Dear Dr. Adolphs,

Thank you for the thoughtful questions about our manuscript, “Real-time lexical comprehension in young children learning American Sign Language (ASL).” We have revised our manuscript to address your questions, and hope you will find that the revision is substantially improved. More detailed responses to your questions are provided below.

Please contact us if you have questions or concerns. We look forward to your consideration of this revision.

Sincerely,

Kyle MacDonald

1. The sample size seems very small for a study of individual differences such as this (only 16 deaf children). Can you address this issue with further justification?

We appreciate and share your concern about the sample size of our study since we do not want to contribute an unreliable finding to the literature. Nevertheless, we think this work is worthy of publication despite the small sample size for the following reasons. First, our goal was to measure the development of ASL processing skills under ideal language learning circumstances, using children who learned American Sign Language from birth (native ASL-learners). This includes both deaf children with deaf adults as parents and hearing children with deaf adults as parents (called CODAs – Children of Deaf Adults). However, native ASL-learning children comprise a very small population that is extremely difficult to recruit, thus the small sample size (which is larger compared to samples in most other studies of ASL-learning children). We now emphasize this point in the manuscript, by explaining:

“It is important to note that native ASL-learners are a small and decreasing population of children who are extremely difficult to recruit. The incidence of deafness at birth in the US is less than .003%, and only 10% of the 2-3 per 1000 children born with hearing loss have a deaf parent who is likely to be fluent in ASL (Mitchell & Karchmer, 2004). Moreover, a rapidly increasing number of deaf infants receive cochlear implants and are raised in exclusively oral language environments, further reducing the population of potential native ASL-learners. In addition to the 29 child participants who met our inclusionary criteria and contributed adequate data, we also recruited and tested 17 more ASL-learning children who were not included in the analyses, either because it was later determined that they did not meet our stringent criterion of exposure to ASL from birth (*n* = 12), or because they did not complete the real-time language assessment due to inattentiveness or parental interference (*n* = 5).”

Thus over two years we were fortunate to be able to recruit a total 46 children who were learning ASL through the California School for the Deaf (CSD) in Fremont CA – one of only two such schools in the state (the other branch of CSD in Riverside serves Southern California). This sample represented a substantial majority of all eligible families affiliated with CSD with children between the ages of 16-53 months. We should also stress that there is now urgency in studying ASL-learning children - given that enrollments at Schools for the Deaf are declining in every state nationwide. As more and more families with deaf infants elect cochlear implant surgery and oral language communication, there will be fewer and fewer children learning ASL as their first language from fluent deaf caregivers.

Second, the deaf children of deaf parents and hearing children of deaf parents (CODAs) in our sample should all be considered monolingual ASL-learners (see our response to question #2 below). Both groups of children were living in homes in which ASL was the primary language, and therefore, all of the children had similar language experiences, receiving almost exclusively ASL input from caregivers. We present evidence that these groups did not perform differently on either language processing measure

Finally, we think that the adult data (n=16) and the substantial amount of prior work on individual differences in real-time comprehension of spoken language helped to constrain our analyses and to inform our interpretation of our findings, making us more confident in the results reported in the manuscript.

To better address this concern in the manuscript, in our discussion of the results we emphasize that replication of these findings is an important next step, and we have expanded the justification of our sample size in the Participants and Discussion sections.

2. All the analyses pool the deaf and hearing children - that seems risky at best and possibly misleading depending upon the data structure.

This is an important concern, and we thank you for pointing it out. It is true that the deaf and hearing children differ in their capacity to access auditory information. However, we took great care to include only children who were exposed to ASL from birth through interaction with at least one fluent ASL caregiver. In fact, the majority of our hearing children (10 out of 13) had two deaf caregivers, and all participants used ASL as their primary mode of communication (>80% exposure to ASL via parent report). So although the hearing children couldexperience spoken language, their language input was almost exclusively ASL.

To address this important concern in the manuscript, we have expanded our description of the sample to include a justification for treating deaf and hearing children as monolingual ASL learners. We also moved the “effects of hearing status” analysis to the beginning of the results section. This analysis directly compares deaf and hearing children’s performance on the Visual Language Processing task, and provides evidence that the two groups show no difference on either processing measure.

3. The main result (that processing efficiency correlates with vocabulary size seems almost a tautology), can you clarify why this is an important advance?

In a study published in *Psychological Science*, Fernald et al. (1998) presented the first experimental evidence that toddlers are capable of incremental processing of familiar spoken words. Previous studies had all relied on offline measures of children’s vocabulary knowledge, asking parents to report whether or not a child “knows” a word. Using the looking-while-listening procedure, Fernald and colleagues showed that while 18-mo-olds oriented to the named picture at the end of the target word, 24-mo-olds relied on partial phonetic information to make their choice, progressing toward proficiency in real-time processing by age 2 years. This was compelling evidence that learning to recognize, understand, and speak a new word is a gradual process – a challenge to the prevailing nativist views of the time. Not only do infants respond meaningfully to more words over the 2nd year, they also respond with increasing speed and efficiency to each of the words they are learning. So rather than “acquiring” a new word in an all-or-none fashion, they get better at interpreting the same word in more challenging contexts.

Subsequent work went on to show that measures of real-time processing at 24 mos were highly correlated with the number of words that children could say. Moreover, speed and accuracy in spoken word recognition at that age were correlated with lexical and grammatical development from 12 to 25 mos (Fernald, Perfors, Marchman, 2006), and also with children’s performance on standardized tests of language and cognition at 8 years of age (Marchman & Fernald, 2008). These studies shifted away from a static notion of “word knowledge” to a much more dynamic notion of fluency in processing language as a means of building knowledge. They also encouraged a stronger focus on variability among children, showing that differences among kids in processing skills were predictive of differences in language growth. Fernald, Marchman, and Weisleder (2012) extended this logic in a widely cited study showing that significant individual differences in this important skill were associated with variability in SES as early as 18 months of age.

These findings have been replicated and extended with children who use other spoken languages, but this is the *first* study to explore them in a signed language. In the context of this prior work, we think the finding that differences in processing efficiency are related to differences in vocabulary size in a visual language is an important advance.

4. Can you provide more information about the possible effects of the "priors" selected on the results obtained, for your Bayesian analysis?

We agree that it is important to show that our analysis is robust to the specification of the prior distributions. In the supplementary information, we provide much more detail about the Bayesian models used to analyze our data. We also present a sensitivity analysis of our model, which shows that our estimates of the associations between age/vocabulary and accuracy/reaction time (RT) are robust to different parameterizations of the prior distribution and to different cutoffs for the analysis window.

To better address this concern in the manuscript, in the results section we explicitly point the reader to the supplementary materials if they have about the role of the specification of the priors or the analysis window.