The influence of background music tempo and genre on virtual roulette

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Abstract

Background music can influence everyday behaviour. We examined the influence of music tempo and genre on roulette. Fast tempo and popular music resulted in quicker betting with no effect on expenditure. Subjective arousal did not mediate music tempo's effects. Alternative mechanisms underlying music's influence on gambling and directions for future research are considered.

Résumé

La musique de fond a parfois un effet sur notre comportement habituel. Nous avons étudié l'incidence des genres musicaux et du tempo sur la pratique de la roulette. Selon nos observations, un tempo rapide ainsi que la musique populaire accélèrent le rythme du jeu sans effet sur le montant dépensé. L'excitation n'a pas modifié les effets du tempo. Les auteurs proposent une réflexion sur les autres mécanismes susceptibles d'expliquer l'incidence de la musique sur le jeu et sur les thèmes de recherche à explorer.

Introduction

Many studies demonstrate music's effects on the performance of everyday tasks (North, Hargreaves & Hargreaves, 2004). A meta-analysis found that fast tempo was consistently related to faster behaviour (Kämpfe, Sedlmeier, & Renkewitz, 2011). Fast tempo music leads to quicker drinking (McElrea & Standing, 1992) and faster running speeds (Edworthy & Waring, 2006); slow tempo increases time spent in a supermarket (Milliman, 1982) and restaurants (Caldwell, & Hibbert, 2002; Milliman, 1986). Music genre influences expenditure and spending intentions in retail environments (North & Hargreaves, 1998; North, Shilcock, & Hargreaves,

2003). For example, classical music increases expenditure in a wine cellar (Areni & Kim, 1993).

Music is often present within real and virtual gambling environments, and can potentially influence the initiation, maintenance and reinforcement of gambling behaviour (Griffiths & Parke, 2003; 2005). Adolescent gamblers have reported music as an attractive feature of fruit machines (Griffiths, 1990), and an observational study illustrated how music can be utilised within an amusement arcade (Griffiths & Parke, 2005). Gambling operators tend to control the background music in amusement arcades, and their choice of music can be informed by gamblers' respective ages, genders, and by which fruit machines they play (Griffiths & Parke, 2005). That differing music genres are played in different areas of an arcade illustrates this fact (Griffiths & Parke, 2005). However, some gamblers may request certain specific music to be played, and gambling operators have reported that this feature can help to please gamblers, possibly maintaining their gambling behaviour (Griffiths & Parke, 2005). Music is also included within the design of fruit machines, and similarly to background music may initiate, maintain and reinforce gambling behaviour (Griffiths & Parke, 2005). For example, familiar music played by fruit machines can create a sense of familiarity with the machines, thereby aiding gamblers' choice of machine (Griffiths & Parke, 2005). Furthermore, the music emitted by fruit machines can signal winning, a signal which may in turn both help to raise gamblers' self-esteem and encourage further gambling (Griffiths & Parke, 2005). These studies suggest that music has the potential to influence decisions regarding choice of gambling activity. They also show that music can be tailored to gamblers' needs and musical preferences, thereby maintaining gambling behaviour (Griffiths & Parke, 2005; Parke & Griffiths, 2007).

The studies discussed above investigate the presence of music in gambling environments and its potential effects on gamblers' behaviour. In the present study, we seek to extend the knowledge of how background music may influence gambling behaviour by examining the effects of manipulating two musical parameters (tempo and genre) on virtual roulette gambling behaviour. Internet gambling may be potentially more problematic and addictive compared to other forms of gambling (Griffiths & Barnes, 2008). Compared to in-situ gambling, gambling in virtual environments is characterised by increased event frequency, 24-hour availability, smaller intervals between gambles, instant reinforcements, and less time to contemplate losses before gambling again (Griffiths & Barnes, 2008). A recent survey found a relatively high proportion of gamblers chose to play casino games online opposed to offline (Wardle et al., 2011). Therefore, it is important to determine whether online gambling behaviour can be influenced by background music, and the mechanisms through which any effect occurs.

