Supplementary materials to “Predicting individual variation in language from infant speech perception measures”

Further details on the predictor measures

In order to be included, sound-level measures had to be gathered after the age of 6 months, the point that is widely recognized as being the earliest at which cross-linguistic differences in sound perception have been recorded (Kuhl, Williams, Lacerda, Stevens & Lindblom, 1992). This could have meant the exclusion of the work on newborn (e.g., Molfese & Molfese, 1985) or 2-month-old (e.g., Been et al. 2008) sound-level perception, except that those studies do not report correlations with vocabulary size, but rather group comparisons or infant classification in terms of a language delay outcome.

Word-level measures had to be gathered after 4.5 months, since at this age infants can recognize their own name (Mandel, Jusczyk, & Pisoni, 1995), thus suggesting they have some acquired word-level knowledge. No study was excluded on this criterion. We had also considered a second benchmark, 8 months, the earliest age at which infants have been reported to fail at segmenting words in an unfamiliar and highly different language (Polka & Sundara, 2012). This second benchmark would also not have resulted in any exclusions. Finally, there is evidence for language specific responses to word-level prosody at four months (Friederici, Friedrich & Cristophe, 2007) and to larger units at 6 months (Intonational Phrases; Johnson & Seidl, 2008). There were no exclusions based on these criteria.

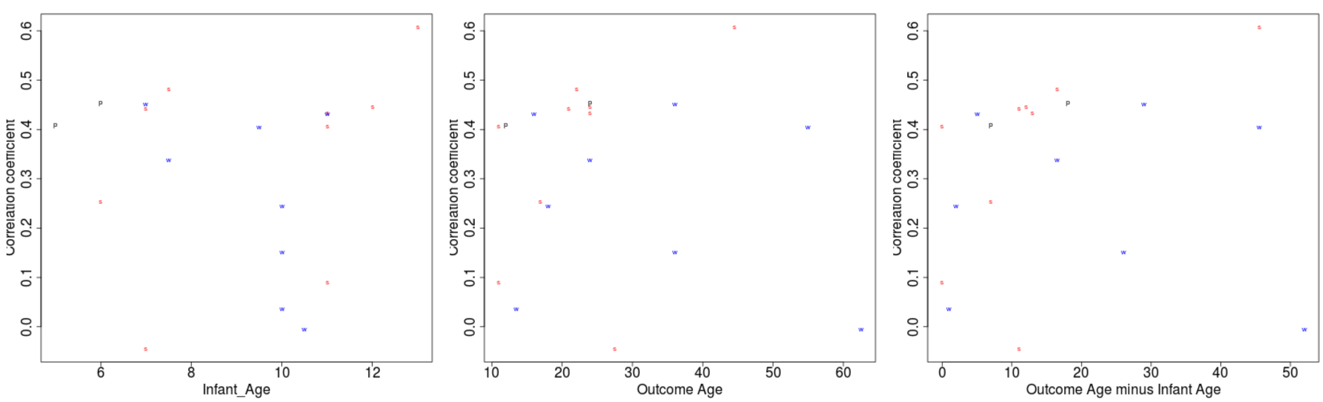
Further details on the outcome measures

We provide here details on the 'rare' outcome measures. These were: the PPVT (Peabody picture vocabulary test; Dunn & Dunn, 1981), TOLD (Test of language development; Newcomer & Hammill, 1988), Reynell (Reynell developmental language scales; Reynell & Gruber, 1990), SETK (German language development test/Sprachentwicklungstest für zweijährige Kinder; Grimm, Aktas, & Frevert, 2000), and ELFRA (German version of the CDI/Elternfragebögen für die Früherkennung von Risikokindern; Grimm & Doil, 2000).

