explicitly presented or not), but while these gambles are usually related to the domain of gains, the tax context corresponds to the domain of losses. Besides the analysis of participants' actual choices, the intention is to apply eye-tracking measures to this experiment in order to get additional information about which determinants might actually affect tax decisions in experiments as well as in real life.

Friday, 17th April

9:40 AM

**Decisions based on probabilities estimated from experience:
the role of emotions and individual differences**

Kamil Fuławka, Paweł Tomczak

University of Social Sciences and Humanities, Faculty in Wrocław, Poland

Here we present a method of experience-based probability information format and investigate the relations between this information format and numeric competencies. Studies show that experience-based probability format results in better understanding of probability when it regards emotionally laden stimuli. It decreases the deviation from the objective probability and results in more rational decisions.

The appraisal tendency theory shows that valence based approach is not detailed enough to form adequate hypothesis about the impact of emotions on human behavior. For example, although fear and anger are both negative emotions, fear increases the value of perceived risk meanwhile anger decreases it.

To measure numeric competencies we use Berlin Numeracy Test. BNT has been proven to be strong, independent predictor of risk comprehension and probability estimation abilities. People who score higher understand probability information better, therefore usually make more rational and unbiased decisions. We also control the level of Symbolic Number Mapping abilities. SMap allows to assess adequacy of the mental line representations of the magnitude of numbers. Some theorists suggest that higher SMap abilities should result in better and faster estimation of values.

In our pilot study we investigate the role of numeracy and symbolic number mapping in experience-based information format. We hypothesize that BNT and SMap scores would allow to predict response times and the deviations in assessing probability values. Based on the results we propose a mediation model, in which BNT score directly predicts the magnitude of deviations in estimating

probabilities. Indirect path includes response times: Higher score in BNT is associated with longer estimation times, which results in lower magnitudes of deviations in estimated probabilities.

In our second study we utilize an experience-based probability format in context of gambling. We expect that SMap would be an important factor influencing the time required for estimating the expected values (EV) of lotteries. BNT score should significantly predict the magnitude of absolute deviations from EV. We hypothesize that people in fear condition will overestimate the risk which will result in lower values of certainty equivalents. We expect the opposite in anger condition. What's more we expect those with higher scores in BNT to be less affected by experimental manipulation than participants with lower numeric abilities.

Friday, 17th April

10:15 AM

Cognitive conflict in social dilemmas: An analysis of response dynamics

Pascal J. Kieslich¹, Benjamin E. Hilbig²

¹University of Mannheim, Germany

²University of Koblenz-Landau, Germany

Recently, it has been suggested that people are spontaneously inclined to cooperate in social dilemmas, whereas defection requires effortful deliberation. From this assumption, we derive that defection should entail more cognitive conflict than cooperation. To test this hypothesis, the current study presents a first application of the response dynamics paradigm (i.e., mouse-tracking) to social dilemmas. In a fully incentivized lab experiment, mouse movements were tracked while participants played simple two-person social dilemma games with two options (cooperation and defection). Building on previous research, curvature of mouse movements was taken as an indicator of cognitive conflict. In line with the hypothesis of less cognitive conflict in cooperation, response trajectories were more curved (towards the non-chosen option) when individuals defected than when they cooperated. In other words, the cooperative option exerted more “pull” on mouse movements in case of defection than the non-cooperative option (defection) did in case of cooperation. This effect was robust across different types of social dilemmas and even occurred in the prisoner’s dilemma where defection was predominant on the choice level. Additionally, the effect was stronger for dispositional cooperators as measured by the Honesty-Humility factor of the HEXACO personality model. As such, variation in the effect across individuals could be accounted for through cooperativeness.

How to make people more interested in information about probability? The Active Information Search study of natural hazards

Agata Sobkow¹, Anna Polec¹, Jakub Traczyk¹, Tadeusz Tyszk²

¹University of Social Sciences and Humanities Faculty in Wroclaw, Wroclaw, Poland;

²Kozminski University, Warsaw, Poland

Previous research has shown that people tend to ignore information about probability in the decision-making process. This is especially pronounced in low-probability high-consequence events, such as natural hazards. For example, people living in flood-risk areas, usually base their insurance decisions on previous experience with flood or feelings of worry rather than objective risk estimations (including probabilities).

The aim of the present project was to investigate how to make people more interested in searching for probabilistic information. We have employed the Active Information Search paradigm (AIS). In this procedure participants, after reading a short description of a situation and two alternatives, can ask questions to receive additional information about the decision problem. Each question is coded into categories, e.g., outcomes, risk diffusion operators or probability, what allows to trace process of naturalistic risky decision making.

In the ongoing study, we have used one original (Virus) and proposed two new scenarios (House and Holidays) related to natural hazards (flood and earthquake). In this talk, we will present preliminary results as well as discuss ideas on experiments aimed at making people more interested in probabilities in naturalistic decisions.

