



# EGPROC 2014 Conference

1.-3/5/2014  
Salzburg University  
Faculty of Natural Sciences



## *Program & Abstracts*



## Thursday: Pre-Conference Workshop

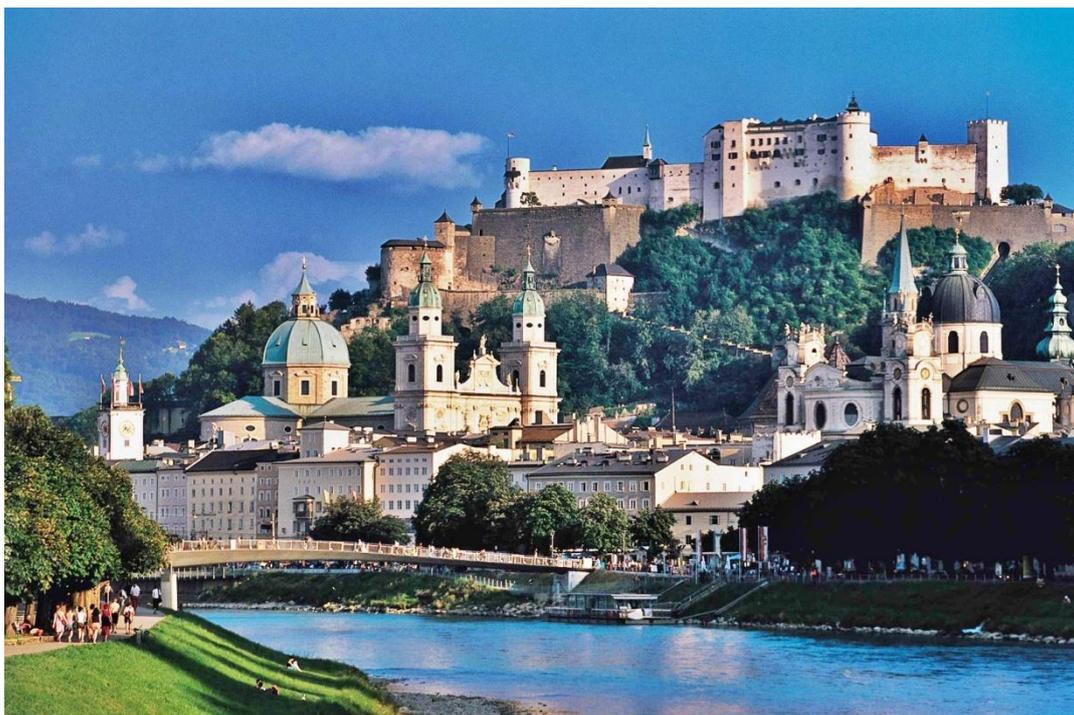
9 : 0 0 – 9 : 3 0	<b>Welcome+General Introduction</b>	
9 : 3 0 – 1 1 : 0 0	Group 1: Theory and Planning	Group 2: Hands-On
1 1 : 0 0 – 1 1 : 1 5	<b>Break</b>	
1 1 : 1 5 – 1 2 : 4 5	Group 1: Theory and Planning	Group 2: Hands-On
1 2 : 4 5 – 1 3 : 1 5	<b>Lunch</b>	
1 3 : 1 5 – 1 4 : 4 5	Group 1: Hands-On	Group 2: Theory and Planning
1 4 : 4 5 – 1 5 : 0 0	<b>Break</b>	
1 5 : 0 0 – 1 6 : 3 0	Group 1: Hands-On	Group 2: Theory and Planning
1 6 : 3 0 – 1 7 : 3 0	<b>Discussion and Best Practice</b>	
1 9 : 0 0	<b>Müllner Bräustübl (Brewery)</b>	

