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I've heard that brand before: the role of music recognition on consumer choice

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ABSTRACT

When searching for and buying new products, consumers' knowledge is often limited, and some (but not all) options in the choice set are unrecognized. In such situations, research on the recognition heuristic shows that people tend to choose more often the recognized option over the unrecognized one, as they infer it has the higher value regarding the criterion being judged. Since humans are particularly good at rapidly recognising familiar music, this paper examines the effect of recognition to influence brand choice when using music as the recognition cue. In two experiments ($N=486$), participants were familiarised with several excerpts of advertising music. Participants then performed a choosing task to decide which of two brands they would purchase when searching for different products (e.g., headphones, cameras). Brands were either presented with familiar music clips or completely novel ones. Results showed that pairing brands with music that can be recognised by the target consumers increased brand choice by 6% ($d = .21$). Importantly, participants' preferences for the advertising music also influenced brand choice, increasing the effect of recognition when the music was liked and suppressing it in extreme cases when the music was most disliked. This suggests that ad practitioners should use a cue integration framework when working with music, weighing all available musical and extra-musical cues according to their impact on the target consumers. Results are discussed in terms of the practical implications of measuring brand's ROI when working with music and the value of the heuristics-and-biases framework to study music effects on consumer behaviour.

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Introduction

Music is considered one of the most important executional cues in advertising. When used correctly, music can positively influence consumers' mood, memory, attitude

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towards brands, and purchase intentions (see Allan 2007; Bruner 1990; North and Hargreaves 2008; Oakes 2007; Shevy and Hung 2013, for reviews). It is therefore not surprising that music has played a central role in advertising since the early days of radio broadcasting in 1923 (Brooker and Wheatley 1994; Hecker 1984; Hettinger 1993), with more than 90% of radio and television advertising incorporating some type of music (Allan 2008). In recent years, music and other auditory cues have also become particularly important to convey core brand values and influence consumer behaviour whenever they interact with a product or service, often referred to as audio or sonic branding (Beckerman and Gray 2014; Gustafsson 2015; Jackson and Fulberg 2003). Thus, billions of dollars are spent worldwide on synchronization revenues – i.e., the use of music in television and radio commercials, social media, branding, and experiential events. In 2018, for example, revenue generated in synchronization totalled more than \$400 million (IFPI 2019); and music used in commercials airing during the Super Bowl alone were secured with licenses ranging in cost from US \$100,000 to upwards of US \$750,000 (Hampp 2018).

With music playing such an influential role in advertising and branding, choices about what music to use, and how much to pay for that use, are incredibly important. However, the effects of music on consumer perception and behaviour are complex and remain poorly understood, such as the cognitive mechanisms underlying music effects on consumer choice (Allan 2007), or the interplay of moderating variables that can either increase or eradicate such effects, including music preferences and familiarity (Shevy and Hung 2013). As a result, one of the largest obstacles for brands when working with music is measuring the return of their investment or music's ROI (Allan 2015; Lusensky and Tinsley 2011). This is important because a failure to adequately use music, and the associated extra-musical elements, can result in detrimental effects on communication effectiveness, consumer memory, purchase intentions, and overall advertising costs ((Anglada-Tort et al., 2021; Allan 2007; Lantos and Craton 2012). On top of that, advertisers and marketers often rely on their gut instinct and personal experience to choose music for advertising purposes, overlooking scientific evidence, methods, and theories (Herget, Schramm, and Breves 2018; Ruth and Spangardt 2017; Schramm and Spangardt 2016).

This paper contributes to addressing this issue by applying the *adaptive toolbox of human judgement and decision making* (Gigerenzer, Todd, and The ABC Research Group 1999) to improve our understanding of the cognitive mechanisms underlying music effects on consumer choice. As thoroughly defended by Hauser (2011), the adaptive toolbox paradigm offers a model of consumer decisions grounded in empirical observations that can be highly valuable to marketing science. Similarly, we see great potential in applying this framework to prescribe better strategies when using music as means of persuasion in branding and advertising. In particular, we aim to examine whether *the recognition heuristic* (Goldstein and Gigerenzer 2002) can be an effective mechanism to guide consumer choice when using music as the recognition cue. By quantifying the influence of music recognition on brand choice, we also aim to provide a reliable measure of music's ROI to better inform ad professionals and brands when working (and paying for) music.

This introduction continues by discussing the potential of music in branding and advertising, with a focus on the role of music familiarity. We then introduce the

fast-and-frugal adaptive toolbox, and more specifically, the recognition heuristic, focusing on key considerations when applied to music.

Theoretical background

The role of music familiarity on consumer choice

Music is a powerful tool for facilitating memory, enhancing emotional responses, and fostering positive attitudes towards brands, advertisements, and purchase intentions (see Allan 2007; Bruner 1990; North and Hargreaves 2008; Oakes 2007; Shevy and Hung 2013, for reviews). Thus, using music strategically can influence consumers' purchasing behaviour towards specific choices, playing a crucial role in the commercial success of a product or brand. However, reliably predicting the effects of advertising music on target consumers still poses a significant challenge, often leading to conflicting results in the literature (e.g., Craton and Lantos 2011; Kellaris, Cox, and Cox 1993; Guido et al. 2016; Park, Park, and Jeon 2014). That is, at least partly, because consumers' responses to advertising music are influenced by a complex interplay of four interconnected factors (Lantos and Craton 2012): the music itself (e.g., genre, fit with the brand, tempo, mood, complexity, familiarity), the listener (e.g., music preferences, age, personality, culture), the listening situation (e.g., ongoing activities, time of the day, social context), and the listener's advertising processing strategy (e.g., attitudes towards advertisements, attention, involvement). For instance, Alpert, Alpert, and Maltz (2005) showed that product preference and purchase intent only increased if the mood induced by advertising music was congruent with the context-specific purchase occasion; and Hahn and Hwang (1999) found that the relationship between message recall and the tempo of background music was determined by the familiarity of the music.

Among all possible influential factors, this paper focuses on the role of music familiarity. As humans, we develop preferences for things simply by becoming familiar with them. This is known as the mere exposure effect (Zajonc 1968) and has been supported by decades of research in psychology and marketing. For example, studies show that people prefer stimuli they have previously seen, even if they were not aware of seeing them (see Bornstein 1989, for a review); and consumer preferences for products relate to their familiarity or brand awareness (Hoyer and Brown 1990; Coates, Butler, and Berry 2004). In the music domain, studies have consistently shown that music familiarity is a critical factor to determine the variation of musical enjoyment, liking, emotional engagement, interest, and arousal (see Chmiel and Schubert 2017; North and Hargreaves 2008; Peretz, Gaudreau, and Bonnel 1998, for reviews). In marketing and advertising, professionals are also aware of the power of familiar music to involve, engage, and ultimately persuade consumers to buy their products or services (Allan 2006; Burns 1996; Dunbar 1990; Kellaris et al. 1993). Thus, popular (or highly familiar) music is pervasive in marketing and advertising, traditionally considered as the "perfect marriage of commerce and art" (Paoletta 2003).

