



56. Herbsttreffen experimentelle Kognitionspsychologie  
(HexKoP)



UNIVERSITÄT  
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## Begrüßung

Liebe Teilnehmerinnen und Teilnehmer,

wir begrüßen Euch sehr herzlich zum 56. Herbsttreffen für experimentelle Kognitionspsychologie (HexKoP) und freuen uns sehr darüber, diese Tagung – nach 2012 – in diesem Jahr zum zweiten Mal im Haxterpark in Paderborn ausrichten zu dürfen. Insbesondere freuen wir uns über 45 Anmeldungen. Die insgesamt 36 Beiträge sind jeweils einer von 8 Vortragsessions oder der Posterpräsentation „Walking Science“ zugeordnet. Die Tagungssprache ist Englisch, und so werden wir spannende Beiträge über Binding- und Simon-Experiments, Social Perception and Coordination, Human Performance, Priming und Experimental Methods hören. In guter Tradition findet über die gesamte Tagung hinweg zu jedem Zeitpunkt immer nur ein Vortrag statt (anstelle von den sonst üblichen Parallelsessions auf größeren Veranstaltungen), sodass jeder wissenschaftliche Beitrag die ihm gebührende Aufmerksamkeit erfährt und am Ende darüber ausgiebig diskutiert werden kann. Insbesondere konnten sich die Vortragenden wieder zwischen einer Vortragslänge von 15 oder 25 Minuten entscheiden, um auch die Möglichkeit einer etwas ausführlicheren Vorstellung der eigenen Forschungsarbeit zu geben. Ein wichtiger Teil der Tagung wird die Posterpräsentation in lockerer Atmosphäre sein. Dabei liegt es uns am Herzen, dass alle 13 Poster ausführlich betrachtet und besprochen werden können. In den Pausen wird es Kaffee und Kuchen geben.

Der Austausch soll am Abend in der Paderborner Innenstadt weitergeführt werden. Dafür haben wir am Montagabend im Café Central reserviert, wo wir Euch Alle nach dem Essen zu einem Spieleabend in kleineren und größeren Gruppen begeistern wollen. Ein weiteres Highlight wartet am Dienstagabend im Sputnik auf uns. Für den Jazz Club konnten wir das Bielefelder Musik Duo Copa Room Service engagieren, die den Abend musikalisch begleiten. Außerdem wird es ein vegetarisches und veganes Buffet von Festfalen® Catering geben.

Jetzt kann es losgehen!

Euer Orga-Team Paderborn

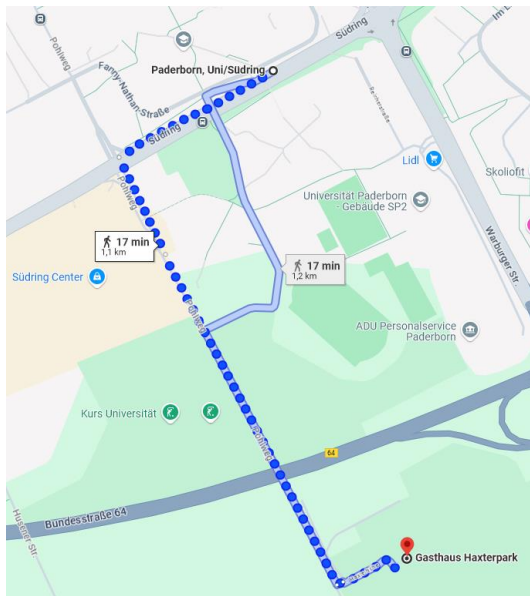
## Danksagung

Wir danken den vielen Unterstützerinnen und Unterstützern innerhalb der Universitätsverwaltung, die uns bei der Planung, Realisierung und Abrechnung der Tagung behilflich waren (und noch sein werden). Außerdem bedanken wir uns bei Frau Pilz vom Gasthaus Haxterpark, bei Frau Bekemeier vom Café Central, Herrn Schade vom Sputnik, Frau Husemann von Festfalen® Catering (alle aus Paderborn) für die Bewirtung sowie beim Musik Duo Copa Room Service (aus Bielefeld) für die musikalische Begleitung des Gesellschaftsabends. Dankbar sind wir auch für das Bereitstellen von Zimmerkontingenten im „Liborianum: Bildungs- und Tagungshaus Paderborn“ und in der "IN VIA Akademie Paderborn".

## Anreise

Die Tagung findet in den Räumen des **Haxterparks** ([www.haxterpark.de/haxterpark](http://www.haxterpark.de/haxterpark)) statt, der sich in der Nähe der Sportstätten der Universität Paderborn befindet. Bitte plant bei Eurer Anreise mit den öffentlichen Verkehrsmitteln ein, dass ihr ca. 1km (15min) zu Fuß zurücklegen müsst (von der **Haltestelle Uni/Südring** (siehe Abbildung)).

Adresse des Tagungsortes: Haxterpark, Haxterhöhe 2, 33100 Paderborn



Für die Anreise und den Transfer mit öffentlichen Verkehrsmitteln während der Tagung empfehlen wir Euch die Padersprinter-App. Dort findet Ihr alle Verbindungen zum Campus und Tagungsort.

<https://www.padersprinter.de/app/>



## Weitere wichtige Tagungsorte

**Café Central** (Montagabend): Rosenstraße 13, 33098 Paderborn  
**Sputnik** (Dienstagabend): Imadstraße 7, 33102 Paderborn



## Programm

**Montag, 30.09.2024**

**13.00 Uhr | Anmeldung und Kaffee**

**14.00 Uhr | Begrüßung und Talk Session I**

Ruben Ellinghaus

*Order effects in stimulus discrimination challenge  
established models of comparative judgement*

Carolin Wickemeyer

*Response inhibition for the basketball pump fake with  
responses of different complexity*

**15.30 Uhr | Talk Session II: Binding I**

Lars-Michael Schöpfer

*When detection comes down to discrimination: Binding and  
retrieval in a pop-out-search task*

Maria Nemeth

*Response-Response binding effects when actions are  
stopped: A Multi-Study approach*

**16.15 Uhr | Kaffeepause**

**16.45 Uhr | Talk Session III: Simon**

Peter Wühr

*How location-specific is the coding of stimulus (and  
response) frequency?*

Pamela Baess

*The mystery of two-dimensional Simon effects revealed*

Aldo Sommer

*Color vs. space: Modulations of the Simon effect in  
embodied cognition*

**19.00 Uhr | Essen und Spieleabend im Café Central**



**Dienstag, 01.10.2024**

**10.00 Uhr | Talk Session IV: Binding II**

Matthäus Rudolph

*Stimulus-response binding and retrieval processes operate independently of contingency awareness*

Nicolas Münster

*Weighting feature dimensions to modulate the influence of task-irrelevant features on S-R binding*

