Please find below our point-by-point responses (in blue font) to the editor's and one reviewer's comments (in black font). Please note that the page numbers refer to the revised manuscript with tracked changes.

Editor:

1. Hypotheses: You have replaced your hypotheses using t-contrasts with ANOVAs again, effectively reverting back to an earlier version. However, this is too flexible and does not address your research questions. Your two hypotheses are in fact clear directional contrasts. Feel free to include the ANOVA in your design (with appropriate power analysis) but also include targeted, directed hypothesis posthoc tests that will address the main research questions.

In response to this point, we have changed the manuscript accordingly: "To check our directed hypotheses, we will conduct targeted post-hoc t-tests, controlled for false discovery rate (FDR, Benjamini & Hochberg, 1995)." (p. 21)

2. Power analysis: Moreover, your power analysis for both hypotheses is currently based on the main effects of the three-way ANOVA from hypothesis 2. Please also report the power analysis for all hypotheses in your design table and use the maximal necessary sample size across all these. Your maximal sample size may very well be the 3-way ANOVA you already included, but the design must include all power analyses.

Thank you for pointing this out. We have conducted an additional power analysis using G*Power. Please note that we plan to perform a 2x2 ANOVA with the factors task type (single versus dual) and congruency, as well as a 2x2x2 ANOVA with the factors modality, complexity, and congruency. For the latter analysis, we will focus on the main effects and the 2x2 interactions (e.g., complexity x congruency) to test our hypotheses.

We have changed the manuscript accordingly: "In G*Power 3.1.9.7 (Faul, Erdfelder, Lang, & Buchner, 2007) we calculated the sample size for main effects (modality, complexity and congruency; measurements: 2; groups: 1) and 2x2 interaction effects (modality x congruency, complexity x congruency; measurements: 4; groups: 1) in a 2x2x2 ANOVA, with factors modality, complexity, congruency. We also calculated the sample size for main effects (task type, congruency; measurements: 2, groups: 1) and a 2x2 interaction effect (task type x congruency; measurements: 4, groups: 1) in a 2x2 ANOVA, with the factors task type and congruency. Assuming a mean correlation between repetitions of 0.5, we determined that for a medium effect size f (0.25, partial eta squared = 0.06, Cohen, 1988) for the main effects, and alpha = 0.05, a sample size of N = 34 was required to achieve a power of 0.80. For a medium effect size f for the interaction effects and alpha = 0.05, a sample size of N = 24 was required to achieve a power of 0.80. The largest calculated N determines our sample size: N = 34 (see Design Template for details)." (p.14)

3. EEG analyses: Reviewer 2's question 4 suggested previously you should preregister the EEG analysis and conduct a power analysis for that. Your response states that there is no prior research on which to base power analysis. It is a common misconception that this is necessary. Ideally, we would suggest defining a minimal effect of interest. What difference of EEG responses would actually be meaningful in theoretical or practical terms? Whether or not you do this is up to you. You can certainly conduct an exploratory EEG analysis in Stage 2 if you

want, but the reviewer is right that it could be wasteful to collect these data when there is little chance of yielding meaningful results.

We understand that this is a valid point. However, we decided to restrict ourselves to an exploratory EEG analysis. Please note that our planned sample size of N=34 is within the range of those in other, related EEG studies (e.g., Eiserbeck et al., 2024, N=32; Trammel et al., 2023, N=35, N=45; Kappenmann et al., 2021, N=40; Papaioannou & Luck, 2020, N=20; Luck et al., 2009, N=20).

Reviewer: Markus Kiefer

The authors have appropriately addressed my concerns. I appreciate their responsiveness to my recommendations. I only have two final remarks:

1) I did not see that the two Kiefer et al. (2023) publications are not differentiated by the suffixes a and b.

We originally differentiated between the two sources by putting “Kiefer et al., 2023” for one and “Kiefer, Harpaintner et al., 2023” for the other (APA 7th). However, we have changed it now to “Kiefer et al., 2023a”, and “Kiefer et al., 2023b”, respectively.

2.) Although ICA can be performed on single trial EEG data, the separation of components is more reliable if applied to continuous EEG. The authors may think over their decision to run the ICA on segmented data.

We have decided to follow the reviewer’s recommendation. Therefore, we will perform the ICA on the continuous EEG and changed the manuscript accordingly: “Independent-component analysis (ICA) will be performed on the continuous EEG data, using the extended INFOMAX algorithm as implemented in EEGLAB (Bell & Sejnowski, 1995).” (p.17)