The influential role of music familiarity in advertising is consistent with the Elaboration Likelihood Model (Petty and Cacioppo 1986), where consumers' responses to attributes of advertising music (e.g., its familiarity) are assumed to depend on their involvement. That is, music is processed via a central route under

high-involvement situations and via a peripheral route under low-involvement situations (MacInnis and Park 1991; Shevy and Hung 2013). It is only in the latter where familiar music is particularly effective in influencing consumer responses through priming or mood induction, which in turn it increases consumers' involvement and affective states through a peripheral attitude shift (Park et al. 2014; Shevy and Hung 2013). Previous research supports this view, showing that the success of popular music in advertising is due to its potential to increase involvement (Allan 2006; Dunbar 1990), and "attention-gaining value" for brand names associated with it (Kellaris et al. 1993). Others have shown that highly familiar music can serve as an effective retrieval cue, enhancing message processing and memory for brands and products, although in some cases it can also be distracting and reduce recall (see Allan 2007; Raja, Anand, and Kumar 2020, for reviews). For example, MacInnis and Park (1991) found that familiar music leads to more positive evaluations of advertisements, although in some cases it can also distract consumers and decrease their attention to the central message.

The studies outlined above show that using familiar music can play an important role in positively differentiating a product or brand. This suggests that the familiarity (or recognition) of music can be a strong driver of consumer choice. For example, Khan, Hamid, and Rashid (2019) found that the use of familiar music in advertising is a vital element considered by ad professionals to influence consumers' buying behaviour. However, to the best of our knowledge, this hypothesis has not yet been empirically investigated. Previous research looking at the effects of music on consumer choice has focused on other music attributes than familiarity and presents important limitations. A well-known case is a study by Gorn (1982), who reported that participants were more likely to choose a specific colour of a pen if that pen had been paired with pleasant rather than unpleasant music. Nevertheless, Gorn's findings have been questioned due to its problems of replicability (Kellaris and Cox 1989; Vermeulen and Beukeboom 2016). Moreover, the music stimuli used in these studies is highly confounded with familiarity, as the music pieces were selected based on pleasantness, ignoring the extent to which participants were familiar with them. Another limitation is the restricted number of purchase situations and music stimuli used in each experiment (normally consisting of two music pieces only), compromising the ecological validity of the experimental design. Another body of research has looked at the effect of music-evoked emotions (e.g., happy vs sad), showing that purchase intentions are enhanced only when the mood induced by music is congruent with the purchase occasion (Alpert and Alpert 1989; Alpert, Alpert, and Maltz 2005). Again, these studies were limited in that familiarity was confounded in the music stimuli and choice was not directly measured (instead they measured purchase intention using a self-reported rating scale).

Here we examine the effectiveness of music familiarity (recognition) to influence consumer choice and the role of the recognition heuristic on preferential choice when using music as the recognition cue. Importantly, our paradigm allows for the systematic measurement of music effects on brand choice while manipulating familiarity within the same experimental setup, controlling for participants' previous music experiences and preferences while examining a wider range of consumer decisions and purchase occasions.

The role of the recognition heuristic on consumer choice

The adaptive toolbox of human judgment and decision making (Gigerenzer, Todd, and Goldstein 1999) proposes several adaptive heuristics that are simple to execute and allow people to make accurate decisions while saving time and effort. These heuristics are thought to be fast and frugal because they limit the information search and do not heavily involve mental resources. The recognition heuristic has been proposed as a simple but powerful adaptive heuristic to make inferences about the environment (Goldstein and Gigerenzer 2002; Pachur et al. 2011). The recognition heuristic states that when people are faced with recognised and unrecognised options, they infer that the recognised one has the higher value concerning the criterion being judged and, therefore, they tend to choose it (Goldstein and Gigerenzer 2002). Thus, this heuristic only applies usefully in domains in which knowledge is limited, and some (but not all) options in the choice set are unrecognised. This is often the case when searching for and buying new products or brands. Thus, the recognition heuristic has inspired research in the realm of preferential choice and consumer behaviour (see Hauser 2011, for a review). Drawing on this literature, the current paper examines the potential of music recognition to influence brand choice through the recognition heuristic. Below, we discuss key considerations regarding the recognition heuristic and its use in the context of music and advertising. From this, we formulate the hypothesis that motivated this work.

First, it is important to discuss the role of recognition in preference as opposed to inference. The original recognition heuristic was primarily developed in the context of inferential choice tasks, such as when deciding which of two cities has more inhabitants (Gigerenzer and Goldstein 2011). While inferential choice can be objectively assessed using some external criterion of accuracy (e.g., population size), preferential choice is subjective by nature and cannot be assessed based on an objective criterion (Brandstätter, Gigerenzer, and Hertwig 2006). Nevertheless, previous studies have shown that recognition-based strategies are also used in preferential choice tasks, such as in the domain of consumer behaviour (Oeusoonthornwattana and Shanks 2010; Thoma and Williams 2013). Thus, when searching for and buying new products, we expect that brands associated with familiar or recognisable music may enter the mental awareness set and, consequently, pass on to the consideration set more readily than brands without such associations (see Shocker et al. 1991). Namely:

- H_1 (*Experiment 1 and 2*): The familiarity (recognition) of music presented with novel brands will be a significant determiner of brand choice. This effect will be robust across product categories.

Second, there is the assumption that people use the recognition heuristic in a non-compensatory fashion (Goldstein and Gigerenzer 2002). That is, if people recognize one object but not the other one, recognition is used as the only cue and no other cue knowledge is taken into account (Pachur et al. 2011). However, the non-compensatory use of recognition has been challenged in several studies, showing that additional cues can indeed influence or even exceed the effect of recognition (see Pachur, Bröder, and Marewski 2008 for a review), also shown in consumer behaviour studies using preferential choice tasks (Oeusoonthornwattana and Shanks

2010; Thoma and Williams 2013). For example, Oeusoonthornwattana and Shanks (2010) found that well-known brands were chosen more often than less known brands, although additional information about the well-known brands had a significant impact on the proportion of chosen brands. When using music as the recognition cue, there are many other variables associated with the music that can influence consumers in addition to its familiarity, such as music congruency with the advertisement or consumers' preferences for the music. Thus:

- H_2 (Experiment 2): Consumers will rely on the recognition heuristic in a compensatory manner – i.e., their choices will be influenced by a combination of music recognition and other music information, such as liking.

In two experiments, we adapted a paradigm to study the recognition heuristic in consumer choice (Oeusoonthornwattana and Shanks 2010; Thoma and Williams 2013) using music instead of verbal cues. Prior to the experiment, we selected existing excerpts of advertising music and brands based on a large cohort of more than two thousand consumers to ensure they were highly unfamiliar to participants. We then used a learning task to familiarize participants with half of the music excerpts, generating a set of recognisable music clips and a set of completely novel ones. In the main choosing task, participants were presented with pairs of novel brands and had to choose which one they would purchase across different product categories (e.g., headphones, cameras, cell phones). To determine the extent to which participants relied on the recognition heuristic, we examined their choices when one brand in the pair was paired with a previously learned (recognisable) music clip and the other with a completely novel one. To study the compensatory use of the recognition heuristic, we explored the extent to which brand choices were influenced by both the recognition status of the music and additional information, such as participants' liking of the music.

