

## Dense Data Collection Through the Speechome Recorder Better Reveals Developmental Trajectories

**Background:** Longitudinal designs are frequently used in developmental research; however, sampling at small intervals, or “microgenetic sampling,” has often been underutilized. Less dense sampling rates distort developmental trajectories, as has been shown for infant’s motor skills (Adolph et al., 2008). Sampling intervals thus affect the shape of developmental change; this is especially important in language research, where the type of trajectories that children undergo, such as the vocabulary growth spurt around 18 months, influences the theories proposed to explain language development (Lieven and Behrens, 2012).

**Objectives:** The importance of microgenetic sampling was explored here through the use of the Speechome Recorder, which collects home-based dense, daily recordings of language use.

**Methods:** The Speechome recorded one child, Audrey between the age of 33-37 months. Audrey was diagnosed with ASD at 22 months but no longer met diagnosis at 32 months. A total of 34.14 hours of recorded interaction across 35 sessions ( $M_{\text{length}} = 58.5$  minutes;  $M_{\text{interval}} = 3.54$  days) was collected. Although installed in only one room, a variety of naturalistic child-adult interactions were obtained. Recordings were transcribed and coded for a number of grammatical features, including future tense.

**Results:** When examining data from all sessions, Audrey produced correct forms for the future, “going to” (60 instances) and “will” (66 instances), as well as an unusual frame “I’m a verb” (e.g. I’m a walk) 41 times. The developmental trajectories of all three forms were best fitted with a cubic model (adjusted  $R^2$  between 0.94-0.98), but because the linear model also accounted for much of the variance (adjusted  $R^2_{\text{will}} = .94$ , adjusted  $R^2_{\text{going to}} = .74$ , adjusted  $R^2_{\text{I’m a verb}} = .75$ ) subsequent analyses utilized the linear model. To investigate the effects of sampling rates on the shape of future tense development, data was selected at 7- and 14-day intervals (typical of language research; Lieven & Behrens, 2012). The longest session was chosen within that particular interval to provide the most data possible. With 7-day intervals, all three forms are shown to be growing in parallel, which is contrasted with the more variable trajectory revealed when all data are included (i.e., “Going to” and “will” alternate in growth until “will” supersedes “going to” at later sessions). With a 14-day interval, the growth curve was significantly different from the ‘all data’ one ( $p < .01$ ). Therefore, the development of future tense looks drastically different when the sampling rate is increased.

**Conclusions:** The distortion of developmental trajectories by sampling rates was demonstrated here by deviations from the original model when intervals were larger than 7-days, consistent with Adolph et al. (2008). Even when using the longest session, increasing sampling intervals altered the trajectory for each future tense form. Therefore, sampling rates can play a key role in the interpretability of research findings and smaller sampling intervals may be needed to accurately depict developmental trajectories. Tools that collect dense data such as the Speechome, allow for more accurate models and will play an important role in future language development research, especially in special populations where acquiring daily recordings may be difficult.