Modality related differences in the semantic activation of idiom constituents

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How the language processing system handles formulaic language like idioms (e.g., *to let the cat out of the bag*) is a matter of debate. One line of argumentation relies on processing benefits of formulaic expressions compared to novel expressions. These benefits are interpreted as reflecting chunked representation of formulaic expressions in the mental lexicon (Conklin & Schmitt, 2008). Holistic processing of chunk-like units saves effort otherwise needed for processing of each individual idiom constituent. Alternatively, we test the activation of single word meanings within idioms. For example, we tested activation of a semantic associate like *basket* of an idiom final constituents like *bag* (in to *let the cat out of the bag*).

Previous investigations of our research question showed mixed effects. However, studies differed largely in employed experimental designs including the processing mechanism being targeted (semantic priming vs. semantic expectations) or the modality in which the idioms were presented (spoken vs. written). While experiments measuring semantic priming consistently reported facilitated processing of words semantically related to idiom constituents (Beck & Weber, 2016; Holsinger, 2013; Smolka, Rabanus, & Rösler, 2007), experiments measuring semantic expectancy showed diverging results (no semantic activation: Rommers, Dijkstra, & Bastiaansen, 2013; semantic activation: Sprenger, Levelt, & Kempen, 2006). With respect to the modality, all experiments using spoken idioms found activation of single word meaning (Beck & Weber, 2016; Holsinger, 2013). In contrast, findings differed for experiments presenting written versions of idioms (no semantic activation: Rommers et al., 2013; semantic activation: Smolka et al., 2007; Sprenger et al., 2006).

Here, we targeted the previously obtained mixed results. By relying on a similar experimental design as Rommers and colleagues, we measured semantic expectancy in highly predictable idioms in an ERP paradigm. In a previous experiment (presented at AMLaP 2018, Poster 47), forty German-speaking participants listened to sentences, which either contained correct idioms (*Hannes ließ die Katze aus dem Sack.* Engl. *Hannes let the cat out of the bag.)* or manipulations of those idioms. We realized two types of manipulations. Either the final word was replaced with a semantic associate of that word (*Korb*, Engl. *basket*) or it was replaced with an unrelated word (*Bauch*, Engl. *stomach*). We compared amplitude differences between these conditions (Figure 1, Panel (A)). ERPs reflected facilitated processing of correct idioms across several regions of interest (ROIs) and time windows compared to both types of manipulation. This indicates that participants build up a strong expectation about the idiom final word. In contrast to Rommers and colleagues, we found amplitude differences between semantically related and unrelated completions in the N400 and earlier ERP deflections. However, these effects converge with Sprenger et al. (2006) and Holsinger (2013) who also found evidence for activation of semantic associates during early processing of idiom constituents.

In order to investigate modality related differences between our previous study with spoken materials and that of Rommers and colleagues with written materials, we used written idioms in the current experiment. Twenty-five German-speaking participants read the materials (word-by-word presentation). As in our former experiment with spoken materials (see Figure 1, Panel (B)), amplitudes for correct completions differed significantly from amplitudes for both types of manipulation. In contrast to our former study with spoken idioms, ERP amplitudes for word-by-word reading between semantically related and unrelated completions did not differ in the typical N400 region.

We speculate that a rapid decay of semantic activation of constituent associates accounts for previously found mixed results. It appears that semantic associates of the predicted correct idiom completion are only shortly available and that this activation rapidly declines over time (Sprenger et al., 2006). Since the time before the final word for sequential auditory presentation is shorter than for visual word-by-word presentation, semantic activation of idiom constituents might only be measurable in the auditory modality. In general, the linguistic system may rely on both single constituents and multi-word representations while processing formulaic language (see also Superlemma Model by Sprenger et al., 2006).

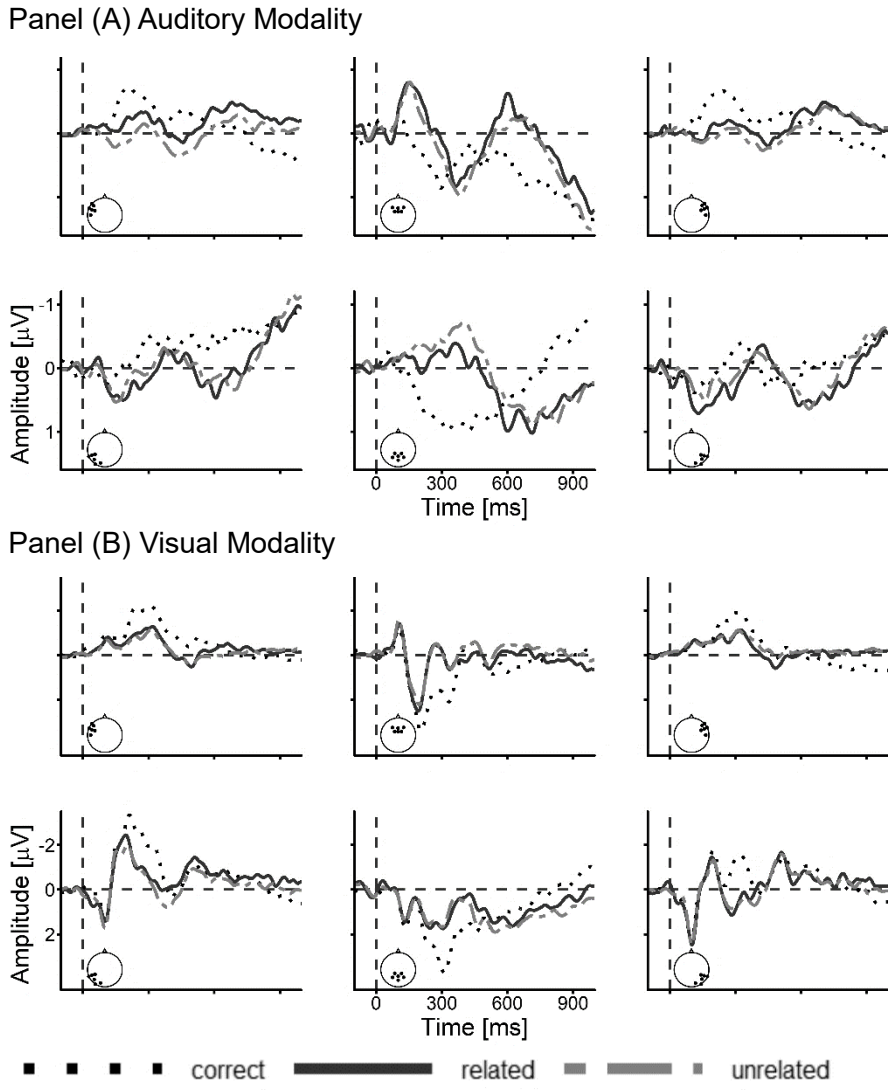

Figure 1. Grand-average ERPs for processing spoken idioms (previous experiment) and written idioms across six different Regions of Interest (indicated by respective highlighted electrodes)

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