# Age of acquisition effects on verbal fluency in TID

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## 1. Introduction

90% of all deaf children are born into hearing parents and thus are deprived of language. Linguistic deprivation results in poorer linguistic abilities in the domains of morphology, morphosyntax and sentential processing [4], reduced lexicon with a slower pace of vocabulary acquisition [6], more impoverished phonological processing and awareness [3], and Executive Functioning (EF) [5].

## 2. Present Study

It is still unclear whether effects of deprivation among late signing children persist or disappear with maturation. In this study, we aim to:

- explore the AoA effects among deaf adult signers of Turkish Sign Language (TİD) on verbal fluency.
- test lexical and phonemic frequency effects on task difficulty through a time-course analysis.

## 3. Materials & Methods

In our test we included 6 handshape (HS) and 6 location (LOC) items for the phonological module, and 6 semantic (SEM) items with E(asy), M(edium), and H(igh) difficulty settings. We calculated the difficulty of the phonemes in their TİD dictionary frequencies [1], and semantic difficulty is adapted from [8].

| Task | Parameter | Easy-1 | Easy-2 | Medium-1 | Medium-2 | Difficult-1 | Difficult-2 |
|---|---|---|---|---|---|---|---|
| Phonology | Handshape | - Flat-B | - 1 | - 2 | - T | - L | -8 |
| | Location | Above-shoulders | Hands | Chest | Arms | Stomach | Shoulders |
| Semantics | | Relatives | Fruits and Vegetables | Professions | Something made of wood | Diseases | Sciences |

**Figure 1:** Task Categories

31 deaf adult signers of TİD, 15 with early (before 3 y.o), and 16 with late acquisition (after 3 y.o), participated in the study. The signers were asked to produce as many signs as possible in 60 seconds for each item.

## 4. Results

For a statistical analysis of how word production has proceeded through time, we fit a linear mixed model using the brms package [2] in R with predictors for Time and Acquisition. We present the model results in 2.

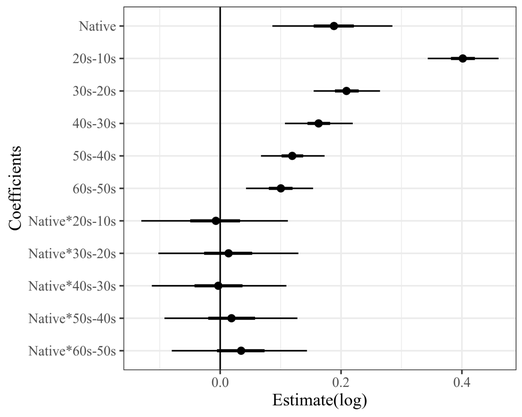


**Figure 2:** Regression model for the time course analysis

## 5. Results (cont.)

The results revealed that native acquisition of TİD increased the mean number of correct signs, but it did not affect access to the lexicon. Increasing difficulty reduced mean responses overall. We attribute the lower mean number of responses by late signers to fewer initially available linguistic resources because of smaller vocabulary and phonemic awareness.

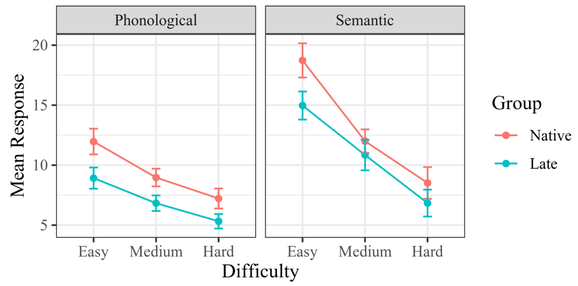


**Figure 3:** Mean correct responses

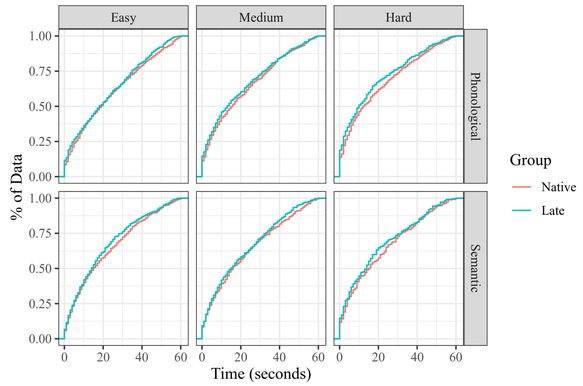


**Figure 4:** Cumulative distribution of correct responses

We interpret this as no difference between acquisition groups in terms of access to the vocabulary inventory or namely the updating ability of the participants.

## 6. Conclusion

The present study examined the age of acquisition effects on verbal fluency among native and late adult signers of TİD through an analysis of mean number of correct responses and the time course.

The findings suggested that late L1 acquisition of a sign language (AoA > 3 years) has detrimental effects on the linguistic measures of verbal fluency, namely the size of the search set initially available to the signer, because of:

- smaller vocabulary
- poorer phonemic awareness

Phonological and semantic frequency were also found to be suitable measures of difficulty in the assessment of VF. These findings supports the notion that not all cognitive discrepancy observed among late-signing children extends to adults, but the linguistic effects do remain [7].

Possible explanations for poorer linguistic skills:

- little joint attention during DCHP's early development
- weaker attention span abilities to learn new words and identify phonemes

## 7. Future Research & Implications

This study has direct implications for **early and systematic exposure** to a sign language among deaf children. The earlier opportunities for preschool instruction and interaction in a language available to linguistically deprived deaf children become prevalent, the more likely it is for them to retain future language skills and good vocabulary knowledge in adulthood.

There is a clear need for future empirical research directed at late signing children and adults with larger samples.

The results also highlight the importance of **the role of early social interaction for DCHP** in relation to the maintenance of good linguistic skills later in life.

## 8. References

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