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THE PULSE OF IMPULSE BUYING: AN EXPERIMENTAL STUDY ON THE EFFECTS OF BACKGROUND MUSIC TEMPO ON IMPULSE BUYING

Research in Progress

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Abstract

Considering the importance of e-commerce, very little research has examined how marketing stimuli like music affect impulse buying behavior online. In general, the effect of music on impulse buying is not entirely understood yet. Prior research leads us to suggest that music may influence consumers' ability to exert self-control and thus their receptiveness to product offers in a shopping situation. Most research has been done in offline settings via surveys or field studies, which often makes it difficult to measure traits, attitudes and cognitive resource and to control confounding factors. Our study aims to contribute to research on impulse buying in three ways: 1) observing impulse buying in an e-commerce setting, 2) exploring the relationship between self-control, background music and impulse buying, and 3) proposing an experimental design to study impulse buying in the lab.

Keywords: Impulse buying, Music tempo, Background music, Online shopping.

1 Introduction

In 2021, consumers were forecast to spend on average \$276 monthly on impulse purchases, with 48% of consumers making impulse purchases on food (Tronier, 2021). Considering that the COVID-19 pandemic accelerated the shift from offline to online shopping for a substantial number of consumers (Torkington, 2021), it stands to reason that online impulse buying is also on the rise. However, most research on impulse buying so far has been carried out offline (Iyer et al., 2020; Lo, Lin and Hsu, 2016). An impulse purchase is a purchase that results from “a sudden, often powerful and persistent urge to buy something immediately” (Rook, 1987). Prior research suggests that if four factors coincide, an impulse purchase will likely follow: a receptive consumer, an irresistible product offer, the right shopping environment, and the right timing (Mohan, Sivakumaran and Sharma, 2013). Not all consumers are equally “receptive”, i.e. prone to impulse buying, in terms of personality traits (Rook and Fisher, 1995; Beatty and Elizabeth Ferrell, 1998; Vohs and Faber, 2007) but also in terms of personal ability, specifically the ability to exert self-control (Baumeister, 2002). Crucially, the ability to exert self-control can change depending on the situation a consumer finds herself in (Baumeister, 2002). If a consumer is in a situation where the mental resources she requires for self-control are depleted, her receptiveness to marketing stimuli and likelihood to engage in impulse buying increases (Vohs and Faber, 2007; Sultan, Joireman and Sprott, 2012). One such marketing stimulus that demonstrably affects purchase behavior in offline environments is background music (Turley and Milliman, 2000; Garlin and Owen, 2006). Playing background music can increase the time and money consumers spend in offline

retail stores (Turley and Milliman, 2000; Andersson et al., 2012). One music characteristic that has been shown to have a particularly large effect on consumers' emotional states and purchase behavior is music tempo (Garlin and Owen, 2006). While some studies examine the effect of music on self-control (Bray et al., 2013), there is, to the best of our knowledge, no study that examines the relationship between music tempo and self-control and how it affects impulse buying behavior.

As the native integration of e-commerce in social media platforms and augmented or virtual reality applications continues to grow, it will become more commonplace for consumers to be exposed to music while shopping online. Following the call of Iyer and colleagues (2020) to investigate marketing stimuli like music in different (online) settings and to examine interactive effects like the relationship between the ability to exert self-control and music tempo in more detail, we propose an experimental design that makes it possible to study these effects in a controlled online environment.

2 Research Model

Mohan, Sivakumaran and Sharma (2013) group the conditions under which impulse buying is likely to occur in four categories: it requires a receptive *consumer*, an irresistible *product offer*, the right *shopping environment* and the right *timing*. Our **focus variables** fall in the categories “*consumer*” (**self-control**) and “*shopping environment*” (**music tempo**).

Music has been researched and used as a tool in offline retail with the intention of inducing higher sales by increasing positive affect (Alpert and Alpert, 1990; Yalch and Spangenberg, 1990). A review of the effects of atmospheric factors on consumer behaviors indicates that in-store music has a significant impact on a variety of behaviors, specifically, “sales, arousal, perceptions of and actual time spent in the environment” (Turley and Milliman, 2000, p. 195). Fast tempo music, in particular, has been shown to increase arousal and pleasure, and to provide a more positive shopping experience (Eroglu, Machleit and Chebat, 2005; Garlin and Owen, 2006; Cheng, Wu and Yen, 2009; Andersson et al., 2012). Recent research in social commerce has similarly found fast tempo background music to increase arousal and pleasure leading to more impulse buying (Ju and Ahn, 2016). Pantoja & Borges (2021) found that compared to slow music, fast music leads to better taste expectations and higher purchase intentions.

