**Peer Review and Communication History – Streamlined review**

**MS Title**: Mental Number Representations are Spatially Mapped both by Their Magnitudes and Ordinal Positions

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Cover Letter:

Dear Editors of *Collabra: Psychology*,

please find attached our manuscript “Mental Number Representations are Spatially Mapped Both by Their Magnitudes and Ordinal Positions” for consideration as Streamlined Review in *Collabra: Psychology*. After this manuscript was rejected by *Cognition,*we transferred it to *Cognitive Psychology* (following the explicit recommendation of the publisher)*,*where itwas desk-rejected (surprisingly). We enclose the letters from the editors as well as the detailed responses to the reviewers in a separate document. We also marked the changes in the manuscript that were made since the last review. Bert Reynvoet and Jean-Philippe van Dijck permitted to make their comments openly available at Collabra: Psychology. We acknowledge the Transparency and Openness policy of *Collabra: Psychology*.

One of the current debates about Spatial-Numerical Associations, as measured by the SNARC effect, is whether this effect implies that cardinal magnitude on a mental number line or rather ordinal relations are mapped to space. Some studies, in which numbers or verbal sequences have to be stored in working memory suggest an ordinal relation. All of these studies required the temporary memorization of sequences, explicitly promoting an ordinal relation.

In the present preregistered study, we present a new paradigm that does not require sequence memorization. The trick is to restrict the numbers that occur in the experiment to a skewed subset. This allows us to contrast the two models (cardinal magnitude versus ordinal sequence account) head-to-head without the need for an explicit sequence memorization task. The results indicate a better fit of cardinal magnitude. However, the data also indicates that simultaneous activation of the ordinal position in working memory and the magnitude on the mental number line could improve the data fit. This is coherent with more recent approaches that indicate that both cardinal and ordinal representations of numbers with space contribute to spatial-numerical associations.

Given the new paradigm to study the pressing question in numerical cognition of a cardinal or ordinal nature of mental number representations, we are convinced that both the paradigm and the results will be of interest to the readership of *Collabra: Psychology*. We thus hope that you find this work interesting and appealing and thus we look forward to hearing from you.

Yours sincerely,

Nadine Koch, Julia Huber, Johannes Lohmann, Krzysztof Cipora, Martin Butz and Hans-Christoph Nuerk

**See separate suppl. File titled “1823124-responses-to-the-reviewers.pdf” for authors’ responses to previous reviews.**

**Editor Final Decision:** Accept

Dec 20, 2022

Dear Dr Koch,

Thank you for submission of your manuscript as a streamlined submission to Collabra, and for the quick follow-up regarding my questions for clarification.

Having read the manuscript and response to reviewers thoroughly, I am happy to accept it for publication here at Collabra. While I agree with the reviewers that the small effect size and opposing results from different statistical analyses mean that it is not clear what the precise “story” is, I don’t think that is a reason to reject a paper – sometimes the world is just complicated, but if the methods and analyses are appropriate they can still be informative and belong in the public record. That is what I believe is happening here. Further work can build on the research here; if nothing else, it indicates the difficulty in teasing apart ordinality and magnitude, as well as what precisely the working memory account predicts.

I’d advise you thoroughly proofread and upload a final document after doing so. I found multiple typos, some critical (e.g. page 11 it says “according to” blank, I presume there is an equation that should go there? on page 9 the pargaraph beginning “Next, the participant…” looks like it has several cut and paste errors, etc).

A final thought: I think it is great that you did the linear mixed model - that is what I would have suggested as an analysis. I think it would be nice if you don’t simply indicate in a footnote that it was done and where to find it in the supplemental materials, but also say the outcome (i.e., which model was preferred).

Nice work!  
Andy