Colorless green emoji sleep furiously: Exploring structural priming between text sentences and emoji strings

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Though the semantic and pragmatic representational capacity of emoji is well established [1,2], questions of “emoji grammar” remain. Emoji can be substituted in for words in sentences and yield comprehensible outcomes (though not all word classes sponsor emoji substitution equally, and a processing cost for such substitutions is sometimes observed [3]), but to what extent do emoji convey sentence-like structural information on their own? One study in Japanese suggests emoji word order simply reflects the word order of the language being used [4], while another study in Chinese indicated that emoji may have their own preferred word order independent of language [5]. Whether or not emoji grammar is merely parasitic on the word order of the language that people already know is important evidence for evaluating the claim of emoji as an “emergent graphical language” [6].

We designed an experiment to explore the extent and directions of structural priming between text sentences and emoji strings. Stimuli were 50 target sentences in English, each of which had an active (SVO) and a passive (OVS) construction. Half of the target sentences were semantically non-anomalous (e.g., “The man winked at the judge”/“The judge was winked at by the man”), and half were anomalous (e.g., “The coffin bathed the lemon”/“The lemon was bathed by the coffin”). For each sentence, a corresponding three-emoji sequence was also constructed (e.g., ⚰️🛁🍋 / 🍋🛁⚰️). In Experiment 1, participants (n=90 as of now) saw the text sentence first, on an untimed screen, followed by the emoji sequence. Once the emoji sequence appeared, participants made a timed judgment of whether the emoji sequence matched the text sentence. Stimuli were counterbalanced in a 2x2 design, crossing the order (SVO/OVS) of the text sentence and the order (SVO/OVS) of the emoji sequence. The 50 target items plus 20 filler items (half anomalous, half non-anomalous, all mismatching between prime and target) were randomized for each participant. Experiment 2 (n=106) utilized the same materials and design but in the opposite direction, with participants first encountering an emoji sequence and then judging whether the following text sentence matched.

Participants gave more “yes” (i.e., “match”) responses, irrespective of stimulus order or sentence anomalousness, when both prime and target were SVO, compared to all other word order combinations (Figure 1). In addition, analysis of participants’ match response rates illustrates interactions between stimulus order and sentence anomalousness, indicating a greater difference between anomalous sentences and non-anomalous sentences when text sentences primed emoji sequence targets compared to the reverse direction. Analysis of response times (generally quite long due to task complexity) again indicates an overall preference for SVO+SVO alignment (Figure 2). This analysis also revealed faster overall response times for non-anomalous compared to anomalous sentences, as well as faster overall response times when text sentences primed emoji sequence targets compared to the opposite direction; there were no significant interactions regarding response times.

That an SVO+SVO alignment was preferred (via responses and response time) above all other combinations lends support to the idea of emoji order being parasitic on the word order of the language, in this case English. That text sentences were a more effective prime for emoji than vice versa further illustrates that structural representations of emoji sequences are not as robust as those of words. Overall, these results support perspectives of emoji demonstrating a “simple grammar” as compared to a genuinely language-like “complex grammar” [7,8].

