Exploring the Impact of Musical Stimuli on Moral Attention

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Abstract

Music plays a significant role in human activities, with its dual role of functionality and entertainment. It exerts diverse influences on individuals. This study explores music's impact on individuals' moral cognition. To ensure the objectivity and accuracy of the findings, this study employed eye tracking as the research methodology. Participants were exposed to two distinct types of music: Rock music and Yayue, a serene and elegant form of traditional Chinese music. Participants were randomly assigned to either the Rock music group or the Chinese Yayue group. They were tasked with viewing images depicting moral and immoral behaviors while these two musical backgrounds played. The eye-tracking technology recorded participants' gaze patterns, providing quantitative insights into their visual attention under different musical conditions. Our data analysis revealed that, in both groups, immoral images initially captured participants' attention. However, participants exposed to Rock music focused more on immoral images, whereas those listening to traditional Chinese Yayue music significantly prioritized moral images. These findings contribute valuable new perspectives to the intersection of music and education research, shedding light on the dynamic relationship between music and moral cognition.

Keywords: rock music, traditional Chinese music, Yayue, morality, eye tracking, education

Introduction

As an enduring art form, music has long been a subject of interest in psychology for understanding its connection with human emotions. It serves as a means of expressing and sustaining feelings and a channel for catharsis and emotional transmission (Sun, 2019; Jia, 2016). The functions of music are diverse, and some research has found that it can elicit and regulate emotions (Bonassi, 2023; Ribeiro, 2023), alleviate anxiety and depression (Nichols, 2015), reduce stress (Listed, 2011), and contribute to the treatment of mental trauma (Ruud, 2015). Moreover, music exerts varying degrees of influence on attention processing, working memory, and learning efficiency (Feeley, 2017).

People also consider music may facilitate education. In ancient China, dating back to the pre-Qin period, Confucianism underscored the role of music in moral education. Confucian scholars advocated the simultaneous cultivation of etiquette and music to refine human nature, nurture individual character, and standardize moral conduct in pursuit of an ideal societal state (Wu, 2011). In contemporary education, music's significance is also recognized. Scholars in music pedagogy emphasize the connection between music and moral values, focusing on the moral impact of music on individuals. They integrate the aesthetic experience of music, the aesthetic process, and creative aspects with moral refinement and enhancement, positioning music as an agent of moral beauty (Shao, 2005). In recent years, an increasing number of individuals have turned their attention to the moral value of music, particularly its role in moral education. The question of how music can foster students' moral development has become a prominent topic in pedagogical discourse (Zhou, 2019; Zhang, 2021).

Most previous studies have predominantly relied on theoretical approaches, such as literature reviews, observations, and logical reasoning. Quantitative empirical methods have been underutilized (Feng, 2019; Bai, 2022). This study seeks to address this gap and offer a more rigorous empirical perspective on the relationship between music and morality. The present study employs an eye-tracker to gather data and quantitatively assess the abstract concept of music's influence on morality. Statistical testing of objective data will be carried out afterward. Two different types of music are used as stimuli to explore this concept. One is rock music, known for its intensity and power. The other stimulus is traditional Chinese music, Yayue, celebrated for its peaceful and elegant qualities (Han, 2015). Historically, Yayue was performed in royal courts and temples in ancient China. Participants will be exposed to images depicting moral and immoral behaviors while listening to the two types of music. The viewing process will be recorded using an eye-tracking device. This technology will capture eye-tracking parameters, providing quantified data that reflects participants' attention. The findings of this study hold the potential to contribute new ideas and research methodologies for future scholars and enhance our understanding of the role of music in education.

2. Methods

2.1 Participants

For this study, 20 individuals were recruited randomly, with an equal split of 10 males and 10 females. These participants were then divided into two groups, labeled Group A and Group B. Before the experiment, all participants were provided with a detailed explanation of the study's procedure, the potential risks involved, and the voluntary nature of their participation. Each participant willingly participated in the experiment after signing the informed consent form.

2.2 Stimuli

The experiment involved presenting four sets of images displayed sequentially on a screen. Each set comprised four images arranged in a four-square grid format, with one image illustrating a moral behavior and another depicting an immoral behavior. The four images featuring moral behavior scenarios are helping others, demonstrating politeness, caring for the elderly, and offering seats on public transportation. The four immoral behavior scenarios included fraudulence, spitting, stealing, and throwing objects from a height. As all participants were Chinese, these scenarios were chosen to reflect typical moral and immoral behaviors in Chinese culture. The participants were divided into two groups, and each group viewed these images accompanied by either rock music or Chinese Yayue.

