DURMS
Durham Undergraduate
Research in Music & Science

Do Music-Evoked Thoughts Vary Depending on Genre?

Irobosa Osagie
Durham University

ABSTRACT

Listening to music has been shown to evoke a wide range of thoughts unrelated to the music itself, including fictional stories, autobiographical memories, or visual imagery. This study aimed to replicate the results from recent research by investigating how musical genre and music's emotional expression affect the occurrence, type, novelty and sentiment of thoughts. Twelve 30-second, instrumental, musical extracts were evenly selected across three genres (film, hip-hop, jazz), with two levels of expressed valence-arousal (high, low) and two levels of familiarity (low, medium). UK participants (N=62, M_{age}= 25.13) heard these excerpts and described any thoughts they experienced related to the music and rated various features about their thoughts and the music (e.g. liking, familiarity). Thought occurrence and types of thoughts evoked varied significantly across genres, with film excerpts evoking more thoughts than hip-hop and jazz excerpts. Positively-valenced extracts and higher liking of excerpts tended to evoke positively rated thoughts. Higher liking and familiarity ratings of an excerpt increased thought occurrence, though higher familiarity decreased thought variety. These findings have implications for therapeutic or marketing purposes, for example, where influencing thoughts through music is of interest.

1. INTRODUCTION

Previous studies have shown that music and thoughts are related. Whether that be autobiographical memory (Jakubowski & Ghosh, 2021), mind-wandering (Taruffi, 2021) or fictional narratives (Margulis, Wong et al., 2022), music has been indicated to have an active role in evoking thoughts. It has also been shown that music's perceived expressed emotion can influence thoughts, as demonstrated by Koelsch et al. (2019) and Taruffi et al. (2017). These studies found that musical emotion can affect the type of thought evoked, with 'happy' or 'heroic' excerpts resulting in happy, exciting thoughts and 'sad' excerpts resulting in more calm, demotivating thoughts, and more mind-wandering. Both studies evidence music can have an effect on the valence of thoughts evoked. Yet both studies and indeed the wider area is still unable to pinpoint a specific musical feature that could underpin in a certain emotion in music, and though one study has reported that music with higher tempi caused more positive imaginings, and shorter spaces of time between imaginings (Herff et al., 2021), the area remains relatively underexplored. Finally, increased levels of familiarity with a certain type of music has been indicated to evoke more thoughts, as indicated by two studies (Margulis, 2017; Jakubowski & Francini, 2023), which showed that familiarity increased the occurrence of fictional narratives and autobiographical memories respectively.

This present study aims to replicate the results of those found in Jakubowski et al. (2024). They explored how genre and emotional expression, as well as familiarity with a particular style and liking of certain excerpts affected the occurrence, type, novelty and valence of thoughts. Twenty-four short excerpts were selected evenly across the pop/rock, electronic and classical genres. These excerpts had two levels of expressed valence and arousal (high/low). Music-evoked thoughts were reported in 76% of all trials, and all twenty-four excerpts elicited thoughts in participants. Classical and electronic trials evoked more thoughts than pop/rock trials, however there were no significant differences in thought occurrence between classical and electronic trials. Negatively-valenced excerpts resulted in more negative thoughts than positively-valenced excerpts.

Despite the burgeoning empirical interest towards music and thoughts, there are still areas that have not been explored in detail yet. For example, the majority of studies, including the original study, use a very limited set of genres, typically 'Classical' or 'pop/rock' music. This means that the findings cannot be directly applied to music outside the genres of the original study, nor outside the MUSIFEAST-17 database. This means that more research needs to be done in order to investigate whether genres outside the parameters of the original study and the database would yield similar results to the ones inside the original experiment. As well as this, there is a lack of studies focusing on more than one type of thought music can evoke (currently Jakubowski et al., 2024, van der Walle et al., 2025a; 2025b to date) as most just focus on one type of thought type, such as visual imagery or fictional narratives (Dahl et al., 2022; Margulis, Wong et al., 2022).