Experiment 1

Method

Participants

A total of 205 participants (143 female), aged 18-42 ($M=24.35$, $SD=5.24$), took part in the experiment. Participants were recruited in English speaking countries through the market research platform Slicethepie (www.slicethepie.com, owned and operated by SoundOut LLC.), an online recruitment panel of over 2.5 million people that operates across the US, UK, and European markets. There was a monetary compensation of US \$1 to complete the experiment, which lasted 15-20 minutes.

Design

The experiment used a within-participants design measuring participants' choices in a two-alternative forced choice (2AFC) task. The independent variable was the recognition of the music (learned vs. novel clips) and the dependent variable was the participants' binary choice response. The experiment was conducted online using Qualtrics software (Provo, UT) and was granted ethical clearance by the Ethics Committee of the Department of Psychology, University of Goldsmiths, London, on

5 May 2017. In the 2AFC task, we tested pairs of brands across four product categories (i.e., headphones, tennis racquets, cameras, and cell phones). The position of the brand in the pair and order of the pairs were randomized for each participant.

Stimuli

Pre-selection procedure. To make sure the brands and music clips were highly unfamiliar to participants while also ensuring ecological validity (e.g., using real brands and music clips), we conducted an online study through the market research company *SoundOut* (slicethepie.com). The primary goal was to test the familiarity of existing brand logos and music clips. A total of 2,854 participants (1,910 female; Mean age = 32; $SD=2.76$) rated the stimuli. Participants were asked to evaluate how familiar they were with the brand or song on a 10-point Likert scale (1= extremely unfamiliar; 10= extremely familiar). Sixty brand logos, representing five product categories (i.e., headphones, tennis racquets, cameras, cell phones, and laptops), and 46 music clips were tested. All music clips were produced by 'unknown' artists that were not signed to record companies but are used by *SoundCloud* (soundcloud.com) to support marketing research. The brand names were taken from the appendix in Thoma and Williams (2013), which provide a useful list of existing but unfamiliar brands. The familiarity scores for the brands and music clips were averaged across participants.

Materials. The 24 most unfamiliar brands and 24 most unfamiliar music clips were selected. The mean familiarity of the 24 brands and 24 music clips were 2.22 ($SD=.73$) and 1.73 ($SD=.2$), respectively. The selected brands and music clips were organised into four product categories: headphones, tennis racquets, cameras, and cell phones. This resulted in a total of six music clips and brands per product category (see Appendix A for a list of the 24 music clips and brands used organised by product category). The six songs were fixed in each product category throughout the experiment and were selected randomly. Images of the logos of the brands were collected for presentation in the experiment. All images sourced had the same size dimensions and were all placed on top of a black background. All music was in the genre of popular contemporary music and had vocals. Each music clip was then edited with Audacity software (Audacity Team), cutting its length to 8seconds (with 0.5sec fade at the beginning and ending) and normalizing its volume. The chorus section of each song was selected to capture the main part of the music. We paired each brand logo with a music clip using QuickTime software (Apple Inc.), creating 8-second video clips. This resulted in a total of 144 videos (12 brands X 12 music clips). In each video, the music played from the beginning with a black background and after 1 second, the brand image appeared. The video clips were then used to construct the different pairs of clips for the 2AFC task.

The music clips were randomly divided in blocks (A and B). In block A, one set of the music clips remained novel (1-12) and the other set (13-24) was included in the learning phase and, therefore, was learned by participants through a familiarisation process. In block B, the order was reversed, i.e., the first set of music clips were learned (1-12) and the other set remained novel (13-24). Half of the participants were randomly allocated to version A and the other half to version B.

Procedure

Before starting the experiment, participants were instructed that they were taking part in a study about music and advertising and were asked for consent. They were then told that the use of headphones was mandatory and that the experiment had two main parts, a learning task and a choice task.

Learning phase. This phase aimed to make sure participants were familiarised with a set of music clips to build the 2AFC task, where one music clip in each pair of brands had to be recognisable and the other completely novel. Participants were instructed to listen to each music clip and memorise them. Participants had to learn a total of 12 music clips (depending on whether they were assigned to block A or B). Before the learning phase, they were warned that they would complete a memory test in the next section. To ensure active listening, we also asked them to count how many instruments they heard in each clip and write it down in an open-text box.

Next, participants were presented with a memory test asking them to listen to each clip again and indicate whether they had heard the music clip in the previous section or not. Four previously unheard music clips were added as decoys. If participants failed to pass a pre-established threshold of 87.5% correct responses, they were given another chance to repeat the same learning procedure. If they failed for a second time, they were excluded from the experiment. The order of the music clips in the two tasks (learning and memory test) were randomized per participant.

Choosing phase. Using a 2AFC paradigm, participants were presented with four pairs of videos, one for each of the four brand categories. Each video contained a brand logo and a music clip. For each pair, participants were instructed to imagine they would like to buy a new product (according to each product category, e.g., headphones). Participants were then instructed to play each video and indicate the brand they would choose to purchase. After making a choice, participants were asked to evaluate how much they liked the music clips presented with the brands, using a 6-point Likert scale (1= not at all; 6= very much). This experiment only tested participants' choices using critical pairs, where the conditions of the recognition heuristic were met - i.e., in each pair, one brand was always paired with a previously learned music clip while the other with a completely novel one. To pair the brands with the music clips within each product category, we used a randomised Latin Square Design. Thus, all participants were presented with the same brands and music clips without any repetition. The order of presentation of the product categories and brand position within each pair were randomized for each participant.

Results and discussion

One participant who did not give consent and another who did not complete the entire experiment were excluded from the subsequent analysis. Thus, the following analysis included a total of 189 participants.

Correction for recognition

To examine the role of the recognition heuristic, one music clip in the critical pair had to be recognised (learned) and the other unrecognised (novel). To ensure that this was the case, we used the following two-fold exclusion criteria. First, participants who did not pass the pre-established threshold (i.e., to have 14 out of 16 correct answers, 87.5%) were removed automatically. Note, however, that participants who failed the memory on their first attempt, were given a to repeat the learning phase and attempt the memory test for a second time. A total of 42 participants did not meet the threshold both times and were excluded from the analysis. Thus, 147 participants, all of whom had successfully learned to recognize the set of music clips, were included in the following analysis. Second, for those participants who were included, we removed those trials in the main experiment where they were presented with a clip that they had not recognised in the learning phase. On average, 6.8% of the total number of observations were excluded due to this criterion.

The effect of music recognition on brand choice

In line with the analytic strategy used in previous work (Oeusoonthornwattana and Shanks 2010; Thoma and Williams 2013), we calculated participants' mean choice proportions across all choosing trials to test the main effect of music recognition on brand choice. The proportion of choices across all participants when the brand was paired with learned music was 59% ($SD=26\%$) and when it was paired with novel music was 41% ($SD=26\%$). This represents an absolute difference of 9% for choosing brands paired with recognized music compared to choosing at a chance level (50%). The relative increase of choosing a brand when paired with recognized music compared to the novel was 18% ($61/50=1.18$), and the odds ratio to choose a brand paired with recognized music was 1.44 (44% higher). A paired-sample t-test across participants indicated that this difference was statistically significant, $t(126)=3.97$, $p<.001$, and had a small to medium effect size, $d=.334$. Overall, the results of Experiment 1 indicate that the familiarity (recognition) of music presented with novel brands is a significant determinant of consumers' choice (H_1) while also validating the paradigm and materials for Experiment 2.