2.3 Design and Procedure

This study adopted a between-subject design. Following randomly assigning participants into two groups, researchers guided them to the experimental area, where they signed the consent form. Subsequently, participants were seated in front of a computer screen connected to an eye tracker (Tobii 4C). After a successful calibration process, instructional slides were presented. Group A was instructed to listen to a piece of Chinese Yayue while viewing the four sets of images, while Group B listened to a piece of rock music while viewing the same sets of images. It was played from the instructional slides to ensure the music effectively created the desired atmosphere. Each group viewed the four sets of 16 images for approximately four minutes. After completing the experiment, all participants received gifts for appreciation. Each set's immoral and moral images were classified as areas of interest (AOIs). The data of Total Fixation Duration (TFD), Fixation Count (FC), and Time to First Fixation (TFF) for each AOI were collected for further analysis.

2.4 Data analysis

Between-group and within-group T-tests for TFD, FC, and TFF variables were conducted to compare the attention orientation effect of different music on moral and immoral behaviors. For instance, TFD (moral images) vs. TFD (immoral images) within the rock music group; TFD (moral images) between the rock music and Yayue group.

3. Results

3.1 Within-group Test for TFD Analysis of Group A and Group B

Table 1 displays the results for TFD in Group A. The T-test results indicate that there is no significant difference ($t = 2.56$, $p > 0.05$) between immoral images ($M = 3.57$, $SD = 0.79$) and moral images ($M = 3.92$, $SD = 1.007$). In Group B, the TFD of moral images ($M = 2.79$, $SD = 1.003$) was significantly smaller ($t = 1.72$, $p < 0.05$) than that for immoral images ($M = 3.92$, $SD = 1.007$).

3.2 Between-group Test for TFD Analysis of Group A and Group B

There was no significant difference ($t = 1.72$, $p > 0.05$) in TFD for immoral images between Group A ($M = 3.57$, $SD = 0.79$) and Group B ($M = 3.92$, $SD = 1.007$). Similarly, there was no significant difference ($t = 1.73$, $p > 0.05$) between Group A ($M = 3.92$, $SD = 1.007$) and Group B ($M = 2.79$, $SD = 1.003$) for moral images.

3.3 Within-group Test for FC Analysis of Group A and Group B

The results illustrate that there was no significant difference ($t = 1.73$, $p > 0.05$) in FC between moral images ($M = 12.7$, $SD = 3.15$) and immoral images ($M = 12.2$, $SD = 2.83$) in Group A. However, in Group B, the FC for immoral images ($M = 13.65$, $SD = 5.49$) was significantly greater ($t = 1.75$, $p < 0.05$) than that for moral images ($M = 9.20$, $SD = 2.73$).

3.4 Between-group Test for FC Analysis of Group A and Group B

Group A ($M = 12.7$, $SD = 3.15$) had significantly greater FC for moral images than Group B ($M = 9.20$, $SD = 2.73$) ($t = 1.74$, $p < 0.05$). However, there was no significant difference ($t = 1.75$, $p > 0.05$) between Group A ($M = 12.2$, $SD = 2.83$) and Group B ($M = 13.65$, $SD = 5.49$) for immoral images.

3.5 Within-group Test for TFF Analysis of Group A and Group B

In both Group A and Group B, the TFF of immoral images ($M = 0.46$, $SD = 0.18$) and ($M = 0.42$, $SD = 0.20$) had significantly smaller values ($t = 1.83$, $p < 0.05$) and ($t =$

1.79, $p < 0.05$), respectively, than the moral images (M = 2.12, SD = 1.44) and (M = 2.11, SD = 1.11).

3.6 Between-group Test for TFF Analysis of Group A and Group B

For both immoral images and moral images, there is no significant difference (t=1.74, p>0.05) (t=1.73, p>0.05) between Group A (M=0.46, SD=0.18) (M=2.12, SD=1.44) and Group B (M=0.42, SD=0.20) (M=2.11, SD=1.11).

Table1: The Results of TFD, FC, and TFF

	TFD (s)		FC		TFF (s)	
	Moral Images	Immoral Images	Moral Images	Immoral Images	Moral Images	Immoral Images
Rock Music	2.79	3.92	9.20	13.65	2.11	0.42
Chinese Yayue	3.45	3.57	12.2	12.7	2.12	0.46

4. Discussion

The research aimed to explore the influence of two distinct types of music, Chinese Yayue and rock music, on individuals' attention toward moral and immoral behaviors. Two groups of participants viewed images depicting moral and immoral behaviors under the influence of Chinese Yayue and rock music, respectively. The entire process was recorded using an eye tracker, enabling the collection of quantitative and objective data regarding participants' visual attention. Several eye-tracking parameters were analyzed to provide insights into participants' attention patterns, focusing on Total Fixation Duration (TFD) and Fixation Count (FC) representing overall attention toward AOIs. Time to First Fixation (TFF) was also examined to understand how quickly individuals noticed specific AOIs. The results of statistical analyses demonstrated that participants, irrespective of the type of music they were exposed to, exhibited shorter TFF values for immoral images compared to moral ones, indicating a rapid and robust attraction of attention toward immoral content. This phenomenon remained unaffected by the type of music. Further analyses of TFD and FC revealed notable differences between the two music groups. Participants exposed to rock music displayed significantly increased fixation duration and fixation count when viewing immoral images. At the same time, those listening to traditional Chinese elegant music showed heightened attention toward moral images.