Iris Güldenpenning

*Context-specific adaptation for head fakes in basketball: A study on player-specific fake-frequency schedules*

**11.15 Uhr | Kaffeepause**

**11.30 Uhr | Talk Session V: Social Perception & Coordination**

Ogeday Çoker

*Did you see what I saw? Investigating joint attention mechanisms in terms of social groups*

Linda Linke

*How the information of both eyes is combined in the perception of gaze direction and direct gaze*

Matthias Weigelt

*Coordination efficiency in social interaction: A pilot study for the object-transport task in a real-life context*

Nils Böer

*Differences of producing head fakes with and without a social partner*

**13.00 Uhr | Mittagspause**

**14.00 Uhr | Walking Science: Poster Session**



**15.00 Uhr | Talk Session VI: Performance**

Stephan Dahm

*No motor learning via action-imagery practice in the two-ball rotation task*

Amelie Jung

*Assessing time-on-task changes in cognitive control and vigilance components in a dual task*

Philip Schmalbrock

*Constant auditory noise as a burden on working memory?*

Daniel Darnstaedt

*The role of working memory in task-order coordination:  
Mechanisms of training-related improvements*

**19.00 Uhr | Essen und Show Act im Sputnik**



**Mittwoch, 02.10.2024**

**10.00 Uhr | Talk Session VII: Priming**

Omar Jubran

*Chasing the wave front of response hazards in speeded pointing decisions*

Daniel Maurer

*Aftereffects of selection in an action-based negative priming paradigm*

Belgüzar Nilay Türkan

*When affordance is not universal: Negative compatibility effect is modulated by task type*

**11.15 Uhr | Kaffepause**

**11.30 Uhr | Talk Session VIII: Methods**

Christoph Louven

*emoTouch - A new web-based Continuous Response System for Real Time Research and Process Support*

Maximilian Friehs

*This is the way: Indoor navigation cues in virtual environments*

**12.30 Uhr | Verabschiedung**





## Abstracts der Beiträge

Montag, 30.09 2024

### Begrüßung und Talk Session I

#### **Order Effects in Stimulus Discrimination Challenge Established Models of Comparative Judgment**

Ruben Ellinghaus, Rolf Ulrich, Karin Bausenhart & Roman Liepelt  
University of Hagen

The ability to discriminate between physical magnitudes (e.g., loudness, brightness, duration) is a basic component of human judgment. Since the time of G.T. Fechner, discrimination performance has often been studied with the 2-Alternative-Forced-Choice (2AFC) paradigm, wherein which participants repeatedly compare a constant standard stimulus against a variable comparison stimulus. For the case of duration discrimination, it has been shown repeatedly that discrimination performance is better when the standard precedes rather than follows the comparison, a phenomenon which is referred to as the *Type-B-Effect* (TBE). This effect is not only counterintuitive but also contradicts standard psychophysical models such as Signal Detection Theory. Here, we present the results of a meta-analytic random-effects model designed to assess the TBE's generality and size. This meta-analytic regression model indicated real evidential value for the TBE and thus reveals it as a ubiquitous feature of the classic 2AFC task. Accordingly, future models of stimulus discrimination should ideally account for this effect. Although the mechanisms responsible for the occurrence of the TBE are currently not fully understood, memory updating, internal reference formation, and differential weighting of the two stimulus positions are plausible candidate mechanisms that are in line with our findings.



## Response inhibition for the basketball pump fake with responses of different complexity

Carolin Wickemeyer, Iris Güldenpenning, & Matthias Weigelt  
Paderborn University

Even NBA players fall for pump fakes in approximately 73% of the time and initiate erroneous blocking movements. To investigate the point where inappropriate defensive movements can no longer be inhibited, two experiments were conducted. The aim of Experiment 1 was to validate suitable stimulus material for constructing a basketball-specific anticipation-response inhibition (ARI) task and Experiment 2 investigated response inhibition in a real-life response scenario. In both experiments, a video of a basketball jump shot was presented and in Experiment 1 participants were instructed to release the space bar at the point when the ball leaves the player's fingertips (go-trials), while in Experiment 2 they were required to jump up and press a buzzer at the ceiling to "block" the shot. In 25% of all trials, a simulation of a pump fake was presented, and participants should withhold their response (stop-trials). To measure response inhibition ability, the point-of-no-return (PNR, signifying a response-inhibition rate of 50%) was calculated. In Experiment 1, the PNR was located 177 ms before the point of ball release and in Experiment 2 the PNR was located 462 ms with and 153 ms without movement time. Participants delayed their responses after stop-trials in a subsequent go-trial in Experiment 1 [ $F(2, 46) = 65.590, p < .001; \eta p^2 = .740$ ] as well as in Experiment 2 [ $F(2,40) = 22.245, p < .001; \eta p^2 = .527$ ], which reflects strategic post-stop-trial adjustments. In addition, biomechanical parameters are discussed that provide important further insights concerning the inhibition of a defensive action.



## Talk Session II: Binding I

### **When detection comes down to discrimination: Binding and retrieval in a pop-out-search task**

Lars-Michael Schöpper, Elisa Besler, Dominique Lamy, Heinrich R. Liesefeld &  
Christian Frings  
University of Trier

In odd-one-out detection tasks participants indicate if a target stimulus is present or absent in a distractor-filled display. It has often been found that repeating the feature dimension by which a target pops-out benefits search performance, which has been interpreted as “dimension weighting” taking place. This interpretation is derived from analyzing target-present trials that were preceded by target-present trials; target-absent trials are typically dropped from analysis. From an action control perspective deciding if a target is present or absent and giving the respective response involves discriminating the display to have a unique target or not. For such discrimination performance, effects of binding and retrieval are assumed, which lead to partial repetition costs. In the current study, we hypothesized that indicating if a target is present or absent should lead to a stimulus-response binding pattern. Participants indicated if a target was unique among a set of distractors; crucially, we orthogonally varied the color of a stimuli on screen. We replicated a dimension repetition effect in target-present trials, suggesting the occurrence of dimension weighting. Crucially, there was a strong binding pattern between responding and color of all stimuli. This suggests that binding and retrieval are processes constantly active in odd-one-out detection performance, or, more general, visual search. The results are discussed by re-interpreting dimension weighting from an action control perspective.