Experiment 2

Experiment 2 was designed to use a more sophisticated design and analysis strategy to examine the effect of music recognition on brand choice. This included a comparison between critical pairs (i.e., where one music clip was always learned and the other novel) and a control condition using noncritical pairs (i.e., where both music clips were either novel or learned). In addition, we employed a more granular and accurate analysis at the trial level that allowed us to measure the overall effect of brands and music clips on brand choice. Finally, Experiment 2 explored the extent to which participants used the recognition heuristic in a non-compensatory fashion by taking into account participants' liking of the music.

Methods

Participants

A total of 281 participants (157 female), aged 18-63 ($M=28.92$, $SD=10.54$), took part in the experiment. Participants were recruited in English speaking countries through the market research platform Slicethepie (www.slicethepie.com), owned and operated by SoundOut (www.soundout.com). There was a monetary compensation of US \$1 to complete the experiment, which lasted approximately 15-20 minutes.

Design, stimuli, and procedure

The only difference between Experiment 1 and 2 was the addition of a control condition using two types of noncritical pairs. Thus, we compared participants' choices in three types of pairs (see Figure 1): critical pairs (one brand paired with a learned clip and one with a novel clip), noncritical learned pairs (the two brands paired with learned clips), and noncritical novel pairs (the two brands paired with novel clips). The noncritical pairs were used to examine consumer choice in a control situation where the recognition heuristic cannot operate because the two music clips were either novel or learned. Each participant was presented with three pairs of each type in each of the four product categories, resulting in a total of 12 trials per participant (Figure 1).

We paired the brands with the music clips within each product category and type of pair using a Latin Square Design. This resulted in six possible brand-music combinations for each product category (see Appendix B for an example). Participants were randomly allocated to one of the six combinations at the beginning of the experiment. Thus, all participants were presented the same 24 brands and 24 music clips without any repetition. In each type of pair, we also fully counterbalanced the music clips with the presentation position of the two choices in the 2AFC task. The order of presentation of the brand categories, type of pair within each category, and brand position within each pair were randomized for each participant. The stimuli, measures, and procedure were the same as described in Experiment 1.

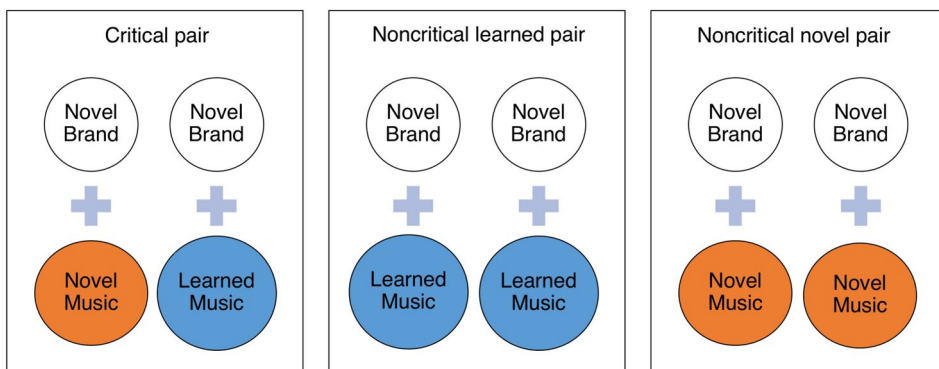


Figure 1. Schematic visualization of the three types of pairs used in the choosing task. Note. Each participant was presented with the three types of pairs in each product category, resulting in a total of 12 trials per participant.

Results and discussion

Five participants who did not consent to their data being used for research were excluded, resulting in a total of 235 participants.

Correction for recognition

We applied the same procedure used in Experiment 1 to include participants we were confident had learned the music clips and exclude those observations where the music clip was not learned. Accordingly, a total of 83 participants did not meet the learning threshold and were excluded, 152 participants remained. Lastly, for those participants who were included, we removed those trials in the main experiment where they were presented with a clip that they had not recognised in the learning phase. Overall, 3.5% of the total observations were excluded because of this correction.

The effect of music recognition on Brand choice

The first analysis strategy was the same as the one used in Experiment 1. The proportion of choices across all participants when the brand was paired with learned music was 56% ($SD=28\%$) and when it was paired with novel music was 44% ($SD=28\%$). This represents an absolute difference of 6% for choosing brands paired with recognized music compared to choosing at a chance level (50%). The relative increase of choosing a brand when paired with a learned music clip compared to a novel clip was 12% ($56/50=1.12$), and the odds ratio was 1.27 (27% higher). A paired-sample t-test indicated that this difference was statistically significant, $t(128)=2.43$, $p=.02$, and had a small effect size, $d=.21$.

In addition, we performed a more sophisticated analysis using a Bayesian mixed-effects model with a binomial link function¹, as implemented in the R package *brms* (Bürkner 2017). This analysis allowed us to use the non-aggregated data at the trial level, taking the repeated measurement structure of participants' choices into account. This analysis was crucial to examine the effect of music recognition across all choice conditions (critical and noncritical pairs) while also taking into account the role of brands and music clips. The dependent variable was the binary response indicating whether the brand was chosen or not at each trial. To examine participants' choice across all choice conditions we coded a categorical variable with four levels indicating the recognition of the music clip (learned vs. novel) on each type of pair (critical vs. noncritical): (a) critical-novel (this brand was presented with a novel clip while the other brand in the pair was presented with a learned music clip), (b) critical-learned (this brand was presented with a learned music clip while the other brand in the pair was presented with a novel music clip), (c) noncritical-learned (both brands in the pair were paired with learned music clips), and (d) noncritical-novel (both brands in the pair were paired with novel music clips). The random-effects structure of the model included a random intercept for participants, music clips, and brand.

Figure 2 shows the coefficient estimates and confidence intervals of the model in the four choice conditions and random effects factors. The marginal and conditional R^2 were .016 and .099, respectively. The model-based CIs confirmed that in the critical pairs, brands presented with previously learned music were selected consistently more often than brands paired with novel music. Namely, the coefficients for the critical

condition showed the expected sign: a positive coefficient for brands presented with familiar music and a negative coefficient for brands presented with novel music. Importantly, there were no differences between learned and novel clips in the non-critical pairs, where the coefficient estimates in the two noncritical conditions were at 0 and, therefore, participants' choices in these conditions were at chance level (50%). Moreover, the high estimate of the random intercept for music clip shown in Figure 2 indicates that the actual music excerpts played a major role in participants' choices regardless of its recognition status, whereas the effect of the brands was much closer to 0.

The effect of additional information

We examined the role of additional information by taking into account the preferences for the advertising music provided by each participant after choosing each brand. Specifically, we ran a linear model on the critical pairs where the brand choice was the dependent variable, and recognition (learned vs novel), music liking (on a 6-point scale), and the interaction between recognition and liking were the predictor variables.