Strategies in Mindreading – a Process Approach

Thomas Scherndl, Anton Kühberger

University of Salzburg, Austria

How do we predict the choices of other people? Three possible models have been put forward: (1) social projection, i.e., making predictions based on one's own preferences; (2) stereotyping, i.e., making predictions using stereotypical theories about the preferences of people in general; or (3) anchoring-and-adjustment, i.e., anchoring predictions in one's own preferences and adjusting for differences between oneself and other people. Empirically distinguishing these strategies based on choices alone is difficult; rather, process data measuring the cognitive processes underlying predictions are called for. In an experiment, we used multi-attribute consumer decision tasks and had people choose their own preferred option and predict the choice of another person while tracking information acquisition by Mouselab. We calculate the social projection index, which takes into account the number and the duration of information acquisitions. We also collect retrospective verbal protocols and have participants report their prediction strategies. Additionally, we test whether these measures are sensitive for changes if participants are instructed to predict using a specific strategy. Process data were

sensitive to changes in instruction self-report measures were surprisingly insensitive though. We argue that process data are a valid and valuable source of evidence for distinguishing among mind-reading strategies and suggest using process data additional to the commonly used choice data.

Friday, 17th April

11:35 AM

Analysis of consumer behaviour regarding the purchase of organic food products

Sonja Perkovic

University of Leeds, United Kingdom

I am a first year postgraduate researcher at the Centre for Decision Research, Leeds University Business School. My research interests are in the area of decision making processes with respect to organic food. In order to better understand consumer behaviour, it is essential to incorporate traditional behavioural economics and psychological approaches in the research i.e. how different cognitive processes influence consumers' decision making processes. I AM most interested in incorporating dual process model or intuitive and deliberate thinking i.e. system 1 and system 2 thinking into my research due to my intention to investigate what cognitive processes consumers use when making decisions about purchasing organic food. In addition to the previously mentioned, I AM also interested in exploring whether consumers use certain heuristics ("cognitive shortcuts or rules of thumb"), and which ones, when deciding what type of organic food to purchase. My research idea consists of two parts. The first part relates to developing a study to investigate consumer shopping behaviour about organic food by employing MouselabWeb. Therefore, I AM going to develop a quasi-online supermarket in the form of three web pages with different contents in regard with the position/visibility of organic food products by applying special filters. The reason I chose MouselabWeb is because its features seemed appropriate for this particular study since I want to track time spent while choosing different options and the number of clicks per different products and their characteristics. The second part of my research idea is related to Big Data and I AM currently in the process of securing access to one of the British retailers' data sets. The idea is to analyse the data set, draw a parallel to the process tracing study and to compare the results. If I succeed to prove that consumers tend to buy more organic food products when a web page is organised in a way that it contains a special filter for organic food products, then this would imply that they may choose other healthy products more often if a retailer separates them into special categories (e.g. low fat products, low sugar products, etc.). To sum up, this research has potential for improving our understanding of consumers' food purchase behaviour and might provide retailers with a possible opportunity to influence/nudge them to buy healthier food products and in so doing enhance their corporate social responsibility.

Investigation of the food choice process using hand movements in binge eating disorder

Zoe van Dyck¹, Michael Schulte-Mecklenbeck², Jens Blechert³, Claus Vögele¹

¹Research Unit INSIDE, University of Luxembourg, Luxembourg;

²Max Planck Institute for Human Development, Berlin, Germany;

³Psychology Institute, University of Salzburg, Austria

Navigating today's food environment with a high degree of immediate food availability requires frequent food choices. The decision of whether and what to eat is influenced by situational factors (e.g., what foods are available) and interindividual differences. Moreover, eating-related psychopathologies are likely to moderate such food choices. This may be particularly true for eating disorders characterized by frequent self-control failures, such as binge eating disorder (BED). BED refers to recurrent binge eating episodes, including eating large amounts of food accompanied by a sense of lack of control over eating, and commonly occurs in obese individuals. Food-related decision making in BED and its situational determinants is only partially understood. The aim of the present study was to analyse the outcome and time-course of the food choice process in individuals suffering from binge-eating disorder (BED) as compared to overweight and normal-weight controls. Participants were tested during both hungry and satiated conditions in a counterbalanced design. A mouse-tracking paradigm was used to record peoples' continuous hand-movements during repeated forced choices between tasty and healthy foods. To model situational variables such as food availability, one half of the displayed food items were declared available for consumption whereas the other half was declared as unavailable. The degree of curvature in response trajectories during forced mouse-based choice was calculated as a metric of the competition between choice options. The results will be presented at the time of the conference. Study findings will be discussed in terms of implications for the understanding of food choice processes in eating disorders and obesity.

Dual processes in decision making: Minute-long mouse-tracking reveals conflicting processes

Eoin Travers, Jonathan Rolison, Aidan Feeney

Queen's University Belfast, UK

Many theories of reasoning and decision making propose two kinds of cognitive process: those which are fast, effortless, automatic, and heuristic, and those which are slow, deliberative, controlled, and reflective. How these processes interact, however, remains an unresolved question, particularly for decisions in which heuristic and reflective processes conflict. Evans (2007) identifies three possible models: selective activation of one or other process, parallel and competitive activation of both, or a sequential model, in which heuristic responses can be overridden by reflective processing.

In order to explore the predictions of these competing dual process models, we developed a novel version of the mouse-tracking paradigm, recording participants' mouse movements over the course over a minute, as they completed a multiple-choice version of the Cognitive Reflection Test (Freder-

ick, 2005), a popular task in which heuristic and reflective processes cue different responses. Growth curve analyses of the mouse trajectories provide evidence in support of sequential versions of dual process theory, as trials in which the correct response was chosen display an attraction towards the heuristic alternative, but heuristic responses do not show attraction towards the correct one.