This study investigated whether genre and music's emotional expression can affect the occurrence, type, novelty and sentiment of thoughts. This was done using 12 unfamiliar excerpts from three genres–hip-hop, jazz and

film–that have not been explored widely in previous studies of the same nature. This is to see whether the results of the original study were isolated to the genres investigated, or whether it could be applied to other genres not investigated in the study. Based on previous research, three hypotheses were formulated:

- H_1: There will be a difference in the number and types of thoughts evoked per genre with film and jazz excerpts resulting in more thoughts generated compared to hip-hop excerpts. (Jakubowski et al., 2024)
- H_2: Higher valence, arousal and liking ratings of the excerpts will correlate with higher valence ratings of the reported thoughts. (Jakubowski et al., 2024; Koelsch et al., 2019; Taruffi et al., 2017)
- H_3: Excerpts with high familiarity ratings will correlate with more thought occurrences and would result in less novel thoughts. (Jakubowski et al., 2024)

2. METHOD

Design. This empirical research study was run online, collecting both quantitative and qualitative data, reliant on participants self-reporting. It was carried out via an online survey created using *Qualtrics* (https://www.qualtrics.com) and was distributed to participants via the *Facebook* page 'Overheard at Durham' (Lily Stott, 2024) and the researchers' *Instagram* stories (N. Connellan, I. Osagie, personal communication, November 10th , 2024).

Participants. Ninety-six participants had entered the online study, but thirty-four were removed having not completed the full study. This left the final sample size of 62 UK-based adults aged 18–63 years (M = 25.13, SD = 11.43; 28 male, 33 female, 1 non-binary). All participants reported being native English speakers. One question from the Ollen Musical Sophistication Index (OMSI; Ollen, 2006) was used as an index of musicianship: 53.2% considered themselves musicians, while 46.8% considered themselves non-musicians. Of the 53.2% who considered themselves musicians, 19.4% of them classified themselves as an amateur musician, 19.4% of them classified themselves as a serious amateur musician, 9.7% of them classified themselves as a semi-professional musician and 4.8% of them classified themselves as a professional musician. Of the 46.8% who considered themselves as non-musicians, 37% of them classified themselves as a music-loving non-musician and 9.7% of them classified themselves as a non-musician. Participants were recruited using convenience sampling – posts were placed on the community page 'Overheard at Durham' on *Facebook* and *Instagram*. No further demographic information was collected. This study was approved by a Module-Wide ethics approval by the Department of Music.

Stimuli. Twelve excerpts across three genres (i.e. four clips per genre) were selected from the 'MUSIFEAST-17: MUsic Stimuli for Imagination, Familiarity, Emotion, and Aesthetic STudies across 17 genres' database – film, hip-hop and jazz (van der Walle et al., 2024). Each excerpt had been already pre-trimmed to 30 seconds with fade-ins and fade-outs already included and were all instrumental so that lyrics would not affect thought content. To ensure that each excerpt was heard clearly, we used *Audacity* (Version 3.7.5, 2024) to normalise the loudness to -20Db. The stimuli were picked so that for each genre there was an excerpt with:

- low familiarity & low valence and arousal
- medium familiarity & low valence and arousal
- low familiarity & high valence and arousal
- medium familiarity & high valence and arousal.

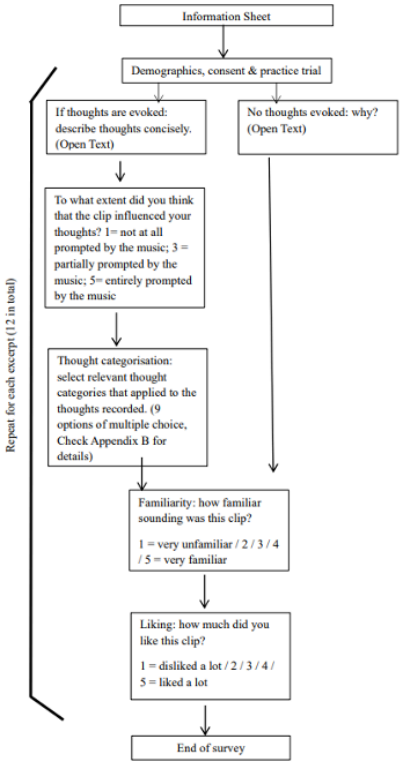
Low and medium familiarity excerpts were selected to increase the chance that participants would not know the songs, so familiarity would not impact the thought sentiment analysis. The list of excerpts used can be found in Appendix A.

