

## Individual variability in the timecourse of predictions

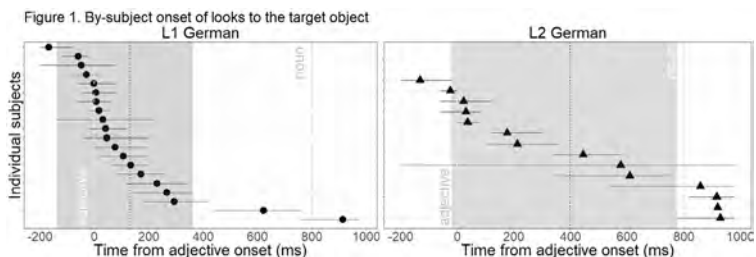
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Predicting upcoming words is important in comprehension because it can influence processing speed and accuracy. While much work has demonstrated that predictive processing is diminished in non-native (L2) versus native (L1) languages, it is less known whether the speed of L2 predictions varies across individuals and whether this variation is linked to properties such as proficiency, native language status, and age of acquisition. To address these questions, we used a visual world paradigm where L1 and L2 speakers of German saw two objects and heard a pronoun whose gender inflection agreed with only one of the objects, e.g.: “Klicke auf seinen.MASC blauen.MASC...” [1,2]. We used participants’ fixations during the time window of the adjective to infer whether they could use gender information to predict an upcoming noun. To estimate the onset of predictive effects, we adapted a bootstrapping-based survival procedure originally proposed for reading data [3]. We show that this method allows measuring the speed of predictions on a by-participant basis, allowing its correlation with individual properties. We discuss the method’s advantages over approaches that only allow binary decisions about the presence/absence of an effect in a selected time window [4] or inference at a cluster- rather than at an individual timepoint level [5,6].

**Methods and results.** Fixations to the target object were sampled at 200 Hz and grouped into 20 ms bins. The bootstrapping procedure involved resampling observations within each bin 1000 times. After each resample, z-scores were computed in each bin to test whether looks to the target were above chance. The earliest bin in a run of 10 consecutive significant z-scores was taken as the onset of predictive eye-movements, resulting in a bootstrap distribution of onset times by-subject. In the figure below, the dashed vertical line and shaded area in show mean onset times and 95% CIs for each speaker group. German L1s began looking at the target 266 ms earlier than German L2s, who showed more variable predictive onsets. Following the completion of data collection, variability in L2 onsets will be correlated with individual-level variables such as age of acquisition, proficiency and native-language status.



**References:** [1] Lew-Williams & Fernald (2010). *JML*; [2] Hopp & Lemmerth (2017). *Studies in SLA*. [3] Sheridan & Reingold (2012). *Visual Cog*. [4] Allopenna et al. (1998). *JML*. [5] Barr et al. (2014). *J Exp Psych*. [6] Maris & Oostenveld (2007). *J Neurosci Methods*.