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SOME ASPECTS OF STIMULUS CHOICE FOR A CROSS-LINGUISTIC EXPERIMENT ON THE PROCESSING OF SYNTACTIC AMBIGUITY BY AI-BASED CHATBOTS

This experiment aims at a better understanding of how ChatGPT processes syntactic ambiguity.

Syntactic ambiguity is based on morphosyntactic structures that provide two possible readings. These structures can be regarded as constructions in the sense of Construction Grammar (cf. e.g. Goldberg 1995, Fried & Östman 2006). Constructions are understood as form-function-pairing, i.e. a certain form, in our case a morphosyntactic form, is ascribed a certain function.

If we look at syntactic ambiguity from a cross-linguistic perspective, the question arises as to which constructions lead to ambiguity in many languages – also across morphological language types – and which ambiguous constructions are rather language-specific. From the perspective of Natural Language Processing, whose methods should be applicable to as many languages as possible, it is therefore more worthwhile to find processing methods for ambiguities that occur across languages.

Therefore, this paper focuses on ambiguous constructions that occur in languages representing two different morphological types, namely English as a

language with analytic features and Russian as a strongly synthetic language. Furthermore, it is hypothesized that ChatGPT often relies on English as a relay language when processing non-English data; a comparison of the distribution patterns of responses to the Russian and English stimuli may shed light on this.

The stimuli for the experiment were obtained in the following way: For the ambiguous English sentences, ChatGPT4.0 was asked to generate English sentences that had two readings. Post-processing was then carried out manually: all sentences were excluded from the sample that were either not ambiguous at all or showed another type of ambiguity such as semantic ambiguity (e.g. in *The stolen painting was priceless*. the polysemy of *priceless* '1. priceless (expensive); 2. worthless' lends itself to two readings).

To obtain ambiguous Russian sentences, we referred to the literature on morphosyntactic ambiguity in Russian (*Криночкина et al. 2023*) and to the stimuli from experiments on morphosyntactic ambiguity that had been conducted with human respondents (*Чернова 2016; Birzer & Mayer 2023*). This has the advantage that the results of our experiment can be triangulated with the data from the experiments with human respondents. If the data distribution of the results is similar in both experiments and if it is known which factors influenced the decisions of the human respondents, this may provide clues as to which factors ChatGPT uses for its decisions.

In a second step, all sentences were then translated three times with the help of the AI-based applications DeepL, ChatGPT4.0 and GoogleTranslate, i.e. the English sentences were translated into Russian and the Russian sentences into English. Afterwards, it was manually checked whether at least one translation conveyed the ambiguity into the target language; if so, this English-Russian sentence pair was added to the list of stimuli for the experiment. If the translations were not ambiguous, it was checked whether the possibility of an ambiguous translation existed in principle. If so, this ambiguous translation was included in the list of stimuli together with the original sentence.

This resulted in a list with a total of 123 stimulus pairs representing the following types of syntactic ambiguity: 1) ambiguous scope of a modifying PP; 2) ambiguous scope of a modifying NP in the genitive; 3) ambiguous reference of the Russian adverbial participle or the English gerund; 4) ambiguous binding of the possessive pronoun; 5) ambiguous reference of the Russian attributive participle and the English attributive participle or relative clause.

In a third step, prompt engineering was used to develop a sequence of prompts building on each other. The prompts provide information on the data set and instructions for processing the ambiguous stimuli (from two possible answers, ChatGPT has to select the one it considers most likely, taking into account the context) and on the output format of the results. It was also made sure that the prompts work reliably on different user accounts.

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