H1: Faster tempo music increases the likelihood for impulse buying.

Failure to exert **self-control** has been discussed as an important consumer-side condition for impulse buying (Verplanken and Sato, 2011). Self-control can break down due to conflicting goals and desires, lack of monitoring of own behaviour, or a lack of mental self-regulatory resources (Baumeister, 2002; Verplanken and Sato, 2011). Self-regulatory resources are used during acts of self-control, active choice making and resisting impulses (Baumeister, Muraven and Tice, 2000; Bruyneel et al., 2006; Baumeister et al., 2008; Roberts and Manolis, 2012; Vohs et al., 2014). Consumers with depleted self-regulatory resources from repeated choice making have been shown to be more tempted by hedonic product features (Bruyneel et al., 2006), feel stronger urges to buy impulsively, and spend more on impulse purchases (Vohs and Faber, 2007).

H2: Self-control decreases the likelihood of impulse buying.

There is little research specifically on the relationship between self-control and music. One study investigated whether listening to emotionally uplifting music would improve self-control performance on a physical exercise task (Bray et al., 2013). While they did not find evidence for their hypothesis, the authors argue that “self-control tasks requiring cognitive breadth such as [...] decision-making [rather than tasks requiring cognitive narrowing as employed in the study] may show stronger effects” (Bray et al., 2013). Iyer et al. (2020) find that self-control mediates the effect of other marketing stimuli; thus we expect that it will mediate the effect of music tempo as well.

H3: Self-control mediates the effect of music tempo on impulse buying.

Impulse buying behavior is potentially affected by a variety of other factors (see e.g., Iyer et al., 2020). We control for them either by holding them constant in our experimental design (see next section) or by measuring them. Specifically, we consider the following **control variables**.

In the category “consumer”, multiple studies have indicated that the personality trait of *buying impulsivity* is a strong predictor of impulse buying behaviour (Iyer et al., 2020). Strong *shopping preferences*, e.g. a dislike towards online shopping, likely affect behavior *Mood*, both positive and negative, as it can trigger impulse buying (Beatty and Elizabeth Ferrell, 1998). Conversely, impulse buying can serve as a form of stress relief or mood repair to relieve negative moods (Youn and Faber, 2000). High music tempo has been shown to increase arousal (Turley and Milliman, 2000; Ju and Ahn, 2016).

In the category “product offer”, we control for factors that affect its desirability (e.g., prices, discounts) (Kukar-Kinney, Ridgway and Monroe, 2012; Park et al., 2012) by holding them constant during the experiment and across participants and treatments (see next section).

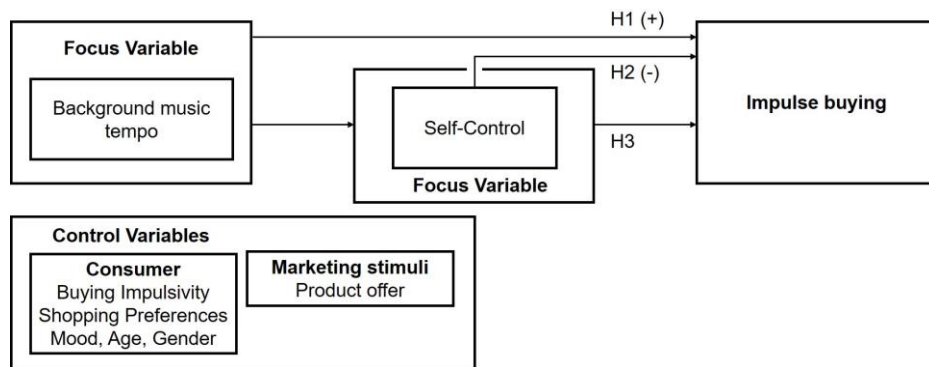


Figure 1. Research model.

3 Experiment

3.1 Procedure and payout mechanism

We design a laboratory experiment because it permits us to hold constant or measure a number of control variables that might obscure the relationships between our focus variables in a field setting. Our experiment is deployed on oTree, an open-source platform for conducting laboratory experiments (Chen, Schonger and Wickens, 2016). oTree’s platform uses HTML, which allows us to simulate a typical e-commerce store for the purpose of our experiment.

Our experiment is a 3x2 full-factorial between-subject design, with the focus variables music (fast, slow, control) and self-control (depletion, control). We chose a between-subject design to avoid spillover effects between treatments regarding music tempo changes and self-regulatory resource depletion. At the beginning of the experiment, participants are randomly assigned to one of the six treatment groups (Table 1). The groups in the “background music tempo: control” treatment do not hear any music throughout the experiment.

