PERSONALITY AND COMPUTER MUSIC

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ABSTRACT

Research has suggested that music preferences and an attraction to computers and technology are related to specific personality traits. This paper will argue that so-called 'music-systemizing' may be predictive of a preference for electronica, techno and computer-generated music. We report a preliminary study in which listeners who enjoy computer music based genres demonstrated a trend towards a higher mean score on the music-systemizing scale than those who enjoy love songs.

1. PERSONALITY AND MUSIC

Numerous studies have been conducted on the influence of personality traits on music listening preferences. Litle and Zuckerman [1], for example, found that individuals with high scores in sensation-seeking evidenced a preference for highly stimulating music such as rock. Dollinger [2] found that extraversion was positively related to one kind of music with high arousal properties (jazz), and excitement seeking to another (hard rock). Openness to experience related to enjoyment of a variety of musical forms outside the mainstream of popular and rock music. Robinson, Weaver and Zillmann [3] reported that respondents scoring high on psychoticism or reactive rebelliousness enjoyed hard/rebellious rock more than low scorers. Similarly, a study by McCown, Keiser, Mulhearn and Williamson [4] found that psychoticism, gender, and extraversion were positively related to preference for enhanced bass. Schwartz and Fouts [5] also found considerable support for the hypothesis that adolescents' listening choices were related to particular personality traits.

Further evidence of the influence of personality variables on music preferences is demonstrated by Chamorro-Premuzic and Furnham [6]. They reported that intellectually engaged individuals with higher IQs tended to use music in a different way from neurotic, introverted and non-conscientious individuals. In addition, it has been argued that individual differences in dissociation and absorption can influence enjoyment of sad music [7] and was found to be correlated with musically induced arousal [8]. Other studies have discussed gender-related differences in response to music [9].

2. PERSONALITY AND TECHNOLOGY

Evidence also suggests that personality has an influence on computer use. McNulty, Espiritu, Halsey and Mendez [10] found that personality traits measured on the Myer Briggs Type Indicator influenced the level to which medical students utilized Computer Aided Instruction (CAI). They found that students with a "sensing" preference tended to utilize CAI applications more than "intuitives". Contreras [11] found that computer confidence was predicted by cognitive flex. Slate, Manuel and Brinson [12] reported a gender difference in attitudes towards computers and the Internet. Since both music preferences and general attraction to technology and computers appear to be related to certain aspects of personality, it could be expected that an attraction to electronica or computer-generated music would also be influenced by personality.

3. PERSONALITY AND ELECTRONICA

One of the most comprehensive studies on personality and music preferences was an investigation by Rentfrow and Gosling [13]. They examined the music preferences of over 3,500 individuals and identified four categories of music for which their participants demonstrated a preference: Reflective and Complex, Intense and Rebellious, Upbeat and Conventional, and Energetic and Rhythmic. Preferences for these music dimensions were found to be associated with the well-established 'Big-Five' and other personality factors. The Energetic and Rhythmic dimension was defined as including rap/hip-hop, soul/funk and electronica/dance music. This dimension was positively related to Extraversion, Agreeableness, blirtatiousness - "the tendency to respond to others quickly and effusively" [14], liberalism, self-perceived attractiveness and athleticism. It was negatively related to social dominance and conservativism. Thus the authors describe individuals who enjoy this kind of music as "talkative, full of energy, are forgiving, see themselves as physically attractive, and tend to eschew conservative ideals" (p.1249).

In relation to electronica, this study appears to have focused on the liveliness and rhythmic characteristics of the music. No distinction was made between the different genres within the 'Energetic and Rhythmic' dimension. In regards to computer-generated music and electronica, a different personality element may also be involved.

A similar study was conducted in the Netherlands involving 1044 adolescent participants [15]. In that study

four dimensions of music preference, similar to those in the Rentfrow and Gosling study, were labeled: Rock, Elite, Urban and Pop/Dance. In that sample, the trance/techno genre (comparable to the electronica/dance genre in the American study) loaded onto the Pop/Dance factor. Again it was found that adolescents who enjoyed Pop/Dance, tended to be high in Extraversion and Agreeableness. However, once again, no distinction was made between computer-generated music/electronica and other forms of pop or dance music.

The above cited research appears limited in that computer music encompasses a broad range of styles, covering popular, steady beat styles suited to dancing, through to experimental pieces that exploit freedom from the musical score with which more traditional forms are often associated. No attempt was made to distinguish computer-generated forms of music from other types of pop or dance music. The personality aspects reported in the above studies seem logically to relate to the popular/dance music end of the computer-music spectrum: Extraversion, Agreeableness, and 'blirtatiousness'. We here examine personality traits that may correlate with a tendency to listen to (in the present study) but also to create computer music.