## Friday: 1st Day of Main Conference

9 : 0 0 – 9 : 1 5	<b>Welcome</b>
9 : 1 5 – 9 : 3 0	<b>Van Dyck:</b> <i>Investigation of the food choice process using hand movements in binge eating disorder</i>
9 : 3 0 – 1 0 : 1 5	<b>Riege:</b> <i>An eye-tracking analysis of the effect of answering format on additivity neglect</i>
1 0 : 1 5 – 1 0 : 3 0	<b>Havlicek:</b> <i>The Influence of Quality Seals on Brand Evaluation</i>
1 0 : 3 0 – 1 0 : 4 5	<b>Teichert:</b> <i>Heuristics in joint purchase: an explanatory study</i>
1 0 : 4 5 – 1 1 : 1 5	<b>Break</b>
1 1 : 1 5 – 1 2 : 0 0	<b>Huber:</b> <i>Identifying the outcome structure of risky alternatives - results and problems.</i>
1 2 : 0 0 – 1 2 : 1 5	<b>Brandstätter:</b> <i>Attention in Risky Choice</i>
1 2 : 1 5 – 1 2 : 3 0	<b>Kogler:</b> <i>Delayed Feedback on Tax Audits: Consequences for Compliance and Fairness Perceptions</i>
1 2 : 3 0 – 1 2 : 4 5	<b>Idzikowska:</b> <i>Effect of delay on probability weights</i>
1 2 : 4 5 – 1 3 : 4 5	<b>Lunch</b>
1 3 : 4 5 – 1 4 : 3 0	<b>Nurek:</b> <i>Information distortion in medical diagnosis: strengthening the leader or weakening the competitor?</i>
1 4 : 3 0 – 1 4 : 4 5	<b>Mühlbacher:</b> <i>Mental reframing in the Asian disease problem: A verbal protocol analysis</i>
1 4 : 4 5 – 1 5 : 3 0	<b>Kostopoulou &amp; Sirota:</b> <i>Tracing physicians' information search and its role on the detection of early cancers</i>
1 5 : 3 0 – 1 6 : 0 0	<b>Break</b>
1 6 : 0 0 – 1 6 : 4 5	<b>Witteman:</b> <i>Decision making by experienced and novice clinicians.</i>
1 6 : 4 5 – 1 7 : 0 0	<b>Kubinska:</b> <i>Positive and negative recency effect in binominal events recognition and forecasting process</i>
1 9 : 0 0	<b>Knights' Meal at Festung Hohensalzburg</b>

## Saturday: 2nd Day of Main Conference

9 : 0 0 – 1 0 : 0 0	<b>Jarecki:</b> <i>Discussion - Moot Point Process Models</i>
1 0 : 0 0 – 1 0 : 4 5	<b>Gonzalez:</b> <i>Judgments of Resource Savings and the Time-Saving Bias</i>
1 0 : 4 5 – 1 1 : 1 5	<b>Break</b>
1 1 : 1 5 – 1 2 : 0 0	<b>Schulte-Mecklenbeck:</b> <i>Mapping process measures to cognitive processes</i>
1 2 : 0 0 – 1 2 : 4 5	<b>Fiedler:</b> <i>Looking at Outcome Distributions Differently: How Social Preferences Guide the Transformation of Objective Payoffs</i>
1 2 : 4 5 – 1 3 : 4 5	<b>Lunch</b>
1 3 : 4 5 – 1 4 : 0 0	<b>Scherndl:</b> <i>Nudging on the process level - attentional effects preceding actual choices</i>
1 4 : 0 0 – 1 4 : 4 5	<b>Orquin:</b> <i>Attention and Choice</i>
1 4 : 4 5 – 1 5 : 3 0	<b>Schlegelmilch:</b> <i>Looking and Weighting</i>
1 5 : 3 0 – open end	<b>Future of EGPROC</b>





## Abstracts (sorted by occurrence)

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

Van Dyck, Z.<sup>1</sup>, Schulte-Mecklenbeck, M.<sup>2</sup>, Blechert, J.<sup>3</sup>, Vögele, C.<sup>1</sup>

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<sup>3</sup> Psychology Institute, University of Salzburg, Austria

#### **Abstract**

*Background:* 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 and interindividual differences. Moreover, eating-related psychopathologies such as binge eating disorder (BED) are likely to moderate such food choices. BED is characterized by 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.

*Objective:* 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.

*Methods:* Participants will be tested during both hungry and satiated conditions in a counterbalanced design. A mouse-tracking paradigm will be used to record peoples' continuous hand-movements during repeated forced choices between healthy and unhealthy foods. To model situational variables such as food availability, one half of the displayed food items will be declared available for consumption whereas the other half will be declared as unavailable. The degree of curvature in response trajectories during forced mouse-based choice will be calculated as a metric of the competition between choice options.

*Expected findings:* When actual consumption is expected (available condition), BED individuals are hypothesized to choose high-calorie food less often as compared to healthy participants because of their negative associations with the consequences of indulgence (e.g., weight gain). In contrast to healthy controls, this effect should not depend on hunger/satiety state in BED. We assume that the competition between choice options is stronger in BED than in control participants, manifested in an increased trajectory curvature toward high-calorie food items. Furthermore, we expect the extent of the curvature to be correlated with the severity of the disorder.