		Background music tempo		
		Fast	Slow	Control
Self-control	Depletion	Group 1	Group 2	Group 3
	Control	Group 4	Group 5	Group 6

Table 1. Overview of treatment groups.

The experiment consists of five phases (Figure 2). First, the procedure and payout mechanism are explained and the audio signal is tested. In the “fast” and “slow” treatment groups, music starts playing with the start of the self-control task and stops after the impulse buying task. Next, participants complete either the depletion or the control task depending on their treatment group. Participants in the depletion treatment are shown two random products and asked to indicate their preference for one of them, which has been shown to be mentally difficult and effortful (Vohs et al., 2014) (Appendix A: Figure 3). Participants in the control treatment are shown a single product and asked to indicate their preference, for instance regarding product usefulness or visual appeal (Appendix A: Figure 4). To reduce the cognitive effort of the control task further, it includes a no-preference option (Vohs et al., 2014). In both conditions, the task is repeated 67 times. Third, participants are asked to fill in a twelve-item questionnaire on depletion, choice intent, mood and arousal. Fourth, participants complete four rounds of a shopping scenario (Appendix A: Figure 5). In each round, they can choose between two variants of a single product or buy nothing. After each round, participants answer whether they had planned to buy such a product before the experiment, and some questions on attitudes to the product type. Fifth, participants fill in a final questionnaire that measures mood, arousal, perceived music tempo and musical enjoyment. After the debriefing, payout is facilitated through bank transfer with the participants’ personal details collected and stored separately from experiment data.

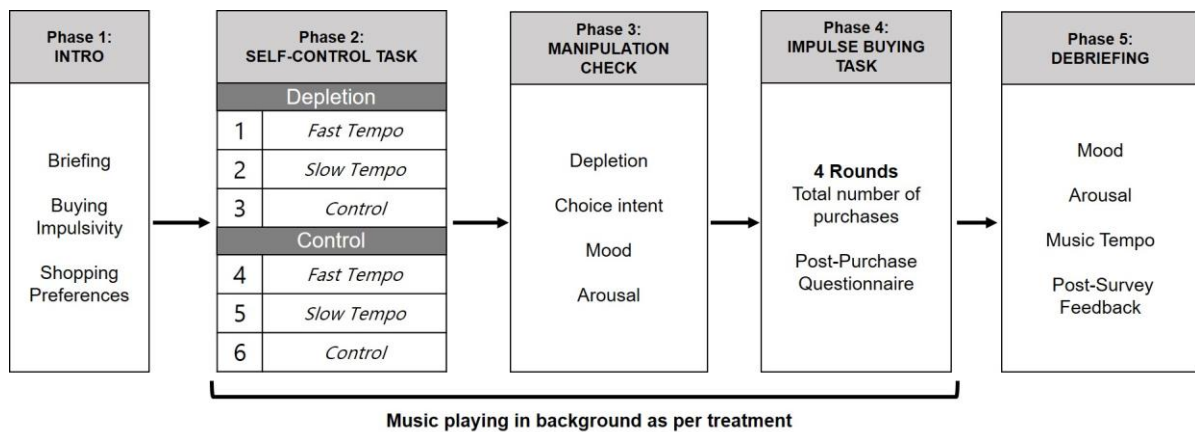


Figure 2. Experimental design.

3.2 Operationalization of variables

Dependent variable. Impulse buying. We count the number of purchases for each participant in the four rounds of the impulse buying purchase task. Each purchase counts as an impulse purchase unless the participant indicated in the post-purchase questionnaire that they had planned to purchase the product before the experiment.

Focus variables.

Music tempo is operationalized based on the *beats per minute* (BPM) of a piece of music. BPM is considered a “unit of measurement of rhythmic pulse” (Kennedy and Bourne, 2004, p. 181). Previous studies that have used music tempo as treatment variable have defined music with 60 BPM as slow music and music with 140 to 165 BPM as fast music (Balch and Lewis, 1996; Husain, Thompson and Schellenberg, 2002). We selected 18 instrumental songs based on their BPM for our experiment and conducted a pre-test with 12 participants. Participants were asked to indicate the perceived tempo for each song (fast/slow). 5 songs were excluded because participants’ perceptions varied widely. They agreed on the remaining 13 songs, which were combined into two playlists. The “slow” playlist consists of 6 songs (68-78 BPM), the “fast” playlist of 7 songs (140-170 BPM). Participants in the treatment

groups with music will hear the same playlist in the same sequence on repeat. We set the playlist length based on the expected duration of the experiment such that each playlist is heard twice at most.