4. EMPATHIZING-SYSTEMIZING

Baron-Cohen, Knickmeyer and Belmonte [16] developed a model based on broad empirical support of the Empathizer-Systemizer Theory (E-S-theory). This theory distinguishes two cognitive styles. Empathizing is defined as the capacity to respond to the emotions of other individuals, whereas systemizing represents the capacity to construct systematic relationships or to identify regularities of objects and events. A study by Nettle [17] found that these distinct cognitive styles were also related to differences in levels of interest in the arts or technology.

Kreutz, Schubert, and Mitchell [18] developed an instrument for the measurement of 'music empathizing' (ME) and 'music systemizing' [MS] by adapting a general empathizing-systemizing measure [19] to music. Kreutz et al. argue that the empathizing-systemizing distinction is a more accurate predictor of musical preference than gender, and that an individual's appreciation of music may be based on an attraction to the structural features of the piece for one person (systemizing), and the emotional content for another (empathizing).

Our viewpoint is that musicians who make their music mainly while interacting with an object (a computer) are more likely to be systemizers than those who primarily interact with other musicians (e.g. in a band, ensemble, orchestra and so forth). However, we also speculate that *listeners* of such musical styles may also populate these cognitive styles. This hypothesis can be tested experimentally, and in the following section we present a small-scale study which is part of a larger project, to see if aspects of our hypothesis might be supported.

5. METHODS

Two hundred and seventy-five participants were recruited into a larger study on emotion, personality characteristics and memory. The study was conducted online and commenced by requesting participants to nominate two favourite pieces of music and two of their least favourites. Later in the study they completed the ME and MS music cognitive styles questionnaire reported above [18]. Items from the ME/MS questionnaire designed to measure music empathizing focused on the emotion in and from the music such as 'I feel when listening to music I can understand the emotions the writer/performer is trying to express' and 'Music is important to me mainly because it expresses something personal and touching'. Items measuring music systemizing concentrated on structural features such as 'I like hearing the different layers of instruments and voices in a song/piece of music' and 'I especially like the organised way that music is laid out.'

Participants were asked to give the name of each piece, the composer and/or performer's name, a link to an online recording if possible, and to provide a brief description of the piece and why they chose it. The music nominated by participants was classified according to genre/style primarily based on the descriptions given by the participants. Given the possible overlap between genres, this method of classification was chosen since it provides some indication of the aspect of the music the participants were attracted to. In particular, for the present study, romantic/love songs and electronic/computer music styles were the key musical items we sought to identify. The romantic/love songs category included both ballad-type popular songs and instrumental/romantic music where the participants descriptions of the music indicated an attraction to its emotive qualities. Similarly, the electronica/computer-music category included music from various genres that have some electronic element.

The study had a 'listener' focus, meaning that we did not explicitly seek computer music composers. We wanted (1) to see how many electronic/computer music related pieces were *spontaneously* selected and (2) to compare their ME and MS scores against a control group, which was based on a random selection of the remaining participants who selected a love song as their favourite piece, but did not select a computer music piece (see Appendix for a list of participant-selected songs). 'Love songs' were considered a genre that would exemplify the preference for emotive music of the music-empathizer group. If our hypothesis is supported, we would not expect Love Song fans to demonstrate any systematic response due to music systemizing, unlike the computer music fans. If anything, Love Song fans may show a tendency to empathize or 'music-empathize', but this is a moot point, and an exploratory focus of the present investigation.

An alternative approach would be to seek out people who might like computer music. Our approach, we believe, is more robust because it was not possible for the participant to know that we were seeking computer

(among other) music lovers. The disadvantage of our approach is many participants are required to improve the chance of obtaining a statistically sufficient number of computer music loving participants. In an attempt to manage this problem but restrict ourselves to the current data set, two analyses were conducted.

6. ANALYSIS 1

After the first analysis, 18 participants were identified as nominating at least one piece that could be classified under the broad heading of computer music. A control group was also extracted from the data set, another 18 participants who selected at least one love/romantic song as their favourite piece, but no pieces that could be classified as computer music/electronica.

There were seven males and 11 females in the Love Song group and six females and 12 males in the Computer Music group. This ensured that any possible confounds due to gender (e.g. males being more likely to systemize) rather than cognitive style were reduced. The Love Song group had a mean age of 36 years and the Computer Music group averaged 26.3 years of age.