**Type of contribution:** work-in-progress



## **An eye-tracking analysis of the effect of answering format on additivity neglect**

*Riege, A. H., Sulutvedt, U., & Teigen, K.H.*

<sup>1</sup>Department of Psychology, University of Oslo

<sup>2</sup>Simula Research Laboratory, Oslo

### **Abstract**

When people are asked to estimate the probabilities of uncertain events, they often neglect the additivity principle, which requires that the probabilities assigned to an exhaustive set of outcomes should add up to 100%. Previous studies indicate that additivity neglect is dependent on response format, self-generated probability estimates being more coherent than estimates on rating scales. The present study made use of eye-tracking methodology, recording the movement, frequency and duration of fixations during the solution of ten additivity problems and two control tasks. Participants produced more non-additive estimates in the Scale format than in the Selfgenerated format. Self-generated estimates also led to longer decision time and a higher number of repeated inspections, suggesting a deliberate comparison process. In contrast, the Scale format seemed to encourage a case-based approach where each outcome is evaluated in isolation. Further studies of additivity neglect and format differences will investigate the differences in visual layout between the two formats. A planned study will manipulate the distance between the alternatives in the Self-generated layout. It is possible that the close proximity of the alternatives in the Self-generated condition might facilitate vertical eye movements, or vice versa, that the horizontal scales separating the alternatives in the Scale condition might discourage such movements.

**Type of contribution:** standard presentation



## The influence of quality seals on brand evaluation

*Havlicek, C.*

Vienna University of Economics and Business, Austria

### **Abstract**

For advertisers it is getting extremely difficult to reach potential customers, due to 3 reasons (Schweiger/Schrattenecker 2012):

- Information overload of recipients (Kroeber-Riel/Esch 2000; Sanger/Wascher 2011; Scheier/Held 2012; Yilmaz et al. 2011)
- Sketchily/Cursorily examination of ads by the target group (Kroeber-Riel/Groppel-Klein 2013; Topfer 2007)
- Saturated markets and homogeneous products (Bauer et al. 2012; Esch et al. 2005; Hofbauer/Helwig 2009; Littich/Zimmermann 2010; Trommsdorff/Teichert 2011)

A popular advertising technique to achieve the recipient's attention is – beside to eroticism, humor, children and testimonials – the use of **quality seals** in advertising. An important purpose of quality seals is the pooling of information as "information chunks", so that they fulfill similar functions as brands in the buying-decision-process, namely signaling a certain level of quality, reducing the perceived risk and thereby building trust with consumers (Esch et al. 2005).

Several studies showed that quality seals help to reduce uncertainties concerning quality (Gierl/Stich 1999). According to "signaling theory" quality seals act as an anchor and help customers in decision-making, increase the credibility of advertising claims and improve the attitude toward the brand and toward message sender (Atkinson/Rosenthal 2014).

The **experiment** will use eye-tracking and EDA-measurement simultaneously to investigate the influence of quality seals on advertising effectiveness of print ads. Attention and activation are prerequisites for processing the advertising content (Kroeber-Riel/Groppel-Klein 2013; Trommsdorff/Becker 2009) and therefore essential for successful brand communication. In addition, both methods are superior to the verbal measurement (Hyona 2010; von Keitz 2009). One ad of a "search goods"-product and one of a "experience goods"-product will be explored. The design of the ads will be comparable and realistic. Furthermore it will be checked, if the combination of methods will lead to different results.

The experiment will use 3 factors to answer the research questions, each with 2 levels. The first factor will manipulate quality seal (existing vs. not existing), the second research method (eye-tracking vs. eye-tracking + EDA) and the third product group (search goods vs. experience goods). 2

**Type of contribution:** work-in-progress



## **Heuristics in joint purchases: an exploratory study**

*Teichert, T.<sup>1</sup> & Schulte-Mecklenbeck, M.*

<sup>1</sup> University of Hamburg, Germany

<sup>2</sup> Max Planck Institute for Human Development, Germany

### **Abstract**

Heuristics limit the task burden of consumers when choosing single products. Purchase decisions are however often interdependent, e.g. when choosing a complete menu for dinner. Here, there is an especially large need to limit the overall burden of all decision subtasks. Whereas anchoring and adjustment is recognized as a simplification scheme to sequentially assess product bundles, other heuristics applied in joint purchase decisions are yet unexplored.

We suggest that both top-down as well as bottom-up processes of visual attention and attribute evaluation may explain the sequence of decisions in joint purchase decisions. To investigate viewing processes and the underlying types of heuristics taking place in joint purchase decisions, we apply a MouselabWeb experiment that records viewing sequences as well as final decisions made in repeated choices. We vary the presentation sequence of choice components across respondents to disentangle top-down and bottom-up processes of information acquisition behavior. 86 participants responded to 10 joint purchase situations (menu choices) comprising of three components with three product alternatives each.