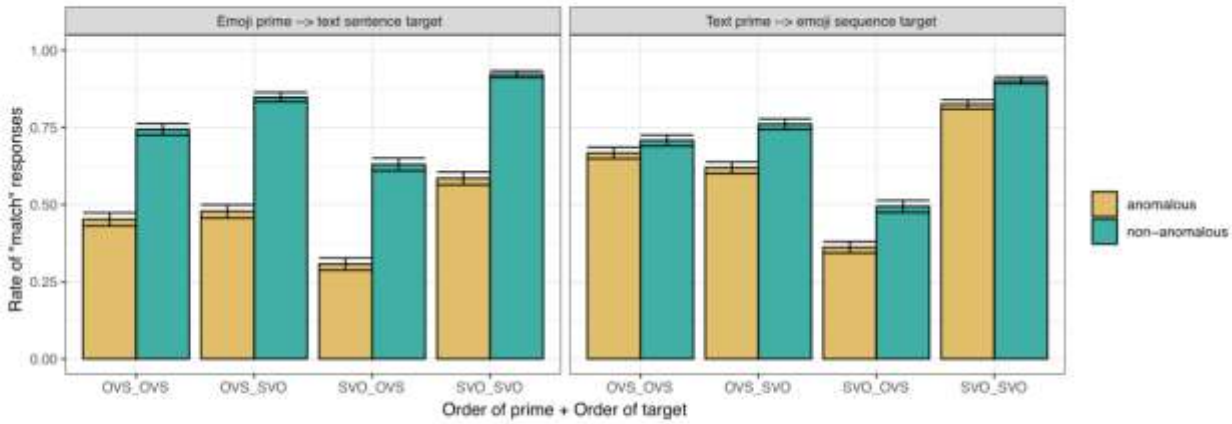

Figure 1 – Rates of “match” responses across stimulus order, sentence anomalousness, and word order combinations. Bars indicate standard error.

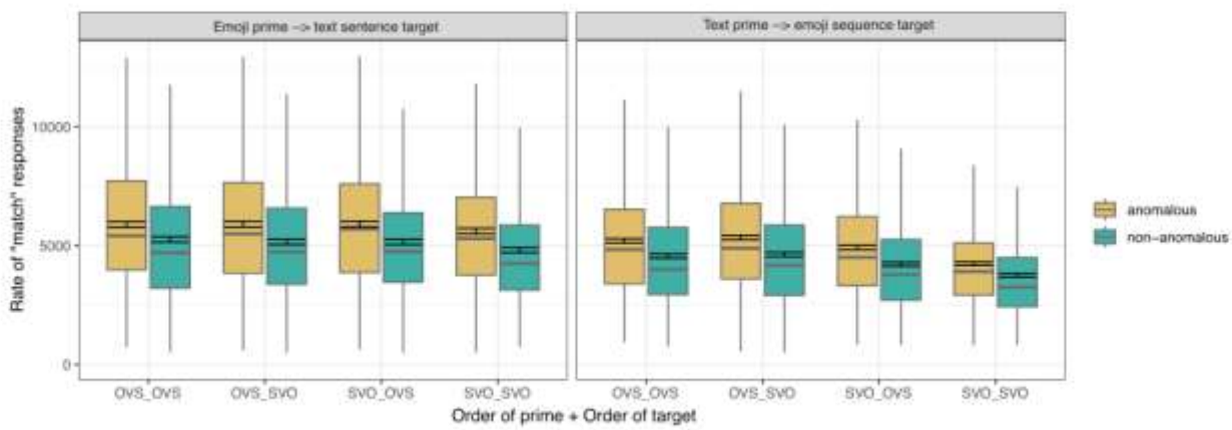

Figure 2 – Mean response time across stimulus order, sentence anomalousness, and word order combinations. Grey horizontal bars indicate median, error bars indicate standard error around condition mean. Boxes encompass middle quartiles; whiskers extend to 1.5*IQR.

References

[1] Grosz, P. G., Greenberg, G., De Leon, C., & Kaiser, E. (2023). A semantics of face emoji in discourse. *Linguistics and Philosophy, 46*(4), 905-957.
[2] Weissman, B., Engelen, J., Baas, E., & Cohn, N. (2023). The lexicon of emoji? Conventionality modulates processing of emoji. *Cognitive Science, 47*(4), e13275.
[3] Cohn, N., Roijackers, T., Schaap, R., & Engelen, J. (2018). Are emoji a poor substitute for words? Sentence processing with emoji substitutions. *Proceedings of the Annual Meeting of the Cognitive Science Society, 40*.
[4] Sekine, K., & Ikuta, M. (2024). Grammatical structures of emoji in Japanese-language text conversations. *Cognitive Research: Principles and Implications, 9*(1), 49.
[5] Herring, S. C., & Ge, J. (2020). Do emoji sequences have a preferred word order?. In *ICWSM Workshops*.
[6] Ge, J., & Herring, S. C. (2018). Communicative functions of emoji sequences on Sina Weibo. *First Monday*.
[7] Cohn, N., & Schilperoord, J. (2022). Remarks on multimodality: Grammatical interactions in the parallel architecture. *Frontiers in Artificial Intelligence*, 4, 778060.
[8] Cohn, N., Engelen, J., & Schilperoord, J. (2019). The grammar of emoji? Constraints on communicative pictorial sequencing. *Cognitive research: principles and implications, 4*, 1-18.