Czech learners' perception of English lexical stress is enhanced by music perception skills

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Sensitivity to lexical stress of the ambient language develops early (Skoruppa et al. 2009). The lack of lexical stress in the L1 (in a fixed-stress language) may constrain accurate perception of stress during L2 learning ("stress deafness", Altmann 2006, Dupoux et al. 2008). Overcoming L1 constraints may depend on an individual's auditory abilities (Chandrasekaran et al. 2010, Saito et al. 2022), including musical aptitude (Pujazón Rodríguez 2021, Gralińska-Brawata & Rybińska 2017), and may become easier with growing L2 proficiency. We tested adult speakers of Czech, a fixed-stress language, to explore the link between their ability to perceive L2 English stress, their musical aptitude, and their L2 proficiency.

The participants, 54 Czech learners of English, university students of English or musicology, took part in three tests. (1) English stress perception was tested in an AXB discrimination task. The stimuli were 12 CVCVCV pseudowords recorded by 3 native English talkers. They displayed natural variability in the expected acoustic cues to English stress: F0, intensity, duration, vowel formants, and spectral tilt. The stimuli were combined into 144 AXB trials, in half of which X had the same stress placement as B, and in the other half as A, e.g. [təˈnɛɹiː]–[dəˈkɔɪliː]–[ˈsiːməlaɪ]. (2) Musical aptitude was assessed using the PROMS battery of AAX discrimination tasks (Law & Zentner 2012), which tested the learners' perceptual musical skills in the tonal (melody, pitch), spectral (timbre, tuning), temporal (rhythm, rhythm-to-melody, tempo), and dynamic (beat) domain. Finally, (3) the participants' proficiency (indexed by vocabulary size) was determined using LexTALE (Lemhöfer & Broersma 2012).

A mixed-effects logistic regression model revealed that the overall music perception skills reliably predicted the probability of correct L2 English stress perception (logit estimate=0.4, SE=0.094, z=4.247, p=2.17×10^{-5}) and that they interacted with vocabulary size (logit estimate=0.298, SE=0.084, z=3.539, p=4.02×10^{-4}) so that the highest probability of correct L2 stress perception was observed in participants with both high musical and high vocabulary scores (cf. Figure 1). Another model tested which specific musical skills reliably predicted correct L2 English stress perception. Interestingly, they were rhythm, tempo, and beat, i.e. temporal and dynamic dimensions, whereas no tonal or spectral dimensions had a reliable effect.

We found that stress deafness remains a challenge even for advanced Czech learners of English. However, the L2 learners' accuracy of perceiving L2 English stress seemed associated with their ability to perceive temporal and dynamic differences in music, hinting at a facilitating effect of these musical skills.
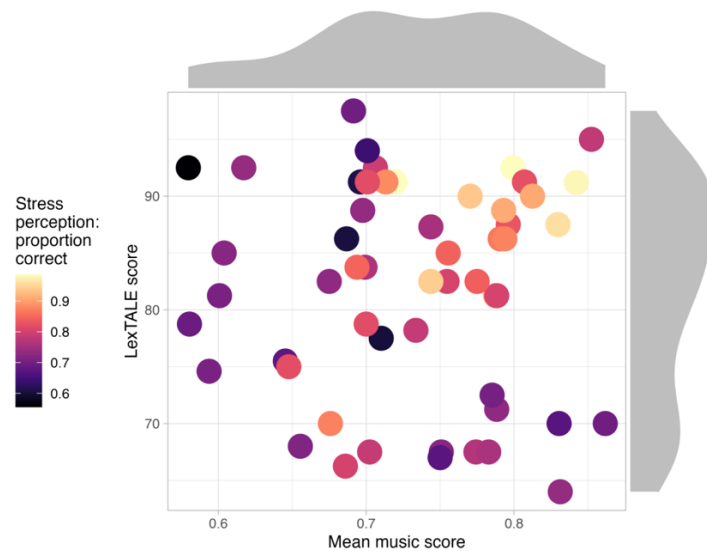
Figure 1. A scatter plot showing the participants' L2 English stress perception proportions correct as a function of their mean musical scores and their LexTALE scores. Each dot represents one participant.

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