## **Response-Response Binding Effects when Actions are stopped: A Multi-Study Approach.**

Maria Nehmet  
University of Trier

In the literature on human action control, the binding and retrieval of responses is assumed to shape the coordination of more complex actions. Specifically, the consecutive execution of two responses is assumed to result in their integration into cognitive representations (so-called event files) and can be retrieved from that upon later response repetition thereby influencing behavior. Against the background of ideomotor theory and more recent theorizing in the BRAC framework (Frings et al., 2020), we investigated whether response execution is necessary for binding and retrieval of responses. We manipulated whether the retrieving response (Experiment 1), as well as the to-be-bound response (Experiment 2), is executed or omitted. The results showed that responses do not need to be executed to retrieve other responses or to be bound to other responses. Apparently, activating the cognitive representation of a response sufficed for this response to trigger event-file binding and retrieval. Our results are the first that show that response-response binding is not dependent on executing responses. Together, the results support the core assumptions of ideomotor theory and BRAC, namely a common coding of action and perception. In addition, two further follow-up experiments are presented that examine binding and retrieval when actions are stopped more early and no action tendency is elicited (Experiment 3) and when the stopped action is otherwise very rare to be executed (Experiment 4).



## Talk Session III: Simon

### **How location-specific is the coding of stimulus (and response) frequency?**

Peter Wühr

Dortmund University

Humans regularly respond to stimuli that appear with different frequency at different locations. In two experiments, in which stimulus (and response) frequencies differed between stimulus locations, we investigated whether participants encode stimulus (and response) frequencies in a location-specific, or in a location-independent, manner. We used a variant of the Simon task where participants had to press a left or right key to a green or red stimulus that could appear in different locations. In Experiment 1, stimuli occurred in one of four locations (left, right, above, below screen center). We manipulated stimulus frequency (with one color/response occurring more often than the other) for vertical locations, while red and green stimuli occurred with equal frequency at horizontal locations. As expected, responses were faster to frequent relative to rare stimuli at vertical locations. Notably, this frequency effect transferred to the horizontal location, and modulated the Simon effect. Results of Experiment 1 hence indicate that stimulus (and response) frequencies are encoded in a location-independent manner. In Experiment 2, we investigated if the effects of different stimulus (and response) frequencies at peripheral (vertical) locations can be counteracted by an opposing frequency manipulation at the central stimulus location. Results showed that the effects of compensatory stimulus (and response) frequencies at peripheral versus central locations nullify each other. Together, results indicate that, while participants are sensitive to (irrelevant) differences in stimulus (and response) frequencies, they do not encode these frequencies in a location-specific manner.



## The mystery of two-dimensional Simon effects revealed

Pamela Baess

University of Hildesheim

Spatial compatibility effects such as the Simon effects are rather robust showing that spatially incompatible mappings between stimulus position and response are not ignored. One theoretically interesting question is whether they also can be found in regard to different reference frames. Rubichi and colleagues (2005) presented stimuli at two different spatial positions along the vertical or horizontal axis, which introduced two different spatial reference frames potentially underlying the Simon effects. Interestingly, two different Simon effects were only observed for the horizontal Simon task but not for the vertical one. This is the only study investigating multiple Simon effects in a vertical Simon task. However, the participants in this study participated either in the horizontal or vertical version of the Simon task. Therefore, the aim of the present study is to replicate this study within the same group of participants performing a vertical and horizontal version of the Simon task with two different spatial reference frames, i.e. one based on the global screen position (left vs. right and top vs. bottom in regard to the screen's center) and one based on the relative screen position within each hemifield. Results will be discussed against the background of the original study.



## Color vs. Space: Modulations of the Simon Effect in Embodied Cognition

Aldo Sommer, Roman Liepelt & Rico Fischer  
University of Greifswald

Studies in embodied cognition demonstrated larger Simon effects when participants place their hands close to stimuli in comparison to far from them. Placing the hands near stimuli might heighten similarities between spatial stimulus-response (S-R) dimensions through a hand-centered attentional scope, resulting in enhanced S-R interference through increased S-R binding processes. The present study investigated if S-R binding processes are modulated in the near-hand space by manipulating response features in a visuo-motor Simon task. In Experiment 1, participants wore gloves that matched one color of the two stimuli of the Simon task. The results revealed larger Simon effect in the near-hand space in comparison to the far-hand space. However, the gloves' color did not impact task processing. Since the color of the gloves was kept the same for both hands, they might not have provided sufficient similarities between the S-R dimensions to modulate S-R binding processes. In Experiment 2, we implemented a Hedge and Marsh (1975) reverse Simon paradigm and changed the color of the gloves into a relevant task feature. Participants wore a red and a blue glove on either the left or right hand and were instructed to respond with the red glove to the blue stimulus and the blue glove to the red stimulus. We expected to reverse the Simon effect through the incompatible S-R color mapping. The results of Experiment 2 revealed a larger reversed Simon effect in the near-hand space in comparison to the far-hand space, indicating enhanced S-R binding processes in the near-hand space.



**Dienstag, 01.10.2024**

**Talk Session IV: Binding II**

**Stimulus-response binding and retrieval processes operate independently of contingency awareness**

Mathäus Rudolph, Carina Giesen & Klaus Rothermund  
University of Jena

Stimulus-response binding and retrieval (SRBR) is a fundamental mechanism facilitating behavior automatization. The binding and retrieval in action control framework (BRAC; Frings et al., 2020) proposes that SRBR is subject to modulation by top-down processes, such as awareness and instruction-based learning. Yet, the empirical findings regarding this conjunction are scattered and unsystematic. In a mega-analysis, we analyzed the data of four contingency learning experiments ( $N_{total} = 859$ ) to investigate the modulatory role of contingency awareness on SRBR effects. In two of these experiments, participants received explicit instructions about the contingencies. Our findings suggest that SRBR effects operate independently of contingency awareness, as (a) participants' contingency awareness did not modulate SRBR effects, and (b) SRBR effects were not modulated by experimental manipulations of contingency knowledge (instructed contingencies).





## **Weighting feature dimensions to modulate the influence of task-irrelevant features on S-R binding.**

Nicolas Münster

University of Trier

In action control, it is assumed that stimulus and response features are integrated into a common event file when they occur in a shared action episode. This event file is retrieved when at least one of the features involved is repeated, causing stimulus-response binding effects due to the relation of repeated and changed features. In a task containing different features, emphasis can be placed on certain feature representations by weighting the corresponding feature dimension, for example, by instruction. However, due to this intention-based approach weighted feature dimensions are often directly task-related. Our study examined how a task-irrelevant stimulus can influence task performance depending on whether its particular feature dimension is weighted or not. In one experiment ( $n = 125$ ), we varied different feature dimensions of stimuli within an object. Participants had to perform a stimulus-response binding task with an additional task that weighted the feature dimension of the task-relevant stimulus. A varying task-irrelevant stimulus only influenced the S-R binding effects of the task-relevant stimulus when their two feature dimensions were equal. This leads to the conclusion that a globally weighted feature dimension also affects stimuli that are not relevant to a current task.



