Department of Psychology

Stanford University

Building 420 (Jordan Hall)

450 Serra Mall

Stanford, CA 94305

650-924-5675

ejyoon@stanford.edu

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Dr. Catherine A. Haden

Associate Editor, Journal of Experimental Child Psychology

Dear Dr. Haden,

Thank you very much for your comments on our previous submission to Journal of Experimental Child Psychology, "Developmental Gains in Speed and Accuracy in the Processing of Ad-Hoc Implicatures." The goal of this manuscript was to explore developmental change in children’s pragmatic implicature and provide an experimental test of the role of salience in young children’s failures.

We have taken your and the reviewers’ comments to heart and have radically restructured our manuscript; at this time, we are re-submitting as a new manuscript with the title “The role of salience in young children's processing of ad-hoc implicatures”. As you mentioned in your note of 2/24/17, we hope that you will be able to handle this manuscript and perhaps even recruit some of the same reviewers. In your editorial note, you encouraged us to use Experiment 2, our tablet study, as the basis of a shorter report, which we do here. Thank you for this suggestion.

We were concerned at the time that focusing on Experiment 2 would promote the positive result in that study over the negative result in Experiment 1 without any assurance that these differences were not due to spurious variation. Accordingly, we now re-submit with the inclusion of a preregistered replication study – and we are pleased that our findings proved to be quite robust. Further, we have broadened and deepened our theoretical discussion in both the introduction and the discussion so as to address other comments by the reviewers. Please find below our point-by-point responses.

We appreciate your consideration of our revision; please do not hesitate to contact us with any questions or concerns.

Sincerely,

Erica Yoon and Michael Frank

Stanford University

**Reviewer 1**

*This paper is a solid contribution to a growing body of literature that investigates the developing pragmatic abilities of young children. The value of the paper is three-fold. First, it replicates the experimental results in Stiller et al. 2015. The fact that children as young as 4 can compute ad hoc quantity implicatures is a fairly controversial claim and the experimental data should be replicated. Second, the paper demonstrates in its last experiment that saliency might indeed be one of the factors that can mask the ability of children to compute implicatures. Third, the paper demonstrates that tablet-based tasks might be superior to eye-tracking when measuring psychological computations that take a certain amount of time.*

We appreciate these favorable comments on the previous manuscript. While we chose to omit the eye-tracking data from the current (much shorter) manuscript, we believe that the first and second contributions are now much stronger in the revision due to the replication of the salience effect in our tablet paradigm. We have attempted to emphasize these contributions in the revision.

*PROBLEMS WITH EYE-TRACKING: In theory, I think there are some methodological problems with using eye-tracking as a measure of implicature. Let me explain my concerns by using a different type of sentence than the ones discussed in the paper. When I say a sentence like "Look at the picture with two apples in it" and there is one picture with two objects and another with three, I might indeed look at the picture with two objects (upon hearing "two") because I am computing an implicature (i.e., two but not three), but I might equally as well be looking at the picture that is more prototypical of two. In other words, the methodology is unconvincing until it can be shown that "Look at the picture with AT LEAST two..." (a sentence where the implicature is absent) behaves differently from "Look at the picture with two...". This is a general point and not sentence-specific. It is always possible that children are looking at the picture that is a more prototypical example of the event/state described in the sentence rather than looking at the picture that satisfies the implicatures induced by the sentence.*

Thanks for this guidance – due to these and other concerns, we have omitted this experiment from the revision.

*PROBLEMS WITH SALIENCE: The idea that object-salience can mask the effects of implicature computation is interesting, but it is also specific to certain methodologies, particularly those where a subject either has to look at certain objects or has to choose between objects. The worries about object salience do not seem to be relevant in paradigms where subjects are given one scene and one statement and asked if the statement is a true/good (versus false/silly) description of the scene. In this type of paradigm there is no choice between objects.*

*The paper needs to do a better job of discussing the limitations of "salience" as a confounding factor. Even if "salience" plays a role in predicting children's behaviour in their experiments, it cannot be used as a general explanation for children's failures in other types of paradigms. If the author disagrees, then they should explain how salience would effect other paradigms.*

Thank you also for this feedback. In the previous draft we had tried to avoid making too much of the salience finding because we were confident about its presence in only one experiment. Now that we have replicated it in the tablet paradigm, we completely agree that it should be discussed more fully. Accordingly, we have added discussion of the salience account – including cases where it may be in operation (e.g., “mutual exclusivity” experiments in word learning) – to both the introduction and the discussion.

*Page 3 of pdf, bottom: The author refers to "some" as a weaker TERM and "all" as a stronger TERM. I think this is misleading. Weaker propositions imply the falsity of stronger propositions: the terms do not imply anything on their own. In the right context a sentence with "all" can imply the falsity of a sentence with some, such as in "I will pay you if all of the students come to my party" implies that the speaker will not pay the addressee if only some of the students come to the party. I think the author should be careful to mention that "strength" is at the propositional level and not the word level.*

and

*Page 6 of pdf, bottom: The author mentions that "all" is stronger than "some" but "strength of meaning" can only be determined once the lexical item in embedded in a proposition. For example, "All of the men laughed" is stronger than "Some of the men laughed" but "I will be surprised if all of the men laughed" is weaker than "I will be surprised if some of the men laughed". Stating comparisons of strength in terms of the lexical items themselves is misleading and should be avoided.*

Thank you for these comments, we have adjusted this language accordingly so that we refer to propositional strength.

