This abstract has been accepted for presentation at the Interdisciplinary Workshop "Sign Language Grammars, Parsing Models, & the Brain", 6-7 November 2025, Max Planck Institute for Human Cognitive & Brain Sciences, Leipzig, Germany. For further information about the event visit: https://sign-language-grammars-parsers-brain.github.io

LIS comprehension in deaf L1 and hearing L2 signers: methodological issues

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Italian Sign Language (LIS) has been extensively studied over the last decades (e.g., Volterra et al., 1987; Branchini and Mantovan, 2020): nonetheless, only few studies focused on LIS acquisition and its assessment (e.g., Pizzuto, 2002; LIS-SRT, Rinaldi et al., 2018; VOLIS, ISTC-CNR, 2021). Our study aims to trace the comprehension process of some syntactic structures in school-aged deaf LIS L1 signers (D-L1) and hearing LIS L2 signers (H-L2) by taking into account issues that specifically arise when testing sign languages comprehension, namely: input presentation and apparent mismatch between referents positioning in a composite input (signed sentence and pictures).

Participants. 4 D-L1 (age: 74-128 months; M=104 months; 3 F, 1 M) and 53 H-L2 (age: 74-131 months; M=110 months; 33 F, 20 M) participated. ***Tasks.*** *Non-linguistic mental rotation task (MRT, adapted from Peters et al., 1995)* to assess mental rotation skills on 180° rotation, oftentimes required in sign language comprehension. *Picture-matching task on locative clauses (LocT)* to understand whether children take the signer's perspective or keep their own in the interpretation of sentences where it is virtually possible to do so (8 left-right (LR), 8 in front of-behind (FB)), compared with sentences in which it is not possible to do so (8 up-down (UD) sentences). *Picture-matching task on declarative clauses (DecT)* to collect a baseline on comprehension abilities of simple sentences comparing SOV and OSV sentences and understand whether the visual rotation required to match the sentence with the pictures interfere with comprehension (16 SOV, 16 OSV sentences). ***Results.*** *MRT.* See Figure 1. *LocT*. Children performed at ceiling with locatives in which linguistic perspective taking is not involved (UD). In the other cases (LR and FB) (Figure 2), they had a strong tendency to interpret locative clauses keeping their own perspective. *MRT* has no significant impact (glmer analysis, β=-0.044, z=-0.393), whereas the probability of assuming the signer's perspective decreases as age increases (β=-0.813, z=-2.859). *DecT.* Accuracy results show that SOV clauses were better understood than OSV clauses by H-L2 (age*word order significant interaction β=0.515, z=4.709), while D-L1 had similar performances in SOV and OSV (Figure 3). *MRT* results have an opposite impact on SOV and OSV results (age*MRT significant interaction β=-0.138 z=-3.183). The relation is positive for OSV, and slightly negative for SVO, however none of these effects are significant. Nonetheless, looking at individual performances different profiles emerge: (1) at ceiling performance (D-L1 and H-L2); (2) poor performance (D-L1 and H-L2); (3) SOV > OSV (only H-L2); (4) OSV > SOV (only H-L2). ***Discussion.*** In picture-matching tasks both the pictures and the signed sentence make use of the visual modality, therefore they cannot be presented simultaneously: this non-simultaneity might have had an impact on the general performance and/or on some individual performances. Furthermore, the target image was described from the signer's perspective, creating a seemingly mismatch in reference positioning (i.e., a referent on the left of the image is signed on the signer's left, which appears on the right of the person watching the signer frontally). Results from *LocT* show that the signer's perspective is strongly dispreferred: our idea is that linguistic perspective taking might be developed later than other linguistic/cognitive skills (unless specific training is ongoing at school at the moment of testing, as younger children seem to show), as well as the presence/absence of context might play a relevant role in perspective taking. Results from *DecT* show that H-L2 often overgeneralize the SOV basic structure onto the (marked) OSV structure. As for the visual rotation required, results suggest that some children, both D-L1 and H-L2, with a good performance in *MRT*, might have difficulties with perspective-taking or image-rotation skills applied to the specific task required, to the point that the sentence spatial morphosyntax is overshadowed by the verb directionality, mirrored without applying any rotation. Furthermore, a good performance in *MRT* combined with a poor performance in *DecT* in H-L2 might also suggest: a lexical weakness compensated with a 'copy-paste' strategy which took advantage of the verb directionality; an intermediate acquisition state with a consequent not yet fully mastered linguistic rotation skill.