Further analyses

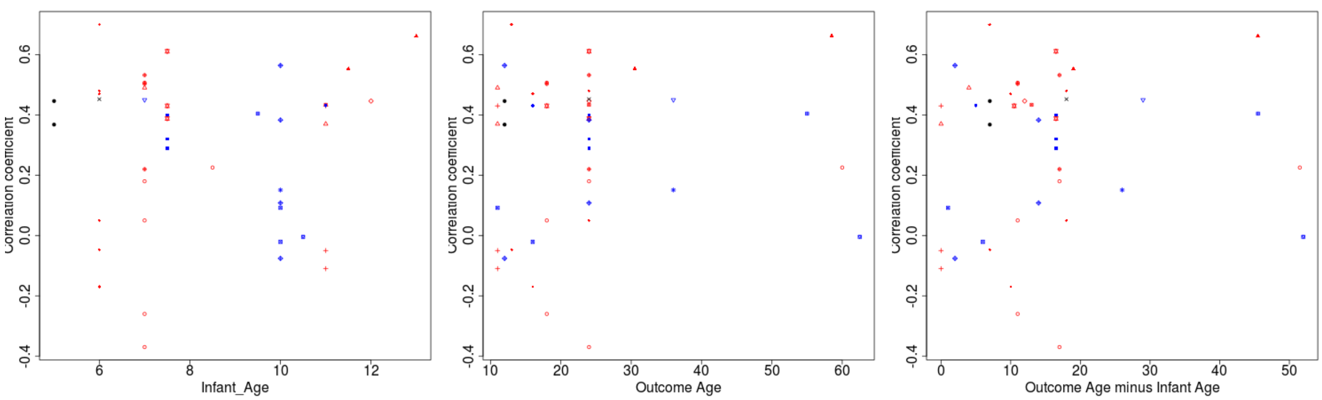
Following a reviewer's suggestion, we explore the modulation of association strength depending on potential mediators using descriptive plots. Statistical exploration would not have been appropriate as heterogeneity was not significant; however, it is not uncommon for this to occur with datasets as small as ours (Rosenthal & DiMatteo, 2001).

Two likely candidates for mediators were linguistic level and age. The following plots illustrate the relationship between, in the y-axis, correlation coefficient (converted in terms of predicted association direction, and with a single measure per infant group), and three possible predictors: age at the infant measure; age at the outcome measure; and difference between these two timepoints. For studies where outcomes were gathered at multiple ages, the mean age weighted by sample size was used. The possibility that this relationship is modulated by linguistic level is captured by using different codes for each level: Red 's' indicate points from the sound-level group; blue w, word-level; black p, prosody.