Altogether, we observe 835 Triple-Choices based upon 20.382 cell acquisitions. Probably due to the easiness of the choice tasks, almost always all product offerings were looked at least opened once. However, the intensity of inspection varies across product offerings. Furthermore, we identify typical sequences of viewing and deciding. The data, so far, suggest that the sequence of acquisition processes does not only influence the order of decisions made but also the outcomes of joint purchase decisions. Thus, the heuristic patterns applied seem to impact decision outcomes. Findings are interpreted in order to assist the Marketing of products in joint purchase decisions.

**Type of contribution:** work-in-progress



## **Identifying the outcome structure of risky alternatives - results and problems**

*Huber, O.*

Fribourg, Switzerland

### **Abstract**

In realistic risky decision situations, the construction of a mental representation of the alternatives is an important component of the decision process. A central aspect of the representation is the outcome structure of the alternatives, that is, which outcomes may occur and especially, which combinations of outcomes are possible or not. For example, it makes a difference if unpleasant side-effects of a medicine may occur *together* with a healing or *instead* of a healing. In my contribution, I focus on the problem which information decision makers search for in order to identify the outcome structure.

In an experiment with O.W. Huber and A. Bär, 36 participants had no initial information about the outcome structure. Observed information search was not conforming to that what one would expect: There were basically **no** diagnostic questions targeted on the probability/possibility of combinations of outcomes. People, however, often asked about the probability of the isolated outcomes. Half of the participants assumed already a clear outcome structure before they searched for information. Practically all alternatives for which a risk-defusing operator was searched for finally represented the correct structure.

In a second experiment with J.M.S.W. Vogt, 40 participants obtained additional cues in the instructions in order to promote search for information about outcome combinations. However, even with a massive cue (examples of combination and explicit invitation to search relevant information), questions for combinations of outcomes were extremely rare.

These results raise a number of questions that will be discussed, for example: Participants often have an incorrect outcome structure, because of a-priory hypotheses or incomplete information search. How does an incorrect representation affect the decision? Which factors determine the a-priory hypotheses about the outcome structure?

**Type of contribution:** standard presentation



## **Attention in risky choice**

*Brandstätter, E.*

University of Linz, Austria

### **Abstract**

Previous research on the processes involved in risky decisions has rarely linked process data to choice directly. We used a simple measure based on the relative amount of attentional deployment to different components (gains/losses and their probabilities) of a risky gamble during the choice process, and we related this measure to the actual choice. In an experiment we recorded decisions, decision times, and eye movements from 80 participants who made decisions on 11 choice problems selected from Kahneman and Tversky (1979). We used the number of eye fixations and fixation transitions to trace the deployment of attention during the choice process. We obtained the following main results. First, not all pieces of information received the same amount of attention, which refutes choice models relying on weighting and summing of information. Second and most important, different components of a gamble attracted different amounts of attention depending on participants' actual choice. This was reflected in both the number of fixations and the fixation transitions. This result supports dimensional decision strategies like the priority heuristic. Finally, a comparison of our attention-based measures with data from verbal protocols showed a large degree of convergence regarding the process and outcome of risky choice – a result also in support of dimensional strategies.

**Type of contribution:** work-in-progress



## **Delayed feedback on tax Audits: consequences for compliance and fairness perceptions**

*Kogler, C.*<sup>1</sup>, *Mittone, L.*<sup>2</sup>, & *Kirchler, E.*<sup>1</sup>

<sup>1</sup> Faculty of Psychology, University of Vienna, Austria

<sup>2</sup> CEEL - Computable and Experimental Economics Laboratory, University of Trento, Italy

### **Abstract**

In most experiments in the field of tax research, audits usually occur directly after filing taxes, and feedback on the consequences of an audit is given immediately. In reality, audits might happen within a much longer period of time, e.g., up to five or ten years in Austria, depending on the respective case. The present study reveals that delaying feedback on tax audits has a clear effect on tax compliance. Participants receiving immediate feedback on audits and fines over repeated periods of taxpaying evade significantly more compared to participants receiving feedback only after the last period. Two potential explanations for this prominent impact of timing of feedback on tax compliance are identified in the post-experimental questionnaire: Although informed about objective probability of audit as well as the precise level of fines, people in the delayed feedback condition indicate a higher subjective probability of audit, and perceive fines to be more severe, than those in the immediate feedback condition. Nevertheless, participants in the delayed feedback group perceive the timing of information on audits as significantly more unfair, and in this vein evaluate the respective authorities as acting unfair. In line with the established connection of perceived fairness, trust in authorities, and tax compliance, it seems plausible that long periods of uncertainty regarding feedback on audits may yield higher honesty for the short term, but nonetheless undermine compliance in the long run. The present experimental results support this notion, since introducing a compulsory tax for three consecutive periods results in a significant drop in compliance in the delayed feedback group, whereas the compliance in the immediate feedback group was not reduced. This conclusion is also maintained by the fact that participants in the delayed feedback group show a significantly higher acceptance of tax cheating in general.

