Introduction

• Language and music perception overlap in the realms of syntax [1] and rhythm [2,3].
• Native-speaker proficiency is subject to inter-individual variability [4] and musical aptitude is not limited to musical expertise [5,6].
• This behavioral study aimed to find individual differences in cross-domain syntax perception as a function of rhythm (organized hierarchically in a metrical structure), which are not explained by differences in musical expertise.

Methods

• 2 x 2 design: domain (language vs. music) and regularity (regular vs. irregular meter).
• Participants: native German musicians (14) and nonmusicians (15).
• Task: forced-choice discrimination between pairs of sentences or melodies (same or different syntax).
• Stimuli: 60 sentences and 60 melodies; each had a regular- and irregular-meter version, and two possible resolutions to a syntactic ambiguity (Figure 1). All stimuli were naturally recorded and presented aurally in discrete counterbalanced language and music sessions.
• Diagnostic tests: data collected in additional sessions, complete list in Table 3 [7-12].

Results

• Two subgroups emerged which performed better in either regular music-performance (support hypothesis 1) or irregular-music performance (counter hypothesis), see Figure 2.
• The two post-hoc subgroups differed in the pattern of cognitive factors that correlated to performance, irrespective of expertise (support hypothesis 2), see Table 1.

Discussion

• Inter-individual differences in the use of metric cues might influence syntax processing across domains—more strongly than previously believed.
• Global cognitive factors such as timing abilities or working memory capacity might drive the use or nonuse of metric regularity, respectively.
• Inter-individual cognitive differences account better for affinity to metrical structures than does musical expertise.

Hypothesis:
1. Improved syntax-discrimination in regular-over irregular-meter items
2. Regular rhythm facilitates syntax perception [3]
3. Working memory and temporal discrimination thresholds correlate to performance
4. NOT just expertise [5,6]

Figure 1: Stimuli. Sentences and melodies follow the same metrical structure. Syntactic difference: language, singular/plural verb conjugation; music, major/minor key in the final measure.

Figure 2: Two subgroups had opposite directions for music-performance. The 'regular' group had a higher score in the regular (MR) condition, the 'irregular' group a higher score in the irregular (MI). t-test, one-tailed, p<.01**, p=.001**.

Figure 3: Grouping participants conventionally into musicians and nonmusicians, type of meter (regular vs. irregular) did not influence syntax discrimination.

Table 1: The supporting-hypothesis group ('regular-better') had timing ability diagnostic scores correlated with performance scores across domains; counter-hypothesis group ('irregular-better') had working-memory diagnostic scores correlated with performance scores across domains. Kendall's tau correlations, one-tailed, p<.05, p<.01**, p<.1. Battery for the Assessment of Auditory Sensorimotor and Timing Abilities[12].

Table 2: Correlations between performance scores and diagnostic scores

Table 3: A-priori EXPERTISE groups

L = language, M = music, R = regular meter, I = irregular meter

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