## **Context-specific adaptation for head fakes in basketball: A study on player-specific fake-frequency schedules**

Iris Güldenpenning, Nils T. Böer, Wilfried Kunde, Carina G. Giesen, Klaus Rothermund,  
& Matthias Weigelt  
Paderborn University

In basketball games, it is important to spontaneously adapt to the individual fake frequency (e.g., 20% vs. 80%) of different opponents. Therefore, stimulus material of three different basketball players was used, and each player was presented in random order with a different frequency of head-fake trials (i.e., 20%, 50%, 80%). The analysis of the mean RTs revealed that the head-fake effect was present for 20% head fakes and disappeared for 50% head fakes. Also, the head-fake effect reversed (though not significantly) for 80% head fakes. Results thus indicate that participants adapted to the individual frequency of head-fake usage of the basketball player displayed in a trial. We analyzed whether this result can be explained by stimulus-driven episodic retrieval of previous responses that were executed at the last occurrence of the stimulus. Indeed, the findings from a multilevel modelling technique point out that for the RT data, the interaction between type of pass and fake frequency (which is indicative for player-specific adaptation of the head-fake effect) was no longer significant as we statistically controlled for stimulus-driven episodic retrieval effects. This implies that episodic response retrieval accounts for a substantial amount of variance in the head-fake effect.




## Talk Session V: Social Perception & Coordination

### **Did you see what I saw? Investigating Joint Attention Mechanisms in terms of Social Groups**

Ogeday Çoker & Türkan Belgüzar Nilay  
Pamukkale University

Humans exhibit a core sensitivity to social cues early on, which plays a vital role in social learning and interactions. Responses to social cues are heavily influenced by social categorization into in-groups and out-groups, with in-group cues receiving attentional priority. This study examined the effects of gaze cues provided by in-group and out-group members on joint attention mechanisms. Previous research (e.g., Chen et al., 2017) showed that the attentional bias towards in-group cues may shift when out-groups are perceived as threats. Therefore, we also investigated the influence of threat perceptions, political ideologies (conservatism vs liberalism), and value structures on joint attention. We hypothesized that social cues from the in-group would be prioritized over those from the out-group, but high-threat perceptions would enhance responses to out-group cues. Individuals with liberal value systems were expected to exhibit reduced antipathy towards out-groups and increased joint attention bias towards them. Using the standard gaze-cueing paradigm, we presented face stimuli from the Bogazici Face Database. We measured participants' reaction times (RT) and eye movements to social cues. Our results demonstrated that participants reacted significantly faster to in-group cues and fixated on their eye regions faster than out-group cues. Additionally, threat perceptions and political ideologies did not significantly influence RT results, whereas threat perception significantly impacted fixation durations on faces. This study contributes to understanding how social group affiliation, individual differences in threat perception, and value systems influence joint attention processes, attention biases, and eye movement mechanisms.



## **How the information of both eyes is combined in the perception of gaze direction and direct gaze**

Linda Linke  
Bielefeld University

The perception of direct gaze provides multiple benefits for the observer. Previous studies have investigated how the information of both eyes is used to estimate gaze direction and direct gaze, showing that the perception of gaze direction and direct gaze differs when only the externally rotated eye versus only the internally rotated eye is visible. With two experiment we investigated whether the difference between the internally and externally rotated eye could be traced back to the absolute rotation amount – with the assumption that the perception of direct gaze and gaze direction is largely dependent on the more rotated eye. By manipulating the distance between looker and observer we can influence the differences in rotation between the eyes. In the near distance condition vergence was present and the internally and externally eye were rotated differently, while in the far distance condition vergence was absent and both eyes were rotated equally. Two experiments yielded evidence for differences between the internally and externally rotated eye in the near distance condition but a lack of differences in the far distance condition. Results indicate that differences in the perception of gaze direction and direct gaze between both eyes are not dependent on the internal or external rotation of the eyes but on the absolute amount of rotation as observers base their judgment largely on the more rotated eye.



## Coordination efficiency in social interaction: A pilot study for the object-transport task in a real-life context

Matthias Weigelt, Jean-Luca Schulz, & Yannic Topp  
Paderborn University

In a virtual sequential object-transfer task, Török et al. (2019, *Psychological Science*) demonstrated that people choose between different paths in a way that ensures the minimization of collective costs. Here, we test this coordination efficiency during social interaction in a real-life context. Thirty participants were asked to carry a ball from a start location on one corner of a 10x10 m square to a goal location in the diagonal corner on the opposite side. The square was divided by a horizontal barrier with two openings to the left and right side of the midline and a vertical barrier of the same or different lengths on either side of the midline. Participants performed alone or in dyads by handing the ball over to another participant at one of the two openings in the horizontal barrier. Because of the different lengths of the vertical barriers, this resulted in *congruent conditions*, where the short subpath from an individual perspective corresponded to an overall shorter path for the dyad, in *incongruent conditions*, where the short subpath led to an overall longer path for the dyad, and to *neutral conditions*, where the two overall paths were of equal length. Results showed that participants not only minimized individual costs but also collective costs when performing in dyads, although to a smaller extent (90.8% vs. 82.9% of trials in congruent conditions; 93.1% vs. 73.8% of trials in incongruent conditions). For the object-transfer task, this suggests that people consider shared goals and act efficiently in a real-life context.



## **Differences of producing head fakes with and without a social partner**

Nils Tobias Böer, Iris Güldenpenning, & Matthias Weigelt

Paderborn University

The head fake in basketball is a scenario in which a basketball player passes the ball in one direction (e.g., to the right) while turning the head in the opposite direction (e.g., to the left). As the head orientation conflicts with the perceived pass direction, responses to passes with head fakes are slower and more error prone than responses to passes without head fakes (head-fake effect; Kunde et al., 2011). Interestingly, players performing a head fake in lab studies without a opposing player showed response-response incompatibility costs, evident in higher initiation times and error rates (Güldenpenning et al., 2023), as s/he must execute a passing movement in one direction while turning the head into the contrary direction. The current study investigated if the fake production costs are increased by the presence of a social partner. Such social costs can occur as the person who performs a deceptive action violates the social rule to not deceive another person (Foerster et al., 2019). Moreover, monitoring the consequences intended by a deception might also produce costs (Wirth et al., 2018). Accordingly, we predict that the fake production costs are higher with the intention to deceive a social partner (i.e., in a social scenario) as compared to when a participant performs the movement on his/her own (i.e., in an individual scenario). We will compare the initiation times and error rates of the attacking player between the social scenario with a defending player (opponent) and the individual scenario without a defending player.



