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Correlations Between Personality Traits and Experience of Groove

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Abstract

Groove, the popular musical term, is described as a multifaced, complex experience associated with immersion, desire to move, positive affect, and social connection. While previous groove literature has demonstrated the influence of several intra- and extra-musical features on the experience of groove, there remains a gap in our understanding of how listeners' personality traits influence their groove experiences. To fill this gap, we investigated the role of personality traits on the experience of groove. Participants ($N = 105$) took part in an online listening survey in which they responded to the Ten Item Personality Inventory (TIPI), and, in a listening task, rated a series of groove-related items for 30 musical excerpts (which varied in their level of groove). Results of correlational analyses demonstrated that Extraversion and Conscientiousness were positively correlated with selected groove-related variables. These findings contribute to the development of a psychological model of groove, demonstrating that personality plays a role in one's experience of groove.

Introduction

Groove is described as a multifaceted phenomenon resulting from a delicate interaction of music-, performance-, and individual-related variables, described with experiences of immersion, desire to move, positive affect, and social connection (Duman et al., 2021). Demonstrating its complexity, Senn et al. (2019, 2023) proposed a psychological model of the groove experience in which various factors such as musical features, listening situation, entrained body movements, as well as personal background contribute to listeners' groove experiences. In fact, over the past ten years, researchers have identified several factors related to the experience of groove, such as specific audio features (Stupacher et al., 2016), rhythmic and harmonic complexity (Matthews et al., 2019; Witek et al., 2014, 2017), familiarity with the music (Senn et al., 2018), musical preferences (Senn, Rose, et al., 2019), and musicianship (Senn, Bechtold, et al., 2019; Witek et al., 2017).

Despite research on various factors associated with the experience of groove, our understanding of the role played by personality remains limited. One previous study (Senn et al., 2016) reported null results concerning the relationship between self-reported groove ratings and personality traits (measured with NEO Five Factor Inventory; McCrae & Costa, 1987). However, several studies have shown that personality traits of listeners are a key factor in phenomena associated with groove, including music-induced emotions (Luck et al., 2014; Vuoskoski & Eerola, 2011a) and music-induced movements (Burger, 2013; Mendoza Garay et al., 2022). In particular, Vuoskoski and Eerola (2011a) reported that perceived sadness in music was positively correlated with Neuroticism, while other traits (except Conscientiousness) had negative correlations. In another study, the same authors (Vuoskoski & Eerola, 2011b) reported positive correlations between Extraversion and induced happiness, sadness and tenderness. In a motion capture study, Burger, Polet, et al. (2013) asked participants to move to music spontaneously and reported Extraversion as a moderator between low-frequency spectral flux and head movements. Similarly, Luck et al. (2010) reported Extraversion and Neuroticism to be particularly strongly associated with different patterns of movement. Additionally, Carlson et al. (2016) reported that people who score high in Conscientiousness are more likely to follow tempo changes in music compared

with people who score high in Extraversion. Furthermore, Agreeableness has been identified as a predictor of speed of entrainment to music (Wakabayashi et al., 2006).

Aims and Hypothesis

The aim of the current study was to explore relationships between the Big Five personality traits and listeners' groove experiences, including their interaction with other groove-related variables, such as liking and familiarity. In line with previous literature (e.g., Luck et al., 2010), we hypothesised that groove-related variables would correlate positively with Extraversion and negatively with Neuroticism.

Method

Participants

One hundred and five participants (61 women, 41 men, 3 other) aged 16 to 54 (M = 27.07, SD = 6.46) took part in a detailed online listening study, part of which included the data collected and reported here.

Procedure and Materials

The online survey investigated various factors influencing people's groove experiences. Participants consented to participate after being informed about the survey content and their rights. Subsequently, participants: 1) provided demographic information (which included an inquiry related to *how easy they find it to dance to music in general* – referred to as "dance ease"), 2) completed a set of questionnaires including the Ten Item Personality Inventory (TIPI; Gosling et al., 2003), and 3) performed a brief online listening task. For further details about the survey, please see Duman et al., 2021 and Duman et al., 2022.

Listening task. In the listening task, participants were presented with 30 musical excerpts (shown in Table 1) from various genres of commercial music with tempi around 120 -/+ 20 bpm. For each excerpt, participants were asked to rate 6 groove-related items – *wanting*

to move, liking, familiarity, desire to sing along, experience of nostalgia, and *perceived beat clarity* – on a series of 5-point Likert scales.

Analysis

Data were analyzed in Python. First, in order to understand the relationship between the groove-related items, a correlation matrix was calculated. Second, to investigate the relationship between groove-related items and personality traits, several Pearson's correlations were calculated between groove-related ratings and each of the five personality traits.