Self-control / self-regulatory resources. We measure the depletion of self-regulatory resources with the scales for perceived effort, task difficulty, fatigue, and tiredness (Vohs *et al.*, 2020). Assuming we find the same correlations between perceived effort and difficulty on the one hand and fatigue and tiredness on the other, we will follow Vohs *et al.* (2020) and average the scores to form an effort index and a fatigue index, respectively.

Control variables measured. **Buying impulsivity** is measured with the Buying Impulsivity Scale (BIS; Rook and Fisher, 1995). Higher scores on the Buying Impulsivity Scale are associated with a higher likelihood of impulse buying (Vohs and Faber, 2007; Xiao and Nicholson, 2013). **Mood** is measured with the valence dimension of the Self-Assessment Mannikin (SAM) scale (Bradley and Lang, 1994). **Arousal** is measured with the arousal dimension of the SAM scale (Bradley and Lang, 1994).

Control variables held constant. All participants are shown the same four **product types** (with the same 2 options for each): chewing gum, soft drink, chocolate bar and muesli bar. In order to increase product desirability, we choose products that are likely candidates for impulse purchases due to their small size, light weight and ease of storage (Stern, 1962); and we choose hedonic food products, which are generally more likely to be bought without previous planning (Inman, Winer and Ferraro, 2009; Kacen, Hess and Walker, 2012). Marketing stimuli that affect impulse buying and are directly related to the product offer include mainly **price** and **sales promotions** (Stern, 1962; Kacen, Hess and Walker, 2012; Chan, Cheung and Lee, 2017). All products are offered at the same price and with the same discount.

3.3 Pre-test

A pre-test was conducted with a prior iteration of the proposed experimental design with 63 participants (36 male, 27 female; average age = 25). As in the proposed experimental design, participants could make up to 4 impulse purchases (average number of impulse purchases observed = 1.73). Based on the pre-test, we made technical improvements to the experiment to enable participants to listen to the playlists without interruption.

3.4 Planned Data Analysis

First, we will check using Mann-Whitney U tests whether we can observe any systematic differences between treatment groups regarding demographic variables (age, gender), buying impulsivity, mood and shopping preferences.

Next, we will use the post-purchase questionnaire to determine which of the purchases were actual impulse purchases and exclude purchases participants had already planned before the experiment. We will then check whether our manipulation of self-regulatory resources was successful. If perceived effort and task difficulty (fatigue and tiredness) are correlated as we expect, we will average them to form by comparing the effort and fatigue indices (Vohs *et al.*, 2020) of the depletion and control groups. We will also check whether participants heard music as intended, and whether their subjective tempo perceptions agree with our classification of music as fast/slow. We will exclude any participants that did not hear music when they should have or perceived a different tempo than intended.

Finally, we will use a mixed-effects logit model to test whether our focus variables affect the probability of making an impulse purchase. As we have four observations per participant, we will use a random effect to model unobserved constant heterogeneity on the participant level. Product and round are perfectly correlated; it will suffice to control for one variable.

4 Expected results

We expect scores for age, gender, buying impulsivity, mood and shopping preferences to be equally distributed across treatment groups. Should we observe significant differences, we will conduct

additional analyses to determine if they correlate with other variables and whether they need to be included in the regression model. We expect participants in the depletion treatment to report greater effort and greater fatigue compared to those in the control treatment. We expect that self-control will have a negative relationship with impulse buying; that background music tempo will have a positive relationship with impulse buying; and that the relationship between music tempo and impulse buying will be mediated by self-control. Lower levels of self-regulatory resources will amplify the effect of music tempo and increase the likelihood of impulse buying.

5 Discussion

Our research aims to contribute to filling the research gap on the relationship between music tempo and self-control and their effect on impulse buying in online environments (Iyer *et al.*, 2020).

Considering the growing integration of e-commerce in social media platforms and augmented or virtual reality applications, it will become more commonplace for consumers to be exposed to music while shopping online. Insofar as exposure to music, or certain types of music, can increase consumers' receptiveness to marketing stimuli, more research is necessary to better understand these relationships. Such insights can be used to inform consumers better about how marketing stimuli affect their behaviour, and perhaps even to develop tools to help them avoid shopping sites geared to tap into impulsive behaviors. In offline environments, the consumer has few options to affect the design of the shopping environment. In online environments, options can be built – some, like adblockers, are already popular and widely used (Malloy *et al.*, 2016). Other small apps or browser extensions can be developed to detect “dangerous” interface elements and warn users, or deactivate the elements. Further research could address the question which elements may even prove beneficial to consumers – like being able to put items on a “buy later” list or the shopping basket, which may satisfy the immediate urge to buy and give consumers time to think about the purchase (Rubin *et al.*, 2020). Such interventions and warnings only work, however, when situations and the actors are well understood. Our research hopes to help achieve an actionable level of understanding by suggesting a lab set-up that permit controlled and systematic variation of any number of (potential) influencing factors.