## Walking Science: Poster Session

### **Searching and responding fixations indicate that attentional guidance underlies contextual cueing in natural scenes**

Josefine Albert  
Bielefeld University

In visual search, humans find targets faster when they appear in a repeated visual context (contextual cueing effect). It is still unclear whether this effect is due to a context-enhanced guidance of attention or due to response-related processing. Here, we aimed to distinguish between these two candidate underlying mechanisms. To this end, we investigated searching and responding eye fixations to dissect the visual search process in an attention and a response phase. In two experiments, participants searched for a letter superimposed on natural scenes and identified the letter as fast as possible. One half of trials showed repeated scenes, the other half showed novel scenes. In Experiment 1, repeated scenes were always shown with the target at one location. In Experiment 2, repeated scenes could be associated with one target location, two alternating target locations, or with one screen side. We found that the number of searching but not responding fixations was reduced by context repetition. Further, the duration of neither searching nor responding fixations was affected by context repetition. The contextual cueing effect for manual response times developed in parallel with the effect on cumulative durations of searching fixations. However, this development was strikingly different from effects on cumulative duration of responding fixations. Thus, this makes the case for attentional guidance as underlying mechanism of contextual cueing.



## Effect of modality mappings on dual-task performance in a more naturalistic environment

Piesie Asuako, Marie Mückensetin, Robert Stojan, Melanie Mack, Sina Alexandra Schwarze, Christine Stelzel, Yana Fandakova, Stephan Dahm & Claudia Voelcker-Rehage

University of Münster

Modality compatibility effect (MCE) describes multitasking-specific performance differences between compatible stimulus-response mappings (MC, e.g., visual-manual and auditory-vocal) and incompatible mappings (MI, e.g., visual-vocal and auditory-manual). The MCE has been demonstrated in various studies on dual-tasking with classical laboratory experimental designs. However, it remains unclear whether MCE also exists in everyday-life tasks, which are uninstructed and less controlled compared to laboratory environments (LE). Here, we investigated the MCE under single-task and dual-task conditions in LE and a more naturalistic driving environment (DE). We hypothesized larger dual-task costs under MI compared to MC, in LE compared to DE, and under MI compared to MC in LE than in DE. Participants ( $N = 39$ , age:  $23.39 \pm 2.02$ y, 27 women) responded manually or vocally to visual and auditory stimuli (MC or MI) in both environments. A cover story was introduced in DE to increase ecological validity. Linear mixed models evaluated the effects of Modality Mapping and Environment, and their interaction on dual-task costs for response time. Results reveal greater dual-task costs for MI compared to MC ( $p = .01$ ,  $\eta G^2 = 0.42$ ), but no significant difference between LE and DE ( $p = .24$ ,  $\eta G^2 = 0.27$ ). The interaction effect showed that dual-task cost differs between Modality Mapping and Environment ( $p < .001$ ,  $\eta G^2 = 0.14$ ). This suggests that the effect of MCE on dual-task cost varies based on the environment. Taken together, our findings reveal the influence of MCE on dual-tasking is less pronounced in everyday life compared to laboratory settings.





## **Back to the roots: Assessing visual attention with microcontroller-based and tangible stimuli**

Ngoc Chi Bahn  
Paderborn University

Complex interactive settings in display-based experiments that aim to replicate real-life aspects in a controlled environment often require modeling intricate stimuli and environments. Paradigms such as temporal-order judgment tasks necessitate precise timing. Combining these elements while ensuring correct timing poses significant demands on the development of the corresponding programs and still limits interaction modes, as participants are bound to touchscreen-based, button-based, or mouse-based interactions. While VR and AR may offer solutions, researchers are often constrained by manufacturers' claims regarding display accuracy and program performance. Before the widespread use of computers, experiments were custom-built boxes with peepholes and flashing electrical arcs. We aim to return to these roots, regaining elementary control over lights without compromising stimulus presentation precision and latency. Our goal is to make stimuli tangible and interactable while preserving the original paradigm. We present a prototype of our system, which enables precise control and interaction with stimuli in a tangible manner, maintaining high accuracy in stimulus presentation and timing. This approach bridges the gap between traditional methods and modern interactive technologies, offering new possibilities for cognitive psychology research. We want to explore how handling objects in a real environment (as opposed to a virtual environment) influences visual attention parameters. Using a simple paradigm based on the Theory of Visual Attention (TVA), temporal-order judgments, we assess visual attention capacity and weight.



## **Neural mechanisms of error processing in children and adults performing a motor task**

Laura Faßbender, Lisa Katharina Maurer, Johannes Falck, Yee Lee Shing & Gudrun Schwarzer  
University Giessen

A previous study suggested that with practice, error processing shifts from postdictive (represented by the feedback-related negativity/FRN) to predictive error processing (represented by the error-related negativity/ERN) (Maurer et al., 2022). Correspondingly, in cognitive tasks, children had lower ERN but higher FRN amplitudes than adults (Hämmerer et al., 2011; Ferdinand & Kray, 2014). Since adults showed higher FRN amplitudes in motor compared to cognitive tasks (Faßbender et al., 2023), we investigated in this study whether children also maintain lower ERN and higher FRN amplitudes than adults when performing and adapting to a motor task. We tested 14 children (8-10 years) and 14 adults (20-35 years) who were asked to open a drawer at a predefined speed against an individualized drawer resistance. The drawer speed within 49-51 mm after pulling determined whether the drawer could be fully opened and a coin was obtained. Participants received auditory feedback on whether their speed was correct, too slow, or too fast. After 300 trials with combined binary/visual and directed/auditory feedback, only binary feedback was presented, and the drawer resistance was changed. Children showed lower ERN and higher FRN amplitudes than adults, indicating stronger responses to external postdictive errors at younger ages. Removing directed feedback reduced performance in children but not in adults. This suggests that adults relied more on internal models than children. Further analyses will show whether differences in error processing will predict how participants adapted their movements.



## **The role of expectations for observationally acquired stimulus-response binding and retrieval effects in human-AI**

Kira Franke  
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Giesen and Rothermund (2022) found that observationally acquired stimulus-response binding and retrieval (oSRBR) effects only occurred if participants believed to be interacting with another human, while effects were absent when they believed that they were interacting with a computer. However, in further unpublished studies from our lab, this finding could not be replicated consistently, suggesting that there might be other factors influencing whether people rely on observed actions performed by AIs/computers to guide their own actions. In two experiments, we investigated whether the expectation to be interacting with another human vs. an AI modulated oSRBR effects. To manipulate expectations, at the start of the experiment, participants were either told that they were going to interact with another human or with an AI. However, after a brief connection attempt, participants in the human condition were told that there were no other participants available, and that they would therefore do the experiment with an AI. Then they performed an online interactive color classification task to assess oSRBR effects. We expected to only find oSRBR effects if participants expected to interact with an AI from the start, but not if their initial expectation to be connected to another human was frustrated. Contrary to our expectations, we did not find a modulation of oSRBR effects by expectations in experiment 1. However, due to a significant number of drop-outs in the condition, in which a human partner was expected, we are currently replicating the study. Results will be presented and discussed.