Results and Discussion

The correlation matrix of groove-related variables is shown in Figure 1. High correlations were observed between groove-related items. The highest correlations are between the items wanting to move and wanting to sing along, $r(103)$ = .77, $p < .001$, wanting to move along and liking, $r(103)$ = .69, $p < .001$, and liking and familiarity, $r(103)$ = .63, $p < .001$. These correlations are in line with previous literature findings (Janata et al., 2012; Madison et al., 2011; Senn et al., 2018). Moreover, contributing to the literature, we demonstrated the relationship between the experience of nostalgia with other groove-related variables such as familiarity, $r(103)$ = .58, $p < .001$, liking, $r(103)$ = .33, p = .001, and wanting to move along, $r(103)$ = .31, p = .002.
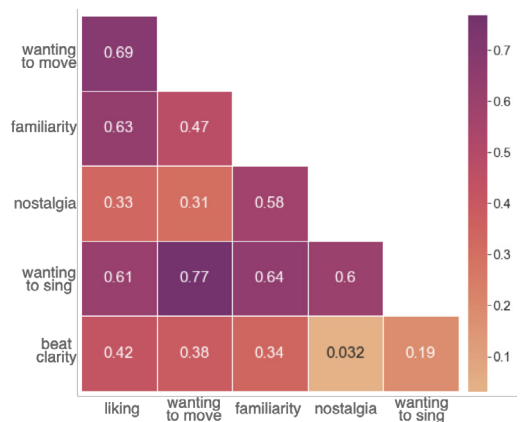

Figure 1. Correlation matrix of groove-related variables.

Table 1. Stimuli with wanting to move ratings (descending order).

Order	Artist	Song	Wanting to Move Rating
1	Queen	We Will Rock You	4.29
2	Bruno Mars	Uptown Funk	4.11
3	Daft Punk	Get Lucky	4.05
4	Earth, Wind, & Fire	September	4.03
5	LaBelle	Lady Marmalade	3.79
6	KISS	I was Made for Loving You	3.71
7	Frank Santana	Fly Me to the Moon	3.70
8	War	Galaxy	3.69
9	Santana	Smooth	3.66
10	The Fratellis	Chelsea Dagger	3.59
11	DNCE	Cake by the Ocean	3.56
12	Bob Marley	Is This Love	3.52
13	Buena Vista Social Club	El Cuarto de Tula	3.51
14	Justin Timberlake	Can't Stop the Feeling	3.45
15	Avicii	Waiting for Love	3.44
16	Florence the Machine + Calvin Harris	Say My Name	3.44
17	Lyn Collins	Think About It	3.37
18	Vulfpeck	Dean Town	3.30
19	Imagine Dragons	Believer	3.29
20	Incredible Bongo Band	Bongo Rock	3.25
21	Parliament	Flashlight	3.19
22	Bruno Mars	Liquor Store Blues	3.10
23	Iron Maiden	Run to the Hills	3.05
24	Gotye	Somebody that I used to	3.00
25	Beyonce	Halo	2.99
26	Stevie Wonder	I Just Call to Say I Love	2.96
27	Lorde	Perfect Places	2.57
28	Kaleida	Think	2.57
29	Gwen Stefani	Cool	2.49
30	No Doubt	Simple Kind of Love	2.38

The stimuli used in the current study, along with their wanting to move ratings, are shown in Table 1. Because most of the groove-related items correlate with each other, for simplicity only the wanting to move ratings are displayed. As can be observed, the highest-rated stimuli represent a range of genres. This supports the argument that the experience of groove is personal and in parallel with the listener's musical taste and familiarity (Senn, Bechtold, et al., 2019).

In terms of the correlation analyses between personality scores from the TIPI and each of the groove-related variables, significant correlations were obtained for 2 personality dimensions, Extraversion and Conscientiousness. Extraversion was positively correlated with dance ease, $r(103) = .37$, $p < .001$, wanting to sing along, $r(103) = .22$, $p = .02$, and wanting to move along, $r(103) = .24$, $p = .01$. Conscientiousness was positively correlated with dance ease, $r(103) = .23$, $p = .02$, and liking, $r(103) = .22$, $p = .02$. Scatterplots of significantly correlated personality traits and groove-related variables are shown in Figure 2.