Our research is subject to several limitations. For one, consumers with compulsive buying disorder are, for now, not in the scope of our research. Extending our research to this group of people would certainly be a highly worthwhile endeavour, and we would welcome a chance to work with experts in the field. For another, we examine only one music characteristic: tempo. Other factors that may be investigated in future research are, for example, music genre and volume. We chose the music based on the tempo regardless of the genre, and let participants adjust the volume as they preferred. Finally, the lab environment our study is set in reduces the ecological validity of our findings. Also, our sample will be a convenience sample of university students. Future research will be needed to show whether our expected results can be replicated in other studies. As this experiment is implemented on oTree, future research can easily replicate our experiment for different samples and test the effects of other variables on impulse buying in the same controlled environment. Replication in the lab would, ideally, be followed by a field study to address the issue of ecological validity further.

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6 Appendix A

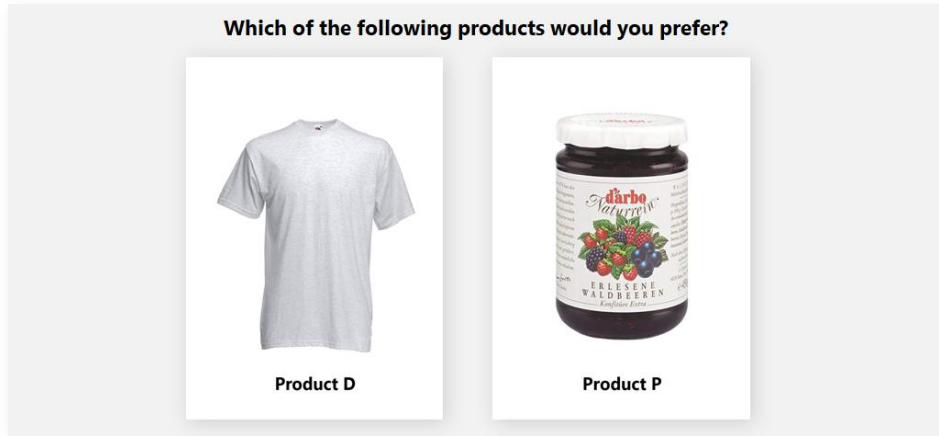


Figure 3. Example of depletion task in phase 2.



Figure 4. Example of control task in phase 2.

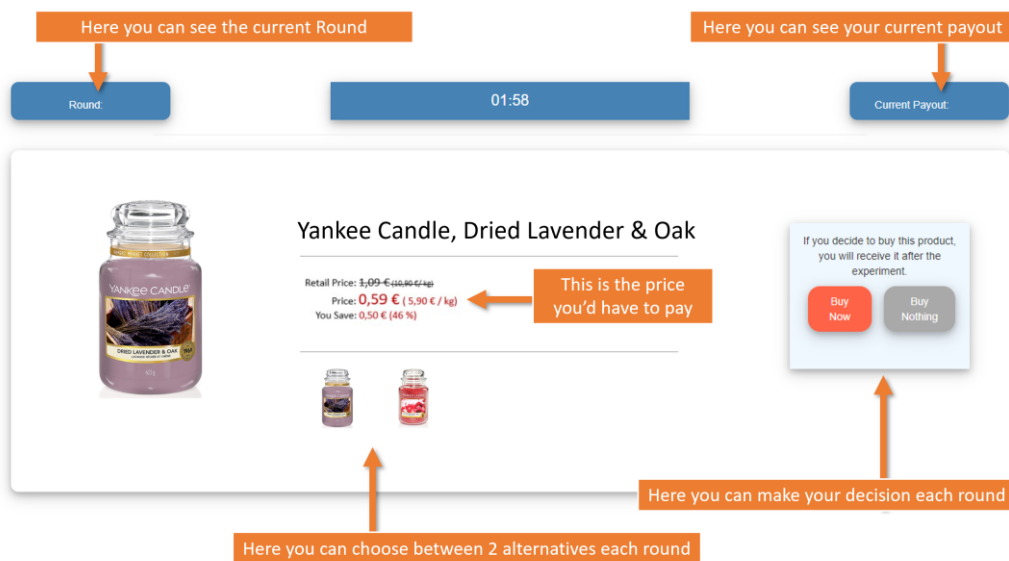


Figure 5. Experimental design.