Mouthing in the acquisition of a second sign language by Deaf learners

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Mouthing is one of the most common types of mouth action found in sign languages (Bank et al., 2011; 2016). For example, Crasborn et al. (2008) reported that mouthings represented between 39 and 57% of all mouth actions in narratives produced by signers in 3 different European sign languages (Britain, Sweden, the Netherlands), Johnston et al. (2017) report a nearly identical figure for Auslan, and Bauer (2018) found that 46% of 20 commonly occurring signs in a corpus of Russian Sign Language (RSL) were accompanied by mouthing.

The relationship between mouthings and the sign languages with which they are associated has been the subject of considerable debate. Some researchers have analysed mouthings as borrowings from spoken languages which have been integrated into the structure of sign languages (Boyes Braem 2001; Bank et al., 2011; 2016; Crasborn et al., 2008). In this view, mouthings are considered to form part of sign language. Others see mouthings as representing online code mixing (i.e., arising from bilingualism in a signed and spoken language), rather than being an integrated part of a sign language (Boyes Braem, 2001; Ebbinghaus & Hessmann, 2001; Vinson et al., 2010; Giustolisi et al., 2017; Mohr, 2012). The continuum of opinions ranges from seeing mouthings as always representing instances of online code-blending, where signers freely and simultaneously combine elements from a spoken and signed language, to analysing mouthings as part of a sign's phonological description.

Model 1. Semantic mediation   Model 2. Direct links
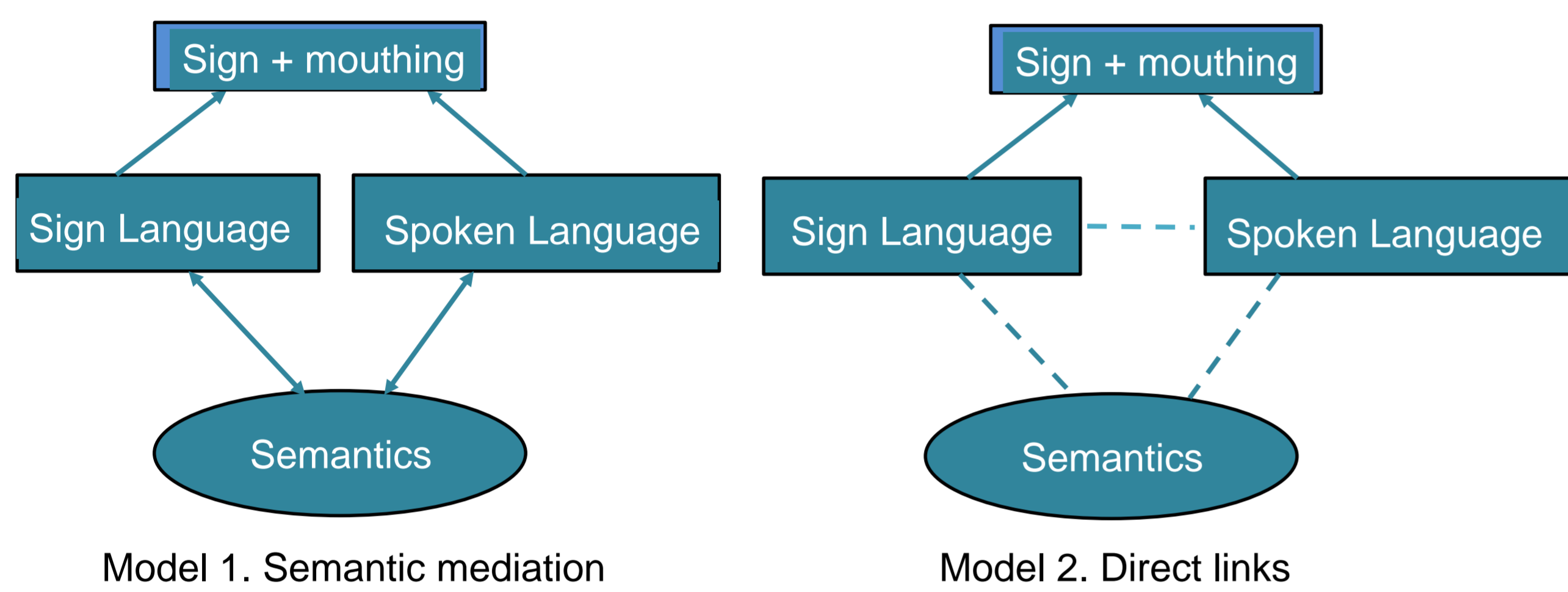
Model 1 above represents separate lexical retrieval, joined only by common semantic features. In this model, mouthings and signs are separately retrieved. In Model 2, there are also links between the sign language and spoken language which do not require access to semantics.