These findings have several impacts. First, people who score higher in Extraversion tend to find moving to music easier in general, and were likely to want to move and sing along with the presented musical stimuli. Second, people who score higher in Conscientiousness also tend to find it easier to move to music in general, and were more likely to report enjoying the presented musical stimuli. These findings are also in line with previous literature on the relationships between personality traits and musical preferences (Carlson et al., 2017), and music-induced movements (Carlson et al., 2016).
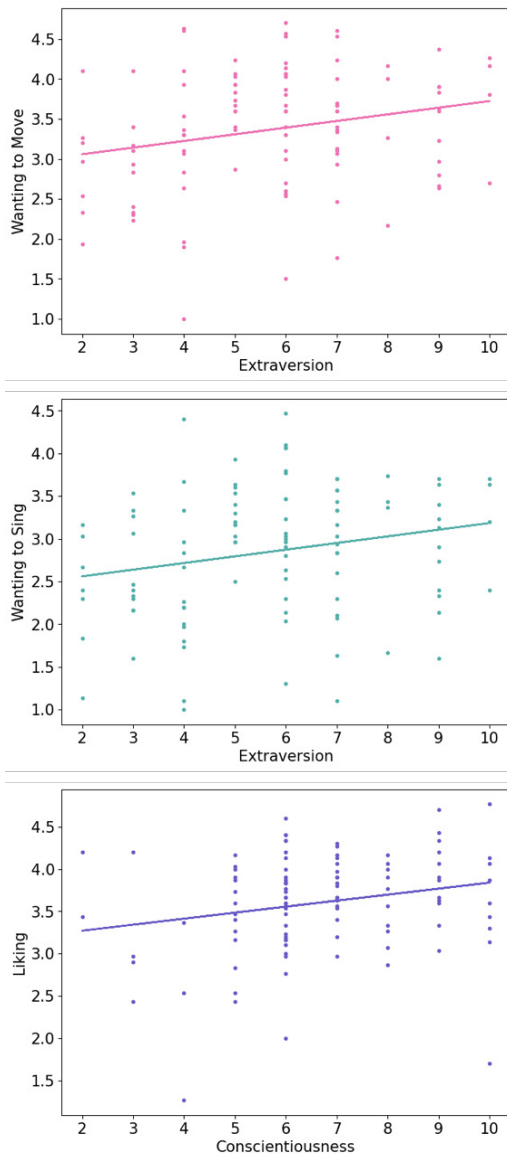
Figure 2. Scatter plots of significantly correlated personality traits and groove-related variables. While Extraversion correlated positively with wanting to move along and wanting to sing along, Conscientiousness correlated positively with participants' liking ratings.

Conclusions

The current study explored the relationships between the Big Five personality traits and listeners' ratings of groove-related variables. Our hypotheses were partially supported, with Extraversion being most strongly correlated with the groove-related variables. That Conscientiousness and not Neuroticism was also strongly correlated warrants further investigation in the groove literature. These findings contribute to the development of a psychological model of groove, demonstrating that personality plays a role in one's experience of groove.

References

Burger, B. (2013). *Move the way you feel: Effects of musical features, perceived emotions, and personality on music induced movement* (Publication No. 2015) [Unpublished doctoral dissertation]. Faculty of Humanities of the University of Jyväskylä. https://jyx.jyu.fi/handle/123456789/42506

Burger, B., Polet, J., Luck, G., Thompson, M. R., Saarikallio, S., & Toiviainen, P. (2013, June 11–15). *Investigating relationships between music, emotions, personality, and music-induced movement* [Conference session]. The 3rd International Conference on Music & Emotion, Jyväskylä, Finland.

Carlson, E., Burger, B., London, J., Thompson, M . R., & Toiviainen, P. (2016). Conscientiousness and Extraversion relate to responsiveness to tempo in dance. *Human Movement Science*, *49*, 315–325. https://doi.org/10.1016/j.humov.2016.08.006

Carlson, E., Saari, P., Burger, B., & Toiviainen, P. (2017). Personality and musical preference using social-tagging in excerpt-selection. *Psychomusicology: Music, Mind, and Brain*, *27*(3), 203–212. https://doi.org/10.1037/pmu0000183

Duman, D., Snape, N., Toiviainen, P., & Luck, G. (2021). *Redefining groove* [Manuscript submitted for publication]. https://doi.org/10.31234/osf.io/mrp6v

Duman, D., Neto, P., Mavrolampados, A., Toiviainen, P., & Luck, G. (2022). Music we move to: Spotify audio features and reasons for listening. *PLOS ONE*, *17*(9), Article e0275228. https://doi.org/10.1371/journal.pone.0275228

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big Five personality domains. *Journal of Research in Personality*, *37*(6), 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

Janata, P., Tomic, S. T., & Haberman, J. M. (2012). Sensorimotor coupling in music and the psychology of the groove. *Journal of Experimental Psychology: General*, *141*(1), 54–75. https://doi.org/10.1037/a0024208

Luck, G., Saarikallio, S., Burger, B., Thompson, M. R., & Toiviainen, P. (2010). Effects of the Big Five and musical genre on music-induced movement. *Journal of Research in Personality*, *44*(6), 714–720. https://doi.org/10.1016/j.jrp.2010.10.001

