

## Infectious Grooves: High-Groove Music Drives Auditory-Motor Interactions

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### ABSTRACT

#### Background

Numerous studies indicate that rhythm perception not only involves auditory, but also motor-related brain areas. Music with a strong groove (i.e., highly movement-inducing music) is thought to be especially powerful in engaging neural auditory-motor links.

#### Aims

A TMS study by Stupacher, Hove, Novembre, Schütz-Bosbach and Keller (2013) showed that high-groove music compared to low-groove music resulted in higher excitability of the primary motor cortex in musicians, but lower excitability in non-musicians. We tested whether the use of near-infrared spectroscopy (NIRS) – a method to examine hemodynamic changes in the brain – leads to equivalent results.

#### Method

Twelve musicians and 14 non-musicians listened to 15 s music clips without moving. The current preliminary analysis was reduced to the two songs that received the highest and lowest groove rating<sup>1</sup>. We analyzed changes in oxygenated (oxy) hemoglobin (Hb) concentration over (pre-)motor and supplementary motor areas in a time window of 3-9 s after stimulus onset.

#### Results

An ANOVA on the changes in oxy-Hb concentration with the factors groove (low, high) and musical expertise (musicians, non-musicians) revealed no significant main effects but a tendency for an interaction ( $F(1,24) = 4.20$ ,  $p = .051$ ,  $\eta_p^2 = .15$ ; Figure 1). In musicians, oxy-Hb was increased with high-groove compared to low-groove music ( $t(11) = 2.28$ ,  $p = .044$ ). No such effect was found in non-musicians ( $p > .5$ ).

#### Conclusions

In musicians, but not in non-musicians, listening to high-groove music compared to low-groove music increased brain activity in motor-related areas. These results are largely in line with the findings of Stupacher and colleagues (2013) and suggest that the higher activation of musicians' motor-related brain areas with high-groove music might be a result of well-developed auditory-motor links that can be strengthened by musical training (e.g., Bangert et al., 2006).

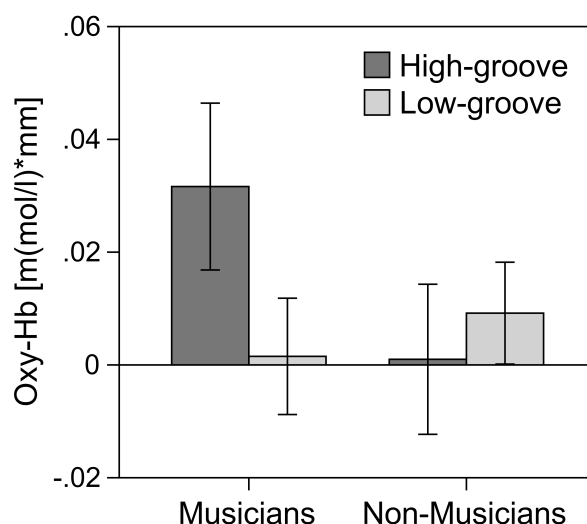


Figure 1. Mean ( $\pm 1$  SE) of musicians' and non-musicians' changes in oxy-Hb concentration over (pre-)motor and supplementary motor areas for the two songs with the highest and lowest subjective groove rating.

#### Limitations

Compared to the low-groove song "Ray Dawn Balloon", the high-groove song "Superstition" is more familiar, which might also have affected the changes in oxy-Hb concentration.

#### Keywords

Musical expertise, sensorimotor links, motor system, rhythm perception, near-infrared spectroscopy (NIRS)

#### REFERENCES

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<sup>1</sup>"Superstition" by Stevie Wonder (high-groove) and "Ray Dawn Balloon" by Trey Anastasio (low-groove)