

Structure dependence and the syntactic expertise of ChatGPT

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The paper contributes to a discussion of the syntactic expertise of ChatGPT (e.g. Chomsky et al. 2023, Piantadosi 2023, Milway 2023). Structure dependence is considered a core property of human syntax, not shared by the AI language generator – ChatGPT. It is deemed responsible, e.g. for determining which of the two verbs *fly* or *swim* used in (1) below, is to be associated with the modal *can*:

(1) *Can eagles that fly swim?* (Chomsky and Moro 2022: 26)

ChatGPT is believed to process sentences in a sequential, though not strictly linear fashion. When directly asked if it “has a sense of syntactic structure”, it replies “while the model processes tokens in parallel, it also maintains a sense of structure and context, allowing it to generate responses that are informed by the global understanding of the input sequence rather than just the preceding words in a linear fashion”. This, evidently, is unlike the human sense of syntactic structure, based on recursion and hierarchy, allowing to formulate constituents as “triangles in the brain” (Coopmans 2023).

If ChatGPT lacks a sense of structure, then one can wonder how successful it is in handling a range of the acclaimed ‘syntactic puzzles’ whose processing by humans arguably dwells on the property of structure dependence. Some deficiency in handling such cases by the language model is expected. The types in question are ‘onion sentences’, garden paths, grammatical illusions, and structural ambiguities, exemplified by (2) – (5) respectively, below:

(2) *The dog the stick the fire burned beat bit the cat* (Pinker 1994: 205)

(3) *While the man hunted the deer ran into the woods.* (Boeckx 2010: 145)

(4) *More people have been to Russia than I have.* (Boeckx 2010: 144)

(5) *Ingres enjoyed painting his models nude.* (Pinker 1994: 209)

The Method

The assessment of ChatGPT’s syntactic expertise is based on a series of Q&A sessions during which the language model is asked to interpret, judge acceptability of, explain or generate English examples displaying such peculiar syntax. This is preceded though, by ‘a training session’ in which the model’s understanding of the nuances of such cases is assessed. The outcome is then confronted with the results of a parallel questionnaire study, with the same set of linguistic tasks, administered to three groups of people, untrained in linguistics, with a native-like proficiency in English.

References

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