Figure 3 shows the mean choice proportion of brands paired with learned and novel music as a function of music liking. An ANOVA revealed a main significant effect of music recognition, $F(1, 991) = 17.55, p < .001$ and music liking, $F(1, 991) = 210.04, p < .001$, but a non-significant interaction, $F(1, 991) = 2.66, p = .1$. The overall $adj-R^2$ of the model was .195, whereas the individual effect size for music recognition and liking in terms of Cohen's f were .133 (recognition) and .475 (liking).

Taken together, the results of Experiment 2 confirmed our hypothesis that music familiarity (recognition) is a significant driver of brand choice (H_1). This was shown using Bayesian mixed-effects modelling, which allowed us to analyse the non-aggregated data to take the repeated measures structure into account and consider all relevant

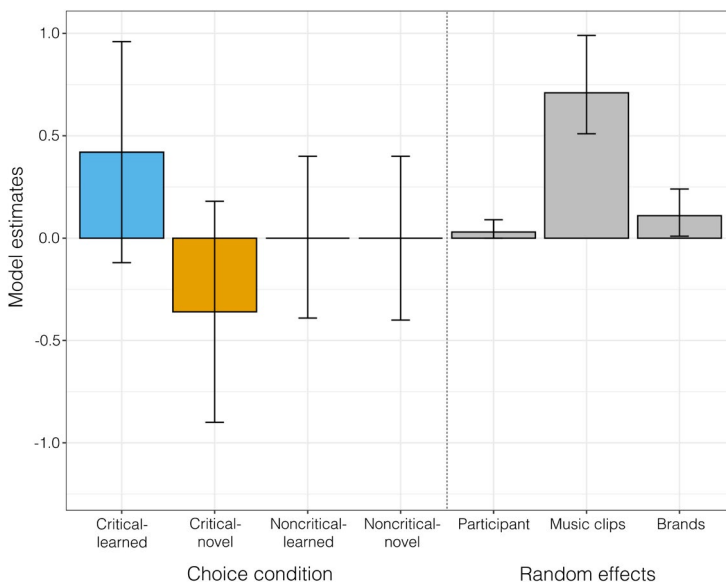


Figure 2. Effect of music recognition across choice conditions in the two experiments. Note. Error bars represent 95% CI.

factors within the same model, including the variability accounted for by participants' individual differences, brands, and music clips. We also studied participants' behaviour in a noncritical condition where recognition could not provide an advantage, finding that participants' choices in that situation were at chance level. Finally, we explored the extent to which participants' choices were influenced by additional information about their preferences for the advertising music. In line with our second hypothesis (H_2), we found that participants combined recognition cues with additional information regarding their music preferences.

General discussion

The influence of music on purchase intention and product choice is one of the most challenging advertising effects to study but arguably the most important (Allan 2007). This paper contributes to the literature by measuring the effectiveness of music when used as a recognition cue to influence brand choice and exploring the role of a potential cognitive mechanism underlying such effects: the recognition heuristic (Goldstein and Gigerenzer 2002; Pachur et al. 2011).

Our results show that music recognition is an important driver of choice in preferential tasks. In two experiments, participants were significantly more likely to choose a brand when paired with recognised music (Experiment 1 = 59% and Experiment 2 = 56%) than when paired with novel music (Experiment 1 = 41% and Experiment 2 = 44%). Based on this, we quantified the effectiveness of music when used as a

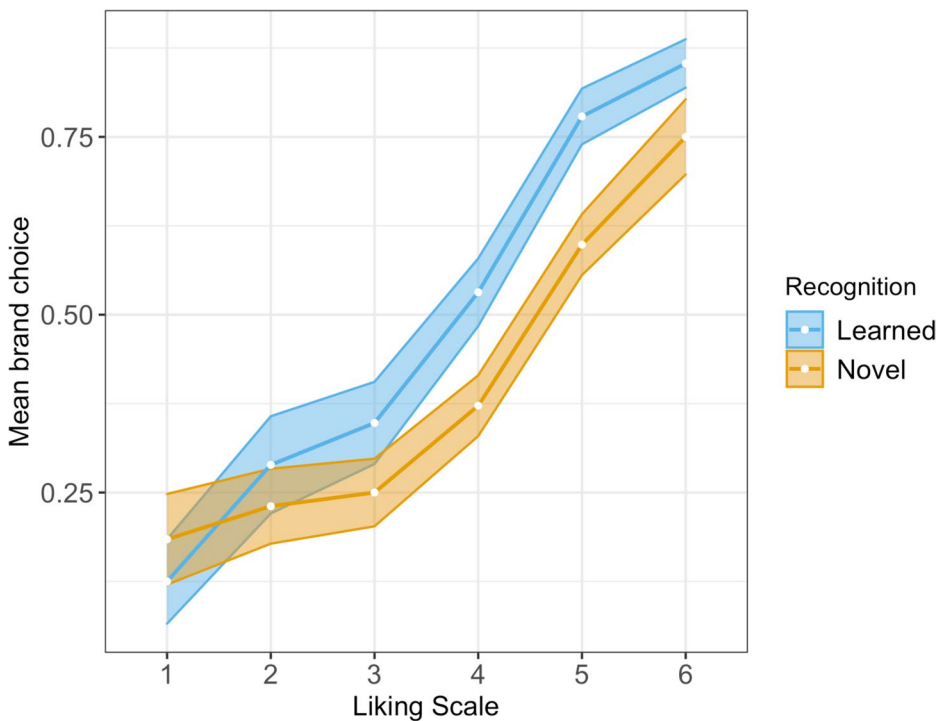


Figure 3. Mean choice proportion of brands paired with learned and novel clips as a function of music liking (on a 6-point scale).

recognition cue to influence brand choice. Our results show that pairing novel brands with music that can be recognized (as opposed to novel music) increases the likelihood that consumers will choose that brand by 6% (using the more conservative estimate found in Experiment 2). Moreover, we corroborated the main findings by examining participants' choices in a control condition where the recognition heuristic could not operate (i.e., when the two brands in the pair were presented either with two learned or two novel music clips). In this condition, participants' brand choices were at the chance level (not statistically different from 50%). Overall, these results support previous research highlighting the critical role of familiarity to determine music effects on behaviour (see Chmiel and Schubert 2017; North and Hargreaves 2008; Peretz, Gaudreau, and Bonnel 1998, for reviews), while providing for the first time a reliable estimation of the magnitude of its effect on consumer choice.

In an exploratory analysis (Experiment 2), we also examined the compensatory use of the recognition heuristic. Namely, whether additional music information, such as participants' preferences, was combined with recognition cues to influence brand choice. We found that both music recognition and preferences significantly influenced participants' choices, although the influence of each predictor was asymmetrical (Figure 3). In particular, music preferences had an effect size (Cohen's $f = .475$) twice as large as the effect size of recognition (Cohen's $f = .133$). Importantly, the two predictors mutually influenced each other: there was an added positive effect of learning (recognition) in addition to a strong effect of liking across a large part of the liking scale (4 out of 6 points), but in the extreme cases where the music was most disliked by participants, the effect of recognition was suppressed and the mean choice proportion of brands was the lowest. It is worth mentioning, however, that music preferences were not systematically manipulated within our experimental design - i.e., liked/disliked songs were not fully counterbalanced in the choosing task and music preferences were not directly manipulated within the experimental sessions. Thus, music preferences and recognition were confounded in our experiments and teasing apart the causal relationship between these two variables will require future research. This is important because music liking and familiarity relate to each other in complex ways (see Chmiel and Schubert 2017, for a review). As our results suggest, understanding this relationship is key to maximizing brands' ROI when working with music.