Friday, 17th April

2:30 PM

Information search in the sampling paradigm: A mouse tracing study

Dirk U. Wulff¹; Jonas M. B. Haslbeck^{1,3}, Michael Schulte-Mecklenbeck^{1,2}

¹Center for Adaptive Rationality, Max Planck Institute for Human Development, Berlin, Germany;

²Swiss Federal Institute of Technology, Zurich, Switzerland;

³University of Utrecht, Utrecht, The Netherlands

When risky options are experienced through active and limited information search choices do not obey many of the classic patterns. This inconsistency is evidently a result of differences in the experienced and true option arising from limited search. In addition, also the active aspect of search, i.e. to decide when to explore which option, is also believed to play a role. As much less is known on the active aspect of search, we use a mouse tracing methodology to illuminate the cognitive processes involved in the exploration of risky lotteries. We show that transitioning from exploring one to exploring the other option is not only reflected but also foreshadowed by signals in the mouse trajectories. Our results establish that mouse tracing can be used to discern between conflicting theoretical positions regarding information search in decisions from experience.

Friday, 17th April

2:50 PM

Real world implementation of Newcomb's paradox using mouse-tracking techniques

Maryam Tabatabaeian¹, Shaun Pilkington², Rick Dale¹

¹University of California, Merced, USA;

²University of Louisiana, Lafayette, USA

Newcomb's paradox is a famous thought experiment in the field of decision theory. There are two paradoxical, yet reasonable, strategies to approach this decision-making problem. We addressed the debate by testing the paradox in a real world experiment. Analyzing participants' mouse movements allowed us to reveal the internal cognitive dynamics of their thought process during the task explanation as well as the actual decision. This knowledge of internal processes helped us to accurately (73%) predict their decision before it was made. Moreover, the consistency of mouse movements before and during the actual decision significantly interacted with RT. This suggests that subjects were revealing their indecision in the mouse movement, and that this indecision weighed on both possibilities. This work has implications for exploring human decision-making, as well as predicting consumers' choice in online setups.

**From decision-outcomes to decision-making:
Harvesting the dynamics of delay discounting decisions**

Stefan Scherbaum, Maja Dshemuchadse
Technische Universität Dresden, Germany

How do people come to a decision when facing conflicting options, e.g. a choice between an immediate but small reward and a delayed but large one? To answer this question, research on delay discounting analyzes the choice patterns in delay discounting tasks leading to a multitude of descriptive models pinpointing precisely how people devalue rewards across delays. However, this outcome-based approach faces limitations in integrating the influence of contextual factors on the decision. Therefore the outcome-based perspective on delay discounting has been complemented recently by a focus on the process dynamics leading to delay discounting decisions. In the talk, we embrace this dynamic approach and show how dovetailing dynamic connectionist modeling with continuous behavioral measures, i.e. mouse tracking, reveals new insights into the processes leading to a final decision-outcome – and hence, into the making of a delay discounting decision.

Thinking while doing: Investigating decision making dynamics

Avril Hand¹, Denis O' Hora¹, Petri Pirroinen¹, Rick Dale²
¹National University of Ireland, Galway, Ireland;
²University of California, Merced, USA

Probability matching is the observation that individuals allocate choices to available options in a ratio that matches the probability of receiving a reward for those options. An extension of the generalized matching law predicts that participants will allocate their choices similarly to options of differing magnitude (i.e., magnitude matching). Previous work in our laboratory has examined whether such magnitude matching occurs and varying competition between options is expressed in motor conflict indicated by mouse cursor trajectories. Comparisons across participants supported the choice allocation hypothesis but differences in online motor movement were not observed.

The current study extended this previous work by comparing choice conflict within participants and investigating decisions between loss options. In addition, differing sensitivity to reward and loss options across individuals was assessed using the Behavioral Inhibition Scale/Behavioral Activation Scale (BIS/BAS) and the impact of reward and loss decisions on positive and negative affect was assessed using the PANAS scale.

Participants were exposed to a set of six conditions in which varying ratios of rewards (Reward Ratio; RR) or loss (Loss Ratio; LR) were provided for choosing arbitrary symbols. Three conditions presented choices between rewards, (i) high-point reward was 20, and low was 5 ($RR = 4$), (ii) high was 10 and low was 5 ($RR = 2$), high was 7 and low was 5 ($RR = 1.4$). Three conditions presented choices between losses, (i) high-point loss was -20, and low was -5 ($LR = 4$), (ii) high was -10 and low was -5 ($LR = 2$),

high was -7 and low was -5 ($LR = 1.4$). Conditions were presented in a quasi-random order based on a latin square and were in place for a session of 36 consecutive choices. In Loss conditions, participants began the session with points equal to 36 times the high value loss (e.g., if the high loss was 20, participants began with 720 points).

In addition to traditional assessments of choice allocation and response conflict derived from mouse trajectories, the decision space visualization technique developed by our laboratory will also employed. Data collection is currently underway and preliminary analyses will be complete by the conference.