The study
This project has used a mix of linguistic, psycholinguistic and neuroscience approaches to address bilingualism in hearing and deaf people, specifically the effects of modality on language learning and language processing, by comparing acquisition of a second sign language by deaf learners with acquisition of a second sign language by hearing learners. Here we report on the use of Russian and English mouthing by deaf users of Russian Sign Language (RSL) while learning British Sign Language (BSL).

Participants
18 deaf Russians (7 male; mean age 34.7y; range 19-52)
**Deafness:** 15 familial deafness
Age of onset of deafness: 11 born deaf; 6 deaf before 3y; 1 before 5y.
Parental deafness: 15 participants had at least one deaf or hard-of hearing parent.
Acquisition of RSL: the 15 from deaf families had learned RSL from their parents: 3 had learned RSL at school.

Methods
Participants took part in a 12-week, 24 hour introductory BSL course, delivered in Moscow by an experienced deaf BSL teacher. Teaching was delivered face-to-face and via Skype. Participants were assessed at 3 points: before the course began, half-way through and immediately after the course ended. At the midpoint and final assessment, participants were recorded in a 2-minute one-to-one conversation with their BSL teacher. All recordings were coded in ELAN with a free translation into English; Each lexical sign was glossed as either RSL, BSL, or Other. Each lexical sign was also coded for the presence of mouthing: English mouthing, Russian mouthing, Mouth gesture, or Uncodable. Data are presented here for 4 of the participants.
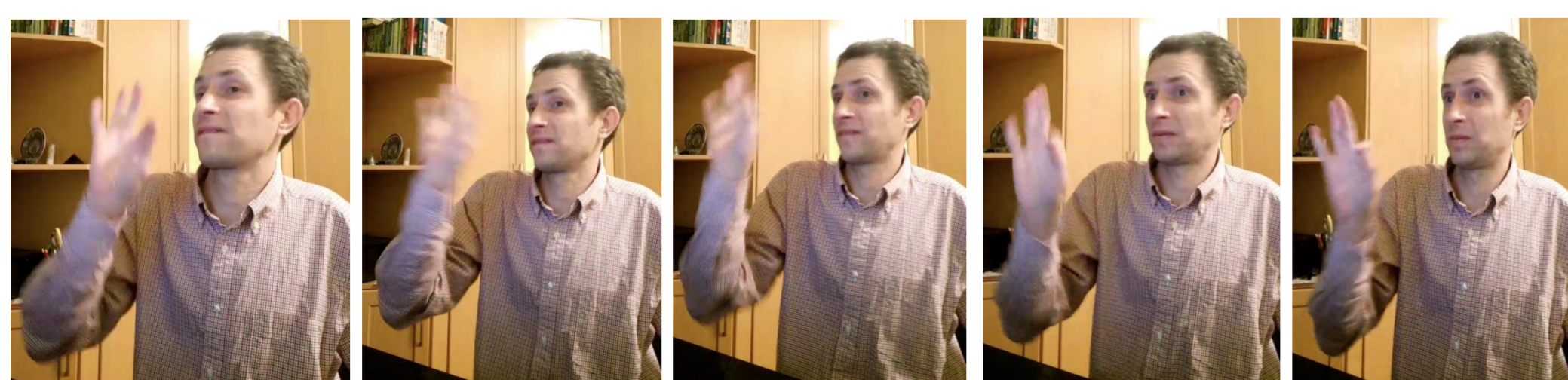

BSL sign QUESTION with Russian mouthing "vopros"