Naturally, our results are limited by a number of factors. First, the experimental design may have forced an artificial situation on our participants. Participants were asked to choose multiple times between two unknown brands without having access to information typically available in this type of decision-making situation, such as price, or further information about the brand or product. Second, according to Gigerenzer and Goldstein (2011), studies on the recognition heuristic should rely on natural memories of the object to be recognised rather than artificially inducing memories through an experiment. The recognised songs in our experiment were learned within the experimental setting and, therefore, this design feature might have artificially enhanced the role of the recognition heuristic. Finally, we did not consider the degree of involvement required of our participants while taking part in the study. Since models of persuasion, such as the Elaboration Likelihood Model (Petty and Cacioppo 1986), suggest that peripheral cues are more persuasive under low-involvement consumption, music recognition may be less influential when

consumers are highly involved and motivated in consuming or purchasing a product. Having established the effectiveness of music as a recognition cue to influence consumer choice within the limits of our design, we encourage future research to use more ecological approaches to investigate the same effects in real-world situations, using a larger range of brand categories, products, and music stimuli.

Theoretical implications

The results reported above are less consistent with the recognition heuristic (Goldstein and Gigerenzer 2002) and more in line with a cue integration framework (Oeusoonthornwattana and Shanks 2010). That is, consumers consider all available cues and combine them according to their usefulness in pointing to one choice option over another. Thus, although recognition is a highly accessible cue, there is nothing special about it and it can either be contradicted or compensated for by other information. This finding broadly supports previous research on preferential choice in the context of consumer behaviour (Oeusoonthornwattana and Shanks 2010; Thoma and Williams 2013) and has important implications for ad professionals and practitioners. In particular, our results suggest that the most effective way to maximize music effects on consumer behaviour is to weigh all available music cues (e.g., preferences, familiarity, fit, mood) according to their impact on the target consumers. This is particularly valuable when considering previous research on advertising music, as one of the most important design features that account for conflicting results in the literature is the poor control over moderating variables, such as music preferences and familiarity (e.g., Shevy and Hung 2013). We believe that systematic sound testing in fundamental cognitive dimensions (e.g., memory, implicit and explicit preferences) is a key step to finding optimal music strategies that maximize the interactions of music elements while protecting brands against the costs of making poor decisions. Such empirically grounded approach will also protect brands against common cognitive biases amongst ad professionals (Anglada-Tort et al. 2021; Tenzer and Murray 2018, 2019).

Interestingly, we found that the presence of extremely negative preferences for the advertising music completely suppressed the effect of recognition. This is different from the results obtained by Oeusoonthornwattana and Shanks (2010) and Thoma and Williams (2013), who found that presenting well-known brands with negative information did not completely suppress the effect of recognition cues on choice. As suggested by Oeusoonthornwattana and Shanks (2010), this might be explained by the fact that participants did not perceive the negative statements used in their study as truly negative, whereas in our study, the content of the music had a stronger effect on preference and subsequent choice behaviour. This is supported by a large body of research showing that consumers' preferences for advertising music play a central role in determining the advertising effectiveness (see Lantos and Craton 2012; North and Hargreaves 2008; Oakes 2007; Shevy and Hung 2013, for reviews).

Why would it be useful for consumers to rely on recognition cues when searching and choosing new brands and products? When using music to influence consumer choice, recognition might function as a proxy for brand and product quality, as only brands that succeed at selling their product can afford large scale advertising. Therefore, there are mediators (e.g., repeated advertising) that can reliably correlate with

perceptions of quality (Hauser 2011). Another explanation is that greater pleasure is derived from purchasing and consuming recognized products. For instance, there is evidence that the very same product is rated more pleasurable when it is identified than when it is not identified (Allison and Uhl 1964). However, relying on music preferences may be more useful to consumers, as these can function as a proxy of brand quality but also other relevant dimensions, such as brand identity, personality, and values.

We hope this study emphasizes the value of applying insights from the heuristics-and-biases framework to prescribe better strategies and tools when working with music in the context of branding and advertising. When buying new products, consumers are often limited by their cognitive abilities, knowledge, and time available. Consequently, they rely on mental shortcuts, or heuristics, to simplify complex decisions into easier to calculate operations (Tversky and Kahneman, 1974 and Kahneman 1974; Gigerenzer, Todd, and 1999). The adaptive toolbox paradigm proposes a set of such adaptive heuristics, inspiring important work in marketing and advertising (Hauser 2011).

Practical implications

Inspired by research on the recognition heuristic, we use a novel paradigm that allows for the systematic measurement of music effects on consumer choice while manipulating music familiarity within the same experimental setup. This is crucial to overcome limitations in previous studies looking at music effects on consumer choice (Gorn 1982; Kellaris and Cox 1989; Vermeulen and Beukeboom 2016), such as increasing control over participants' previous music experiences and preferences, or testing a wider range of music stimuli and purchase situations. This paradigm also allows to reliably estimate the magnitude of the effect of music recognition on brand choice, a key metric to measure the strength of the relationship between the two variables. Moreover, the Latin Square design and analysis strategy used in Experiment 2 (Bayesian mixed-effects models) allowed us to take the repeated measurement structure of participants' choices into account while also measuring the individual effects of brands and music clips. We found that while novel brands had almost no effect on participants' choices, the actual music excerpts had the largest effect. This suggests that music characteristics, other than its familiarity, played a major role in determining the variation in participants' responses. We see great potential in applying this approach to study the complex interplay of factors influencing consumers' responses to advertising music (Lantos and Craton 2012).

Studying the effectiveness of music as an executional cue to influence consumer behaviour is fundamental to informing brands' decisions and minimizing risks (Herget, Schramm, and Breves 2018; Ruth and Spangardt 2017). However, measuring music's ROI and other objective metrics in the real world is notoriously hard (Allan 2015), thereby becoming one of the main obstacles for brands when working with music (Lusensky and Tinsley 2011). The effect size estimated in our study provides a metric to quantify the value of using music to influence consumer choice. This can be used as a reliable proxy of brands' ROI when working (and paying for) music. That is, we found that music recognition has an ROI of 6% when paired with novel brands to influence brand choice and purchase intentions. For example, if you were selling televisions at \$100 per unit, you would see a

gain of \$600 for every 100 units sold when pairing your brand with recognized music, everything else being equal. Importantly, we found that participants' preferences for the advertising music largely mediated the effect of recognition on consumer choice. Thus, ad professionals and practitioners need to consider all available musical and extra-musical cues in order to maximize music effects on behaviour, adopting a cue integration framework grounded on systematic sonic testing from large-scale behavioural experiments.