Friday, 17th April

4:20 PM

Detecting different trajectory types in motor-tracing data

Jonas M. B. Haslbeck^{1,3}, Michael Schulte-Mecklenbeck^{1,2}, Dirk U. Wulff¹

¹Center for Adaptive Rationality, Max Planck Institute for Human Development, Berlin, Germany;

²Swiss Federal Institute of Technology, Zurich, Switzerland;

³University of Utrecht, The Netherlands

Models of cognitive processes require data with a temporal dimension. One promising source for high resolution temporal data in forced choice environments is to record the mouse-trajectory during the execution of a decision, commonly referred to as mouse-tracing. Various recent studies have successfully demonstrated aspects of the underlying cognitive processes by comparing the aggregate mouse trajectories across different experimental conditions. Here we challenge the general approach of comparing aggregate mouse trajectories. We show that aggregate mouse trajectories are composed of at least two, qualitatively different trajectory types and that their relative frequencies can account for the gradual differences in aggregate trajectories which most previous studies focused on. We conclude that dissecting different types of trajectories is crucial to avoiding erroneous conclusions and present improved methods to detect the presence of different trajectories types.

Saturday, 18th April

9:00 AM

The process behind magnitude priming in the non-numerical anchoring heuristic

Paweł Tomczak

University of Social Sciences and Humanities, Faculty in Wroclaw, Poland

In this research, we investigate psychological mechanism underlying magnitude priming in the anchoring heuristic. Recent studies have demonstrated that it is not necessary for the anchor to be a numerical value. For example, people who drew long lines made higher estimations regarding length than people who drew short lines. The lines served as anchors, presumably resulting in creating different senses of magnitude: Short lines gave a sense of “smallness” (low anchor) and long lines gave a sense of “largeness” (high anchor). We replicated and extended this effect, showing that the

action of drawing is not essential to produce the anchoring effect. Perceiving the lines is enough to create the impression of magnitude.

We argue that susceptibility to the sense of magnitude of a given stimuli would effectively moderate final estimations. The explanation of suggested outcome derives from the hypothesis that numbers differ not only in objective value, but also in mental magnitude representation. Basing on the mental number line concept, it is discussed whether differentiation between numbers could depend on the sense of physical magnitude. That is, the number 10 is a greater number than 4, therefore it is intuitively correct that 10 is mentally represented by a larger physical object than 4. Manipulating the depicted size of the same number would result in different subjective sense of magnitude, which would result in different estimations – higher for “larger” 10 and lower for “smaller” 10. We expect to show that using the same numerical value as an anchor – but with different font size (physical size) – would result in different estimations.

In this study, we intend to explain the process underlying the non-numerical anchoring effect and discuss the relation between the classical anchoring and the anchoring without numerical values.

Saturday, 18th April

9:20 AM

Impulsive people have a compulsion for immediate gratification – certain or uncertain

Wojciech Bialaszek¹, Maciej Gaik², Elton McGoun³, Piotr Zielonka⁴

*¹Department of Behavior Analysis, University of Social Sciences and Humanities (SWPS),
Warsaw, Poland;*

²Department of Economic Psychology, Kozminski University, Warsaw, Poland;

³School of Management, Bucknell University, Lewisburg, PA, USA;

⁴Department of Econophysics, Warsaw University of Life Sciences (SGGW), Poland

The purpose of this research was to gain a deeper understanding of the mental processes involved in the decision making of impulsive individuals. We examined participants' rates of delay discounting and probability discounting to determine their correlation with time-probability trade-offs. To establish the time-probability trade-off rate, participants adjusted a risky, immediate payoff to a delayed, certain payoff. In effect, this yielded a probability equivalent of waiting time. We found a strong, positive correlation between delay discount rates and the time-probability trade-offs. This means that impulsive people have a compulsion for immediate gratification, independent of whether the immediate reward is certain or uncertain. Thus, they seem not to be concerned with risk but rather with time.

Intransitivity or Transitivity of Preferences? Process and Structural Accounts**Rob Ranyard***Leeds University, Leeds, UK*

When A is preferred to B and B to C, preferences are transitive if A is preferred to C, but intransitive if C is preferred to A. In his landmark 1969 article, Intransitivity of Preferences, Amos Tversky presented evidence of human intransitive preference cycles and offered explanations in terms of cognitive processes. More than forty years later, Regenwetter and his colleagues, in their article, Transitivity of Preferences, presented new evidence and a persuasive argument that all published empirical evidence of intransitivity could either be dismissed as inadmissible or shown to be consistent with some stochastic, transitive preference theory. This supports rational economic models of decision making, and seriously challenges cognitive explanations based on bounded rationality. It is important to evaluate the premises and arguments of these two diametrically opposed conceptualizations of the nature of human preference. In this presentation, evidence of intransitive choice patterns in two lottery choice tasks is reviewed from these two perspectives. More generally, the approaches are compared and contrasted with a view to evaluating their strengths and weaknesses and constructively resolving their conflicting views. This is a preliminary theoretical discussion.