## **Unique Binding: Examining the effect lingering associations on current binding effects**

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Action control theories suggest that creating a new action plan involves integrating task-relevant percepts and motor programs into an event file, which binds all components associated with a specific action episode. Repeating all elements of an event file in a subsequent action episode improves execution speed and reduces errors, while partial repetitions impair performance. The binding effects observed in action control tasks are usually short-lived, primarily due to event file decay. Another crucial factor contributing to the transient nature of these binding effects is interference, which arises when a single stimulus is associated with different responses, or a single response with different stimuli throughout the experiment. Previous studies have shown that paradigms reducing interference by expanding the stimulus set can create stronger and more enduring stimulus-response associations, even with a single pairing, as seen in long-lag repetition priming. However, these paradigms do not prevent a single reaction from being bound to different stimuli due to a limited response set. In a series of experiments, we systematically investigated the impact of multiple bindings of a single distractor or response on overall binding effects by manipulating whether distractors and/or responses could appear in multiple trials during an experiment or only in a single trial.



## How spatial attention influences iconic memory

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Selectivity is one of the main characteristics of consciousness as well as the defining property of visual attention. Both are considered to be distinct but interrelated processes. However, the relation between attention and consciousness is a subject of ongoing debate. Some argue that attention is a prerequisite for phenomenal consciousness, while others propose the existence of a fleeting, attention-independent phenomenal visual awareness. We investigated the interaction between attention and consciousness using a novel approach that combines spatial cueing with a partial-report iconic memory task (a measure of visual awareness). Participants were briefly presented with multiple arrows and had to report the direction of one, indicated by a colored point presented after varying delays. Preliminary results showed that performance in this task was better after short delays than long delays. Additionally, cues matching the indicator color increased performance when they preceded the to-be-reported arrow at the same location compared to a different position. This cueing effect occurred with short and long indicator delay, suggesting that spatial attention can modulate iconic memory. However, the generally improved performance with short indicator delay indicates that some aspects of iconic memory are independent of visual attention. These findings provide new insights into the interplay between attention and consciousness, helping to distinguish between competing theories and setting the stage for future research.



## **Attentional capture by invisible features retrieved from episodic memory**

Lorena Hell

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Attentional capture describes the phenomenon that a task-irrelevant stimulus involuntarily draws attention, which in turn affects performance in simultaneous or subsequent target selection. Previous studies have shown that attentional capture can also be driven by the retrieval of stimulus features from working and episodic memory, if a related object feature is visibly present during the trial. We examined if even totally invisible object features, that are retrieved from episodic memory, can capture attention. Participants previously studied polygon stimuli which either had a colorless (white) or a colored (red) backside. In a later cueing task, a cue and, shortly after, a target display were presented with one polygon on each side of the visual fixation. Stimuli were presented from the colorless (white) frontside. Participants located the target by determining which of the two stimuli had a red (invisible) backside and then they had to discriminate a frame around said target stimulus. Shortly before the appearance of the target display, a cue display with two other polygons appeared, of which one would have a red (invisible) backside. If the invisible backside color is retrieved from episodic memory and captures attention, cue validity effects are expected: if the cue and target share the same location, performance benefits should occur in comparison to a location change from the cue to the target display. The results are discussed in the context of established attentional capture literature.



## **Urgency affects cognitive control by amplifying cognitive processing asymmetries**

Anika Krause

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Cognitive control ensures that in conflict situations, humans can coordinate information from the environment with their internal goals, in order to react in a goal-driven manner. Previous studies showed, that cognitive control is heavily influenced by urgency. In conflict situations, reactions under urgency in a cognitive control task are dominated by stimulus-driven information rather than goal-directed information and goal-directed action is impaired. If the stimulus driven information conflicts with the goal-driven information, performance drops below chance level in a certain time window. Critically, however, most previous studies on manual tasks used cognitive control tasks that involved a processing asymmetry between the stimulus-driven information and the goal-driven information. Here, we investigated, whether urgency also impacts performance in a task, that evokes a stimulus-stimulus conflict between similarly processed stimuli. In two experiments, an urgency paradigm was applied to two Eriksen Flanker tasks, one using color stimuli and the other one using letter stimuli. In both experiments, urgency did not evoke a dominance of stimulus-driven information over goal-directed information and goal-driven action could be maintained. In a third experiment we artificially evoked a processing asymmetry between the flanker stimuli and the target stimulus by introducing a stimulus onset asynchrony (SOA). When introducing the SOA, the effect of urgency on cognitive control reappeared. Under urgency, performance dropped clearly below chance, showing that reactions were dominated by the irrelevant flanker stimuli. These findings suggest, that urgency affects cognitive control by amplifying cognitive processing asymmetries.



## **Analysing AI-advised decision making: an approach comparison.**

Tobias Peters & Ingrid Scharlau  
Paderborn University

An envisioned use case of AI is to support humans in their decision-making, for example in the context of medical image classification. Often not a sole decision by the AI is desired, but a combination of an expert's knowledgeable perception and an AI-generated estimate or classification as advice. To study how people rely on AI and to easily quantify the influence of AI advice, experiments mostly require participants to make two judgments: an initial judgement before and a final judgement after receiving the AI advice. This two-fold process comes at the cost of artificiality. Realistically, a decision maker would rather make a single decision and would be provided with all information at once. Therefore, inferring the degree to which participants rely on AI advice also from single-turn interactions would be beneficial. In that regard, different approaches will be tested and compared. Data obtained from two distinct sessions will be used. In the first session, participants judge images without AI support. In the second session, participants judge the same material with support of supposed AI classifications and make one, combined judgment. Based on the second session, predictions of the participants' own judgment and their reliance will be derived and compared to approaches that take the individual judgments of the first session into account. Analyses using either Signal Detection Theory, mixed regression, or formal modelling based on the Instance Theory of Attention and Memory are planned to be conducted and presented.





## **Individual Differences in Parallel Task Processing: Depending on Predictability or Context stability?**

Annemarie Scholz  
University of Magdeburg

Recent research has established stable individual differences in processing of multiple tasks. In the present study, we investigate whether these differences reflect traits or states by examining their relationship to task environment predictability using the task-switching with preview paradigm (TSWP). In classical TSWP, two tasks are displayed and alternate in a fixed sequence (e.g., every three trials). The stimulus of the currently irrelevant task (preview) remains unchanged so that its response can be prepared. The key result from TSWP is that some individuals process the preview to achieve switch benefits (overlapping processing), whereas others opt for serial processing. We extended TSWP by introducing blocks with variable task sequences, where tasks alternated unpredictably every second to fourth trial. If processing modes are more state-like, we expect overlapping processors to show a reduced use of the preview. Experiment 1 (N=60) revealed performance reduction in variable relative to fixed sequence blocks, reflected in a shift to more serial processing under conditions of reduced predictability. In the ongoing Experiment 2, we aim to disentangle whether the reduction was due to the volatile context, or whether it was the reduced predictability of the upcoming task switch. To this end, we introduced a countdown in variable sequence blocks. This way, task switches become predictable again, although the number of repetitions before a switch remains unpredictable (i.e., a volatile context). With the intended poster, we discuss and present the data of both experiments and their implications to the trait-state discussion of individual differences in task processing.