Procedure. As shown in Figure 1, participants were invited to read an information sheet which outlined some information about the study and data privacy. Participants were then asked to confirm that they were above 18 years old and complete a practice trial, in which they were asked to listen to an excerpt and to answer a series of questions which was designed to help the participants become familiar with the survey layout. The questions were aimed to find whether participants thought that the music was influencing their thoughts and to rate this on a Likert scale, to categorise the type of thoughts they had, their familiarity with the excerpt rated on a Likert scale and how much they liked an excerpt on a Likert scale. Following the practice trial, the main experiment began, using the same questions from the practice trial for the main experiment excerpts. All twelve of the

excerpts were presented to the participants, however the presentation order was randomised to reduce order effects or random error due to participant fatigue towards the end of the questionnaire.

Figure 1

Experimental procedure



3. RESULTS

Hypothesis 1: 'There will be a significant difference in the number and types of thoughts evoked per genre, with film and jazz excerpts generating more thoughts than hip-hop excerpts.'.

Overall, music evoked thoughts on 74.6% of total trials, with all twelve excerpts eliciting some thoughts. Interestingly, film excerpts evoked the most thoughts, with 82.7% of trials evoking thoughts, while 79.0% of jazz trials evoked thoughts. Hip-hop excerpts had the lowest percentage of thoughts evoked, with only 62.1% of trials evoking thoughts. A chi-squared goodness of fit test was conducted to determine whether there was a significant difference between the number of thoughts evoked per genre. The test worked under the assumption of the null hypothesis. Table 1 shows that there was a significant difference between genres and the number of thoughts evoked, because the chi-squared value is greater than the critical value. Figure 2 shows the frequency of all 9 thought types selected across all 744 trials, with media-memory, life-time memory and fictional story having the most thoughts reported (note: participants were allowed to select more than one thought type per trial). Film trials evoked the most media-memories and fictional stories, compared to the other genres, while jazz trials evoked the most music-related thoughts.

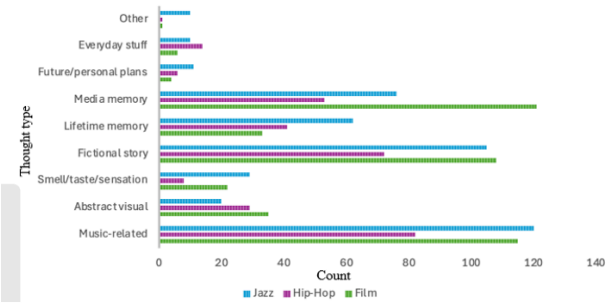
Table 1

Chi-squared test to determine if the number of thoughts reported was significantly different between genres

x^2	8.009
df	2
$x^2_{critical}$	5.991
α	0.05

Figure 2

Number of thoughts reported by thought type and genre



Hypothesis 2: 'Higher valence, arousal and liking ratings of the music will correlate with higher valence ratings of reported thoughts.'.

Using the R package '*syuzhet*' and the method '*bing*' (Jockers, 2015) for automated sentiment analysis, we calculated the sentiment values of each thought description and then the mean sentiment for each track. Figure 3 shows that there is a strong positive correlation ($r = 0.81$) between valence of the excerpts and thought valence. The liking ratings of excerpts and thought valence were also compared, using the mean ratings and mean thought sentiment from all participants per excerpt. Figure 4 shows that there is a weak positive correlation ($r = 0.61$) between liking and sentiment of thoughts. There are two anomalies that do not follow this correlation – excerpts 2 and 4, which are indicated below – which had negative values for thought sentiment but had high liking scores.