Fast tempo leads to faster betting speeds in virtual roulette (Dixon, Trigg, & Griffiths, 2007; Spenwyn, Barrett, & Griffiths, 2010). Arousal is a psychological mechanism which has been proposed as a possible explanation for why music tempo

influences behaviour (Berlyne, 1971). Evidence supports the notion that higher subjective arousal ratings are associated with increased gambling in both regular players (Leary & Dickerson, 1985) and pathological gamblers (Diskin & Hodgins, 2003). Heart rate (Anderson & Brown, 1984; Coulombe et al., 1992; Coventry & Hudson, 2001; Diskin, Hodgins, & Skitch, 2003; Leary & Dickerson, 1985) and skin conductance level (Diskin et al., 2003) have also been found to increase during periods of gambling. However, to date, gamblers' actual arousal responses when listening to music while gambling have not been recorded. Therefore it has not been established whether arousal mediates tempo's effect on betting speed.

It is unknown whether effects of music genre in commercial environments (e.g., Areni & Kim, 1993) transfer to gambling behaviour. Classical music may prime consumers' thoughts of affluence (North & Hargreaves, 2008). However, Griffiths and Parke (2003) suggested that popular music may be the most effective in initiating gambling and stimulating individuals' desire to gamble. Popular music may provide a better fit with gambling, priming thoughts congruent with fun, thereby resulting in less time and attention being allocated to gambling decisions, relative to classical music.

We examine whether tempo and genre influence betting speed and expenditure in virtual roulette. We aimed to replicate the finding that fast tempo leads in turn to quicker betting (Dixon et al., 2007; Spenwyn et al., 2010), and establish whether subjective arousal mediated tempo's effects on gambling. Secondly, we predicted that popular music would better "fit" gambling, thereby increasing expenditure relative to classical music.

Method

Design

A 2×2 (tempo x genre) between-participant design was employed. Participants were randomly assigned to one of four conditions: (1) fast classical, (2) slow classical, (3) fast popular and (4) slow popular. Two primary dependent variables were measured: betting speed and expenditure (amount of credits bet).

Participants

An opportunity sample of 32 undergraduate students (16 male, 16 female; aged 18–61 years; $\bar{\chi}$= 24 years) took part in this study. A 2×2 ANOVA (between-participants) found no main effects of genre ($F(1,28) = 1.6$, $p > .05$), tempo ($F(1,28) = 1.37$, $p > .05$), or their interaction ($F(1,28) = .46$, $p > .05$) on age. Log-linear analyses were performed to examine whether either of the independent variables were associated with participants' gender or prior gambling experience. Gender was not associated with genre or tempo; the 3-way ($\chi^2(1) = 08$, $p > .05$) and 2-way interactions $\chi^2(4) = .79$, $p > .05$ could be removed without significant loss of fit.

Therefore gender ratios did not differ between conditions. Fifty-nine percent of participants had gambled prior to this experiment and prior gambling experience was not associated with gender or tempo. The 3-way $\chi^2(1) = .34$, $p > .05$ or 2-way $\chi^2(4) = .9$, $p > .05$ interactions could be removed without significant loss of fit; prior gambling experience ratios did not therefore differ between conditions.

Apparatus and Materials

Musical stimuli (Table 1) were categorised as fast or slow tempo. To match these tempos, alterations of $<= 10\%$ were made using time stretching, without altering the pitch.

Playback was via a stereo system in a soundproofed room. The volume remained constant between participants but dynamic changes were retained (42.2 to 79.6 decibels).

