How do language use and a dynamic lexicon affect speech production?

Fabian Tomaschek
Eberhard Karls Universität Tübingen

There are two aspects regarding speech production that seem to be well established. The first concerns the effects of language usage, which is typically measured as predictability and frequency of occurrence: the consensus is that greater predictability and higher frequency are associated with phonetic reduction -- i.e. shorter phone duration and more centralized vowels. Typically, these findings are explained to emerge as a result of the need to balance the amount of acoustic signal and the amount of information conveyed by the signal.

The second aspects concerns the cognitive processes that take place during the preparation of speech production and the role of the mental lexicon. Speech production is typically conceived of as a modular, sequential process in which higher-level representations are transformed into lower-level representations necessary for articulation. Once the lower-level representations such as phonology and articulatory gestures are obtained, higher-level representations such as morphology or semantics are discarded. As a result, higher-level information should not be reflected by acoustic and articulatory characteristics.

In this talk, I will present and discuss studies that challenge these well established aspects regarding the interaction between the lexicon and language usage on the one hand, and speech production on the other hand. On the one hand, I will present evidence that demonstrates that language usage is not necessarily reflected by reduction but also can also be reflected by an improvement of articulatory capabilities that show enhancement.

On the other hand, I will demonstrate a strong effect of structures in the mental lexicon on speech production. I will present studies that employ computational learning models to assess the structure of the mental lexicon and how this structure co-varies with acoustic characteristics of the speech signal.