

## Structural priming in ChatGPT

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Large language models (LLMs) such as ChatGPT showcase a remarkable ability to understand and generate language coherently and in an uncannily human-like manner [1]. Intriguingly, evidence suggests that ChatGPT, like humans, is susceptible to structural priming, i.e., the propensity to reuse previous syntactic structures [2]. This observation lends credence to the idea that syntactic representations might emerge organically in ChatGPT, despite it not having been trained on syntactically-annotated data.

Our open-ended, preregistered project (<https://osf.io/qbuzw/>) dives deeper into this phenomenon of structural priming in ChatGPT. Given that ChatGPT operates solely with text input and output, we adopted the sentence completion paradigm [3]. Here, ChatGPT was given a prime sentence or preamble to understand and complete, followed by a target sentence preamble for completion. We investigated how the prime structurally influenced the target completion. The experimental design and stimuli used were adapted from existing human-centric studies, and in each experiment, we presented one trial per run, testing each item across 1000 runs.

In **Study 1**, we examined the persistence of abstract structural priming and lexical boost by varying the distance between the prime and target (with 0, 2, or 6 fillers in between) [4]. Our findings demonstrated long-lasting abstract structural priming and a distance-sensitive lexical boost, mirroring human tendencies [4]. **Study 2** revealed that, like humans, ChatGPT exhibited no boost in priming due to tense or aspect overlap between the prime and target, but a boost was observed due to number overlap [3]. This suggests that ChatGPT's morphological effects on structural priming don't entirely mimic human behaviour. In **Study 3**, we found that ChatGPT, akin to humans, doesn't fully suppress an incorrect syntactic analysis when completing a target preamble following a prime containing temporary syntactic ambiguity [5]. In the context of plausible and implausible primes, **Study 4** showed that structural priming in ChatGPT was reduced following an implausible prime, suggesting that, like humans, ChatGPT reevaluates the syntax of implausible sentences to produce plausible meanings [6]. Finally, **Study 5** compared structural priming within and across languages [7]. Both intra and inter-lingual structural priming were observed, along with a lexical boost within languages and a smaller translation-equivalent boost across languages, in line with human results [7].

This ongoing project has thus far unveiled that ChatGPT, despite not being trained on syntactically-tagged data, demonstrates a susceptibility to structural priming that's remarkably akin to human behaviour. Our findings propose that LLMs like ChatGPT might harbour emergent syntactic knowledge that parallels human syntactic understanding [8]. This unanticipated revelation fuels our continued examination of human-like linguistic phenomena in AI language models.

### References

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