The effect of background music on consumer behaviour in a retail environment.

Bachelor Thesis

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Abstract

This bachelor's thesis is about the effect of the background music in a(n online) retail setting on consumer behaviour. To study this effect music was subdivided into four elements: pitch, volume, timbre and tempo. After elaborating this subdivision, literature was reviewed on the effect of the music tempo on consumer behaviour in a retail setting. This review revealed secondary characteristics of music that influence consumer behaviour according to prior research. The resulting information explained how music affects consumers and what these effects are. After the literature review, the research method and the procedure of the experiment were explained. An experiment was conducted which measured the effect of music tempo on different kinds of consumer behavior during online grocery shopping. Lastly, the results were presented and analyzed, leading to the conclusion, discussion, implications and future directions. The results of the experiment reject the hypotheses that state that music tempo has an impact on shopping time and money spent but confirm that music tempo has a significant effect on perceived shopping time. Faster music made respondents overestimate their shopping time, while slow music made them underestimate it.

Keywords: Background Music, Tempo, Consumer behavior, Volume, Genre, Shopping time, Time perception, Money spent, Sales, Online Retail, Atmospherics

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The effect of background music on Consumer behaviour in a retail environment.

Almost every retail environment you shop plays background music. Most people think this is done just to create a pleasant atmosphere, but there is a lot more this than meets the eye. Individual components and characteristics of music have the ability to influence consumer behaviour in ways beneficial to the owner of the shop. There is an exception though: over the years online shopping is an increasingly prominent part of retail. However, the websites you shop don't have an embedded music player. Is listening to your own music during online maybe preferred by the web shops? Or is there something to be gained for them by adding the embedded music player? Even if they do add the music, does it influence consumer behaviour in the same way as in physical retail environments? This information is useful for retail managers because they can utilize the positive effects of music as a very cost-effective way to influence consumer behaviour and maybe even increase profit margins. On the other hand, consumers could 'defend' themselves by playing their own music while shopping. By doing this they could prevent being influenced by music on their purchasing decisions.

Problem description & Outline

The problem this bachelor's thesis addresses is that the effects of music on consumer behaviour have been extensively researched, but there isn't a widespread consensus about the effects of music on consumer behaviour in an online setting. The goal of this thesis will be providing more practical and physical evidence for the claims made in existing reviewed literature. It is unclear if the behaviour of consumers is influenced in a similar way in an online environment. This thesis tries to bridge this gap and provide preliminary research into the effects of background music on online shopping behaviour. The thesis is structured as follows: First music will be split up in different parts. The different parts are than reviewed by literature concerning their effect on consumer behaviour. Based on the found effects, three hypotheses will be formed. The next step is an explanation of the research method and procedure that is used to conduct the experiment. Following up to that the results are presented and the conclusions are drawn. The last part of this bachelor's thesis will be dedicated to the discussion. This discussion contains: a reflection on the results, theoretical and managerial implications of the conclusions, the internal and external validity of the research, research limitations and future research suggestions.

1. Literature review

1.2 Defining music

Music is the purposeful activity of arranging sound over a period of time used to express oneself. To study this, we divide music into four separate elements: pitch, volume, timbre and tempo. When this subdivision is clear, literature will be reviewed on the effect of music tempo on consumer behaviour in a retail setting. This review will reveal secondary characteristics of music that influence consumer behaviour according to prior research.

1.3.1 Pitch

The pitch of the music can be defined as: "the quality that makes it possible to judge sounds as "higher" and "lower" in the sense associated with musical melodies" (Plack et al., 2005). A faster oscillation of a sound wave will make a sound be perceived as higher in pitch where a slow oscillation of a soundwave will sound lower in pitch. The difference between two pitches is called an interval. The combination of all pitches used in a piece of music is called a scale. The biggest and easiest distinction of scales is between major and minor. Musically the difference between the two is that in a minor scale the third scale degree(interval) is a semitone below the same scale degree in a major scale. The first note of the scale is called the root. The root note is also referred to as the key of a piece of music. The main sequence of pitches in a song is called the melody and all other notes that are played at the same time are called the harmony.

1.3.2 The effect of pitch

To study the effect music pitch has on consumer behaviour, one must use the key or mode of a piece of music because no song consists of only one single pitch. This means instead of looking at the effect of single notes, you look at the scale used to determine how low or high the pitch of a piece of music is. Literature suggest a single effect pitch indirectly has on consumer behaviour: Higher pitches generally invoke happier moods than lower pitches (Bruner, 1990). Since it can be a tedious task to determine how high or low each song is in a

playlist and personal circumstances of customers are endlessly more influential on the mood of a customer, music pitch will not be an independent variable for this experiment.

