'What's That Coming Over The Hill?' The Role Of Music On Response Latency For Emotional Words

Paul Atkinson

Psychology, Goldsmiths University, England
Ps101pa@gold.ac.uk

ABSTRACT

Background

It is evident that music has been present throughout most of human history. With the advancement of technology music has become a booming industry that takes billions every year in revenue. It stands to reason that such an important aspect of human nature can affect how we view and interact with the world. Research conducted by Hevner (1936) into how a person can interact with music and how it can affect their mood and behavior. Aspects of a song such as mode, rhythm, tempo, and harmony or melody line were all changed individually while other parts were left the same. This early research into mood and music give rise to what universals for the structure of music associate with how the music can make people feel. Leonard Meyer, a musicologist, was one of the early researcher's to extend to this research further. Meyer (1956) based his theory around the idea that changing certain elements of music can create expectations within listeners and these expectations can change emotion. Musical emotion comes from expectations, whether the music allows expectations to be fulfilled, giving release and a feeling of completion or to create tension by defying expectation of being complete. Music and words both have the potential to generate emotional states that may impaction concurrent task performance, but the extent of this interaction is rarely explored. A classic example of the effects of emotional words is seen in responses to the emotional Stroop test, Stroop (1935) whereby the presence of emotional words inhibits response times to a standard colour naming task. Researchers employed the Stroop to test various different aspects of emotion such as; how danger schemata are activated (Mathews and MacLeod, 1985), how distracting emotional stimuli could be (Ray, 1979; Williams and Broadbent, 1986) or how salient emotion based words are (Watts, McKenna, Sharock and Trezise, 1986). Research focused now, not on colour interference from using different colour based words but on how words themselves could be used to cause interference. Graham, Robinson and Mulhall (2009) combined the Stroop task with music and found an effect showing that the music significantly impacted the tendency to slow down on threat words.

Aims

The aim of this study was to explore whether pieces of real music could affect performance on an emotional Stroop task: Specifically it was hypothesized that fearful music would inhibit responses on the reading task (increase reaction time) while happy music would decrease inhibition. Both conditions were measured against a silent control.

Method

Sixty undergraduates took part in the study and were comprised of 33 females (M = 20.82, SD = 1.13 years) and 24 males (M = 21.67, SD = 1.41 years).They were required to carry out an emotional Stroop test whilst listening to two different musical pieces and silence. The two excerpts of music were taken from a study by Eerola and Vuoskoski (2010). Both pieces of music were matched on energy arousal and had opposite scores on tension arousal and valence. The fear music had; valence of 2.31, tension arousal of 8.10 and energy arousal of 6.13. The happy music had; valence of 6.00, tension arousal of 3.60 and energy arousal of 6.00. The Stroop test employed both neutral and fearful words. The threat words (of which there were sixty in total) were all between five and seven characters and had an emotionality score M = 4.77, SD = 0.74 and an emotional valence score M = 2.04, SD = 0.45. The neutral words (of which there were sixty in total) were all between five and seven characters and had an emotionality score between M = 2.19, SD = 0.51 and an emotional valence score M = 4.52, SD = 0.38. The dependent variable was the time taken for the participant to respond to the color of the word presented. The participants listened to music or silence in a randomized order. The instructions displayed on the computer informed participants that they were to press the spacebar to start the experiment. They then had to press a colored button on the keyboard that corresponded with the font color of the word displayed on the screen. Participants were not to start a word list that involved listening to music until the music began to play. Participants were also informed to respond as quickly and accurately as possible.

Results

The findings of the study supported the experimental hypotheses: fearful music significantly inhibited response times, while response times in the happy music condition were significantly facilitated. In the silence condition no significance difference was found between performance of words. A two-way within-subjects ANOVA was used to determine this. The main effect of music was significant: $F(2, 118) = 19.44$, $p < .05$, partial $n^2 = .25$. The main effect of the word lists was found not to be significant: $F(1, 59) = 1.354$, $p = .25$, partial $n^2 = .02$. The main effect of the interaction between the music and the word lists was significant: $F(2, 118) = 5.207$ $p < .05$, partial $n^2 = .08$. A post hoc paired t test was carried out on the results. There was no significant difference for performance between the silent conditions. Silence with threat words against silence with neutral words $t(59) = -.135$ $p = .89$. There were significant differences for the processing of threat words for each music condition. Between fear and happy music $t(59) = 5.021$ $p < .05$. For fear and silence $t(59) = 4.129$ $p < .05$. For happy compared with silence $t(59) = -3.738$ $p < .05$. There were significant differences between the processing of

neutral words between the music conditions. Between fear and happy music $t(59) = 4.349$ p< .05. For fear and silence $t(59) = 2.129$ p < .05. For happy compared with silence $t(59) = -2.423$ p < .05. Between fear music with threat words and fear music with neutral words, there was a significant difference $t(59) = -2.545$ p< .05. For happy there was no significant difference for threat and neutral words $t(59) = -1.551$ p = .13.

Conclusions

Overall, the findings indicated that fearful music impaired reading time while the happy music had the opposite effect, a finding which supports the hypothesis that emotional music had a direct impact on responses during an emotional reading task. The music creates not only expectations for what occurs next but also how a person is meant to react to an external situation around them. In the experiment the fear music would create feelings of anxiety and create a false fear for the words displayed. This would be enhanced when the words were of a distressing nature. The results may also be explained as the music having a profound effect on attentional state, thus changing how fast a person could process information. Future research could focus more on how individual differences and music genre preferences could further enhance the effect found. . Using more music types that stimulates a range of emotions may gain a wider variety of response patterns in participants. Music that induces negative feelings such as sadness or anger could have an increased effect on the time taken to respond, whereas music that is more euphoric or serene could decrease the time taken to respond to music more so than happy music. Arousal levels could also produce more interference in naming colors. Possible applications of the research could be to employ music in the use of the work place or schools to relieve anxiety during reading tests or to use in therapy for anxiety disorders. The use of music and the Stroop test could be used as a means of basic music therapy. In the case of phobia patients exposing them to a word list, with related words to their phobias, while playing a piece of positive music could create an association of positive mood between the object of the phobia and the person. This association could diminish the feelings of fear the person feels. The same basic principle could be applied to people suffering from anxiety. Having a word list of negative social words or words of physical ailments played with a piece of euphoric music could again create positive associations.

Keywords

Stroop task, music, emotion, anxiety

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