Investigating Individual Differences in L1 Lexical Semantic Processing: An MEG Study

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Previous models of native language (L1) comprehension have been based on the assumption that L1 individuals show homogeneity in language proficiency and in corresponding brain activity. However, a growing body of research has shown that proficiency is not homogeneous among L1 users, and that variability in this and other cognitive factors could influence the way in which each individual processes language. This study used magnetoencephalography (MEG) to investigate the time course, strength, and localization of brain activity associated with lexical semantic processing, and how these vary among individuals as a function of language proficiency and scores on other standard cognitive tests.

Background information was collected from twenty native English speaking participants regarding socioeconomic status, demographics, and education, as well as language history, reading history, handedness, and learning style. Participants also completed assessments of English proficiency and other cognitive factors such as working memory and executive functioning. Neural activity was recorded using MEG while participants read either semantically congruent sentences (eg., *Jenny lit the candles on the birthday cake*), or anomalous counterparts containing a lexical semantic violation on the terminal word (eg.,*Jenny lit the candles on the birthday <u>mine</u>*).

Potential individual differences in L1 comprehension will be discussed using the results from sensor- and source-level MEG analyses, as well as behavioural analyses of the cognitive tests. Sensor-level results will include details regarding the relationship between neural activity in the 350-500 ms time window (a characteristic time window for lexical semantic processing) and predictor variables including language proficiency and other cognitive factors. Source-level results will provide insight into the location of this activity and address how and why these neural sources may vary across individuals.

The results from this study will provide additional evidence as to how brain activity associated with specific components of language comprehension — namely lexical-semantic processing — is modulated by individual differences. The contribution from this study is novel because it is the first to use the MEG imaging technique and source-level analysis to address this question.