Estimating effect sizes of TEC-related experimental effects (#23128)

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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?
We aim at providing a high-powered estimation of effect sizes in experimental designs that are typically used to assess action control from the perspective of the Theory of Event Coding (TEC). The study has two aims: First, because many previous studies used rather small sample sizes, we seek to provide a more precise estimate of relevant effect sizes to inform power analyses of future studies on effect-based action control. Second, we intend to re-assess previous theoretical conclusions that rested on null-effects (specifically: non-significant higher-order interactions) in several studies. Specifically, we will run six experiments that follow their original reports in the literature as close as possible: (1) Müsseler & Hommel (1997, JEP:HPP, Exp. 1), (2) Hommel (1998, VisCog, Exp. 1b), (3) Stoet & Hommel (1999, Exp. 1), (4) Elsner & Hommel (2001, Exp. 3a), (5) Kunde (2001, JEP:HPP, Exp. 1), (6) Dutzi & Hommel (2009, Exp. 1).

3) Describe the key dependent variable(s) specifying how they will be measured.
All six paradigms will employ reactions on the computer keyboard. Key dependent variables are those used in the original experiments for the main inferences, including response times (RTs), movement times, error rates, choices, and detection performance

4) How many and which conditions will participants be assigned to?
All experiments follow their originals as close as possible and we will use full within-subjects designs throughout. Conditions of main interest are the following (numbering of the experiments as for Question 1): (1) action-stimulus relation (compatible vs. incompatible); (2): orthogonal combinations of response sequence (repetition vs. change), shape sequence (repetition vs. change), color sequence (repetition vs. change), and location sequence (repetition vs. change); (3): orthogonal combinations of feature overlap (present vs. absent) and response complexity (low vs. high); (4): tone-key association (left vs. right), allowing for consistent and inconsistent response choices; (5): response-effect mapping (compatible vs. incompatible); (6): effect-stimulus sequence (tone repetition vs. tone change).

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Numbering as for Question 1: (1) paired-samples t-test comparing detection performance between compatible and incompatible trials; (2): 2x2x2x2 repeated-measures analysis of variance (ANOVA) on RTs; (3): paired-samples t-test comparing RTs for present vs. absent feature overlap; (4): one-sample t-test to compare the consistency of the response choices against chance (50%); (5): 2x2 mixed ANOVA on RTs with the within-subject factor response-effect mapping (compatible vs. incompatible) and the between-subjects factor condition order (compatible first vs. incompatible first); (6): paired-samples t-test to compare response repetition frequencies between tone repetition and tone change trials. Critically, for each comparison, we will compute the corresponding effect size (Cohen's d_z) and the confidence interval for standardized means around this estimate. Interactions will be converted to difference scores to allow for this computation.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
All analyses will be run twice: (1) using the original procedure and (2) using consistent criteria for handling error and outlier trials across all experiments. For the latter, we will exclude all error and post-error trials for RT analyses and will define outliers as trials with RTs that deviate more than 2.5 standard deviations from a participant's cell mean.

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 will collect data at four laboratories, each laboratory testing 30 participants.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Follow-up analyses will include order effects for all blocked manipulations, distribution analyses for RT effects (quantile-binning per condition) and analyses of response strategies for free-choice designs (e.g., consistent alternations, block-wise choices). Finally, we will examine the influence of response complexity (Experiment 3).