Figure 3

Scatterplot of musical valence vs. thought sentiment

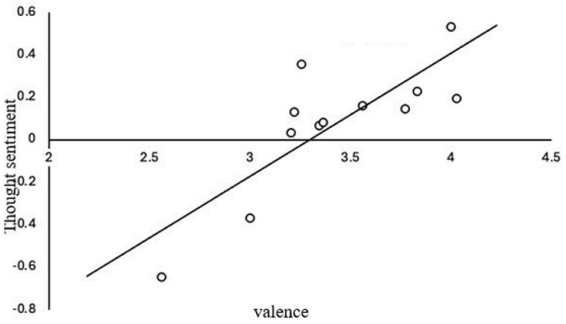
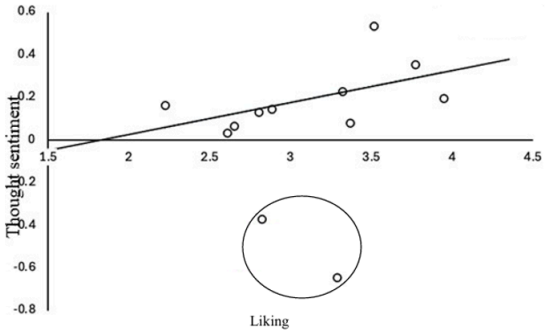


Figure 4

Scatterplot of liking rating vs. thought sentiment

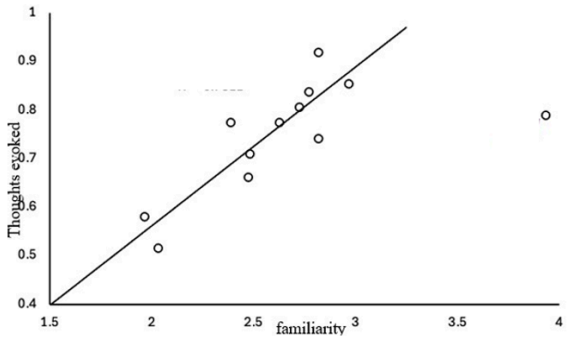


Hypothesis 3: Excerpts with high familiarity ratings will correlate with more thought occurrences and will result in less novel thoughts.

This section focuses on the relationship between familiarity and thought occurrence. Participants were asked to report their familiarity with each excerpt on a 1-5 Likert Scale. The mean familiarity scores of each track was compared to the percentage of participants that reported thoughts. Figure 5 shows that there is a strong positive correlation (r = 0.88) between the two variables. However, there was one anomaly (Excerpt 11) which had a significantly higher familiarity rating than the number of thoughts it evoked.

Figure 5

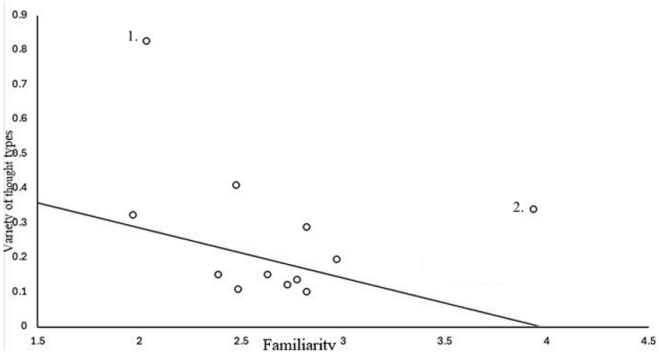
Scatterplot of familiarity vs. thoughts evoked



To investigate the relationship between excerpt familiarity and thought novelty, a manual qualitative analysis approach was adopted. We looked at the individual thought descriptions and identified recurring themes that appeared at least three times. This was then narrowed down to the key unrelated themes that came up repeatedly for each track, which ranged between excerpts from 2 to 6 themes. We then calculated how many participants reported thoughts that fit into one of our identified recurring themes and how many reported novel thoughts or themes that were limited to just one to two participants by manually determining which thoughts best fit the recurring themes. This was to compare the number of thoughts that fitted into one of the key themes and the number of thoughts that did not. Figure 6 shows a weak negative correlation (r = 0.40) between familiarity and thought variety. However, there are two outliers in the data. The first (indicated by circle) is a hip-hop excerpt with only two recurring themes; ‘dancing’ and ‘reference to different songs that the participants knew’. 80% of participants’ responses were original thoughts and therefore did not mention any of the recurring themes. The second outlier is ‘Excerpt 11’, which had five different recurring themes, with 65% of participants mentioning at least one of these themes, however its familiarity ratings were so high that it presented itself as an anomaly.