Decision making styles and new product evaluation**Bernhard Heide¹, Thorsten Teichert²***¹Wiesbaden Business School, Germany;**²University of Hamburg, Germany*

Theoretical models of consumers' choice behavior often base on the assumption of linear-additive utility models and compensatory preference decisions. In contrast hereto, empirical studies show that consumers apply non-compensatory rules of decision making. Simulation studies showed that linear-compensatory models are robust against violations of their underlying assumptions. However, we argue that insights about non-compensatory decision making can provide valuable insights both for new product development as well as for marketing at the point of purchase.

We postulate that different decision rules are accompanied by systematic differences in the evaluation and relative importance of different product attributes. This holds true because non-compensatory decision making involves the utilization of simplifying heuristics. We hypothesize that the applied heuristic depends upon the degree of desired simplification: If consumers are not involved and decide without cognitive reflection, we expect that their evaluation bases on simple and tangible product features as product size. Given that consumers' apply limited rational decision making with pairwise comparisons, we expect an emphasis in decision making upon emotional utility compo-

nents. Finally, we expect utilitarian and brand-based decision making in case of complex product comparisons.

To join processes measures and utility estimates, we join discrete choice experiments with real-time process measurements in an experimental study. More than 50 probands evaluate a set of 16 choice sets with five option each while their eye-movements as well as emotional responses are tracked with eye-tracker and facial EMG. Results so far reveal expected interactions between decision making behavior and revealed choice behavior.

Saturday, 18th April

10:35 AM

The role of numeracy in processing simple lotteries: An eye-tracking study.

Jakub Kus, Agata Sobkow, Jakub Traczyk

University of Social Sciences and Humanities, Faculty in Wroclaw, Poland

Common observations as well as empirical evidence reveal that making accurate decisions in everyday situations is related to greater numeracy – the mental ability to understand and use probabilistic and mathematical concepts. However, little research has examined how high-numerate individuals process characteristics of lotteries to make optimal choices. In this talk, we are going to demonstrate that numerical abilities moderate processing of probabilities and outcomes leading to more rational decisions. In the eye-tracing study, we asked participants to attend to a short description of 48 lottery coupons that varied in the probability of winning (1, 2, 5, 95, 98, 99 %), outcomes (30, 60, 150, 250 PLN) and affective meaning (attractiveness). After eye-tracking procedure, participants were asked to declare the minimum prize they should be offered to sell their lottery coupon before knowing lottery results (willingness to accept, WTA). We found that numerical abilities, lottery attractiveness and the engagement of attentional resources in processing numerical lottery characteristics (as measured by the number of fixations) were related to more accurate decisions defined as WTA prizes that were closer to expected values of lotteries. Interestingly, the number of eye fixations interacted with both numeracy and lottery attractiveness enhancing accuracy in lottery valuation. To summarize, we showed that the interplay between attentional engagement in processing lottery characteristics and numeracy is related to more accurate decisions.

**Predicting (risky) choices from (open) samples:
How much do process models gain from attention data?**

Felix Henninger^{1,2}, Susann Fiedler¹, Andreas Glöckner³, Benjamin E. Hilbig¹

¹University of Koblenz-Landau, Landau, Germany

²Max Planck Institute for Research on Collective Goods, Bonn, Germany;

³University of Göttingen, Germany

Over the recent years, several models have been presented that use the distribution of attention to the available options, as captured through eye-tracking, to successfully predict choices and even response dynamics over time.

Previous studies have, however, used greatly simplified tasks, or restricted themselves to single models. In an on-going project, our aim was therefore to build upon the literature and extend it to more complex (risky) decisions, while using the Open Sampling format, which allows us to observe the information search and sampling as preferences emerge. We also combined the previously suggested models, as well as several baseline competitors, to conduct a comprehensive comparison and test.

We have, by now, gathered eye-tracking data over several studies. While we demonstrate that manipulations of attention and information search affect choices, as predicted by all attention-based models, the models that make use of additional data regarding attention and information search in their predictions do not capitalize on this supplementary information as strongly as might be expected.

Framing persuasive appeals over time: Can eye-tracking uncover the intratemporal consequences of multiple framings on persuasion?

Sean Nicolas Brueggemann, Florian von Wangenheim

ETH Zürich (Swiss Federal Institute of Technology Zurich), Switzerland

Compliance professionals rely on an extensive set of persuasive strategies to influence individuals' decision making. Today, persuasive stimuli reach individuals at multiple times throughout their decision making process. Building on standard goal framing taxonomy, this research discriminates between qualitatively distinct strategies of message framing. Recent meta-analyses of the framing literature indicate that the effect of framing may vary across consecutively occurring decision stages. This fact has not been addressed in prior research. It is thus aim of the planned study to examine how message frames resonate with the decision maker's affective and cognitive processes throughout the sequential steps of decision making.

To this end, this research proposes a multi-stage decision model that is theoretically grounded within regulatory focus as well as broaden-and-build theory. The model focuses on how a dynamic decision context impinges on both affective and cognitive processes (i.e. exogenous change) and how these strands combine into a final decision (i.e. endogenous change).

