Friday, December 10th, 2021

To: Editorial Board of *Cortex*

Dear Drs. Guediche and Caffarra,

# We are re-submitting our manuscript, CORTEX-D-21-00884 “Most experiments on exposure effects in speech perception do not distinguish between underlying mechanisms: A computational review”, authored by Xin Xie, Florian Jaeger, and Chigusa Kurumada for consideration for the special issue *Mapping sound to meaning under challenging conditions: converging findings and open questions across methods*. The manuscript is original, not previously published, and not under concurrent consideration elsewhere.

We are grateful for the highly constructive (and encouraging) reviews we received from you and the reviewers. All requested revisions were presentational in nature. As you summarized in your letter, both reviewers pointed to a need to (1) clarify the goals and scope of this manuscript, (2) clarify the take-home points, in particular whether there exist conditions for which any of the proposed mechanisms can be ruled out, and (3) shorten the manuscript to make it more accessible, potentially by moving parts of the framework into the SI. Finally, R2 pointed out that (4) our presentation of neuro-imaging work was lacking and not well integrated with the rest of the manuscript. We summarize the revisions we made to address these points here, and then respond to the remaining comments point by point.

1. **Clarifying goals and scope.** This was particularly helpful feedback. We have completely revised the introduction:

* After the first introductory paragraph, the introduction now provides a high-level overview of (a) our long-term goals to understand the *mechanisms* underlying adaptive speech perception and (b) the three more immediate goals of the present study: (i) to introduce a new analytical framework—which we now call *ASP* for *Adaptive Speech Perception*—that can support our long-term goals, (ii) to demonstrate the use of this framework through two simulation-based case studies, and (iii) to provide initial guidance on what factors determine whether an experiment can decide between competing hypotheses about adaptive speech perception.
* Following this overview, a new subsection describes the “State of the field(s)”. This section reviews the field and states our contributions. This includes our classification of dozens of competing hypotheses into three qualitatively different types of hypotheses about adaptive speech perception (normalization, representational changes, and changes in decision-making)—something that we failed to highlight at all in the previous version. More importantly, we are now clear that previous work left open whether its signature results distinguish between competing hypotheses. We believe that our computational case studies are the first to directly show that the signature results of two influential lines of research can be accounted for by *any* of the hypotheses. We have also substantially revised the text introducing each hypothesis to be clearer *why it matters which of these hypotheses is supported*.

1. **Clarify take-home points**
2. **Shorten the manuscript and make it more accessible.** The main text of the document has been shortened from 67 to XXX double-spaced pages. This was achieved primarily by:

* Shortening and restructuring the introduction. For example, we had originally introduced the experimental paradigms for the two case studies in the introduction. In the revised manuscript, we instead introduce each paradigm in the sections where it becomes relevant (3 and 4).
* Simplifying the change model for decision-making, which also simplified and shortened its presentation (Section 2).
* Moving non-critical technical details into footnotes (this mostly affected Section 2).
* Removing various asides throughout the manuscript.

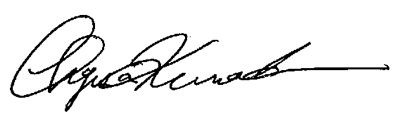
For reasons that are now stated in the introduction, we have deliberately kept the somewhat tutorial-like style of Section 2. We feel that there is a substantial need to bridge the gap between computational and experimental research, and we hope that the relatively verbose exposition of our framework can serve that purpose. Both in our conversations with experimenters, and in our own experience reading computational papers, we often feel the frustration that comes with a lack of shared backgrounds. We have also tried to further improve our figures and animations to that end. However, if the manuscript is still too long or inaccessible, we could move further details of the framework into an appendix OR collect them in a methods article (if that is suitable).

1. **Better integration of neuroimaging research.** R2 suggested we either omit or improve our presentation of neuroimaging research. We have aimed for the latter. This has primarily affected the introduction (p. XXX) and the general discussion (p. XXX-XXX). Additionally, we have aimed to integrate relevant neuroimaging research throughout the paper where relevant. In particular, the introduction now also clarifies that:

*“Compared to the behavioral research …, it is more common in neuroimaging work to directly contrast hypotheses about different mechanisms … However, in contrast to behavioral work, neuroimaging research tends to not distinguish between hypotheses (A) and (B), grouping both hypotheses together as functionally distinct from higher-level, decision-related mechanisms further downstream (C).*” [footnote 3]

Next, we respond to the remaining comments point by point.

Sincerely,





Xin Xie T. Florian Jaeger and Chigusa Kurumada

**Suggested reviewers:**

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