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Sentence reference examples

LocT

(1) TREE CL-TREE$_{LEFT}$, HOUSE CL-TREE$_{LEFT}$ CL-HOUSE$_{RIGHT}$. [Left-right loc]
‘The house is on the right of the tree.’ Link: https://youtu.be/oiabdv90xMA

(2) TREE CL-TREE$_{CENTER}$, HOUSE CL-TREE$_{CENTER}$ CL-HOUSE$_{BEHIND}$. [In front of-behind loc]
‘The house is behind the tree.’ Link: https://youtu.be/ywi9U1c1alw

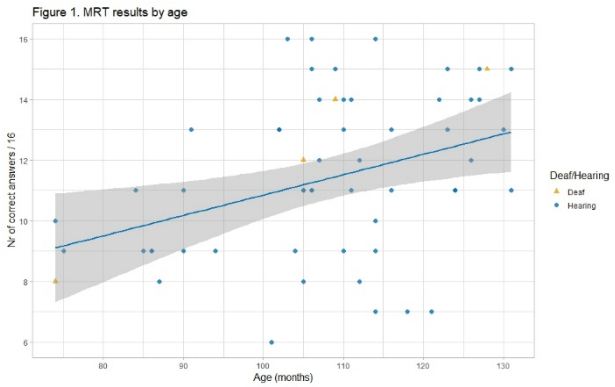
(3) TABLE CL-TABLE$_{CENTER}$, HOUSE CL-TABLE$_{CENTER}$ CL-HOUSE$_{UNDER}$. [Up-down loc]
‘The house is under the table.’ Link: https://youtu.be/hnMi0yBvEeo

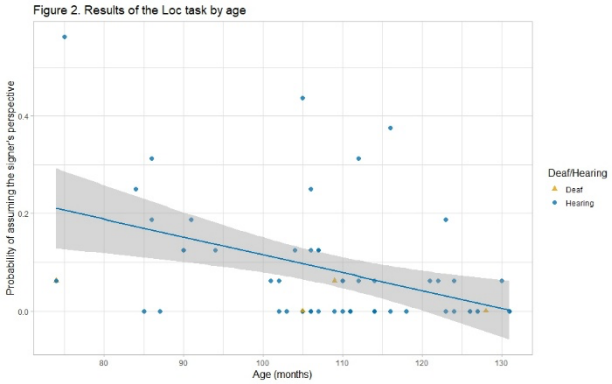
DecT

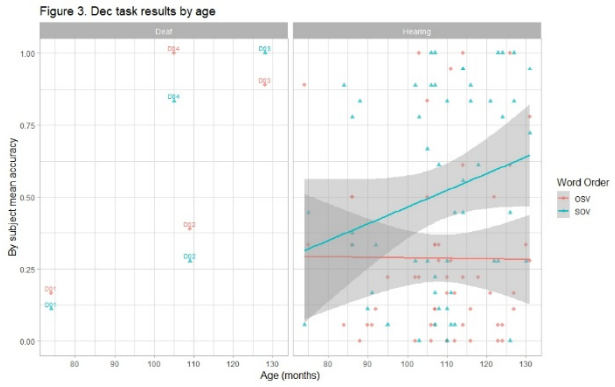
(4) CLOWN$_{LEFT}$ ASTRONAUT$_{RIGHT}$ LEFTCOMB$_{RIGHT}$. [SOV]
‘The clown cuts the astronaut’s hair.’ Link: https://youtu.be/EDwczUKIqbA

(5) SWIMMER$_{LEFT}$, ASTRONAUT$_{RIGHT}$ RIGHTCOMB$_{LEFT}$. [OSV]
‘The queen cuts the king’s hair.’ Link: https://youtu.be/DebWHsCtPl0

Figures







Main references

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