Note

1. The model was run with four chains, 8000 iterations within each chain, and a maximum tree depth of 10. We used the default priors in *brms*, which consist of uninformative flat priors for the fixed effects and student-t priors with 3 degrees of freedom for the random effects. The R^2 was computed using a Bayesian version for mixed-effects regression models, including a marginal (fixed effects only) and conditional (including random effects) R^2 .

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No potential conflict of interest was reported by the authors.

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Notes on Contributor

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Data availability statement

The data that support the findings of this study and code for analysis are available in <https://github.com/manuelangladatort/recognition-music-advertising>

References

- Allan, D. 2006. Effects of popular music in advertising on attention and memory. *Journal of Advertising Research* 46, no. 4: 434–44.
- Allan, D. 2007. Sound advertising: A review of the experimental evidence on the effects of music in commercials on attention, memory, attitudes, and purchase intention. *Journal of Media Psychology* 12, no. 3: 1–35.

- Allan, D. 2008. A content analysis of music placement in prime-time television advertising. *Journal of Advertising Research* 48, no. 3: 404–17.
- Allan, D. 2015. Audio Branding and ROI - A Review. In *Audio branding yearbook 2014/2015: Audio branding academy*, ed. B. Kay, C. Ringe, and R. Hirt, 103–116, 103. Baden-Baden, DE: Nomos Edition.
- Allison, R.I., and K.P. Uhl. 1964. Influence of beer Brand identification on taste perception. *Journal of Marketing Research* 1, no. 3: 36–9.
- Alpert, J.I., and M.I. Alpert. 1989. Background music as an influence in consumer mood and advertising responses. *Advances in Consumer Research* 16: 485–91.
- Alpert, M.I., J.I. Alpert, and E.N. Maltz. 2005. Purchase occasion influence on the role of music in advertising. *Journal of Business Research* 58, no. 3: 369–76.
- Anglada-Tort, M., S. Keller, J. Steffens, and D. Müllensiefen. 2021. The impact of source effects on the evaluation of music for advertising: Are there differences in how advertising professionals and consumers judge music?. *Journal of Advertising Research* 61no.1: 95–109.
- Beckerman, J., and T. Gray. 2014. *The sonic boom: How sound transforms the way we think, feel, and buy*. Boston, MA: Houghton Mifflin Harcourt.
- Brandstätter, E., G. Gigerenzer, and R. Hertwig. 2006. The priority heuristic: Making choices without trade-offs. *Psychological Review* 113, no. 2: 409–32.
- Bornstein, R.F. 1989. Exposure and affect: Overview and Meta-analysis of research, 1968–1987. *Psychological Bulletin* 106, no. 2: 265–89.
- Brooker, G., and J.J. Wheatley. 1994. Music and radio advertising: Effects of tempo and placement. *Advances in Consumer Research* 21: 286–90.
- Bruner, G.C. 1990. Music, mood, and marketing. *Journal of Marketing* 54, no.4: 94–104.
- Bürkner, P.C. 2017. Brms: An R package for bayesian multilevel models using Stan. *Journal of Statistical Software* 80, no. 1: 1–28.
- Burns, G. 1996. Popular music, television, and television. *The Journal of Popular Culture* 30, no. 3: 129–41.
- Chmiel, A., and E. Schubert. 2017. Back to the inverted-U for music preference: A review of the literature. *Psychology of Music* 45, no. 6: 886–909.
- Coates, S.L., L.T. Butler, and D.C. Berry. 2004. Implicit memory: A prime example for Brand consideration and choice. *Applied Cognitive Psychology* 18, no. 9: 1195–211.
- Craton, L.G., and G.P. Lantos. 2011. Attitude toward the advertising music: An overlooked potential pitfall in commercials. *Journal of Consumer Marketing* 9, no. 1: 22–42.
- Dunbar, D.S. 1990. Music and advertising. *International Journal of Advertising* 9, no. 3: 197–203.
- Gigerenzer, G., and H. Brighton. 2009. Homo heuristicus: Why biased minds make better inferences. *Topics in Cognitive Science* 1, no. 1: 107–43.
- Gigerenzer, G., and D.G. Goldstein. 2011. The recognition heuristic: A decade of research. *Judgment and Decision Making* 6, no. 1: 100–21.
- Gigerenzer, G., P.M. Todd, and The ABC Research Group. 1999. *Simple heuristics that make us smart*. New York: Oxford University Press.
- Goldstein, D.G., and G. Gigerenzer. 2002. Models of ecological rationality: The recognition heuristic. *Psychological Review* 109, no. 1: 75–90.
- Gorn, G.J. 1982. The effects of music in advertising on choice behavior: A classical conditioning approach. *Journal of Marketing* 46, no. 1: 94–101.
- Guido, G., A.M. Peluso, A. Mileti, M. Capestro, L. Cambò, and P. Pisanello. 2016. Effects of background music endings on consumer memory in advertising. *International Journal of Advertising* 35, no. 3: 504–18.
- Gustafsson, C. 2015. Sonic branding: A consumer-oriented literature review. *Journal of Brand Management* 22, no. 1: 20–37.
- Hahn, M., and I. Hwang. 1999. Effects of tempo and familiarity of background music on message processing in TV advertising: A resource-matching perspective. *Psychology and Marketing* 16, no. 8: 659–75.
- Hampp, A. 2018. Songs for screens: Super bowl synchs are roaring toward a 25% revenue increase for top publishers. February 2. <http://variety.com/2018/music/news/songs-for-screens-super-bowl-synchs-are-roaring-toward-a-25-revenue-increase-for-top-publishers-1202685365/>