In the mid-course 2-minute conversations, participants produced an average of 102 lexical signs (range 66-103). In the end of course conversation, participants produced an average of 65 lexical signs (range 39-82).
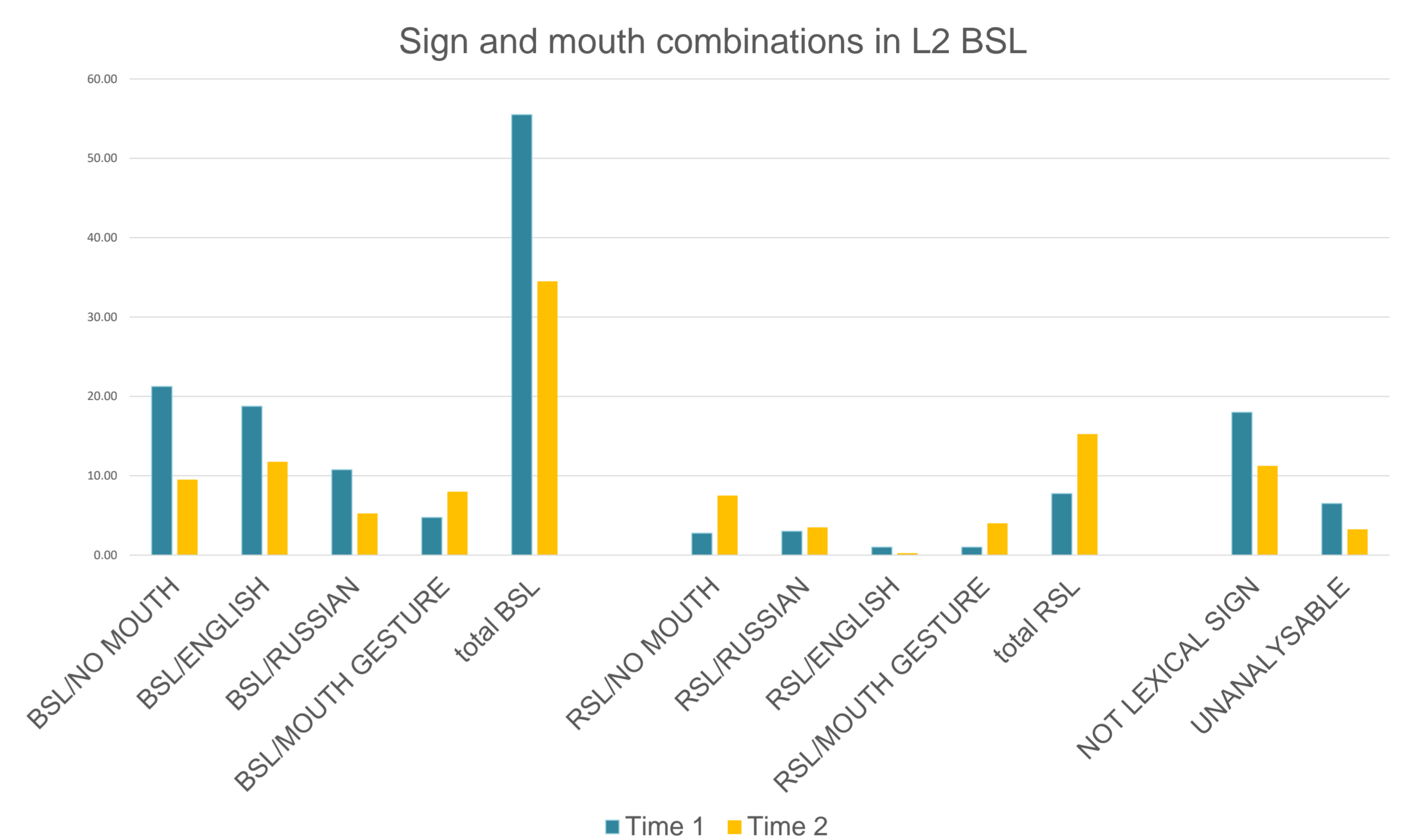

