Examining the roles of semantic iconicity and language-specific usage on children’s comprehension of complex sentences in Hebrew

Shiri Hornick (Tel-Aviv University), Laura de Ruiter (Tufts University) & Einat Shetreet (Tel-Aviv University)
shirihornick@mail.tau.ac.il

Complex sentences, such as: (a) “Betty ate an apple after she had a glass of water”, describe more than one event and consist of a main clause and a subordinate clause. Constructing a coherent mental representation of such sentences presents significant cognitive challenges: First, the listener must form the semantic relationship between the clauses, often signalled by a connective (e.g. temporal - ‘before’, ‘while’, or causal – ‘because’, ‘consequently’). An additional challenge is the possibility for an event-to-language mapping that does not follow the real world. That is, the clause order in the language may match the order of the events, leading to an iconic order in the language or the clause order may be different from the order of events, leading to a non-iconic order. For example, compare (a) above to (b) “After she had a glass of water, Betty ate an apple”. Both sentences describe the same situation, (a) in a main-subordinate non-iconic clause order and (b) in a subordinate-main iconic clause order.

Developmental studies show an asymmetry between production and comprehension: although such structures appear in children's speech as early as 3 years of age [1], they do not fully comprehend them until very late in their development (6-12 years) [2,3,4]. Previous studies with English-speaking children [5,6] showed better comprehension of complex sentences in iconic order, supporting the importance of iconic mapping between events and language in children's language development. Furthermore, the connective ‘before’ was better understood than the other connectives tested in those studies (‘after’, ‘because’ and ‘if’). It is undetermined whether this is due to iconicity, because main-subordinate clause order is iconic for ‘before’ but not for the other tested connectives, or due to usage factors because ‘before’ had higher frequency and a more consistent form-meaning relationship (in English, ‘before’ always appears in a spatial or temporal meaning, while ‘after’ may also be used in phrasal verbs, as in “to look after someone”).

To examine the influence of iconicity vs. usage factors, we tested the comprehension of complex sentences in a typologically different language, Hebrew. Hebrew is similar to English with regards to clause order and iconicity, such that “before” appears in the main-subordinate iconic order, whereas other connectives appear in a subordinate-main iconic order. Unlike English, the Hebrew equivalent of ‘after’ (‘axrey’) has a more consistent form-meaning relationship than the Hebrew equivalent of ‘before’ (‘liphney’) (i.e., the root of the Hebrew ‘after’, a.x.r., is used in words with similar spatial or temporal meaning, whereas the root of the Hebrew ‘before’, p.n.i, is used in a wider variety of meanings, such as the word ‘face’). Thus, if usage factors contribute to the comprehension of connectives, ‘axrey’ (‘after’ in Hebrew) should be understood better than ‘liphney’ (‘before’ in Hebrew).

Nineteen Hebrew-speaking children (4.5-5.5 years) and ten adults (as controls) completed a comprehension task adapted from [6], manipulating four connectives (the Hebrew equivalents for ‘after’, ‘before’, ‘because’, ‘if’) in two different orders (iconic, non-iconic). Participants listened to complex sentence-stories and had to select which picture sequence of two possible options matched the story. Adults responded correctly in all trials. Children comprehended iconic sentences better (p = .04; Figure 1), but there was no effect of connective type (p = .1). There was, however, an interaction between iconicity and connective type (p = .02), such that in the non-iconic sentences, accuracy rates were higher for sentences with liphney (i.e., ‘before’) than for sentences with ‘axrey’ (i.e., ‘after’). Because ‘before’ was less consistent in its form-meaning mapping this finding challenges the importance of usage-based factors for Hebrew, and aligns with previous evidence in support of iconicity as a key factor in the processing of adverbial sentences.
Figure 1. Children’s accuracy in the sentence comprehension task