## **The influence of memory on Evaluative Conditioning effects**

Tarini Singh  
University of Trier

Evaluative conditioning refers to changes in preferences due to the pairing of an attitude object with positive or negative stimuli. Traditional accounts of evaluative conditioning focus on stimulus-stimulus pairings, however, newer accounts also take into account affective actions. Based on action control theories, these accounts suggest that the pairing of an attitude object with an affective response, leads to the automatic binding of the stimulus and response features, thus resulting in evaluative conditioning of an object or stimulus. One area of debate in evaluative conditioning is contingency memory, with a number of studies reporting valence-stimulus contingency memory as a pre-requisite for evaluative conditioning. However, most of these studies focus on stimulus-stimulus pairings, rather than stimulus-response pairings. The present study aims to test whether contingency memory is also a pre-requisite for evaluative condition effects via automatic stimulus-response bindings. To this end, participants first underwent a response formation phase to affectively condition a response, followed by an evaluative condition procedure, in which the conditioned stimuli were paired with the affectively conditioned responses. Finally, participants completed a memory test, in which they indicated the response they previously executed for each condition stimulus. The results are discussed against the background of action control accounts of evaluative conditioning.



## Landmark distortions of intrinsic and extrinsic uncertain targets

Paula Soballa  
University of Trier

Target localization is influenced by the presence of non-targets, often referred to as landmarks. Previous research has shown that landmarks can reduce the variability of nearby target localizations and systematic distortions of target localizations either towards or away from the landmark have been reported in the literature. In a previous study, we found that increasing visual uncertainty of the target altered the direction of these landmark distortions: low uncertainty led to a descriptive attraction towards the landmark, while high uncertainty resulted in significant repulsion away from it. However, that study confounded intrinsic (size, contrast, duration) and extrinsic (possible locations) characteristics of the target, making it unclear which type of uncertainty was responsible for the observed effects. To disentangle both types of uncertainty, we conducted two experiments (each  $N = 24$ ) that varied levels of intrinsic and extrinsic visual uncertainty independently to assess their influence on the degree and direction of landmark distortions. The results are discussed in relation to previous work and conclusions regarding the interplay of extrinsic and intrinsic uncertainty, as well as their influence on landmark distortions are drawn.




## Talk Session VI: Performance

### **No motor learning via action-imagery practice in the two-ball rotation task**

Stephan F. Dahm, Matthias Weigelt & Martina Rieger

University of Innsbruck


Action-imagery practice (AIP) i.e., the repeated use of action-imagery has been shown to improve motor performance in many tasks. Particularly, effector-independent representations are acquired similarly as in action-execution practice (AEP). However, in motor tasks that involve little visuospatial components this may not be the case. In the present study, the acquisition of effector-dependent representations, effector-independent motor representations, and effector-independent visuospatial representations was investigated. An AIP group and an AEP group practiced two-ball rotations and a control practice group (CP) performed a control task. In six sessions, participants were tested with the practice and transfer hand, where the ball was rotated once in the practice rotation and once in the opposite direction. Intermanual transfer was observed neither in AEP nor in AIP, indicating that effector-independent representations were not acquired. A rotation specific decrease in MTs in the practice hand indicated movement-specific effector-dependent learning in AEP, but not in AIP and CP. Possibly, an optimization of internal models did not occur in AIP in the two-ball rotation task due to the lack of error availability.



## **Assessing time-on-task changes in cognitive control and vigilance components in a dual task**

Amelie C. Jung, Fernando Luna & Rico Fischer  
University of Greifswald

Over the past decade, cognitive control (e.g., interference control) and its susceptibility to time-on-task effects has gained attention as a possible factor explaining the phenomenon of vigilance decrement. In a previous dual-task study, we observed increased between-task interference, as assessed by the backward crosstalk effect (BCE), with increasing time-on-task (Fischer et al., 2018). However, the relationship between reduced cognitive control and vigilance remains unclear (Luna et al., 2022; Satterfield et al., 2019). Therefore, we aim to assess time-on-task decrements of cognitive control, as assessed by time-on-task changes in the BCE, simultaneously with effects of vigilance decrements, as assessed with an adapted ANTI-Vea task (Luna et al., 2021), in the same dual-task paradigm. In the dual task (60 % of the trials), participants are asked to respond to the direction of two central arrows (i.e., the targets) that appear above (Task 1) and below (Task 2) the fixation point. In addition, executive vigilance (EV) trials (20 %) require participants to detect a small vertical displacement of the upper target, while the remaining 20 % of arousal vigilance (AV) trials require participants to stop a millisecond counter as quickly as possible (Luna et al., 2021). We hypothesize to find an increasing BCE in dual-task trials over time similar to Fischer et al. (2018) and a comparable decrement in executive and arousal vigilance across blocks, as is typically observed in the standard ANTI-Vea.



## **Constant auditory noise as a burden on working memory?**

Philip Schmalbrock

University of Trier

Persistent auditory noise is a constant in our modern life. Although the medical sciences have pointed out the manifest health risks of constant noise exposure, it is less certain how auditory noise affects our cognitive functions. Here, the literature is rather mixed. While some studies claim an effect of auditory noise only when it is language based, others claim no or even a positive effect. Therefore, we were interested in contributing to this still unclear question of how constant auditory noise affects cognition. Specifically, we were interested in how working memory is affected. In several experiments, we investigated how participants performance changed under constant auditory noise compared to a completely silent condition. Our results point to a not-so-straightforward relationship between noise and working memory.



## **The role of working memory in task-order coordination: mechanisms of training-related improvements**

Daniel Darnstaedt

University Halle-Wittenberg

Effective task-order coordination (TOC) is crucial for managing bottleneck processing in dual-task (DT) situations. Previous research highlights increased TOC costs when comparing variable to fixed task orders of component tasks. Our earlier work demonstrated that practicing two temporally overlapping tasks with variable order can reduce these costs. In the present study, we investigate the mechanisms underlying this improvement, focusing on the role of working memory (WM).

Participants practiced two visual-manual tasks presented in variable order under three conditions: training with an additional high WM load, training with no additional task, or training with no additional task but later test under high WM load. Pre- and post-training sessions measured two aspects of TOC, specifically Task-Order Scheduling (TOS) costs and Order Switching (OS) costs.

Results revealed enhanced TOS (i.e., reduced TOS costs) for participants who trained without a concurrent WM load, supporting earlier findings. However, participants trained with a high WM load showed no such improvement in TOS. Interestingly, OS improved (i.e., reduced OS costs) across all groups, irrespective of WM load during training or testing.

