Predictive Coding in Musical Anhedonia: A Study of Groove

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Background

- Groove describes the pleasurable urge to move to music.
- According to the Predictive Coding of music model, listeners experience the most groove in response to music which balances complexity and predictability, resulting in an inverse-U relationship between pleasure and stimulus complexity.
- Individuals vary in the degree of pleasure they derive from music listening: specific music anhedonia describes a condition in which individuals experience little to no pleasure during music listening despite no impairments in music perception or general anhedonia.
- Little is known about musical anhedonics' subjective experience of groove. Here, we explored the relationship between individual differences in music reward sensitivity and the pleasurable urge to move to music.

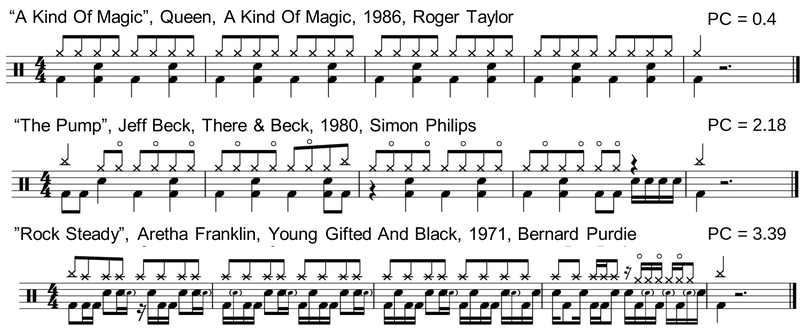
Hypothesis: Individuals with specific musical anhedonia would show less of an inverted-U relationship between complexity and pleasure, as well as lower pleasure ratings overall, compared to matched controls. Second, individual differences in musical reward sensitivity would be a significant predictor of preference for complexity.

Methods

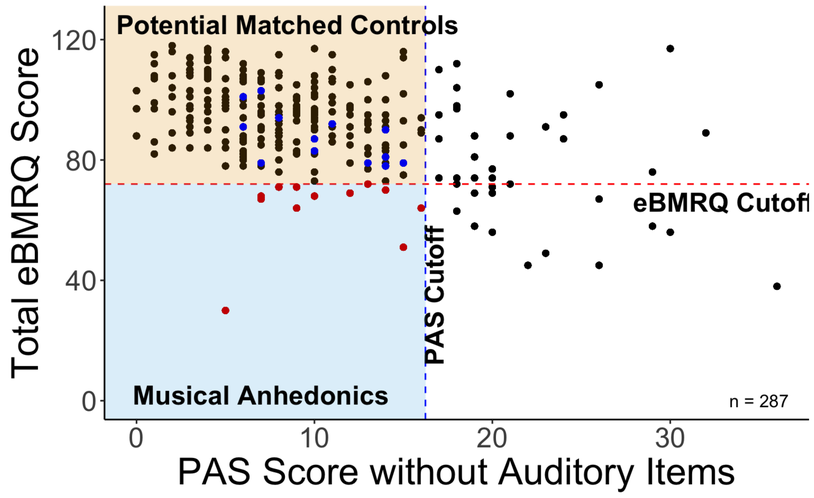
- 287 participants (140F; age_{mean}= 34) from a larger study in the lab (Kathios et al., 2023) listened to 15 stimuli varying in degree of complexity.
- Participants rated each stimuli on how pleasurable it was ("pleasure rating"), as well as how much they wanted to move to it ("move rating").
- Participants also completed a battery of psychometric surveys & tests:
- Extended Barcelona Musical Reward Questionnaire (*eBMRQ*), which measures participants' musical reward sensitivity.
- Goldsmith's Musical Sophistication Index *(Gold-MSI),* a measure of musical training and musical engagement.
- Musical Ear Test (*MET*), a test of melodic and rhythmic perception
- Physical Anhedonia Scale (*PAS*), a measure of general anhedonia
- Musical Anhedonics (eBMRQ < 73, PAS < 16) were matched with matched controls (eBMRQ > 73, PAS < 16) on PAS scores and MET scores.

Stimuli

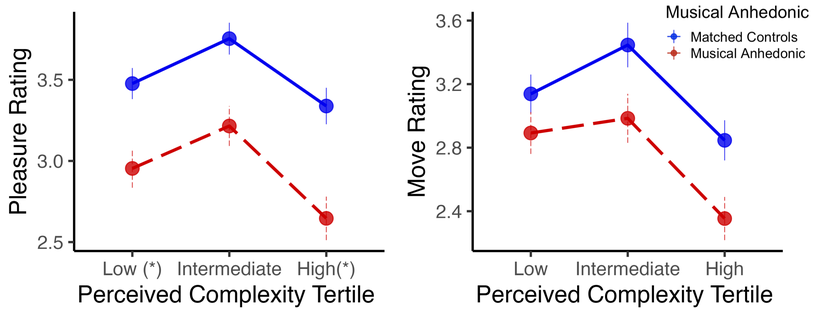
- Our stimuli were selected from a larger corpus of naturalistic drum excerpts normed on subjective perceived complexity measures(Senn et. al, 2022)
- We split the entire corpus into tertiles based on perceived complexity (low, intermediate, and high complexity).
- Then, the five lowest rated stimuli were then matched on measures of loudness, number of onsets, initial tempo, and duration for five stimuli from the middle and high tertile complexity stimuli, resulting in 15 total stimuli.