In order to test the model, it is planned to conduct an eye-tracking experiment that mimics a two-step decision context – i.e. transition from pre-choice to final choice – similar to the phased narrowing or the MouseLab framework. Other than the prominence of quantitative information within multi-attribute choice research, goal frames are composed of qualitative and rather vague information. This circumstance favors eye tracking over alternative process tracing methods because it allows for a simultaneous recording of oculomotor-based, cognitive and affective measures as well as reaction times. Informing the model with eye tracking data is thought to allow for competitive model testing between conflicting theoretical stands on the effectiveness of the various strategies on persuasive framing. Approaches with regard to competitive model testing have emerged from risky decision making research, i.e. gambling-based contexts. Integrating this technique within the domain of persuasive appeals may constitute a promising extension to study framing-related phenomena.

The proposed eye tracking study on the intratemporal consequences of message framing is part of an ongoing doctoral thesis. The opportunity to harvest on the wisdom of experts from EGPROC will be particularly helpful for the doctoral student.

Saturday, 18th April

11:50 AM

**Watching Diagnoses Develop:
Eye Movements Reveal Symptom Processing during Diagnostic Reasoning**

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¹Technische Universität Chemnitz, Germany;

²University of Lübeck, Germany

Finding a probable explanation for observed symptoms is a highly complex task that draws on information retrieval from memory. In order to solve this task recent research suggests that people interpret symptoms in a way that allows maximizing coherence for one explanation. This becomes particularly clear in cases where information is ambiguous, i.e. symptom sequences support more than one explanation. However, process data testing memory processes during diagnostic reasoning when critical information has to be retrieved from memory is sparse. We apply memory indexing, an eye-tracking method that affords rich time course information about memory-based cognitive processing during complex tasks, to reveal symptom processing and the preferred interpretation of ambiguous symptom sequences. Participants first learned information about causes and symptoms presented in spatial frames. Gaze allocation on emptied spatial frames during symptom processing and during the diagnostic response reflected the subjective status of hypotheses held in memory and the preferred interpretation of ambiguous symptoms. Memory indexing traced how the diagnostic decision developed and it revealed instances of hypothesis change and biases in symptom processing. Memory indexing thus provided direct online evidence for coherence maximization in processing ambiguous information.

Eye Movements Reveal Memory Processes During Similarity- and Rule-Based Decision Making

Bettina von Helversen¹, Agnes Scholz², Jörg Rieskamp¹

¹University of Basel, Switzerland;

²University of Chemnitz, Germany

People can rely on rule- or similarity-based decision strategies when making decisions such as accepting or rejecting a job candidate. Rule- and similarity-based processes differ in their assumptions about how information is searched in memory, but studying these differences is difficult because the underlying cognitive process is not directly observable. Recent research, however, suggests that specific eye movements accompany the process of retrieving information from memory. When people retrieve information from memory they tend to fixate the blank location where this information appeared during encoding. We used this so-called “looking at nothing” – phenomenon to experimentally investigate differences between rule- and similarity-based decision processes. In two studies, participants first memorized multiple pieces of information about job candidates (exemplars). In a subsequent test phase they judged the suitability of new candidates that varied in their similarity to the previously learned exemplars. Results showed that when using similarity, but not when using a rule, participants fixated the previous location of exemplars that were similar to the new candidates longer than the location of dissimilar exemplars. This suggests that people using similarity retrieve previously learned exemplars, whereas people using a rule do not. In addition, the results show that the study of eye movements can provide new insights into the memory processes underlying judgment and decision making.

Individual differences in reward and loss processing – an fMRI and Eye-tracking Study

Alexander Niklas Häusler¹, Sergio Oroz-Artigas², Bernd Weber³

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²Department of Epileptology, University Hospital Bonn, Germany;

³Life&Brain Research Center, Bonn, Germany

Using a financial eye-tracking gambling task, we are testing whether more or less attention to either probabilities or values can be predicted by contrast values obtained in an fMRI paradigm investigating decision making in the win and loss domain. 35 participants will complete an fMRI task similar to an only-reward version previously used by our group (Fliessbach et al., 2010; Rohe et al., 2012) which was modified to include loss trials. After the fMRI task, participants will undergo an eye-tracking paradigm similar to the one used by Fiedler & Glöckner (2012) which includes decisions between high and low risk gambles with similar expected values. Additionally, a structural MRI measurement is performed during which participants are asked to complete two tasks assessing financial risk preferences: an allocation task, a certainty equivalence task. Additionally, participants are asked to fill out a

validated preference module (Falk et al., working paper). Personality measures will be assessed using the Temperament and Character Inventory (TCI) and the BIS/BAS/FFFS questionnaire. Previous investigations have shown that the probabilities of maximum wins received more attention than their values, while minimum win values received more attention than their probabilities (Brandstätter and Körner, 2014). Additionally, the same study found maximum loss values to receive more attention than their probabilities and the probabilities of minimum losses to receive more attention than the values of the minimum losses. Considering the inter-individual heterogeneity found in numerous fMRI studies investigating reward processing and loss aversion (Samanez-Larkin et al., 2009; Smith et al., 2014), we want to investigate the correlation between the fMRI contrast values and information search patterns. Structural equation modeling (SEM) will be used to analyze the relation of fMRI data, personality and eye-tracking data to behavior. Of these, previous research lets us hypothesize that participants with increased reward prediction error processing and loss aversion sensitivity display increased levels of anticipatory worry and fear of uncertainty (Paulus et al., 2003; Matthews et al., 2004). Additionally, participants with increased reward prediction error processing sensitivity are expected to be more risk-averse (Rudorf et al., 2012), while participants with increased loss aversion processing sensitivity are expected to be more risk-seeking (Paulus et al., 2003).

