

Processing of German Sign Language

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Abstract

For many years or even centuries, languages have been exclusively thought of as being spoken. However, after the first linguistic investigations of sign languages by William Stokoe in the 1960s [21] [23] [22], and their acceptance as natural human languages, the whole view changed. Not limiting language to a special kind of modality opens up a completely new understanding.

Investigating sign languages questions many common concepts and categorizations. Comparing information from different linguistic domains in the visual and auditory modality might thus substantially enhance our knowledge about the fundamental properties of language itself.

In my PhD thesis, I address the question how sign languages are processed. Regarding spoken language, there are several speech perception theories [11] [20] [19] [7] [8] [18]. Recently, neurolinguistic methods like fMRI, EEG or MEG have been used to reveal underlying neural mechanism of speech perception. However, the question still remains open whether and how speech theories are able to account for another modality. Current neuroanatomical findings indicate that both visual signs and phonological speech information are processed in a comparable manner. Analogous to spoken language, a left-hemispheric dominance is observed for processing sign language [10] [4] [6] [5] [16] [1]. Moreover, behavioural evidence reveals that sign language is perceived categorically [13] [12] [2], analogous to auditory information. However, evidence from time-sensitive methods like EEG or MEG is still scarce, but knowledge about temporal processing phases might be prerequisite for fully understanding the basic cognitive concepts involved in language processing. In order to develop a comprehensive model of sign language processing, I will conduct MEG experiments. More specifically, my experiments will address the following questions:

1. How is visual language information processed?
2. Is the maturation of visual language information processing similar to auditory information processing?
3. Can common speech perception models be assigned to sign languages?

For addressing these issues, I will adopt an experimental paradigm that has been standardly used for investigating phonological processing in the auditory domain. Analogous to existing experiments in spoken languages [9] [3], participants – deaf

native signers and hearing non-signers – will be presented signs and non-signs which differ only in one phonological parameter (pseudo-minimalpairs). Non-signs will be build out of meaningless, non-existing units in German Sign Language (DGS) with a phonotactically legitimate structure. To present the stimuli, the common oddball design will be used [14] [15] [17]. In the experiments, different participant groups (adults vs. children, native speaker vs. late learners etc.) will be tested to learn more about the maturation of language processing and different processing strategies. The analysis of brain responses will show if the processing of sign language shows similar effects as the processing of spoken languages.

The results may help to gain a better understanding of language processing in general.

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