**Type of contribution:** work-in-progress



## **Effect of delay on probability weights**

*Idzikowska, K.<sup>1</sup>, Palenik, M.<sup>1</sup>, Tyszka, T.<sup>1</sup>, & Zielonka, P.<sup>2</sup>*

<sup>1</sup> Kozminski University, Poland

<sup>2</sup> Warsaw University of Life Sciences, Warsaw, Poland

### **Abstract**

Numerous studies on delayed gains and losses showed that people discount payoffs according to hyperbola-like function. On the other hand, human decision making under risky situations seems to be well described by Kahneman and Tversky's prospect theory, where risky gains and losses are described by value function and probability weighting function. Still, in real life we often face choices where outcomes are both delayed and uncertain. In present research a combined effect of delay and risk was studied.

Basing on previous research we formed hypothesis that: the bigger the delay of a lottery the less sensitive people are for the changes in probabilities. Probability weighting function becomes more and more flat. Results of our research supported this hypothesis for gains but not for losses.

In previous research it was also found that when subjects compared lotteries which were said to be paid in the future, they were more risk seeking than in case of instant lotteries. However, a question arises whether higher risk tolerance for the future than for the present payoffs is a general principle or depends on a nature of comparison. In previous experiments subjects compared lotteries with payoffs materializing at the same time: either in the present or in the future. However, quite often we evaluate delayed lotteries in terms of their present value. We compare something in the present with something in the future. In this case eliminating delay may seem so attractive to individual that even small but certain and instant payoff will be an equivalent of a large but delayed and uncertain payoff. In consequence, the decision maker may reveal smaller risk tolerance for delayed than for instant lottery. Indeed, the present research seems to confirm this expectation.

**Type of contribution:** work-in-progress



**Information distortion in medical diagnosis: strengthening the leader or weakening the competitor?**

*Nurek, M.*

King's College London, UK

**Abstract**

**Aim.** Physicians appear to interpret incoming information in a way that supports their emerging diagnostic belief ('pre-decisional information distortion').<sup>1</sup> We aimed to identify whether this distortion serves to strengthen a leading diagnosis ('bolstering'), weaken a competing diagnosis ('denigration'), or both.

**Method.** 96 physicians read three patient scenarios, each with two contending diagnoses. Scenarios began with information supporting one diagnosis. Physicians indicated their diagnostic belief (-10 'diagnosis A more likely' to 10 'diagnosis B more likely'). They then saw four cues, each equally supportive of the two diagnoses. For each cue, physicians 1) rated its support for each diagnosis on two separate scales (0 'no support' to 10 'strong support') and 2) updated their diagnostic belief. A control group of physicians (N=43) rated the same cues, which were presented as a randomly ordered list (no scenarios). With no opportunity to develop a leading diagnosis, their average cue ratings provided baseline values for calculating distortion in the experimental group. We measured cue bolstering (in relation to the leading diagnosis) and cue denigration (in relation to the competitor). In a second study, 87 physicians completed both the experimental and control conditions. We measured bolstering and denigration relative to 1) average control ratings and 2) personal control ratings.

**Results.** Mean bolstering was not significant, whether measured against average control ratings (study 1  $M=0.20$ , study 2  $M=0.18$ , both  $p>0.13$ ) or personal control ratings ( $M=0.09$ ,  $p=0.50$ ). Mean denigration was significant, relative to average control ratings (study 1  $M=0.89$ , study 2  $M=0.95$ , both  $p<0.001$ ) and personal control ratings ( $M=0.82$ ,  $p<0.001$ ).

**Conclusions.** Physicians did not distort information to bolster their leading diagnosis but did so to denigrate its competitor. Measuring distortion relative to personal control ratings made no substantive change to findings.<sup>2</sup> Denigration may have an advantage over bolstering, allowing for direct reduction of 1) threats posed to 'cognitive consistency'<sup>3</sup> and/or 2) the effort required to process discordant information.<sup>4</sup> Alternatively, the finding could be specific to physicians,<sup>5</sup> who are trained to exclude plausible alternative diagnoses.