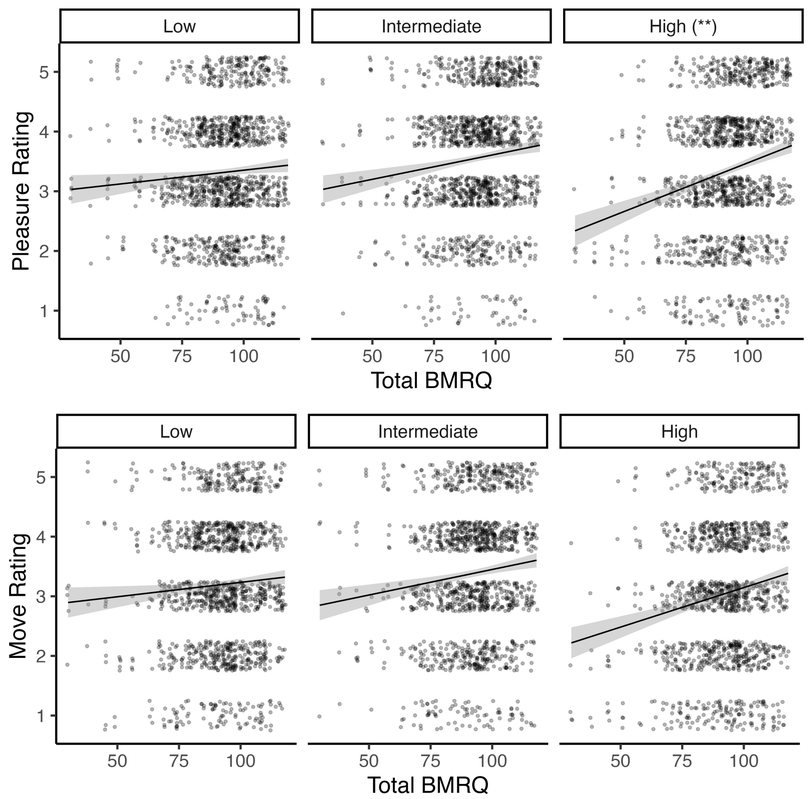
Identifying Musical Anhedonics



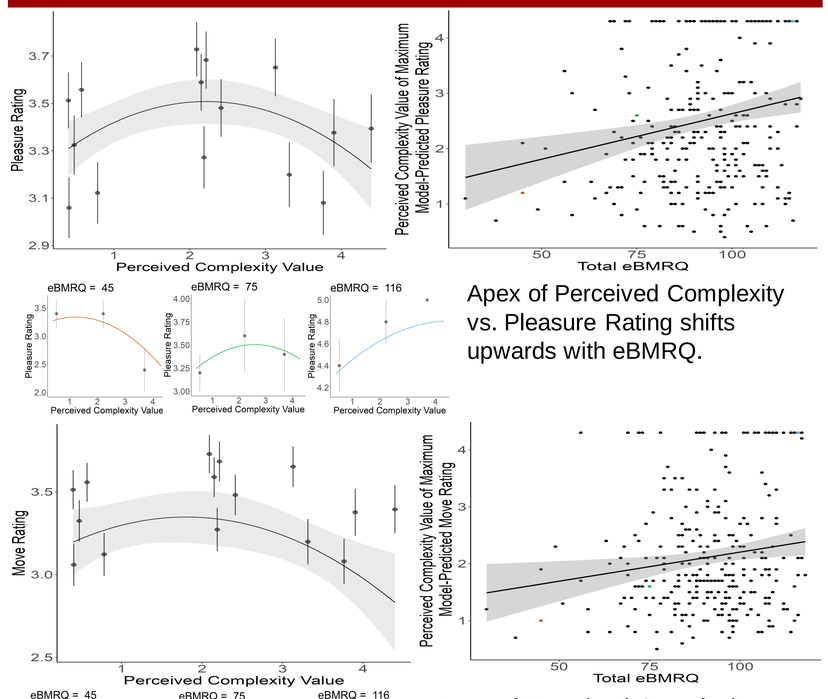
Musical Anhedonics Derive Less Pleasure



eBMRQ Interacts with Complexity



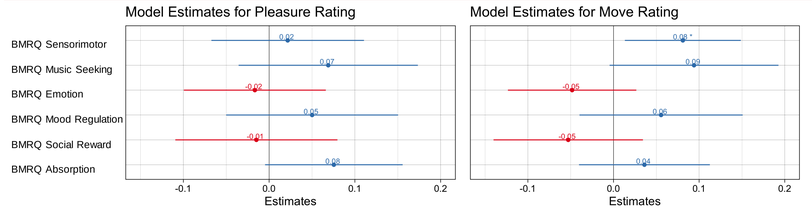
Participant-Level Effects



Apex of Perceived Complexity vs. Pleasure Rating shifts upwards with eBMRQ.

Apex of Perceived Complexity vs. Move Rating shifts upwards with eBMRQ.

Sensorimotor Subscale Predicts Groove



Discussion

- Musical Anhedonics experience less pleasure and desire to move than matched controls. This effect is exacerbated for high-complexity stimuli.
- Broadly, pleasure and move ratings increase with individual musical reward sensitivity. This relationship is steeper for high-complexity stimuli.
- Individual musical reward sensitivity increases peak preferences of complexity.
- The BMRQ Sensorimotor Subscale is a significant predictor of move ratings, but not pleasure ratings.

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