Saturday, 18th April

2:50 PM

Temporal dynamics of cheating: Arousal and attention analysis

Susann Fiedler¹, Guy Hochmann^{2,3}, Shahar Ayal³, Andreas Glöckner⁴

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³School of Psychology, Interdisciplinary Center (IDC), Herzliya, Israel;

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In previous work people reported to experience ethical dissonance when behaving dishonest. One proposed explanation is that their self-interest maximizing behavior stands often in conflict with their moral self-image (Self-Maintenance theory) whereas another account suggests that people are cognitively limited and systematically biased in their moral judgments (Bounded Ethicality). In an eye-tracking study, we aim to test the validity of these two main theoretical accounts. If cheating behavior is predominantly unconscious, and motivated reasoning leads people to biased perceptions that the payoff-maximizing alternative is the correct and honest response, we should expect a confirmation attentional bias where the locus of attentional processing in dishonest responses is biased towards the high-paying alternative. On the other hand, if people first become aware of the correct answer and only then deliberately decide to act dishonestly, we should expect a more balanced locus of attentional processing that facilitates a more accurate representation of the available information and potentially a bias towards the higher incentivized option at a later stage of the decision process. The results show that the decision to cheat within a flexible dot task is mainly made before the concrete decision situation is even presented indicated by a pre-decisional increase in arousal in cheating decisions. However, we also found that attentional biases occur in the information search phase suggesting that people aim to avoid increased tension by preemptive biased processing. This

pattern of results provides support for the relevance of both accounts with regard to the underlying mechanism of dishonest responses.

Saturday, 18th April

3:30 PM

Areas of Interest as a Signal Detection Problem in Behavioral Eye-Tracking Research

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Decision researchers frequently analyze attention to individual objects in order to test hypotheses about underlying cognitive processes. To this end, fixations are assigned to objects using a method known as area of interest (AOI). Ideally, an AOI includes all fixations belonging to an object while fixations to other objects are excluded. Unfortunately, due to measurement error and insufficient distance between objects the distribution of fixations to objects may overlap, resulting in a signal detection problem. If the AOI is to include all fixations to an object it will also likely include fixations belonging to other objects (false positives). In a survey we find that many researchers report testing multiple AOI sizes when performing analyses, presumably trying to balance the proportion of true and false positive fixations. To test whether AOI size influences the measurement of object attention and the conclusions drawn about cognitive processes we reanalyze four published studies and conduct a fifth tailored to our purpose. We find that for studies in which we expect overlapping fixation distributions, analyses benefit from the use of smaller AOI sizes (0° visual angle margin). In studies where we expect no overlap, analyses benefit from larger AOI sizes (> 0.5° visual angle margins). We conclude with a set of guidelines for behavioral eye-tracking research.

Saturday, 18th April

4:00 PM

What is reported in eye-tracking research? – Developing transparency standards

Frank Renkewitz¹, Susann Fiedler², Jacob L. Orquin³, Michael Schulte-Mecklenbeck⁴

¹University of Erfurt, Germany;

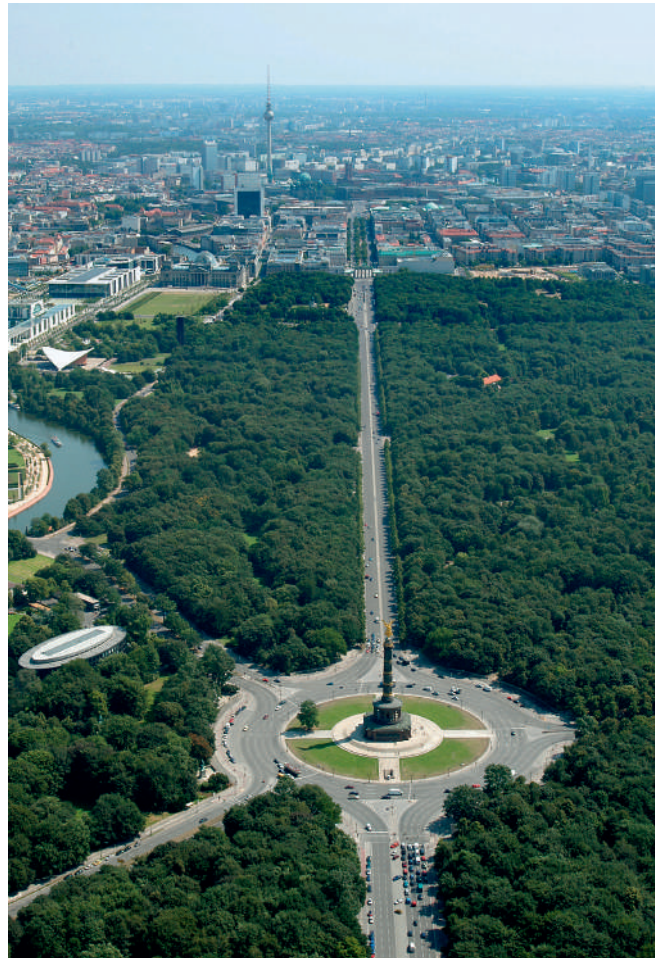
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⁴Max Planck Institute for Human Development, Berlin, Germany

The use of eye-tracking is rapidly growing in the field of judgment and decision making. Applications are diverse and the method proved useful as a means to record information acquisition and better understand the underlying cognitive processes involved in decision making. Because eye-tracking provides such valuable insights, but is also bound to assumptions about cognitive processes and data interpretation, reporting results of eye-tracking studies in scientific manuscripts poses a unique challenge.

