

Rhythmic priming of syntactic processing in Jabberwocky: a short-lived effect

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Recent findings have revealed cognitive and neural mechanisms shared between musical rhythm and language processing, such as the precise encoding of information in the acoustic signal as well as attentional and neural oscillations that are able to entrain to external and other internal oscillations (Fiveash et al., in press; Ladányi et al., 2020). One important line of research has proposed that musical rhythm and language processing both involve the internal construction of hierarchical sequences, i.e., ordered collections of unique elements that can be represented in a structure in which lower-level units are combined into higher-level constituents (Fitch & Martins, 2014; Heard & Lee, 2019).

The present study aimed to explore the hypothesis that there exists a domain-general cognitive system responsible for internal hierarchical structure building, constituting a key shared mechanism between musical rhythm and language processing. In two experiments, French-speaking typical adults listened to 32-second structurally regular or irregular rhythmic primes before completing six-sentence blocks of a grammaticality judgement task (Przybylski et al., 2013). Materials were constructed in a semi-artificial "Jabberwocky" language to focus on the structural aspects of language processing. In both experiments, rhythmic priming influenced syntactic processing only in the first three sentences after a prime. Interestingly, participants with better rhythm discrimination abilities seemed to be less penalized by an irregular prime, while those with better auditory attention benefitted more from the presence of a regular prime.

These findings provide further evidence for the existence of a domain-general cognitive network responsible for hierarchical structure building in musical rhythm and language (Fitch & Martins, 2014; Heard & Lee, 2019). Furthermore, our data showcase that, in typical adults processing Jabberwocky sentences, the rhythmic priming effect is made up of at least two components: a short-term facilitatory effect of regular rhythmic stimulation and an inhibitory effect of irregular rhythmic priming.

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