Luck, G., Saarikallio, S., Burger, B., Thompson, M., & Toiviainen, P. (2014). Emotion-driven encoding of music preference and personality in dance. *Musicae Scientiae*, *18*(3), 307–323. https://doi.org/10.1177/1029864914537290

Madison, G., Gouyon, F., Ullén, F., & Hörnström, K. (2011). Modeling the tendency for music to induce movement in humans: first correlations with low-level audio descriptors across music genres. *Journal of Experimental Psychology: Human Perception and Performance*, *37*(5), 1578–1594. https://doi.org/10.1037/a0024323

Matthews, T. E., Witek, M. A., Heggli, O. A., Penhune, V. B., & Vuust, P. (2019). The sensation of groove is affected by the interaction of rhythmic and harmonic complexity. *PLOS ONE*, *14*(1), Article e0204539. https://doi.org/10.1371/journal.pone.0204539

Mendoza Garay, J. I., Burger, B., & Luck, G. (2022). Exploring relations between Big Five personality traits and musical emotions embodied in spontaneous dance. *Psychology of Music*. Advance online publication. https://doi.org/10.1177/03057356221135355

McCrae, R. R., & Costa, P. T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, *52*(1), 81–90. https://doi.org/10.1037/0022-3514.52.1.81

Senn, O., Kilchenmann, L., von Georgi, R., & Bullerjahn, C. (2016). The effect of expert performance microtiming on listeners' experience of groove in swing or funk music. *Frontiers in Psychology*, *7*, Article 1487. https://doi.org/10.3389/fpsyg.2016.01487

Senn, O., Kilchenmann, L., Bechtold, T., & Hoesl, F. (2018). Groove in drum patterns as a function of both rhythmic properties and listeners' attitudes. *PLOS ONE*, *13*(6), Article e0199604. https://doi.org/10.1371/journal.pone.0199604

Senn, O., Rose, D., Bechtold, T., Kilchenmann, L., Hoesl, F., Jerjen, R., ... & Alessandri, E. (2019).

Preliminaries to a psychological model of musical groove. *Frontiers in Psychology*, *10*, Article 1228. https://doi.org/10.3389/fpsyg.2019.01228

Senn, O., Bechtold, T. A., Hoesl, F., & Kilchenmann, L. (2019). Taste and familiarity affect the experience of groove in popular music. *Musicae Scientiae*, *25*(1), 45–66. https://doi.org/10.1177/1029864919839172

Senn, O., Bechtold, T., Hoesl, F., Jerjen, R., Kilchenmann, L., Rose, D. C., Baldassarre, A., Sigrist, C., & Alessandri, E. (2023). An SEM approach to validating the psychological model of musical groove. *Journal of Experimental Psychology: Human Perception and Performance*, *49*(3), 290–305. https://doi.org/10.1037/xhp0001087

Stupacher, J., Hove, M. J., & Janata, P. (2016). Audio features underlying perceived groove and sensorimotor synchronization in music. *Music Perception: An Interdisciplinary Journal*, *33*(5), 571–589. https://doi.org/10.1525/mp.2016.33.5.571

Vuoskoski, J. K., & Eerola, T. (2011a). The role of mood and personality in the perception of emotions represented by music. *Cortex*, *47*(9), 1099–1106. https://doi.org/10.1016/j.cortex. 2011. 04. 011

Vuoskoski, J. K., & Eerola, T. (2011b). Measuring music-induced emotion: A comparison of emotion models, personality biases, and intensity of experiences. *Musicae Scientiae*, *15*(2), 159–173. https://doi.org/10.1177/1029864911403367

Witek, M. A., Clarke, E. F., Wallentin, M., Kringelbach, M. L., & Vuust, P. (2014). Syncopation, body-movement and pleasure in groove music. *PLOS ONE*, *9*(4), Article e94446. https://doi.org/10.1371/journal.pone.0094446

Witek, M. A. G., Popescu, T., Clarke, E. F., Hansen, M., Konvalinka, I., Kringelbach, M. L., & Vuust, P. (2017). Syncopation affects free body-movement in musical groove. *Experimental Brain Research*, *235*(4), 995–1005. https://doi.org/10.1007/s00221-016-4855-6

Wakabayashi, A., Baron-Cohen, S., Wheelwright, S., Goldenfeld, N., Delaney, J., Fine, D., Smith, R., & Weil, L. (2006). Development of short forms of the Empathy Quotient (EQ-Short) and the Systemizing Quotient (SQ-Short). *Personality and Individual Differences*, *41*(5), 929–940. https://doi.org/10.1016/j.paid.2006.03.017