*Page 3 of pdf, bottom: You don't need ad hoc implicatures to get the inference that "I ate the chocolate chip cookies" implies that the speaker didn't eat all the cookies. The relevant alternative can just be "I ate the cookies" which, given the standard semantics for the definite determiner means something similar to "I ate all of the cookies" (see Link 1983 and references therein). "I ate the cookies" asymmetrically entails "I ate the chocolate chip cookies" thus by uttering "I ate the chocolate chip cookies" one implies that they did not eat all of the cookies.*

Thanks, we have now addressed this point and acknowledged this possible alternative analysis in the first footnote in Introduction.

*Page 6 of pdf, bottom: The discussion of saliency at this point in the paper is too vague. The reader cannot make any sense, given what is said, of how saliency could mask the computation of implicatures. The author needs to outline the steps involved and be more specific about how this could explain the children's behaviour with an example.*

We have now devoted three paragraphs in the Introduction to thoroughly explain what we mean by saliency in the scope of this paper: The fifth-last paragraph in Introduction uses Stiller et al. (2015)’s paradigm as an example to explain the role of saliency in ad-hoc implicature; The fourth-last paragraph explains how saliency may also play a role in other kinds of implicatures; The second-last paragraph describes in detail how we manipulated saliency in our own paradigm, and how the manipulation may affect children’s implicature processing performance.

**Reviewer 2**

*This struck me as an interesting paper that makes a valuable new empirical contribution, particularly with respect to experiment 2. In my view, although probably worth reporting, experiments 1a and 1b are rather less compelling, for reasons that are mentioned later in the paper but which don't get quite the attention they deserve earlier on. There are also some theoretical issues which could usefully be clarified, although I don't think these seriously undermine the paper's main gist.*

Thank you for raising these concerns. We have now omitted the eye-tracking experiments and focused on the findings from the tablet paradigm (which has now been replicated) where participants deliberately choose the referent, which should address the reviewer’s concern about the validity of eye-movements as an index of choice.

*A few minor comments and suggestions:*

*"Implies" would be better as "implicates", when referring to implicature.*

Corrected.

*p.3 - "a maximally informative utterance" - maybe this should also say "for the present conversational needs".*

Corrected.

*p.4 - missing umlaut in 'Stuhlmuller'.*

Thanks.

*p.4 - Arguably Grice (1975) doesn't describe the process as such, although his work is widely interpreted as though it did.*

Reference removed.

*p.4 - "children especially struggle with scalar implicatures" - ambiguous (especially children, or especially scalars?)*

Corrected.

*p.13 - "correct look to inferential target exceeded look" -> "correct looks to inferential target exceeded looks"? (And as noted above, referring to these as 'correct' looks seems to make some rather prescriptive assumptions about participants' looking behavior.)*

The text has now been removed, as the sections about the eye-tracking experiments have been omitted.

**Reviewer 3**

*This paper tracks the ability to compute ad hoc scalar implicatures in children between the ages of 2 and 5. This is an important topic in recent developmental psychology and linguistics and contributes to the ongoing discussion about children’s pragmatic development.*

We appreciate that the reviewer sees the value of our contributions.

*Despite these positive features, I had several issues with the novelty and theoretical framing of the paper. For the most part, as the authors acknowledge, this paper replicates what is known about the pragmatic abilities of preschoolers: at least the tablet data (but not the eye tracking data) show that scalar implicature from ad hoc scales is within the abilities of 3-year-olds and improves with age. Given the similarities of the present paradigm to the Stiller et al paradigm that relies on reference assignment, this empirical finding is not novel (even though the novel methodologies are still nice to see). The eye tracking data are, in fact, messy: far from showing early success with implicature computation, these data fail to show success even from older children (for reasons that the authors discuss).*

We now focus in our revision on the component of our work that we believe is most novel: the salience finding with the tablet paradigm, especially with the (generally understudied) two-year-old group. As noted above, we have omitted the eye-tracking date, compensating for this omission by including a pre-registered replication of the key effects in the tablet paradigm.

*A second issue I had is that the paper does not address the roots of the reported problems with scalar implicature computation in a way that could generalize beyond a single paradigm. The only factor that the authors consider as a possible reason for very young children’s failure with implicatures is inhibitory control (and the role of salience of distractors). However, this explanation can only address possible limitations of past studies that relied on a very specific kind of referential communication task (i.e. the Stiller et al study – even though the authors do not make this explicit). Even if the inhibitory control account is correct, I do not see how it can generalize beyond this very specific paradigm to a broader account of early failures with implicatures.*

We agree that the salience hypothesis we propose is only one component of the developmental story for implicature. Indeed, as we discuss in the revision, our other work (e.g., Horowitz, Schneider, & Frank, “The trouble with quantifiers,” in press at Child Development) provides a plausible story for children’s difficulties with quantifiers specifically. On the other hand, we also think that the salience hypothesis has important implications beyond the specific paradigm we use – in particular, we now make links in the general discussion to work on mutual exclusivity and pragmatic word learning, which we believe to be affected by the same salience issues that are present in our implicature paradigm.