These findings suggest a universal tendency for immoral images to capture initial attention swiftly, aligning with the well-documented attentional bias towards negative information. This bias permeates various cognitive processes, including sensory perception, memory, and attention, and is evident in different stages of information processing, such as the emotional assessment and response preparation phases (Huang & Luo, 2006). Previous research, including studies employing Emotional Stroop tasks, point detection experiments, and neuroimaging studies (Mama, Ben-Haim & Algom, 2014; Carlson & Reinke, 2008; Dannlowski et al., 2007), consistently supports the idea that negative information consistently commands attention and is processed as a priority. These findings underscore the robust nature of the attentional bias towards negative stimuli, prevailing across various cognitive domains and stages of information processing. From a biological evolution perspective, negative stimuli are intricately connected to human survival. Even when attentional resources are limited, humans exhibit an attentional bias toward negative information (Bradley, Mogg & Lee, 1997).

Participants exposed to rock music stimuli exhibited a heightened focus on immoral images, as evidenced by increased TFD and FC measurements, aligning with findings from prior studies. Past research has consistently associated rock music with a negative influence on human morality and a propensity for risk-taking behaviors (Shafron G R, Karno M P, 2013; Santoso, Maulina, Adystia C, et al; 2013; Gabhainn, 2012). Furthermore, a meta-analysis has indicated that music featuring adventurous themes is correlated with heightened preferences for such content and increased individual risk behaviors (Fischer, 2011). The proclivity for rock and heavy metal music often coincides with engagement in risky activities, including drunk driving, speeding, alcohol and drug abuse, and minor misconduct (Juul, 2007; Selfhout, 2009). Studies investigating antisocial behavior have even suggested that rock music can evoke negative emotions in individuals, potentially leading to aggressive and antisocial behaviors (Rustad, R. A., 2003). This phenomenon may be attributed to rock music's

typically intense rhythms and beats, which can provide strong stimulation. Moreover, some rock music explicitly emphasizes rebellious themes, potentially encouraging individuals to transgress societal norms.

In contrast to the rock music group, participants exposed to Chinese Yayue were more inclined to gaze at moral images, supporting music's role in moral education. Previous research has demonstrated that music can alleviate anxiety and foster positive emotions (Li, 2009; Bai, 2013). Emotions are recognized as a mediating factor in moral decision-making (Wu, 2017; Ren, 2011), significantly influencing moral judgments. Positive emotions tend to lead individuals toward more just decisions, while negative emotions can lead to deviations from moral standards (Liu, 2023). Positive music can indirectly impact people's moral behavior and judgment by modulating their emotional states. Yayue, as a form of traditional Chinese music, embodies principles of benevolence, respect, humility, and rationality (Han, 2015). In this experiment, Group A was exposed to Chinese Yayue, which led the subjects to tend to perceive images depicting similar moral behavior.

This experiment does have certain limitations, including a relatively small sample size. Further research in this area could explore more directions. Various types of moral and immoral behaviors were considered as a whole in this study. The specific impacts on different behaviors could be investigated further. Additionally, this study exclusively employed ancient Chinese Yayue and rock music as experimental stimuli. Future experiments could encompass a broader range of music types to derive a more comprehensive conclusion. Finally, it is important to note that the participants in this research were of Chinese origin. Individuals from diverse countries with differing cultural backgrounds may respond differently to music. Therefore, studies focused on individuals from other countries merit investigation.

5. conclusion

The study's conclusion highlights music's impact on individuals' attention towards moral and immoral behaviors. The research findings indicate that immoral images were the initial focus of participants' attention. Moreover, participants exposed to rock music were more drawn to immoral images, whereas those exposed to traditional Chinese elegant music, Yayue, showed a significantly higher inclination towards moral images. These results imply that peaceful and elegant music can guide individuals' attention toward moral behaviors, while intense music tends to direct attention towards immoral behaviors. This study contributes significantly to the understanding of the moral influence of music. It sheds light on how different genres shape individuals' perceptions of morality. Moreover, the findings have practical implications for education. By understanding the impact of music on moral attention, educators, particularly in the field of music or moral education, can effectively incorporate these insights into their teaching methods. This knowledge empowers teachers to enhance the moral education function within music education, creating a more informed and conscientious learning environment.

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