Scoring was performed as indicated in Kreutz et al [18], without adjustment that normalizes the scores to a standard deviation of about ±10. Figure 1 summarizes the results of the comparison of the groups. Neither group is significantly different on either the music empathizing scale or the music systemizing scale, as demonstrated by the large, overlapping Standard Error bar.
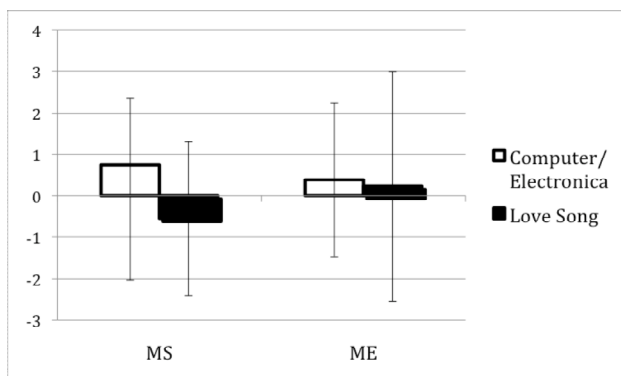

Figure 1. Results of Analysis 1, showing mean Music Systemizer (MS) and Music Empathizer (ME) scores by Computer/Electronica (n=18) vs. Love Song (n=18) favourite-piece selection in the survey. Error bar is ±1SE.

An ANOVA confirmed this, returning non-significant differences for both groups ($F_{(3,70)} = .0675$, $p = .98$). Cohen's $d = 0.064$ for ME difference and .095 for MS difference, so effect sizes were negligible. While this result suggests that there is no difference in music cognitive style between Computer music/Electronica and Love song fans, it may also be the case that a real difference was hidden, for example in our group selection regime or due to lack of statistical power. Also, the mean age was higher in the love song group, suggesting another possible confound. Thus we conducted a second analysis,

with more stringent criteria for selection of groups, and with a slightly larger sample size.

7. ANALYSIS 2

In the second analysis, all of the 275 participants in the larger study were given a score for *exclusively* liking computer/electronica music. Recall that participants selected two of their favourite songs, and two of their least favourite. Participants were given 1 point for each electronica piece selected as a favourite or a score of -1 if a love song was one of their favourites. If a love song was one of the *least* favourite (hated) it received a score of 1. But if an electronica/computer music piece was chosen as a least favourite, a score of -1 was given to that participant. This approach means that the more exclusively the individual loves electronica, at the exclusion of (non-electronica/computer music) love songs, the higher the score, with a maximum possible score of +4. Conversely, a fan of love songs, but hater of electronica/computer music, will score closer to -4. All other styles (non-electronica, non-love songs, whether hated or loved) were scored zero. This time it was decided to exclude instrumental music or classical music of the Romantic period from the love/romantic songs group in order to obtain a closer mean age between groups.

Most participants had small or negative total scores (overall preferring love songs and not preferring Computer/Electronica). Nineteen participants were identified as 'exclusive electronica lovers' receiving a score of 1. A second group was extracted from the data set to balance this, which included a further 22 participants with the most extreme negative scores: that is, exclusive love song fans, scoring -2 or -3 (the lowest scores in the data set out of a possible -4). There were nine males and 13 females in the Love Songs group and 10 females and eight males in the Computer Music group (gender information for one participant was missing). Both groups had a mean age of 22 years.

An ANOVA revealed no significant differences between either group ($F_{(3,78)} = 1.891$, $p = 0.14$). However, Figure 2 suggested some trends that may distinguish the two groups. Computer music/Electronica fans tended to score higher on both systemizing (M = 2.42, SD = 6.51) and empathizing (M = 0, SD = 10.62) scales relative to the Love Song fans (M = -0.82, SD = 7.45; M = -4, SD = 9.778, respectively). The possibility of an effect was supported by Cohen's-d statistics, which returned effect sizes of .483 for Music Systemizing and .392 for Music Empathizing.
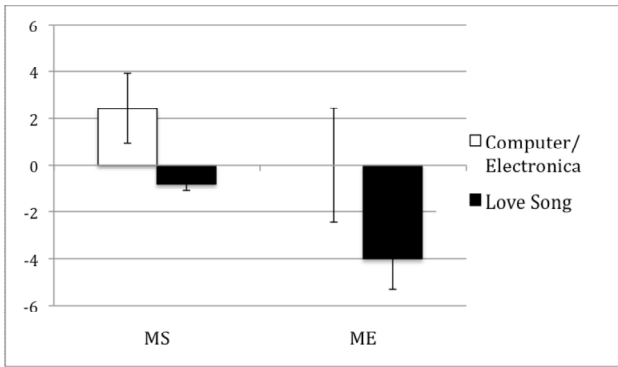
Figure 2. Results of Analysis 2, showing mean Music Systemizer (MS) and Music Empathizer (ME) scores by Computer/Electronica (n=19) vs. Love Song (n=22) groups, this time selected according to the 'exclusiveness' criterion, described in the text. Error bar is ±1SE.

