Poster II

01 | **Céline Haciahmet**, University of Trier | Common Coding in Stroop Conflict: an EEG power analysis of early sensory conflict detection | Céline Haciahmet, Christian Frings & Bernhard Pastötter

The common coding theory of perception and action (Hommel, Müsseler, Aschersleben, & Prinz, 2001; Prinz, 1997) suggests that action execution is coded in terms of perceptual events in a common representational domain (Van der Wel, Sebanz, & Knoblich, 2013). Up to date, the neural mechanisms behind the common coding account are rather unclear for most executive functioning, such as cognitive conflict. There is ample evidence from EEG research (Pastötter & Frings, 2018; Opitz et al., 2020) that response conflict arising in later processing stages can influence early sensory processing of flanking distractors. Here we present EEG time-frequency data (N = 50) from a lateralized colour-word Stroop task as a further piece in the search for the neural basis of common event coding. In general, behavioural and EEG results replicate midfrontal stimulus and response conflict in theta power (4-8 Hz). Regarding early conflict detection, the sensory processing of distractive colour words in parieto-occipital theta power is increased during response conflict, but not during stimulus conflict. In fact, the early detection of upcoming response conflict in parieto-occipital areas correlated negatively with midfrontal theta power increase during the response selection stage. This data pattern supports the idea of a representational link between stimulus perception and associated response features, as recent action control accounts (BRAC; Frings et al., 2020) would suggest.

02 | **Lisa-Marie Krause**, University of Würzburg | Interpretation of non-canonical pointing gestures | Lisa-Marie Krause & Oliver Herbort

Normally, one is pointing by extending arm and hand and putting the index finger in the line between one's eyes and the target, while observers extrapolate the vector defined by the pointer's shoulder and index finger. In this study, we focus on interpretation of non-canonical pointing gesture where the pointing arm and hand are oriented differently, e.g. because the target is hidden behind another object. As indicated by a pilot study, observers base their interpretation mainly but not solely on the hand orientation. Now, we examined whether the arm orientation also serves as directional cue, which is contributing to the interpretation of the target location or whether the arm is affecting the hand orientation by means of a simultaneous contrast. In the former case, the estimated target location should be biased towards the extrapolation of the arm while in the latter case the target location should be perceived as further away from the extended arm. In an online study, participants saw screenshots with a virtual pointer from a sideward perspective with varying arm (-15°,0°,15°) and hand elevations (-30°, -15°, 0°, 15°, 30°) pointing to a vertical pole at different distances (25cm, 100cm, 175cm). They were asked to determine where on the pole the pointer was pointing. Generally, the arm orientation was perceived as a contrast, leading to a repulsion of the finger orientation from that of the arm. However, when the arm direction was oriented upwards, the estimated target location was biased towards the extended arm line, indicating an assimilation.

03 | **Melanie Richter**, TU Dortmund | Relative, not absolute, stimulus size is responsible for a congruency effect between physical stimulus size and left/right response positions

Recent studies demonstrated a novel congruency effect between physical stimulus size and horizontally aligned response position: Right-hand responses are shorter and more accurate to a small stimulus, compared to a large stimulus, whereas the opposite is true for left-hand responses. The present study investigated whether relative or absolute size is responsible for the effect. If relative size was important, a particular stimulus would elicit faster left-hand responses if the other stimuli in the set were larger, but the same stimulus would elicit a faster right-hand response if the other stimuli in the set were smaller. In two experiments, participants performed a discrimination task in which they had to respond to stimulus color (Experiment I) or to stimulus shape (Experiment II) with their left/right hand. Stimulus size varied as an irrelevant stimulus feature, thus leading to congruent (small-left; large-right) and incongruent (small-right; large-left) conditions. While in one half of the experiment, a set of small stimulus sizes was employed, in the other half a set of large sizes was used. The consistently significant two-way interaction between stimulus size and response position reliably demonstrated the presence of the congruency effect. The three-way interaction between stimulus size, response position and stimulus set, however, never reached significance. The pattern of results, thus, demonstrates that relative, but not absolute, stimulus size is crucial for the congruency effect between physical stimulus size and response position. Hence, the associations between stimulus size and the categories (responses) “left” and “right” are established on the fly, depending on task-context.