In a comprehensive evaluation of the published experimental literature between 2010 and 2014, using eye-tracking, we evaluate reporting norms and identify current short-comings. Our goal is to present a set of guidelines aimed at reporting practices of eye-tracking studies. A guideline like this must be responsive to the ideas of the research community, so we particularly looking forward discussing our suggestions with the audience.



Around the Max Planck Institute for Human Development

Supermarket

The closest supermarket is Kaisers (five minutes walk).

Walk in the direction of the underground station Breitenbachplatz. Then cross under the highway. Then follow the street you are on, Südwestkorso. Opening hours: 8.00 AM to 9.00p PM, Mon-Sat.

Pharmacy

Right by Breitenbachplatz you find the pharmacy Zwillingsapotheke.

Opening hours: Mon-Fri 8.00 AM to 7.00 PM, Sat 9.00 AM to 5.00 PM. Closed on Sun.

Bank

You can find a branch of Commerzbank with an ATM right at Breitenbachplatz. The ATM is always accessible. The bank's opening hours: Mon, Wed, Fri from 9.30 AM to 3 PM; and Tue, Thu from 9.30 AM to 6 PM.

Practical guide – useful tips for a stay in Berlin

Currency exchange and issues of payment

Debit cards and major credit cards (American Express, Visa, Mastercard) are usually accepted in supermarkets and bigger shops. In cafés, bars, small shops, you likely need to pay cash.

So it is always useful to have some cash with you. Taxis only sometimes accept cards.

There are several possibilities for currency exchange. For example at several stations, including the central train station, Ostbahnhof, Alexanderplatz, Friedrichstraße and Zoologischer Garten.

WI-FI

There is a "Public Wi-Fi-Berlin" you can use for free 30 minutes a day. It is available in Mitte and Prenzlauer Berg via 44 access points. You simply need to accept the terms of use.

Tips

Taxes are included in prices. If you are content with the service e.g. at restaurants, you may add a tip.

A suggestion:

Taxis: 10 % of the bill

Restaurants: 10 – 15 % of the bill

Room maids: 2 – 3 EUR per day

Smoking

Smoking is prohibited in public buildings, in train stations, and in means of public transport, as well as in many cafes, bars, and restaurants. In many places, there are separate areas, where you are allowed to smoke.

Opening hours

Note that most shops (including supermarkets) are closed on Sunday.

Exceptions are, for example, the supermarkets at the central station and at Friedrichstraße.

Tickets for public transport (all for the inner city area "AB", see map on page 34)

Short trip: EUR 1.60

Single ticket: EUR 2.70

Four-trip-ticket: EUR 9.00

Day ticket: EUR 6.90

7-day-ticket: EUR 29.50.

What to do on Sunday in Berlin?

Flea market and Karaoke at Mauerpark

The Mauerpark is a very colourful, very crowded place with lots of interesting stands, selling antiques, food, jewelry.

Flohmarkt im Mauerpark (9 AM-18 PM); Karaoke (starting at 3 PM)

Bernauer Strasse 63-64,

13355 Berlin-Mitte.

The dome of the German Bundestag

You do not need to pay an entrance fee, but an online registration is required.

Opening hours: 8 AM-12 PM

<https://visite.bundestag.de/BAPWeb/pages/createBookingRequest.jsf?lang=en>

Asisi Panorama

Daily life in a divided city: this 360° panorama by Yadegar Asisi shows a scenery at the Berlin Wall on a fictitious autumn day in the 1980's

Opening hours: 10 AM – 6 PM

Entrance fee: 10 EUR

<http://shop.asisi.de/mauer/ticket/ticket-berlin-die-mauer.html>

Berliner Unterwelten (the Berlin Underworlds Association)

An option for rainy days: The Berlin Underworlds Association provides several guided tours in Berlin's subterranean complexes (e.g. in the remains of a fortress used in World War 2).

<http://berliner-unterwelten.de/home.1.1.html>

City tours

There is a variety of different city tours, for example free walking tours or including tours about Berlin's alternative scene.

<http://free-berlin-tours.com/>

Impressum

Publisher

Max Planck Institute for Human Development (MPIB)
Lentzeallee 94
15149 Berlin

Date

April 2015

Print

DTP @ MPIB Berlin

Layout & Design

Jürgen Rossbach
DTP @ MPIB Berlin

Pictures

© MPIB Berlin (pp. 2, 4)

© <http://www.berlin.de/berlinbilder/nutzungsbedingungen/index.html> (p. 32)

Text

Jana Jarecki, Eveline Söder, Michael Schulte-Mecklenbeck

We wish to thank the EADM and the Center for Adaptive Rationality for the financial support of our EGPROC Meeting 2015 in Berlin.



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