**Type of contribution:** standard presentation



### **Mental reframing in the Asian disease problem: A verbal protocol analysis**

*Muehlbacher, S., Hartl, B., & Kirchler, E.*

University of Vienna, Austria

#### **Abstract**

The classical Asian disease problem (Tversky & Kahneman, 1981) demonstrates how framing of decision outcomes affects choice. The preference for the risky option if outcomes are presented as losses can be explained by reference point effects as postulated in prospect theory (Kahneman & Tversky, 1979). However, in the original study applying the Asian disease scenario about 25% of subjects seemed not to be prone to framing effects and showed the opposite choice behavior than predicted. Using the verbal protocol technique, Maule (1989) showed that subjects not following prospect theory's predictions seem to "reframe" the decision problem before deciding. They recognize that saving 200 of 600 people also means to lose 400 and therefore apply a different decision frame than the frame suggested in the scenario. Because Maule's observation is based on an extremely small sample of 12 participants, we replicated his study with a bigger sample of N=55. Subjects were confronted with the original Asian disease scenario and were asked to articulate their thoughts while thinking about the problem. The verbal protocols were analyzed with regard to how often thoughts about gains and about losses were mentioned. Subjects deciding for the risky option in the positively framed version of the scenario mentioned more loss thoughts than those who decided in line with prospect theory's prediction. For the negatively framed version of the scenario no differences in gain or loss thoughts were observed. Further, verbal protocols of subjects deciding not in line with prospect theory were longer, indicating a more thorough and "rational" decision process.

Keywords: framing, prospect theory, risky choice, verbal protocols

**Type of contribution:** work-in-progress



## **Tracing physicians' information search and its role on the detection of early cancers**

*Kostopoulou, O., & Sirota, M.*

King's College London, UK

### **Abstract**

**Purpose:** We used process tracing to investigate how the information that physicians gather relates to the detection of early cancers.

**Methods:** Ninety family physicians were presented with 3 patient scenarios, constructed so that early cancer was possible, although cancer symptoms were subtle. Each patient presented twice, the second time with slightly worse or additional symptoms. Physicians asked for information in order to diagnose and manage the patients. Think aloud was conducted in the last two scenarios. Each scenario was performed under a silent and a think-aloud condition the same number of times as the other scenarios.

We recorded the number of cancer-relevant cues physicians requested and whether their value was positive (present/abnormal) or negative (absent/normal). We computed the ratio between a) the negative cancer-relevant cues out of those available and b) the positive cancer-relevant cues out of those available. This was the ratio of negative vs. positive cancer evidence that participants gathered.

**Results:** A multilevel logistic regression model for diagnosing cancer was constructed with random intercept, 'scenario' as a repeated measure, and 'search ratio', 'visit', 'physician experience' and 'verbalisation condition' as fixed effects. 'Search ratio' and 'experience' were significantly associated with diagnosis (OR 0.04 [95% CI 0.01-0.27], (OR 0.95 [95% CI 0.92-0.99] respectively). Verbalisation had no influence on diagnosis. When the same model was constructed for management (leading to cancer detection or not), experience was no more significant.

**Conclusions:** Gathering more negative than positive information about cancer significantly reduced the likelihood that physicians would diagnose and manage for cancer, perhaps due to expecting more severe symptoms. We will be exploring this further with the think-aloud data. We are also currently looking into analytical methods for representing complex search data, such as process mining and classification methods, and the insights that they can provide about the reasoning processes underpinning cancer detection.

**Type of contribution:** standard presentation



### **Decision making by experienced and novice clinicians**

*Witteman, C., Skvortsova, A., Yanev Y., Jellema, S., Hahn, S., Sanfey, A., Figner, B., & Schulte-Mecklenbeck, M.*

#### **Abstract**

We will present results of performance on sets of clinical and control decision tasks, presented in Mouselab and as triads, by novice and experienced clinicians and age-matched controls. The aim of setting our participants these tasks was to find indications of different processes within a professional domain depending on experience. We hypothesized more detailed, elaborate processing of novices and more abstract, faster processing of experienced professionals within their domain, with the same level of performance. Results partly support these hypotheses, and give some interesting extra insights.

**Type of contribution:** standard presentation



## **Positive and negative recency effect in binominal events recognition and forecasting process**

*Kubińska, E.<sup>1</sup>, Markiewicz, L.<sup>1</sup>, Tyszka, T.<sup>1</sup>, Zielonka, P.<sup>2</sup>*

<sup>1</sup> Cracow University of Economics, Cracow, Poland

<sup>2</sup> Kozminski University, Warsaw, Poland

<sup>3</sup> Warsaw University of Life Sciences, Warsaw, Poland

### **Abstract**

Previous studies found individual differences in beliefs about the continuation or reversal of trends in various processes. Though some tend to believe:

- in the trend's continuation (momentum, positive recency propensity)
- while others tend to predict the trend's reversal (contrarian, negative recency propensity)

The question remains unanswered about the source of these beliefs. We hypothesize that Momentum belief is associated with System 1 usage, and the use of contrarian strategy requires System 2 to overcome the primitive cues of System 1.