8. DISCUSSION

Assuming our hypothesis was plausible, the possible reasons for non-significance were (1) not enough statistical power (only 18 computer music items were located among the cohort of participants in Analysis 1, and slightly more in Analysis 2), (2) we identified people who claimed to like listening to computer music, and not necessarily creating it (which is where the systemizing propensity may become important), and (3) we did not have the luxury of being able to identify music at the more experimental end of the computer music style spectrum (see Appendix), which would also more likely be distant from the presumably more sociable dance/pop music production styles. It is possible that many of the participants were attracted to electronica because of the other functions that it may serve, such as to support dancing.

Analysis 2 demonstrated that with more stringent criteria we could identify some possible effects of music cognitive style upon music preference. However, we did not predict that the Computer/Electronica group would have a greater mean Music Empathizing score than the Love Song group. The surprising difference could be explained by a residual confounding of groups: Despite our more stringent group membership criteria, since much of the music selected by the Computer/Electronica group was dance music, the dance function of this music may be a conduit for social interaction, and some empathizing in the traditional sense may have bled through to music empathizing. Both Cohen's-d effect sizes are medium in Analysis 2, however, the music systemizing effect size was marginally larger than the music empathizing effect size.

While Music Systemizing and Music Empathizing may not be factors that determine or are correlated with music preference, we consider it important that such a null conclusion be subject to replication, particularly with larger sample sizes, alternate methods, and consideration of other covariates, such as age and gender. The research is

considered fruitful, despite being somewhat inconclusive because of the field's interest in music and personality, and because the specifics of computer-based music production has not yet been tested in great detail. Importantly, we felt there was a theoretical perspective that could inform the relationship, in particular that music systemizers may enjoy interacting with machinery that produces music, more than other people, all things being equal.

9. CONCLUSION

Personality and music research is a relatively new area of study among music psychologists. None of the studies cited in the literature have attempted to identify whether personality characteristics might distinguish computer music lovers and creators from lovers of other music forms.

In particular we proposed that computer music creators would score high on a Music Systemizing scale because they were more likely to interact musically with an object (a computer) than people working with more conventional forms. We then conducted a study to see if this hypothesis might also generalize to *listeners* of computer music styles.

The study lent some support to our hypothesis – after a second analysis, a small trend was identified that demonstrated a higher mean music systemizing score for computer music lovers than a control group of Love Song (but not computer music) lovers. Our method avoided possible confounding effects due to participants being recruited because of their liking of a particular musical style (and therefore seeking to guess and try to support our hypothesis). Instead, we used data from a larger survey we conducted where the participants could not have been aware of the hypothesis under investigation. However, since such a method requires a large number of participants, we cannot be certain whether the lack of statistical significance in our finding was due to small numbers fitting into our test state criterion (computer/electronica music lovers) or because the hypothesis was not supported. Future work will also be required to determine whether our hypothesis can be sustained by, for example, comparing experimental computer music lovers and creators with more conventional music creators working with human ensembles.

Of course, we do not deny that computer music composers work with people nor that non-computer music composers could work with computers. The hypothesis simply suggests that people who tend to interact more with computers should be more 'music systemizing' than those who collaborate with other people, whether computer music composers or not.

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11. APPENDIX

Musical selections as reported by participants with regard to First Analysis reported in this study

Computer Music Selections
- "Deeply Disturbed" by Infected Mushrooms
- "Rocketeer", by Far East Movement
- "Swoon" by The Chemical Brothers
- "You've Got the Love" by Florence and the Machine
- "Sa'eed" by Infected Mushrooms
- "Encoder" by Pendulum
- "Party in USA" by Miley Cyrus
- "Electric Feel" by MGMT
- "Bizarre Love Triangle" by New Order
- "Blackout" by Linkin Park
- "This Moment" (Original Mix) by Nic Chagall
- "Protection" by Massive Attack
- "Show Me Love" by Mobin Master
- "New Home" by Craving & Howe
- "Take Over Control" by Afrojack
- "Back Seat" by New Boyz
- "S & M" by Rihanna
- "2001 Spliff Odyssey" by Thievery Corporation

Romantic, Love Song Selections
- Love Theme from Romeo and Juliet, Henry Mancini.
- Nocturne, Opus 9 No. 2, Frederic Chopin
- "You are Beautiful", James Blunt
- "If Love is the Providence", Jin Guangxi
- "A Comme Amour", Richard Clayderman
- "You Were Always on My Mind", Elvis Presley
- "You Haven't Seen the Last of Me", Cher
- "Don't Cry for Me Argentina", performed by Julie Covington
- "We Belong Together", Mariah Carey
- "How Do You Keep Love Alive", Ryan Adams
- "Fur Elise", by Beethoven (chosen by two participants)
- "Try a Little Tenderness", Otis Redding
- "The Heart Asks Pleasure First", composed by Michael Nyman
- "Bella's Lullaby", Carter Burwell
- "Dream a Little Dream of Me", performed by the Mamas and the Papas
- "Clair de Lune", C. Debussy.
- "How am I Supposed to Live Without You", Michael Bolton.