These findings suggest two distinct mechanisms driving TOC improvements: (1) a capacity-demanding process of instantiating potential task orders in WM, consistent with the Efficient Task Instantiation model, and (2) a capacity-independent activation of the currently relevant task order. This study advances our understanding



**Mittwoch, 02.10.2024**

**Session VII: Priming**

**Chasing the wave front of response hazards in speeded pointing decisions**

Omar Jubran, Maximilian Wolkersdorfer & Thomas Schmidt

University of Kaiserslautern-Landau

In a paradigm using isoluminant color targets preceded by consistent or inconsistent color primes, Schmidt et al., 2006 revealed that the flow of color information into executive brain areas is a continuous process that updates even during finger movement. The original experiment showed increasing priming effects with stimulus onset asynchrony (SOA), where longer SOAs caused more deviations toward the primes. We reexamine this data using Spatiotemporal Survival Analysis (StSA; Jubran et al., 2024), a novel method combining event history analysis and trajectory tracking analysis. Rapid Chase Theory (Schmidt et al., 2006) makes quantitative predictions, i.e. sequential time locking and initial invariance of response activations by primes and targets. Tracking the spatiotemporal trajectory of response movements allows us to evaluate these predictions, revealing both their timing and location in the trajectories. By applying StSA, we assess its benefits by comparing it to earlier methods and exploring additional implications, providing a deeper understanding of the dynamics of speeded choice decisions.






## **Aftereffects of Selection in an Action-based Negative Priming Paradigm**

Daniel Maurer, Ruth Laub & Christian Frings

University of Trier

Performance is usually worsened when a previously ignored distractor becomes the target in the current trial, compared to a control trial without stimulus repetitions (a finding called Negative Priming). Negative Priming effects have been observed not only for stimulus identity across senses, such as vision, audition, and touch, but also for location and, occasionally, for semantics. Both attentional inhibition, and episodic retrieval processes, contribute to Negative Priming. We looked at Negative Priming from the perspective of the common coding principle, that is, perceptual information and action plans are encoded within the same representational system. Thus, selecting a response against an interfering response should lead to the inhibition of that distracting response and subsequently to Negative Priming at the level of response selection (not stimulus identity as seen in previous studies). To investigate this claim, we conducted two experiments. In the first experiment, we utilized free choice to implement a selection process between two responses in the prime. A one-to-one stimulus-response mapping in the probe allowed us to analyze the results in a typical Negative Priming manner, creating ignored-repetition, attended repetition, and control trials. In the second experiment, we extended this paradigm. We used an illustrated hand, occasionally with colored fingers, as a cue to indicate different response conditions. By comparing free choice, forced choice, and no-go trials, we further investigated whether aftereffects of selection could be observed in an action-based Negative Priming paradigm. The results are discussed in relation to the common coding principle and the selection for action perspective.



## **When affordance is not universal: Negative compatibility effect is modulated by task type**

Belgüzar Nilay Türkan, Christian Frings & Lars Michael Schöpfer  
University of Trier

Prior research has shown that a graspable object in an environment facilitates an automatic motor response compatible with its orientation, known as the object affordance effect. Vainio et al. (2011) demonstrated that this facilitatory effect (positive compatibility effect, PCE) can turn into an inhibitory effect (negative compatibility effect, NCE) when the prime stimulus is presented shortly before the target – an arrow stimulus pointing to the left or right. However, recently, limitations for action control theories have been proposed, showing that task type heavily modulates response execution processes (e.g., Schöpfer & Frings, 2024). Following this finding, we hypothesized that the affordance effect on motor response varies with task constraints. To test this, we conducted three tasks: discrimination of arrow pointing direction, shape discrimination, and circle localization. The variable time interval between the affordance object (a mug) and target onset (SOA: 30, 70, 170, 370 ms plus 50 ms blank screen), as well as the compatibility between the mug and response (congruent vs. incongruent trials) was identical for all three. In the arrow task, we replicated Vainio et al.'s (2011) findings that participants reacted slower in congruent trials compared to incongruent trials, primarily at early SOAs. However, the NCE was fully absent in the shape discrimination task, and even turned into a PCE in the circle localization task. We conclude from our results that inhibition does not exclusively affect the response, but rather, to some extent, perceptual features associated with spatial connotations.



## Talk Session VIII: Methods

### **emoTouch - A New Web-Based Continuous Response System for Real Time Research and Process Support**

Christoph Louven  
Osnabrück University

emoTouch is a new, web-based research system to design, conduct and analyze any kind of continuous response real time studies and to support, monitor and guide any kind of time evolving processes. The system is based on state-of-the-art network technologies and can easily and instantly turn any mobile device or computer with an internet browser into a research device in laboratory, online, or live settings.

The interfaces that participants will see on their devices are designed in a graphical study editor, just as easy and flexible as slides in PowerPoint. Participants can join a study by simply scanning a special QR Code, even with their own smartphones ('Bring-Your-Own-Device', BYOD). This easily enables e.g. on-the-fly audience studies and feedback situations with hundreds of participants at the same time.

Once a study is executed, all interactions with the interface will be timestamped and stored to the server. emoTouch can immediately analyze and visualize the incoming data in a freely configurable chart interface to provide real time feedback to the ongoing process.

emoTouch Web can be useful in all disciplines that deal with time-bound phenomena, such as music, theatre, dance, film, commercials, lectures, speeches or sport events. The system was developed at Osnabrück University (Germany) and is available free of charge for scientific purposes at [www.emotouch.de](http://www.emotouch.de).

The talk will show the possibilities of the system as well as the flow of a typical research process with emoTouch Web.



## **This is the way: Indoor navigation cues in virtual environments**

Maximilian Friehs  
University of Twente

Efficient navigation in dangerous situations (e.g., during a building fire) is paramount for saving lives. However, factors such as acute stress, chaotic crowd behaviors as well as complex and distracting environments often lead to life-threatening navigation errors. This research addresses the urgent need to develop a potential solution for improving emergency navigation that can effectively help both healthy as well as physically challenged individuals. For example, tactile signals via a smartphone (either handheld or carried on the body) can cut through the visual and auditory distractions and even a vibrating smartphone in a pocket can guide the user if the hands are pre-occupied (e.g., when holding crutches). Thus, this also ensures that the navigational cues are accessible to both able-bodied as well as physically challenged individuals. In a first proof-of-concept study, we employ a virtual reality simulation based on real-life locations to explore guidance opportunities. With the help of individualized and route-based multimodal or unimodal signals (comparing visual, tactile, and auditory cues) participants need to find their way towards the exit along predefined checkpoints. Concurrent to the navigation of routes of different difficulties arousal was measured.



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