To verify this general presumption the set of experimental studies has been conducted. In these studies students have been asked to observe twenty series of ten coin tosses. Some series have been manipulated to end up with two, three or four stimulus of the same type (e.g. four tails or four tosses at the end of the particular series). Two type of tasks were administered to subjects: recognition vs. prediction tasks. Accordingly subjects were asked to:

- predict (N=259) the last toss results in a particular series, or
- recognize (N=125) the last toss results in a particular series.

In line with our general presumption, we expected that in recognition task, System 1 will be at work - with the increasing number of stimulus of the same type in the sequence, the response time will decrease. The hypothesis was supported.

Concerning prediction task, some subjects performed the task under cognitive load, while other proceeded with no encumbrances. Again in line with our general presumption, we expected that cognitive load will increase usage of momentum strategy. Also this hypothesis was supported.

Thus, our results seem to support the claim that using System 1, we follow momentum belief, while the use of contrarian strategy requires System 2.

**Type of contribution:** work-in-progress



## **Towards a definition of process models**

*Jana Jarecki\*, Jolene Tan\* & Mirjam Jenny\**

*Max Planck Institute for Human Development, Berlin*

### **Abstract**

Cognitive scientists seek to model cognition with process models. Those models are argued to foster more insights into human cognition than computational models. But what exactly is a “process model”? A precise definition of the term is absent, hindering model evaluation, model comparison, theory integration, and differentiation. We propose a definition of the term “process model” to reflect its usage in the (JDM) literature and inform future model building. This will facilitate critically assessing and detecting gaps in existing models. Based on this, we review the properties of existing (JDM) models. Issues that will be discussed include: Do process models need to predict process data? How can a definition account for different levels of description? What is the relationship between process models and computational models?

**Type of contribution:** standard presentation // discussion



## **Judgments of resource savings and the time-saving bias.**

*Svenson, O., Gonzalez, N.\*, and Eriksson G.*

\* = presenting author

Stockholm University, Sweden

### **Abstract**

According to the time-saving bias, when people judge time saved following a speed increase they underestimate the time saved from increases from a previously low speed while they underestimate it when the previous speed was high. The time-saving bias has been found for speed increases in road traffic (Svenson, 2008) as well as for production speed of merchandise (Svenson, 2011) which is the subject of the current presentation. Participants judged the production speed increase needed from an improvement in a production line to save the same amount of time as in another previously improved production line (matching).

In the first condition we used verbal protocols to search for heuristics that may be used when making this kind of judgment. The results showed that 45% of the participants used a ratio-rule<sup>a</sup> which means that increases in production speed are compared proportionally while 31% used a difference-rule<sup>b</sup> comparing increases by the numerical difference. The remaining 24% used unknown heuristics. A following linear regression analysis showed that for all participants the judgments predicted by the ratio-rule accounted for 68% of the variance of the judged time saved and the difference rule accounted for 52%. However, when analyzing only the participants who reported a ratio-rule heuristic the ratio-rule accounted for 93% of the variance and a corresponding analysis for participants reporting a difference-rule 79% was accounted for.

We also attempted to reduce the bias by having participants perform additional tasks in order to have the participants better understand time savings from different increases in speed. In the second condition the participants were asked to judge the time saved from the previously improved line before judging the increase needed to match this time saving when improving the second line. This improved judgment performance somewhat. In the third condition the participants judged the time saved from two consecutive increases before doing the matching task which reduced the average judgment error to approximately 25% compared to 51% in condition one.

**Type of contribution:** standard presentation



**Mapping process measures to cognitive processes**

*Schulte-Mecklenbeck, M.<sup>1,2</sup>, Kühberger, A<sup>3</sup>, Gagl, B<sup>3</sup>, & Hutzler, F.<sup>3</sup>*

<sup>1</sup> Center for Adaptive Rationality, Max Planck Institute for Human Development

<sup>2</sup> Swiss Federal Institute of Technology, Zürich, Switzerland

<sup>3</sup> University of Salzburg, Austria

**Abstract**

‘Reverse inference’ is inference from an observable behavior (e.g., a pattern of eye-tracking data) to a cognitive process. Such inferences can be problematic because the same behavior can be caused by various cognitive processes. The mapping between the observed and the inferred element therefore is ambiguous. As a possible remedy we suggest utilizing forward inference: instructing prototypical information processing such that the resulting patterns of behavior can be used to distinguish between cognitive theories. We applied our method of ‘instructed process tracing’ to compare patterns elicited by instructing Expected Value Theory or the Priority Heuristic to instruction-free patterns. We found support for Expected Value Theory in terms of search patterns; attention and sequence alignment data favored both models in different aspects. These results are discussed in light of forward and reverse inference.

