Draft Eye-tracking Attention & Inhibition Study

The eye-tracking study aimed to investigate differences between switching attentional demands, selective attention, divided attention, as well as inhibition. Therefore, the study comprises two tasks described as follows and combined with eye-tracking:

*1. SwAD-task*

The *SwAD-task* offers the possibility to investigate different attentional demands, but more importantly, the ability of switching in between. The modular character of the task – which is based on the Stimulus Delivery and Experiment Control Software, Presentation® – allows the user to address different attentional demands. In the version at hand, we implemented the attentional demands of selective and divided attention. Typically, the SwAD-task comprises three conditions: 1) Training, 2) Single demands, 3) Switching demands (see Table 1).

Table 1. Different conditions in the SwAD-task

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| 1) Training | 2) Single demands | 3) Switching demands |
| - Two trials | - Four trials of each attentional demand | - Four trials of each attentional demand performed alternately |
| - 10 stimuli/trial |
| - Feedback | - 26 stimuli/trial | - 26 stimuli/trial |
|  | - Five to eight target stimuli/trial | - Five to eight target stimuli/trial |
|  | - Two minutes resting period between different attentional demands | - No resting period between trials |
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One stimulus consisted of a shape (e.g., star) and a colored point (e.g., blue). The distinction between selective and divided attention tasks results from the instructions, presented prior to each trial. In selective attention, participants are asked to respond to one pre-defined target which was either a colored point or a shape by pressing one button (e.g., Key: L) and ignore the other part of the stimulus. In contrast, in divided attention both a colored point and a shape were defined as targets. Here, participants should respond by pressing one button for target colored points (e.g., Key: L) and one button for target shapes (e.g., Key: S). In the training session, participants perform two trials – one trial of selective and one of divided attention – each with 10 stimuli. Feedback on whether participants respond right, incorrect to a target stimulus, incorrect to a non-target stimulus, or with the wrong button, is presented only in the training condition. Single demand conditions comprise four trials of selective and four trials of divided attention with two minutes resting between the respective condition. In the switching condition, four trials of each attentional demand need to be performed alternately. Trials in single and switching conditions consist of a total number of 26 stimuli including five to eight randomized target stimuli. In every trial, colored points (red, green, yellow, purple, black, blue) and shapes (bell, circle, flower, heart, moon, star) are presented simultaneously in the middle of the screen in white against a black background. The colored points have a diameter of XX. All shapes are presented with similar size (height: 600px-750px; width 600-700px). The maximum time to respond is set to 1,800ms. Target stimuli as well as respond buttons in the divided attention condition change randomly from trial to trial. Each stimulus is presented for 250ms. Interstimulus interval is randomized between 500ms and 2,300ms and starts after participants respond or 1800ms in case of no respond. During the interstimulus interval a fixation-cross is presented in the middle of the screen. Task performance is quantified by measuring reaction times and error rate.

*2. Alternating Inhibition-/Attention-task*

The alternating inhibition-/attention-task based on a classic visual oddball-task. After a short training trial (6 stimuli, 2 target/4non-target), participants were asked to react on visually presented target stimuli and to ignore non-target stimuli. Visual stimuli comprise colored points (Farben) with a diameter of XX.

The task consists of 18 blocks, 6 blocks with 30 target stimuli and 10 non-target stimuli, 6 blocks with 20 target stimuli and 20 non-target stimuli, and 6 blocks with 10 target stimuli and 30 non-target stimuli. All blocks are presented in a randomized order, with a 3 minutes’ break after each 6 blocks. All stimuli were presented in the same length (200ms) as well as in a randomized order (interstimulus interval randomized between 500ms and 1,000ms). Within a time-window of 2,000ms after stimulus presentation participants had to react to target stimuli as fast as possible by pressing the space bar. Error rate and reaction time were measured