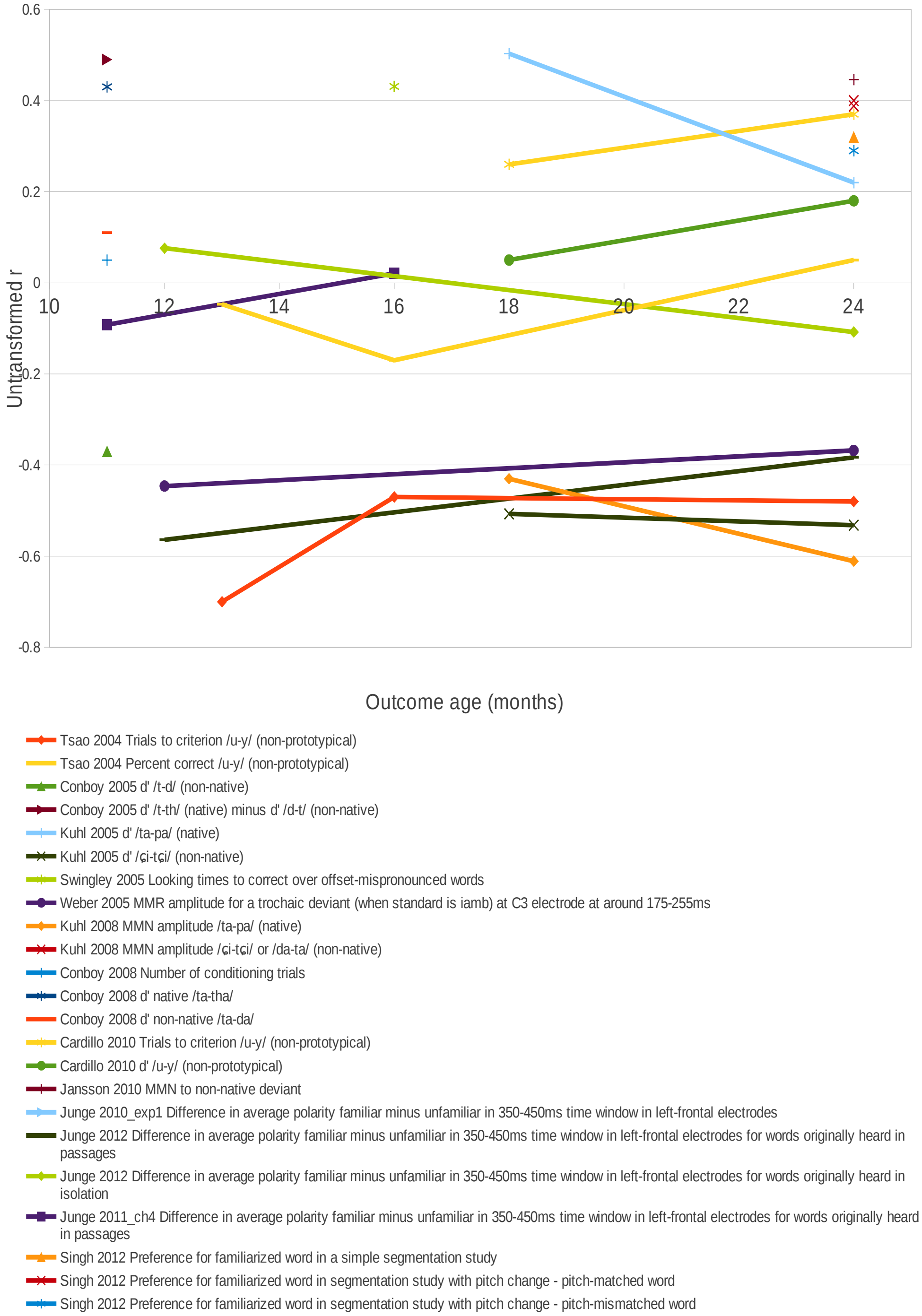
Visual inspection suggests that all measures lead to higher r's when gathered early on, at, or before 8 months of age. There may be also an increase in correlation strength with Outcome age, at least in the 10 to 30 month range where the data is more abundant. This is also clear in the right-hand plot, which seems to show an increase in correlation coefficient with increasing infant to outcome age separation. Increases in correlation strength with age are common for additive ('snowball') effects, as in the case of correlations between parental and filial IQ (Bergen, Gardner, & Kendler, 2007).

To further explore this intriguing possibility, we turned to the data set including all original correlations, before they are combined into a single median for each study. This fuller data set is interesting for the question at hand because several studies gathered multiple infant or multiple outcome measures. In the latter case, we could observe an increase in the r coefficient with outcome/difference age even within studies – provided that the relationship we observed in the previous graph is true (i.e., if the association strength increases with infant age). The following figure represents the same relationships as above, except that each study is now coded with a different symbol; thus, we would expect the same increase in r with age holding symbol constant. This



expectation is not met, as shown in the figure above. This is particularly apparent when drawing lines between the outcome ages among those studies that do have multiple outcome ages, as done in the chart shown in the next page. Additionally, notice that here we plot raw, untransformed r (i.e., without converting direction as a function of authors' report of what that direction should be), and concentrate only in studies with a correlational design.

Based on these data, it is premature to draw any final conclusions regarding the most promising predictors, and the best ages at which to administer them. Nonetheless, we provide here some generalizations to guide future explorations. In particular, notice that prosodic tasks have yielded the largest median correlation, albeit there are only a handful of studies on this level. The forte of the sound-level predictors is their narrow confidence interval, making them a safer choice. Investigating the latter would be particularly important, given that almost all of the data on this predictor has been gathered by the same research group.



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