Figure 6

Scatterplot of familiarity vs. thought variety, with labelled anomalies



4. DISCUSSION

This study aimed to replicate Jakubowski et al's (2024) study. We investigated whether musical genre and its emotional expression affect the occurrence, type, novelty and sentiment of thoughts, by using twelve unfamiliar excerpts across 3 genres – hip-hop, jazz and film – and collected both quantitative and qualitative data.

Effect of genre on thoughts. The results support the claim that genre can affect the occurrence and type of thoughts evoked by music. There was a significant difference between genres regarding and the number of thoughts evoked and thought types evoked. These findings align with the results found in the original study, which found that classical and electronic excerpts evoked more thoughts than pop/rock excerpts, but no significant difference was found between classical and electronic. Our results found a significant difference between all three genres. This difference could be due to the different genres used in this experiment. It could also be because of the sample differences, as our sample was smaller than the original study ($N_{original\ study}$=148; $N_{current\ study}$=62); if this experiment used a bigger sample size, there is a chance there may be no significant difference. This replication study extends the original by using different genres, providing further evidence that genres significantly influences thought type and occurrence. The genres used in the original study are relatively prevalent in the other studies (e.g. Koelsch et al., 2019), and therefore future researchers need to use the same experiment model with other genres to verify if the findings from this study are applicable and replicable with other genres. Therefore, it is pertinent to investigate other genres using the same study model in future studies to verify whether these findings are applicable or replicable with other genres. Using different genres and achieving similar types of results strengthens the relevance of the observations of previous studies.

Emotional Expression, Liking and Thoughts. Both of our findings related to hypothesis 2 ('higher valence, arousal and liking values of the excerpts led to the higher valence in thoughts) supports the findings from the original study. There was a strongly positive correlation between positive valence and positive thought contents, indicating that the emotional expression of the excerpts significantly influenced the thoughts reported by the participants. Additionally, it shows that regardless of thought type reported by the participants, more positively sounding excerpts will result in more positively aligned thoughts as opposed to negatively sounding excerpts. This is in line with Koelsch et al. (2019) and Taruffi's (2021) investigations around positive sounding music eliciting more positive, happy, excited thoughts, and negative sounding 'sad' music resulting in more negative, demotivating thoughts.

Our study used different analysis techniques to determine our results; the original study used mixed effects models to predict and affirm the relationships between the variables while we used a scatterplot to look at correlations, yet the same conclusion was reached. This also increases the confidence in the results achieved in the present study, as it is robust across methods, and reduces the likelihood that the results achieved in the previous studies are a result of its analytical approaches. Future research should focus on further interrogating the connection between valence and thought contents in a more causal direction. For example, future researchers could use the same set of extracts but manipulated so that there is both a positive sounding and negative sounding version of the extracts played, as previous studies (Koelsch et al., 2019) have used different extracts for positive and negative sounding music.

Our results also show a weak positive correlation between higher excerpt liking and more positively valenced thoughts, also supporting the results found in the original study (Jakubowski et al., 2024). Empirical evidence has shown that familiarity with music is a factor that changes emotional response (Freitas et al., 2018). For example in Deil et. al's 2022 study, participants who had familiarity with the music and the artists tended to have more positive thoughts which does suggest that increased familiarity with a certain genre of music also may suggest that liking ratings are also elevated due to positively valenced thoughts.

Familiarity, Liking and Thoughts. Our findings support the hypothesis that higher familiarity would increase thought occurrence but decrease the novelty of thoughts reported. The strong positive correlation between familiarity and the number of thoughts reported and the weak negative correlation between familiarity and thought variety, indicates that increased familiarity with the music increases the chance of thought occurrence but decreases the novelty of those thoughts. This aligns with the original study, which reported similar results – greater familiarity with excerpts made thoughts more likely to happen but decreased the thought novelty (Jakubowski et al., 2024). Other studies support these findings (Jakubowski & Francini 2023; Margulis 2017) showing that music with higher familiarity ratings evoked more fictional narratives and autobiographical memories. These results provide directions and applications for future research on memory retrieval with participants with memory loss-related disorders, such as Alzheimer's and dementia, as more familiar music to them may result in better memory retrieval (Arroyo-Anlló et al., 2013).