**Type of contribution:** standard presentation



**Looking at outcome distributions differently: How social preferences guide the transformation of objective payoffs**

*Fiedler, S., De Dreu, C. & Glöckner, A.*

Max Planck Institute for Research on Collective Goods, Germany

**Abstract**

Previous work has demonstrated that Social Value Orientation (SVO) is related to cooperative behavior in social dilemmas. However, little is known concerning the underlying processes. In a first eye-tracking study investigating decisions in simple money allocation tasks, we show that differences in SVO are accompanied by consistent differences in information search. Decision time, number of fixations, the proportion of inspected information, the degree of attention towards the others' payoffs, and the number of transitions from and towards others' payoffs gradually increase with absolute SVO deviation from a pure selfish orientation. In a second experiment we investigated this relationship further by looking at the temporal dynamics of the information search in decisions about outcome distributions. We show that on the one hand individualists weight their own outcomes most over the entire decision process, but that the attention is particularly strong biased at the beginning and the end of the decision. For pro-social participants on the other hand the attention distribution between own and other payoff, as well as payoff difference and sum of payoff information is fairly evenly distributed. These results are discussed with respect to the common social preference models.

**Type of contribution:** standard presentation



### **Nudging pre-decisional processes – information search preceding actual choices**

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#### **Abstract**

Previous research has demonstrated that the position of an item may have an influence on the likelihood of choice. However, these ‘nudging’ findings have only been demonstrated on choice level but not on the level of the underlying processes. In this talk, I will focus on the question if there are also nudging effects that may be found in pre-decisional information search (i.e. at the process level).

We presented a scenario including two very similar alternatives and present one either at the beginning or the end of a multi-attribute decision matrix depicting test reviews of different cars. We logged participants’ information search before their final decision as well as their final decision.

We demonstrate that there is not only a tendency to choose the first presented alternative, but that there is already a nudging effect during pre-decisional information search: the first presented alternative becomes a standard for comparison for later presented alternatives. This leads to a stronger focus (number of acquisitions, decision time) for the latter not chosen but similar alternative.

**Type of contribution:** work-in-progress



### **Attention and choice: A review on eye movements in decision making**

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#### **Abstract**

This paper reviews studies on eye movements in decision making, and compares their observations to theoretical predictions concerning the role of attention in decision making. Four decision theories are examined: rational models, bounded rationality, evidence accumulation, and parallel constraint satisfaction models. Although most theories were confirmed with regard to certain predictions, none of the theories adequately accounted for the role of attention during decision making. Several observations emerged concerning the drivers and down-stream effects of attention on choice, suggesting that attention processes plays an active role in constructing decisions. So far, decision theories have largely ignored the constructive role of attention by assuming that it is entirely determined by heuristics, or that it consists of stochastic information sampling. The empirical observations reveal that these assumptions are implausible, and that more accurate assumptions could have been made based on prior attention and eye movement research. Future decision making research would benefit from greater integration with attention research.

Keywords: decision making, visual attention, eye tracking, process tracing, review

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**Type of contribution:** standard presentation



## **Looking and weighting**

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### **Abstract:**

According to evidence accumulation models, information about different outcomes or attributes is integrated by a stochastic process of repeated information sampling. The frequency with which specific attributes are sampled is governed by their relative importance. When this sampling process is reflected in gaze behavior, fixation proportions on different attributes should be directly related to the judgmental weights of these attributes. We tested this hypothesis in two eye-tracking experiments on quantitative estimation. Participants estimated the price of fictitious goods, which were described by different quantitative values on four attribute dimensions. In different market settings, we instructed several weighting schemes that varied the number of relevant attribute dimensions and their relative importance (Exp 1 and 2). Furthermore, we realized a condition in which participants had to infer an appropriate weighting scheme during the first few trials based on (manipulated) feedback about their estimates. Our goal here was to induce a stable estimation behavior without giving any instructions about attribute weights. On an aggregate level of analysis, the results clearly reveal that different weighting schemes are associated with different gaze patterns. In all conditions, we consistently found a monotonic and almost linear relationship between mean attribute weights (as estimated by individual regressions of the judgments of each participant on attribute dimensions) and mean fixation proportions on corresponding attribute dimensions. Moreover, on an individual level of analysis, gaze behavior was predictive of participants' estimates. Predictions were derived by computing a weighted sum score for each item and using individual fixation proportions as weights. These predictions showed a substantial correlation with participants' estimates in all conditions, but were less reliable when the weighting scheme was more complex. In sum, both experiments demonstrate that there is a strong and stable relationship between attention and attribute weighting in the process of quantitative estimation.

**Type of contribution:** standard presentation