The figure above shows how in deaf RSL signers' acquisition of BSL as an L2, all combinations of lexical sign + mouth occur throughout the learning process. At 6 weeks, they are using predominantly BSL signs without mouth actions, but also produce nearly as many BSL signs with English mouthing, and a small number of BSL signs with Russian mouthing. Six weeks later, the pattern is very similar, but fewer signs are produced without the mouth.
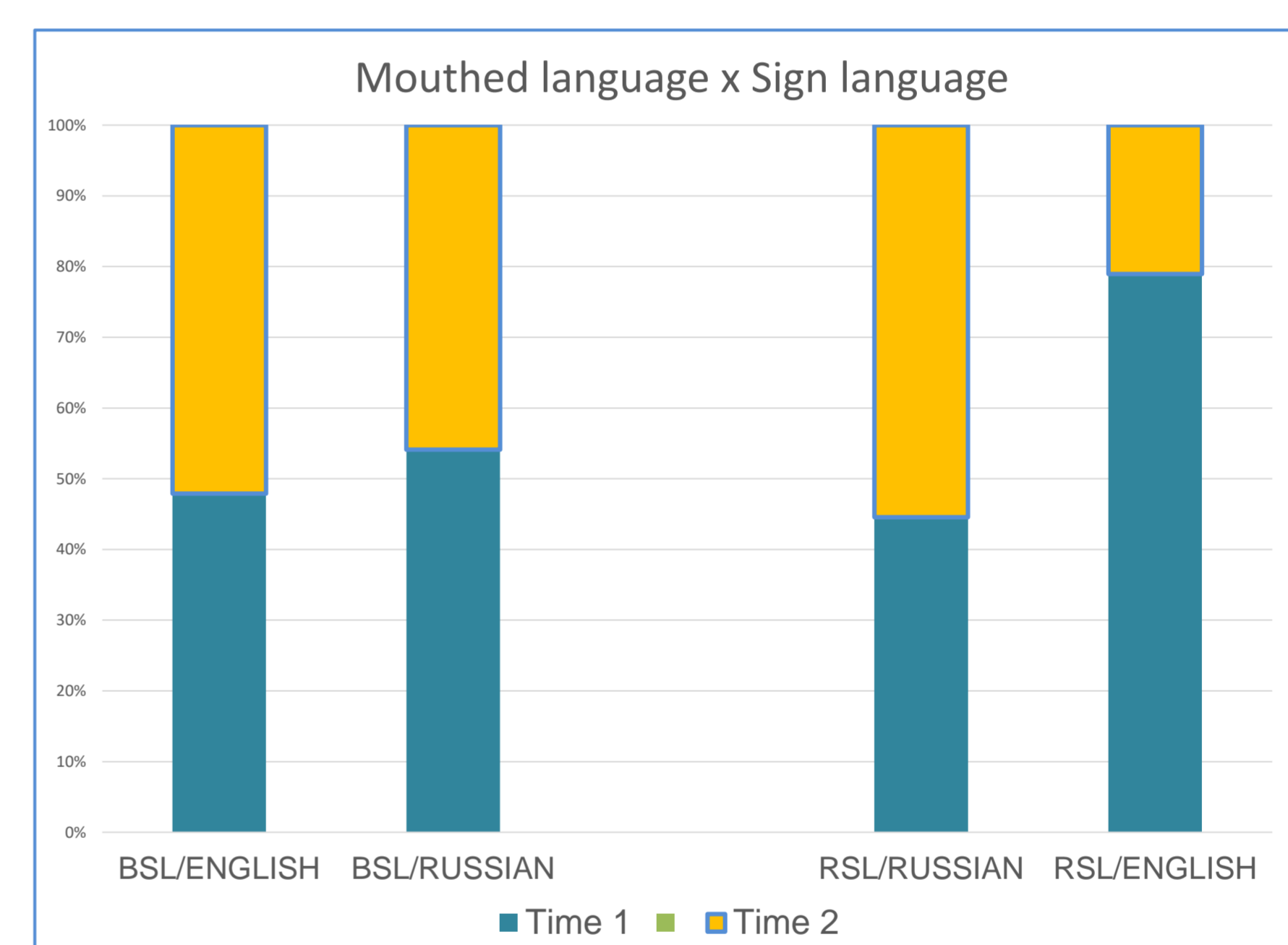
The presence of both BSL/Russian mouthings and BSL/English mouthings at suggests that some BSL signs are initially learned as a unit with an accompanying mouthing, in the absence of semantic representations in English.

