Talks IV

Elena Benini, University of Freiburg | Is Language Bound in Task Switching when it is Task-irrelevant? | Elena Benini, Iring Koch, Susanne Mayr, Christian Frings & Andrea M. Philipp

Task-switching paradigms are typically employed to examine cognitive control. However, automatic processes also intervene in such multitasking settings. For example, in task-switching, response-repetition benefits are observed in task repetitions, but response-repetition costs in task switches. The interaction of task repetition (vs. switch) with response repetition (vs. switch) may be explained in terms of task-response features binding. Binding is the process through which the features of a stimulus are automatically integrated into a coherent representation. Many pieces of evidence suggest that this representation is retrieved from memory upon reencountering at least one feature. In this study, we used cued task switching and added a task-irrelevant feature to examine its influence on binding. Namely, we presented verbal task cues either in Spanish or in English, while the target was always in German. We predicted that repeating the cue language in the subsequent trial would retrieve the features of the previous trial, despite language was a task-irrelevant feature throughout the task. We observed a three-way interaction of repetition (vs. switch) of task, response, and cue language. When cue language switched from the previous trial, the response repetition benefit in task repetitions turned into a small repetition cost, while task-switch trials were largely unaffected by a cue language switch. We discuss the findings in light of binding and retrieval mechanisms: when the cue language repeated, it retrieved the previous task-response binding, yielding the response repetition benefits, whereas such binding could not be retrieved when language switched.

Viola Mocke, University of Würzburg | Exploring the Binding of Different Types of Features in Action Planning

Action planning, that is, the top-down processes preceding an action's eventual execution, can be construed as activation and binding of features of anticipated action effects. Most previous studies have focused on the spatial features "left" and "right" to describe planned body movements. A series of four online experiments aimed at testing whether other (non-)spatial features are bound to action plans as well. Overall, we did not find indications for differences in binding or retrieval of temporal ("short" and "long") or vertical ("top" and "bottom") features as opposed to horizontal ("left" and "right") features. As binding effects did not show consistently, we additionally identified two conditions which, when met, seem to enhance these processes in general. First, the clearest signs of binding and retrieval showed when there was uncertainty regarding all features of an action, up to the point in time it had to be planned or executed. Secondly, indications for feature binding appeared to be more likely when actions were described in terms of features that are not very commonly used to describe the respective body movements, and which in that sense are unfamiliar. These observations have important methodical implications for the future study of feature binding in action planning.

Juhi Jayesh Parmar, University of Jena | Stimulus-response binding and retrieval is independent of affective consequences: Implications for theories of learning and behaviour automatization

Stimulus-response binding and retrieval (SRBR) is a fundamental mechanism driving behaviour automatization. In our 4-part experiment series, we investigated the modulatory role of performancedependent and performance-independent affective consequences on SRBR effects in order to test whether binding/retrieval can explain instrumental learning (e.g., the "law of effect"). SRBR effects were assessed with a colour categorisation task in a sequential prime-probe design, with an orthogonal variation of Response relation (colour repetition vs. change) by Distractor relation (word repetition vs. change). Binding/retrieval effects are measured by an interaction of the two factors, with distractor repetition leading to facilitation in conditions where the response must be repeated, but leading to interference when the response changes from prime to probe. Positive, neutral, or negative events consisting of visual, auditory, and monetary events were interspersed between primes and probes to investigate whether affective consequences modulate the binding/retrieval effect. Consistently across all 4 experiments (total n=334), we did not find any evidence for an affective modulation of RT-based binding/retrieval effects, indicating that these effects are fully automatic and independent of (performance dependent and independent) feedback. Results are discussed with regard to their implications for theories of learning and habit formation.

Silvia Selimi, University of Trier | Hand position effects in response-response binding

Responding to a stimulus leads to the integration of stimulus and response features into an event representation (event file). Consequently, repeating one of these features retrieves the whole event file, influencing further responding. Recently it has been shown that the same mechanisms of binding and retrieval can also affect multiple responses: Executing two individually planned responses in sequence leads to integration of them so that repeating one of the responses later on retrieves the other (Moeller & Frings, 2019). Recent findings show that hand position might influence binding of manual responses: Distance between hands giving responses modulated binding, with larger binding effects for responses with hands positioned close together than far apart. As the exact mechanisms behind this effect are unknown, possible explanations are discussed.

Philip Schmalbrock, University of Trier | Gestalt Principles in Stimulus-Response Binding

We constantly produce action and that almost effortlessly. However, internal processes that lead to our actions are all but simple. The action control literature describes several processes that make actions possible without perceiving their production as effortful. One of these processes that enables us to act intentionally is the binding of stimuli and responses (S-R Binding). Comprising stimulus and response features in a short-lived memory trace (event file), we are able to quickly represent information input and action output in a single format without additional translation- or processing steps. Yet, S-R binding is not one unified process but consists of two separate strands that contribute to it. In a first step, features are *integrated* into an event file. In a second step, the previously integrated event file is retrieved. Further, both processes can be modulated by other variables that increase or decrease integration or retrieval strength. One set of factors that have been shown to modulate S-R binding *in general* are gestalt principles. For example, binding is absent when stimulus features are presented in the background compared to when forming their own figure in front of the background (figure-ground segmentation). However, it is unclear which of the two strands of S-R binding are actually targeted by such gestalt manipulations. In this talk, I want to give a closer look at how integration and retrieval are modulated by two gestalt principles, namely figure-ground segmentation and perceptual grouping.