Limitations and Future Directions. One of the main limitations of this present study was that participants were not asked to adopt a particular style or mode of listening to the excerpts, as the question was vague and broad. This may have resulted in many divergent approaches to listening to these excerpts, which may have affected the number and frequency of thoughts evoked. Future studies should focus on one particular type of listening mode to see whether this affected the results (Herbert, 2012). For example, researchers could ask participants to adopt an 'diffusive' listening mode where participants are asked to complete another task and the excerpts played are not the focal point for the participant. Another limitation is that musicianship was not considered as a potential variable affecting music-evoked thoughts. Though musicianship data was collected, it was not used, and therefore future studies should run two separate experiments with the same excerpts, but two separate groups–musicians and non-musicians–to determine whether musicianship indeed had an effect on music-evoked thoughts. As well as this, some participants may have deliberately generated thoughts despite being informed that having no thoughts was a possible answer (e.g. one participant wrote in the open text that they "tried to imagine something", which defeats the purpose of the experiment) meaning that some of the results may not be as valid and thus some of our claims in the discussion about music-evoked thoughts may not be as reliable. Finally, the participants in this study were mainly from the W.E.I.R.D. demographic (Jakubowski et al., 2025). This is important to address because the results found in this study may not be reflected in other demographic populations due to the differences in cultures and musical traditions. Therefore, future studies should aim to recruit participants from outside the Western sphere, to see whether these results can be replicated in other populations.

5. CONCLUSION

To conclude, this study shows that differences in genre can affect and evoke an array of thoughts, and that the differences in music's perceived emotional expression can influence the thought valence of participants. Greater familiarity with an excerpt increased the chance of evoking thoughts but decreased thought novelty. Higher liking ratings of the music tended to evoke more positively rated thoughts. These findings have implications for therapeutic or marketing purposes, where influencing thoughts through music is of interest and thus could have a major role in therapeutic purposes and future research.

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APPENDIX A

Musical stimuli used in the main experiment

	Label	Title	Composer/Artist	Genre	Familiarity	Valence and Arousal
1	Film_LOW_07 (00:00:00)	Where is My Dad (Fonzy)	Andre Manoukian	Film	Low	High
2	Film_LOW_06 (00:00:00)	Until Now (Officer Down)	Jerome Dillon	Film	Low	Low
3	Film_MED_12 (00:00:00)	The world is amazed – Main Title Theme (Downsizing)	Rolfe Kent	Film	Medium	High
4	Film_MED_11 (00:00:00)	The Strangers prey at Night (")	Adrian Johnston	Film	Medium	Low
5	Hiphop_LOW_06 (00:03:15)	Theme Song	DJ Blackskin	Hip-Hop	Low	High
6	Hiphop_LOW_05 (00:01:49)	Sad Trumpet	Lee Reed	Hip-Hop	Low	Low
7	Hiphop_MED_12 (00:03:31)	NICE OUT	Kilo Kish	Hip-Hop	Medium	High
8	Hiphop_MED_08 (00:00:34)	3030	Deltron 3030	Hip-Hop	Medium	Low
9	Jazz_LOW_19 (00:00:00)	Sembellogy	Sembello	Jazz	Low	High
10	Jazz_LOW_20 (00:00:00)	Tempest	Steve Coleman and the Council of Balance	Jazz	Low	Low
11	Jazz_MED_06 (00:00:00)	Take Five	Paul Desmond	Jazz	Medium	High
12	Jazz_MED_07 (00:00:00)	Turiya & Ramakrishna	Alice Coltrane	Jazz	Medium	Low

APPENDIX B

Word Clouds of the Most Common Response to the Question 'Please describe the thoughts/scenes you imagined in as much detail as possible, but do not spend more than about a minute on the response.' (Note: All words were mentioned 6 times or more, so in at least 10% of participants used these words)

Hip-hop: Variety of thoughts

Jazz: Variety of thoughts

Film: Variety of thoughts