The decline in the number of BSL signs/English mouthings from Time 1 to Time 2, and the increase in BSL signs/Russian mouthing suggests that over time increase in vocabulary and ease of retrieval enable active combining of mouthing and sign as independent forms.
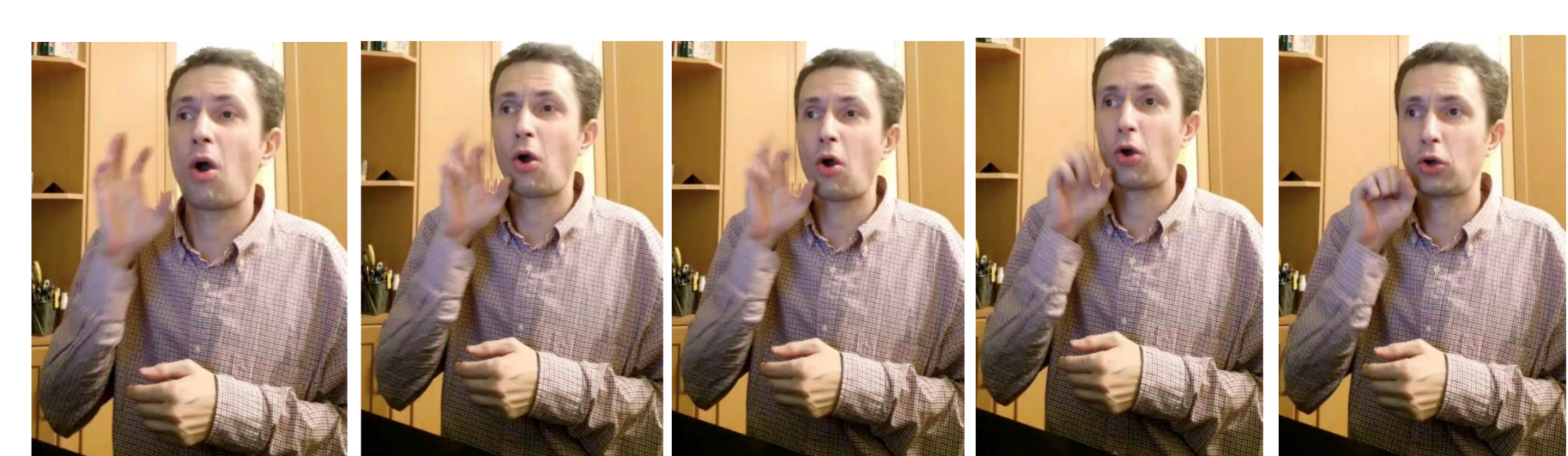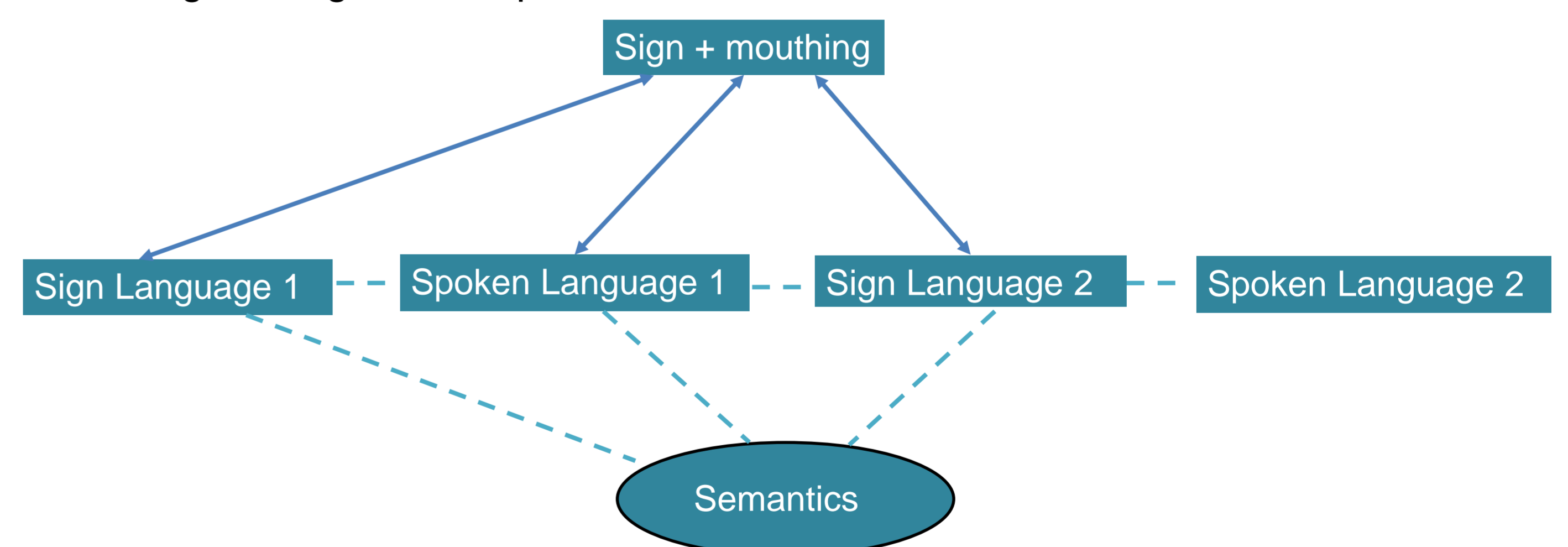
BSL sign ORANGE with English mouthing 'orange'