Participants played virtual roulette using a desktop computer; the monitor was videotaped to assist with coding of variables. Questionnaires were used to collect demographic and gambling habits data. Participants completed the Affect-Arousal Scale (Aarts & Dijksterhuis, 2003); three participants' responses were excluded due to incorrect completion. The Affect-Arousal Scale (Aarts & Dijksterhuis, 2003) comprised six items, each of which was rated using a seven-point scale. Internal consistency of the scale was good ($\alpha = .75$). To measure "fit," participants' indicated respectively their agreement with the statement "I would choose to listen to this music whilst gambling" using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 1
Description of musical stimuli

Condition	Composer/Artist	Title of music	Duration	Tempo (bpm)[a]
Fast Classical	Beethoven	Symphony No. 5 in C minor Op. 67, 1st Movement: Allegro con brio	7 min 20 s	120
Slow Classical	Beethoven	Symphony No. 7 in A major Op. 92, 2nd Movement: Allegretto	9 min 57 s	72
Fast Popular	Christina Aguilera	Ain't No Other Man	3 min 50 s	120
	Robbie Williams	Let Me Entertain You	4 min 25 s	
	Enrique Inglesias	Escape	3 min 29 s	
Slow Popular	Leona Lewis	Run	5 min 53 s	72
	Robbie Williams	She's the One	4 min 58 s	
	Enrique Inglesias	Hero	4 min 50 s	

[a] Milliman (1982) classified fast tempo music as $>= 94$ beats per minute (bpm) and slow tempo as $<= 72$ bpm.

Procedure

Participants sat at the computer and the experimenter sat behind. Participants practiced and could ask questions before playing ten experimental games of roulette. Betting began when "Place your bets" appeared on the screen and concluded when "No More Bets" appeared. Betting speed was measured using a stopwatch, one which was started once "Place Your Bets" was displayed and was stopped when the participant indicated they had finished betting.

Results

Table 2 shows the condition means, and Table 3 shows the results of a two-way ANOVA (between-participants), which reveals the effects of tempo and genre on betting speed and expenditure.

Betting was quicker when listening to fast tempo music than it was to slow tempo music ($n = 30$, after two outliers, defined as being greater than two standard deviations from the mean, were removed from the analyses). Listening to popular music led to quicker betting compared to classical music. No interaction was found between genre and tempo on betting speed.

As shown in Table 3, a two-way ANOVA (between-participants) found no significant main effects of music tempo, genre or their interaction on expenditure ($n = 31$, after one outlier was removed from the analysis).

We found no evidence that tempo's effect on betting speed was mediated by subjective arousal: tempo did not influence arousal ($F(1,27) = 1.06$, $p > .05$), and arousal and betting speed were unrelated ($n = 27$, $r = .08$, $p > .05$). Neither was genre's effect on betting speed mediated by "fit": genre did not influence "fit" ($F(1,30) = .01$, $p > .05$), and "fit" and betting speed were unrelated ($n = 30$, $r = -.08$, $p > .05$).

Table 2
Mean scores and standard deviations by condition

Dependent variable	Condition			
	Fast Classical	Fast Popular	Slow Classical	Slow Popular
Expenditure[a]	67.43 (52.58)	74.66 (27.37)	67.11 (51.55)	67.89 (34.50)
Betting Speed[b]	22.18 (4.67)	17.84 (2.98)	26.78 (5.82)	21.59 (7.00)

Note. All figures calculated with outliers removed.
[a] Total expenditure (credits) divided by number of games (ten)
[b] Total time taken (seconds) to place bets divided by number of games (ten)

Table 3

Two-way ANOVA examining the effects of tempo and genre on betting speed and expenditure

	Betting speed			Expenditure		
	df	*F*	*p*	*df*	*F*	*p*
Tempo	1	4.63	.04[*]	1	.05	.82
Genre	1	6.03	.02[*]	1	.07	.8
Tempo x Genre	1	.05	.826	1	.04	.84

[*] significant at the .05 level

Discussion

This study showed that genre influences betting speed and has confirmed reported effects of tempo on betting speed (Dixon et al., 2007; Spenwyn et al., 2010). In addition, this study tested whether subjective arousal and "fit" were mechanisms underlying the effects of genre and tempo on betting speed.