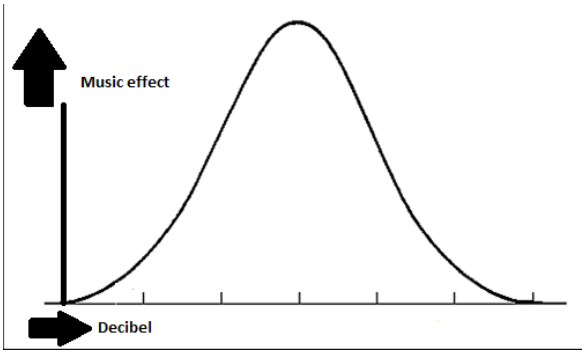
1.4.1 Volume

This component of music is measured in Decibel. This is the logarithmic scale used to measure the amount of sound pressure of a sound wave, where the sound wave is a vibration in the air. This measurement determines how loud something sounds. The master volume determines how loud the entire piece of music combined sounds and the dynamics are how much force is applied to the individual instruments by the musicians and how they relate to each other.

1.4.2 The effect of music volume

The effect the music has on consumers will most likely be stronger when the music is louder because it increases its presence in the minds of the consumer. This can be explained by the consumer being able to hear the subtle nuances in the music. This will result in a positive effect on the power music has on delivering the mood it portrays to the consumer and that they are being distracted less by ambient noise. There is a limit to this effect of course: If the music is to loud to have a conversation, customer service and socialising in the store will become a lot more difficult. Very loud music can even result in pain and hearing damage. Some studies show that playing music at higher volumes can lead to customers spending shorter at a venue without decreasing the amount of sales per minute (Garlin & Owen, 2006) but some studies only found this effect if the consumers are familiar with the tunes played(Smith & Curnow, 1966). This results in a bell curve with on the X- axis volume in Decibel and on the Y- axis Sales per minute. At 0 Db the customers will not be affected by the music because they won't be able to hear it. The effect the music the music has will increase because ambient noises will be less audible. At the top of the curve the volume is at a level where it is clearly audible and drowns out most ambient noise without causing discomfort. After this point raising the volume will create an increasing amount of discomfort to the customers in the store. Volumes over 85Db are not legal in retail environments, because working under these conditions legally require hearing protection. Interestingly a recent study found that "low (vs. high or no) volume music/noise leads to increased sales of healthy foods due to induced relaxation. In contrast, high volume music/noise tends to enhance excitement levels, which in turn leads to unhealthy food choices" (Biswas et al., 2019).

Y



X

Figure 1: **The relation between volume and music effect**

The curve shown in figure 1 is different for each individual. Some people for example might be almost deaf, which would shift the centre of the curve to the far right. Other

people might have very sensitive hearing or react very negatively to loud noises. These people will have the same curve shifted to the left. Because of this, it does not seem to be very useful to determine effect a specific number of Decibels has on consumer behaviour. This is also the reason the X- and Y axis are not numbered, since the numbers are different for each individual customer. Music volume will be taken into account but will not be researched any further as an independent variable in this experiment.

1.5 Timbre

The timbre of the music concerns the quality of the sound. When two instruments play the same note(pitch) they will still sound different. The individual characteristics of the instrument will cause differences in pitch so that not just the corresponding frequency is played but others as well (called overtones). The note that is played is just the loudest one of all the overtones produced. All these overtones combined are called the sonic space of the instrument. There are also differences between how a waveform changes over time, because different instruments have different amounts of attack, decay and sustain (how long the waveform persists). So, by combining the two, timbre consists of differences in the overtones of different instruments and different amounts of attack, decay and sustain. This explains why two singers or instruments will sound different from each other; they might sing the same note but due to differences in their physique or nationality will still make them sound different.

1.6.1 Tempo

The tempo of the music determines how fast the aforementioned pitches are played. It is measured in Beats per minute (BPM). Where one beat is one tap of your foot or nod of your head when you try to move along with the tempo of the song. The second component of tempo is the rhythm. It is displayed as a fracture where the top symbolizes the number of beats in a bar and the lower part what note is counted as one beat. For example, ¾ means there are 3 notes in one bar where one quarter note is 1 beat. The last component of tempo is the accentuation of the beats. Generally, this is where the snare drum is hit by the drummer. This beat is played louder than the others to create a groove.

