Exogenous attention & confidence - Summer 2021 (#73304)

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1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

Does confidence track the effect of exogenous attention on performance in a visual reproduction task? In a prior study we found confidence and accuracy to be greater when the exogenous pre-cue was valid (i.e. at the same location as the target) than invalid (i.e. at a different location as the target) for the cue-to-target interval known to encompass exogenous effects (100ms-150ms). Metacognitive ability (i.e. how well confidence was reflecting performance) was relatively stable across all cue-to-target intervals. In the current task, participants recruited online will have to reproduce the orientation of a target clock, briefly presented following an exogenous cue on one side of a fixation cross. The exogenous cue is not predictive of the target location, and can appear on the target side or the distractor side. A response cue, presented after target/distractor offset, will indicate the target for report. We therefore hypothesise that in the current experiment, average confidence will be higher (and average error will be lower) for valid pre-cues occurring at the short cue-to-target interval (CTOA) but not at the longer interval. We also expect metacognitive ability to be relatively unaffected by exogenous cues (i.e., will not significantly differ between the short and the long CTOA).

3) Describe the key dependent variable(s) specifying how they will be measured.

Absolute error: the reproduction error in radians, calculated as the absolute difference between true and reported target orientation.

Confidence: the confidence about the quality of the reported orientation (2 levels: higher vs. lower than average).

Additional DVs incude:

Circular SD: the circular standard deviation of the error distribution in a given condition, a measure of error variability.

Reaction time: the reaction time of the reproduction task and the confidence judgment.

4) How many and which conditions will participants be assigned to?

There are four within-participants conditions (full factorial design): the validity of the cue (valid vs. invalid) and two distinct cue-to-target intervals (CTOA). A short CTOA (116ms), where the effects of exogenous attention are believed to be present, and a longer CTOA (783ms), where the positive validity effects wane off.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

a) For average absolute error and average confidence, we will test each condition effect using a t-test (and its Bayesian analogue; or a Wilcoxon test if normality test fails). We expect a positive validity effect (for error, invalid-valid>0, for confidence valid-invalid>0) for both confidence and error for the short CTOA, but not for the long CTOA.

b) For metacognitive ability, we will first conduct a repeated-measures ANOVA with error as the dependent variable, and confidence/validity/CTOA as independent variables. We expect a main effect of confidence (i.e. confidence should be lower for higher errors), but no interaction between confidence and validity/CTOA.

c) In a second type of analysis, we will use a logistic regression models comparison approach to predict confidence (high/low) from absolute error, validity and CTOA. Once again, we expect an effect of absolute error, and no interaction.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

To enforce covert orienting of attention, 9% of the trials will be catch trials, where a target letter is presented at fixation during target/distractor onset. Participants will have to report both the target letter and the clock orientation in these trials. We set an a priori 80% performance rate threshold for the letter discrimination: if average performance is below this threshold, participant will be discarded and a new participant will be recruited. Outliers with a circular IQR on clock reproduction error above/below 1.5 times the group IQR will be excluded.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

We conducted a pilot study (N=23) to estimate the effect size for the current reproduction task. Following the small effect size (d = 0.28, for the pairwise t-test validity effect on average absolute error at short CTOA), we therefore need at least 87 participants to have a 85% power to detect the effect. We plan to collect 90 participants for this task.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

We will potentially also test circular SD, as an alternative measure of performance. The analyses will be the same as the one described for absolute error.