- Hauser, J. 2011. A marketing science perspective on recognition-based heuristics (and the fast-and-frugal paradigm). *Journal of Judgment and Decision Making* 6: 396–408.
- Hecker, S. 1984. Music for advertising effect. *Psychology and Marketing* 1, no. 3–4: 3–8.
- Hettinger, H. 1993. *A decade of radio advertising*. Chicago, IL: University of Chicago Press.
- Hoyer, W.D., and S.P. Brown. 1990. Effects of Brand awareness on choice for a common, repeat-purchase product. *Journal of Consumer Research* 17, no. 2: 141–8.
- Herget, A.K., H. Schramm, and P. Breves. 2018. Development and testing of an instrument to determine musical fit in audio–visual advertising. *Musicae Scientiae* 22, no. 3: 362–76.
- IFPI (International Federation of the Phonographic Industry). 2019. IFPI Global Music Report 2018. <http://www.ifpi.org/downloads/GMR2019.pdf>
- Jackson, D.M., and P. Fulberg. 2003. *Sonic branding: An introduction*. Basingstoke, UK: Palgrave Macmillan.
- Khan, S., M., N.A. Hamid, and S.M. Rashid. 2019. Music and its familiarity affection on audience decision making. *Jurnal the Messenger* 11, no. 1A: 70–80.
- Kellaris, J.J., and A.D. Cox. 1989. The effects of background music in advertising: A reassessment. *Journal of Consumer Research* 16, no. 1: 113–8.
- Kellaris, J.J., A.D. Cox, and D. Cox. 1993. The effect of background music on ad processing: A contingency explanation. *Journal of Marketing* 57, no. 4: 114–25.
- Lantos, G.P., and L.G. Craton. 2012. A model of consumer response to advertising music. *Journal of Consumer Marketing* 29, no. 1: 22–42.
- Lusensky, J., and S. Tinsley. 2011. *Sounds like branding: Use the power of music to turn customers into fans*. London, UK: A & C Black Publishers Ltd.
- North, A.C., and D. Hargreaves. 2008. *The social and applied psychology of music*. New York: Oxford University Press.
- MacInnis, D.J., and C.W. Park. 1991. The differential role of characteristics of music on high- and Low- Involvement consumers' processing of ads. *Journal of Consumer Research* 18, no. 2: 161–73.
- Oakes, S. 2007. Evaluating empirical research into music in advertising: A congruity perspective. *Journal of Advertising Research* 47, no. 1: 38–50.
- Oeusoonthornwattana, O., and D.R. Shanks. 2010. I like what I know: Is recognition a non-compensatory determiner of consumer choice? *Judgment and Decision Making* 5, no. 4: 310–25.
- Pachur, T., A. Bröder, and J.N. Marewski. 2008. The recognition heuristic in memory-based inference: Is recognition a non-compensatory cue? *Journal of Behavioral Decision Making* 21, no. 2: 183–210.
- Pachur, T., P.M. Todd, G. Gigerenzer, L. Schooler, and D.G. Goldstein. 2011. The recognition heuristic: A review of theory and tests. *Frontiers in Psychology* 2: 147.
- Paoletta, M. 2003. Dance & electronic music: The newest soundtrack to the world? *Billboard* 115, no.12: 46.
- Park, H.H., J.K. Park, and J.O. Jeon. 2014. Attributes of background music and consumers' responses to TV commercials. *International Journal of Advertising* 33, no. 4: 767–84.
- Peretz, I., D. Gaudreau, and A.M. Bonnel. 1998. Exposure effects on music preference and recognition. *Memory & Cognition* 26, no. 5: 884–902.
- Petty, R.E., and J.T. Cacioppo. 1986. The elaboration likelihood model of persuasion. In *Advances in experimental social psychology*, ed. L. Berkowitz, 123–205. New York: Academic Press.
- Raja, M.W., S. Anand, and I. Kumar. 2020. Multi-item scale construction to measure consumers' attitude toward advertising music. *Journal of Marketing Communications* 26, no. 3: 314–27.
- Ruth, N., and B. Spangardt. 2017. Research trends on music and advertising. *Mediterranean Journal of Communication* 8, no. 2: 18–23.
- Schramm, H., and B. Spangardt. 2016. Wirkung von Musik in der Werbung [Effects of music in advertising]. In *Handbuch werbeforschung*, ed. G. Siegert, W. Wirth, P. Weber, and J. A. Lischka, 433–449. Wiesbaden, DE: Springer VS.
- Shevy, M., and K. Hung. 2013. Music in television advertising and other persuasive media. In *The psychology of music in multimedia*, ed. S.-L. Tan, A. J. Cohen, S. D. Lipscomb, and R. A. Kendall, 315–38. Oxford, UK: Oxford University Press.

- Shocker, A.D., M. Ben-Akiva, B. Boccara, and P. Nedungadi. 1991. Consideration set influences on consumer decision-making and choice: Issues, models, and suggestions. *Marketing Letters* 2, no. 3: 181–97.
- Tenzer, A., and I. Murray. 2018. *Why we shouldn't trust our gut instincts* [White paper]. Reach Solutions. <https://www.trinitymirrorsolutions.co.uk/sites/default/files/2018-07/TMSWhyWeShouldn%27tTrustOurGutInstinctWhitePaper.pdf>.
- Tenzer, A., and I. Murray. 2019. *The Empathy Delusion* [White paper]. Reach Solutions. <https://www.reachsolutions.co.uk/sites/default/files/2019-07/The%20Empathy%20Delusion%20final.pdf>
- Thoma, V., and A. Williams. 2013. The devil you know: The effect of Brand recognition and product ratings on consumer choice. *Judgment and Decision Making* 8, no. 1: 34–44.
- Tversky, A, and D. Kahneman. 1974. Judgment under uncertainty: Heuristics and biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *Science* 185no.4157: 1124–31.
- Vermeulen, I., and C.J. Beukeboom. 2016. Effects of music in advertising: Three experiments replicating single-exposure musical conditioning of consumer choice (gorn 1982) in an individual setting. *Journal of Advertising* 45, no. 1: 53–61.
- Zajonc, R.B. 1968. Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology* 9, no. 2: 1–27.

Appendix A. List of the 24 music clips and brands used in the study, organised by product category.

Product category	Brand	Music artist (title)
Headphones	V-Moda	George Kaufmann (Till one day)
	Thompson	One man disco band (I really dig it)
	Klipsche	Ribak (Saturday)
	Goldring	Malfunc (Put your trust in me)
	Shure	The clinks (Typical kind of girl)
	Ultimate	Lucia (Sooner)
Tennis	Babolat	Steph Porter (It's all good)
	Gamma	NOSUGA (Hot girl)
	Snauwaert	Joan Mercury (Never enough)
	Greys	Sarah Solovay (Rough Draft)
	Power Angle	The Marshfieldz (Long long time)
	Yonex	litM (Prodigies)
Cameras	Contour	Invoke music INVK (No sleep)
	Vivitar	James Stevenson (Living in a day dream)
	Mamiya	Alan Tuck (Try)
	Sigma	Jaak (I'm not the one)
	Aigo	Quaid (Cannibal)
	Veho	Jacq (It's not ok)
Cell phones	Kyocera	Pravada (Hear me out)
	ZTE	DHT (4 kee)
	Qualcomm	Saving Koko (Na Na Na)
	TCL	Freedvmb (Vintage Youth)
	NTi	Kenzie Moore (Past due)
	ComplIQ	ALK (39 Lines)

Note. Experiment 1 used a total of 8 brands and 8 music clips (two per product category), whereas Experiment 2 used 24 stimuli.

Appendix B. Randomized Latin Square Design used to fully counterbalance the pairing of the brand with each music clip in each product category and type of pair (Experiment 2).

	<i>Critical</i>		<i>Noncritical learned</i>		<i>Noncritical novel</i>	
	Critical-Learned	Critical- Novel	Noncritical Learned	Noncritical Learned	Noncritical Novel	Noncritical Novel
C1	M1 + B2	M2 + B6	M3 + B1	M4 + B5	M5 + B3	M6 + B4
C2	M1 + B3	M2 + B1	M3 + B2	M4 + B4	M5 + B5	M6 + B6
C3	M1 + B1	M2 + B2	M3 + B4	M4 + B3	M5 + B6	M6 + B5
C4	M1 + B5	M2 + B4	M3 + B6	M4 + B2	M5 + B1	M6 + B3
C5	M1 + B6	M2 + B3	M3 + B5	M4 + B1	M5 + B4	M6 + B2
C6	M1 + B4	M2 + B5	M3 + B3	M4 + B6	M5 + B2	M6 + B1

Note. C: Combination; M: Music clip; B: Brand. Participants were randomly allocated to one of the six combinations. The order of presentation of the type of pair and position of the music-brand on each pair was randomized for each participant.