

Intricate relationships between lexical and grammatical development: a longitudinal study of Polish monolingual and bilingual children up to three years of age with a mobile app

The present project will investigate the relationship between lexical and grammatical development in children from the age of 18 months to the age of 36 months acquiring one or two languages. Although lexical and grammatical development are known to be related, the intricacies of this relationship remain largely unexplained. Early studies considered mostly unidirectional hypotheses (with vocabulary influencing grammar, or the other way around) and did not include factors that might influence growth in both areas. Meantime, more evidence was found for bidirectional relationship between lexical and grammatical growth. For example, children need to acquire a lexicon that is large and varied before they can extract and generalise grammatical rules but even when children's vocabularies are not extensive, they are sensitive to the morpho-syntactic information available in the language input and use this information to grasp the meanings of new words.

In the present study we will explore the intricate relationship between lexical and grammatical development in children aged 18-36 months. We will consider the relationship between these two areas as dynamic, assuming that its directionality may change with time, and also specific, with different parts of lexicon linked to different grammatical domains (e.g., number of verbs to clause syntax, nouns to case inflections or conjunctions to complex sentences). To allow for the dynamics, we will take measurements within shorter intervals than considered in previous studies. To take the specificity into account, we will include some fine-grained measures in addition to coarse-grained measures of general lexical and grammatical development. Additionally, in our modelling we will include the impact of another factor that is known to influence vocabulary and grammar acquisition and may mediate their relationship, i.e. the quantity and quality of language input. To zoom in on the effects of input we will study both Polish monolingual children and a group of bilingual children (Polish-Norwegian), whose language exposure is (often unequally) divided between two languages. In bilingual children we will also compare relationships within a particular language and across the languages. Overall, the results of the study will allow us to draw a more nuanced picture of the relationship between lexical and grammatical development in children up to the age of 3.

We will gather data frequently (i.e. monthly) with coarse-grained measures of language and every 6 months with more fine-grained measures. For all these measures we will use MacArthur-Bates Communicative Development Inventory: Words and Sentences (CDI:WS) in Polish and Norwegian. As a coarse-grained measure of lexicon we will use a vocabulary score from a Computerised Adaptive Testing (CAT) version of CDI:WS. CAT, in which the next item shown to the participant is chosen automatically on the basis of their previous answers, allows for a tailored administration and ensures that different items will be used depending on a child's age. It is thus an ideal tool for frequent measurements, as it prevents parents from repeating their answers from previous measurements. As a coarse-grained measure of grammar we will use Mean Length of Utterance from the child's three longest sentences (MLU3). For the fine-grained measures we will use full, rather than CAT, versions of CDI:WS (both lexicon and grammar parts) and calculate specific subscores (e.g., nouns, verbs, conjunctions for vocabulary measures, or items related to noun inflections, clause or complex sentence syntax for grammar measures).

The project's effectiveness will rely on collecting the data via a mobile application, specifically designed for this project. This mobile application will enable a more direct control over the participants' engagement in the study via notifications and most importantly, will include CAT complex algorithms calibrated specifically for use with the CDI:WS.