LINGUISTIC STRUCTURE AND LISTENER TRAITS MODULATE THE “SPEECH-TO-SONG ILLUSION”
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BACKGROUND. The "speech-to-song illusion" (S2S) is a perceptual phenomenon in which a spoken phrase shifts to being experienced as sung when repeated. The illusion indicates a tight link between language and music, and offers a unique opportunity to study structural links and cognitive underpinning of the two domains. Previous work has shown that prosody of the spoken phrases that are repeated to create S2S (esp. pitch and timing) influences the frequency and the ease of the transformation (Falk et al. 2014, Tierney et al. 2018). However, it is still unclear whether the linguistic (esp. lexical or syntactic) properties of the phrases also shape S2S, though some previous evidence suggests a strong involvement of the language processor in the illusion (cf. Castro et al., 2018; Rathcke et al., 2021; Margulis, 2013).

HYPOTHESES. The present study tests the hypothesis that the illusion involves a functional re-evaluation of phrasal prosody during repetition and is induced by a switch from a linguistic to a musical perception mode (cf. Castro et al., 2018; Rathcke et al., 2021; Margulis, 2013). Given that lexioco-syntactic processing is cognitively demanding (e.g. Daneman & Carpenter, 1980; Just & Carpenter, 1992; Just, Carpenter & Keller, 1996), the disengagement of the language processor is likely to free up attentional and working memory resources for a prosodic re-analysis that is key to S2S. The present study tests this hypothesis by investigating how listeners’ individual working memory, perceptual flexibility and divided attention moderate their experience of S2S in semantically or syntactically complex sentences that do or do not entail lexioco-syntactic violations.

METHOD. Two sets of sentence pairs were created in English and French. The ‘semantics’ set contained alternations in the plausibility of lexical constituents (Ducks can fly vs. Trains can fly). The ‘syntax’ set comprised a garden-path type of sentences in which the prosodic break location manipulated the sentence interpretability (While the woman washed (. the cat (. purred). 40 native English and 40 native French listeners participated in experiments conducted with stimuli in their native language. The listeners evaluated their impressions of each test sentence on a scale from 1 (clearly speech) to 8 (clearly song) before and after being exposed to sentence repetitions. They were also asked to indicate whether or not they experienced S2S. Individual data on the working memory ability and attentional resources were collected using the auditory digit span test (WAIS-III) and the TAP battery (Zimmermann and Fimm 2011).

RESULTS. In line with the predictions, working memory, divided attention and to a lesser extent attentional flexibility influenced participants’ experience of S2S, partially in interaction with syntactic complexity. More specifically, listeners with limited divided attention and working memory capacity reported more S2S-occurrences in sentences with higher syntactic complexity. Listeners with lower attentional flexibility generally reported more S2S. Lexico-syntactic violations (not infrequent in Western songs and lyrics) also fostered S2S.

CONCLUSIONS. Overall, these findings provide evidence for individual cognitive processing styles being a source of variation in the perception of S2S. Higher S2S occurrences in participants with lower attentional and WM capacity point towards shallower linguistic processing throughout repetitions when cognitive resources are limited. This pattern becomes visible in particular with complex linguistic stimuli. These findings corroborate the idea that S2S rests on the disengagement of the language processor and involves a shift from a linguistic to a musical perception mode (cf. Castro et al., 2018; Rathcke et al., 2021; Margulis, 2013). The shift itself may be triggered by means of looping, tapping into a general perceptual effect of repetition (Rowland et al. 2019).