

## **Abstract**

This diploma thesis explores the intersection of computational approaches to language, network science, and psycholinguistic research of word production. The thesis introduces network science together with its formalism and application in linguistic research as phonological and semantic networks. It introduces relevant psycholinguistic experimental research of word processing, namely lexical decision task that is indicative of processing efficiency. Finally, large language models and word vectors are introduced. The aim of this thesis is to construct a semantic network of English based on word vectors computed by BERT language model from a sample of the TV Corpus. A structure of the resulting semantic network is analysed in the light of results from lexical decision task drawn from the MALD database that reflect word processing efficiency. The resulting semantic network has small-world structure implying that word vectors transformed into a semantic network can capture cognitively salient semantic relationships between words. Multiple linear regression analysis between degree centrality, closeness centrality, and clustering coefficient of words within the semantic network and reaction time for the same words from the MALD database did not show statistically significant relationship. Clustering coefficient appears to have slightly negative relationship to the reaction time that was approaching statistical significance implying that words from denser parts of the network are processed faster. Current results allow careful optimism for the use of semantic networks based on word vectors for the research of cognitive processes underlying language.

Keywords: semantic network, word processing, word vectors, machine learning