04 | **Alejandra Rodríguez-Velásquez**, University of Freiburg | Evidence for Time-based Expectancy in the Tactile Domain

When a particular stimulus appears more frequently after a certain time interval than after another, participants adapt to such regularity by responding faster to frequent interval-stimulus combinations than to infrequent ones. This phenomenon is known as time-based expectancy (Thomaschke et al. 2015). Most studies on time-based expectancy have primarily focused on the visual domain using modified versions of the time-event correlation paradigm (Wagener, & Hoffmann, 2010). However, given current assumptions of different sensory-dependent human timing mechanisms that work in parallel, the question whether such expectancies can also be formed in the tactile domain remains open. We will present a series of experiments where we explored whether participants could build time-based expectancies for vibrotactile stimulation. Our findings will be discussed in relation to human timing research and its implications for future research in multitasking.

05 | **Irina Monno**, University of Freiburg | Exploring strategies for cost balancing in self-organized task switching | Irina Monno, Jeff Miller & Andrea Kiesel

In voluntary task switching, individuals aim to optimize their performance by balancing cognitive constraints (switching costs) and environmental constraints (waiting time). In the self-organized task switching paradigm, the stimulus associated with a task repetition occurred with stimulus onset asynchrony (SOA), which increased continuously with the number of repetitions until a task switch reset the SOA. Thus, the waiting time for the repetition stimulus increased with the number of successive task repetitions. We examined how individuals balanced switching costs and waiting time in different experimental settings. We observed two different cost-balancing strategies. That is, some individuals switched tasks when the waiting cost was approximately equal to the individual switching cost, i.e., they used the local strategy. Other individuals switched tasks before the waiting cost reached the individual switching cost, i.e., they used the global strategy. Interesting, the preferred strategy was used consistently across different experimental settings, suggesting interindividual stable strategies.

06 | **Anne Saulin**, University of Würzburg | Learning prosocial motives

Empathy, i.e., sharing another's feelings, and reciprocity, i.e., reciprocating kindness, are two strong motives for prosocial behaviors. However, so far, it is unclear which of the two motives is more sustainable over time. Here we use a reinforcement learning approach to investigate how empathy and reciprocity motives develop and decay over time in the absence of further reinforcement. In the first experimental phase (corresponding to acquisition), we reinforced the respective motive (empathy/reciprocity) with high probability (80%) and in a second phase (corresponding to extinction) with low probability (20%). In a parallel control condition, the motive was randomly reinforced (50%) in both phases. We observed that the strength of the reciprocity motive closely mirrors the frequencies of reinforcement in the respective phase, i.e., increased in the first phase and decreased in the second phase. In contrast, the strength of the empathy motive increased in the first phase and persevered in the second phase. When modeling motive strength over time using a variant of the Rescorla-Wagner model, this difference in motive development was reflected by a significant difference in one key model parameter. Follow-up analyses revealed that this model parameter is likely to capture the motive dependent influence of emotional valence on motive development. Together, these results suggest (i) that the empathy motive might be more sustainable than the reciprocity motive and (ii) that differences in motive development over time can be well captured and described in terms of standard reinforcement learning models.

Online 1 | **Philipp Raßbach**, University of Würzburg | The effects of action costs and cognitive crosstalk from lower to higher levels in nested multitasking | Philipp Rassbach, Eric Griessbach, Rouwen Cañal-Bruland & Oliver Herbort

Humans engage in nested multitasking when they regularly make higher-level cognitive decisions (e.g., deciding whether or not to cross a street) while continuously performing a lowlevel motor task (e.g., walking). Sequential choice models predict an influence of higher cognitive to lower motor levels, but only embodied choice models predict bidirectional influences between action and decision making. Here we examined whether low-level motor task execution biases higher-level cognitive decision making due to cognitive crosstalk and action cost related discounting. Participants performed a multilane tracking task comprising a low-level motor task of tracking a stimulus on a lane and a higher-level cognitive decision task of moving to an upper or lower lane offering equal or unequal rewards; to disentangle cognitive crosstalk from action cost related discounting, the action costs for moving to the upper or lower lane varied as a function of the state of the low-level motor task. Higher-level cognitive decisions were biased both by the state of the low-level motor task and the varying action costs. Specifically, we observed the largest biasing effects if rewards were equal but smaller biasing effects persisted when rewards were unequal. These findings indicate that humans are prone to making biased decisions due to crosstalk effects from lower to higher levels in nested multitasking. This supports embodied choice models of decision making that emphasize bidirectional influences between action and decision making.

Keywords: multitasking, decision making, embodied choice, crosstalk, action-based models.