We found no evidence that tempo influenced behaviour via subjective arousal. Other mechanisms may explain tempo's effects: fast tempo music may reduce attention (Cassidy & MacDonald, 2009) thereby resulting in quicker bet placement. Popular music led to quicker betting. One difference between the stimuli utilised in this study was the presence of lyrics. The popular music contained lyrics as opposed to the classical music, which was instrumental. Salamé and Baddeley (1989) suggested that vocal music may disrupt behaviour and cognitive tasks—such as reading, counting, calculating and reasoning—as its presence can, through interference with the phonological store's ability to retain information, impair working memory. Further research could investigate whether vocal music influences gambling behaviour by employing the same piece of music as stimuli—one version with lyrics and the other instrumental.

Unexpectedly, music genre did not influence expenditure, which suggests that the previously observed effects of music genre (Areni & Kim, 1993) on expenditure in other retail and commercial environments may not transfer to online virtual roulette gambling. Three explanations have been proposed for why music genre leads to increased spending, for example, in a restaurant (North et al., 2003), with individuals being prepared to pay more for items in a cafeteria (North & Hargreaves, 1998). First, it has been speculated that music genre influences individuals' perceptions of an environment, and if music causes the environment to be perceived as sophisticated or upmarket, then this primes contextually appropriate, congruent behaviour leading to increased spending or purchasing intentions (North et al., 2003; North & Hargreaves, 1998). Second, North et al. (2003) suggested that music can synergise with other aspects of a commercial environment, and this synergy consequently promotes spending. Third, consumers'

music preferences may lead to them preferring one music genre over another, and liking for the music correspondingly increases spending (North et al., 2003). However, given the findings of the present study and those obtained in other studies (Dixon et al., 2007; Spenwyn et al., 2010), it appears that, to date, a consistent lack of influence of music tempo or genre on expenditure in laboratory gambling environments has been shown. We do not know, however, whether background music influences expenditure in real-life gambling situations; further research is therefore needed.

These results must be considered in the context of a number of limitations. First, a larger sample size would be desirable to quantify with precision the influence of music on performance. However, this sample size was sufficient to confirm the findings of prior research (Dixon et al., 2007; Spenwyn et al., 2010), and identify that popular music leads to faster betting. Second, participants were observed by the experimenter to collect data. It is therefore possible that social facilitation may have occurred. Previous research suggests that gamblers exhibit riskier behaviour when playing online roulette with another person, in comparison to when gambling offline and alone (Cole, Barrett, & Griffiths, 2011). Nonetheless, a protective effect of gambling with others has also been observed—smaller bets were placed when gamblers believed that they were being watched by an audience of 26 people (Rockloff & Greer, 2011). Given the solitary nature of Internet gambling and the potential for presence of others to influence gambling behaviour, future research should permit participants to gamble alone so that the experiment reflects a more realistic gambling session. Third, participants gambled with credits, as opposed to real money. Griffiths (2003) has suggested that the psychological value of electronic money such as chips is less than real money (Griffiths, 2003), as shown by individuals gambling more with poker chips than real money (Lapuz & Griffiths, 2010). Future research may wish to explore whether music influences gambling expenditure differently during a real-life gambling situation where real money is gambled. Fourth, in the present study a stopwatch was used to measure betting speed, but this technique did not control for the potential for the experimenter to be influenced by the music, and the experimenter was not hypothesis-blind. Future research should therefore adopt a more precise and objective measurement of betting speed, such as via an automated timer. Finally, our sample consisted of undergraduate students, which may limit the extent that our findings can be extrapolated to problem or pathological gamblers.

Despite these limitations, our study does provide new knowledge, specifically the effect of genre on betting speed, and the absence of evidence for mediation of effects of tempo by subjective arousal, thereby offering potential avenues for further large-scale empirical research. Furthermore, this research highlights the lack of explanatory evidence regarding the mechanisms underlying music's effects on gambling behaviour and everyday life (Kämpfe et al., 2011). Future research should therefore examine to what extent background music affects objective indices of both physiological arousal, and attention, when gambling.

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