1.6.2 The effects of tempo

To understand how fast the music needs to be played in a store one must consider several effects music tempo has on consumers. The first one is that music tempo can significantly impact the cardiovascular system of the human body. Some research shows that fast music can lead to higher blood pressure and heartrate (Ma, 2016). This could explain the second effect music has on customers: faster music increases the traffic pace an of customers in a supermarket (Milliman, 1982) and causes people to stay shorter in restaurants (Caldwell Hibbert, 1999; Garlin & Owen 2006; Milliman, 1986). The third effect tempo has on customers is that it can increase or decrease sales volume. Milliman (1982) reported a huge increase of 38.2% in sales by Slowing the music tempo in a supermarket. The reason for this is complicated. It could be a secondary effect to the aforementioned changes in the cardiovascular system and traffic pace, but also by different speeds of music invoking different moods. One thing that is important to notice is that music tempo has the greatest effect on customer arousal out of all the researched characteristics (Garlin & Owen, 2006; Smith & Cornow, 1966). Faster music also causes consumers to spend more money, for example to drink more alcohol at a bar (Milliman, 1986; McElrea & Standing, 1992; North & Hargreaves, 1998; Stafford & Dodd, 2013). The tempo of music impacts the time perception of customers: playing faster music will increase the perceived time that has passed (Oakes,

2003; Schallmoser et al, 2017). This can be explained by aforementioned effects of music tempo but also by increasing the number of stimuli the customer receives in a certain time. The customer has more songs and beats to reference events to and must process more "information", so will think that more time has passed (Ornstein, 1969). 15 minutes spend in a store while playing 7 songs will seem longer than 15 minutes in a store that plays 3 songs. This effect can be used to alter consumers perception on waiting times at a checkout in a busy store or while waiting for their food in a restaurant.

It is important to note that the type of retail setting has a high impact on the optimal tempo of the music: If a store has a large amount of customers inside they might want to play fast music to increase the traffic pace but when they only have a small amount of checkouts with long waiting lines this will also increase the perceived time waiting in line, which in turn might negatively impact the consumers satisfaction in the store. Stores with a very large number of products or very small number of customers might want to play slower music to keep the customers in the store for as long as possible. This way they have more time to inspect the different kinds of products and maybe buy stuff they wouldn't have seen when they left earlier.

Research also shows that the effect of music tempo is highly dependent on the mode music is in: "music in a major mode did not vary in effectiveness on sales by tempo while music in a minor mode was significantly more effective when accompanied by a slow tempo. That is, the Milliman effect was eliminated for music in a major mode." (Knoferle et al., 2011).

Since music tempo is very easily to manipulate in a reliable scientific way and shows a lot of promising and interesting effects in the researched literature above, music tempo will be the dependent variable of this experiment.

1.7.1 Other characteristics, Music genre

Some secondary characteristics of music that are known to have an influence on consumer behaviour based on reviewed literature are: Lyric content, lyric language, portrayed mood, familiarity, preference and most importantly genre. The genre of the music is a categorisation of different types of music into groups based on all aforementioned characteristics. Since music genre is the determining factor explaining if an individual likes a piece of music or not, it will be reviewed in the literature research separately as well.

1.7.2 The effects of genre

To determine the genre that a retail setting should play one should consider a few things.

The most important thing to determine the genre is the target audience of the store. Characteristics to consider are for example: the age of the customers and if the belong to a specific subculture that enjoys a certain kind of music. Since most retail environments focus attracting as much people as possible, top 40 is typically the genre used as background music. This genre inherently appeals to the most amount of people, which in turn will improve the mood for the largest part of the customers. Some niche categories of shops might perform better with different kinds of music. Think for example of a skateboard shop playing hip-hop, or a guitar store playing rock.

A store can also make customers believe they are popular among a certain kind audience by playing jazz or classical music. This music tends to be associated with people of a high socio-economical class and status. This can make the customers think that people who tend to listen

those genres tend to shop there and thus the products being of a higher quality than they actually might be.

Research supports this hypothesis: classical music leads to customers spending more money than top 40 music (Garlin & Owen, 2006; North, Shilcock & Hargreaves, 2003), on meals in a restaurant along with jazz (Wilson, 2003), compared to no music or easy listening music and also increases the amount of money spend in a wine store (Areni & Kim, 1993). Research interestingly also confirms that matching the nationality of the sold products to the lyrics of the music increases sales: Playing French or German music in a wine store can significantly increase the sales of French or German wine in a wine store (North & Hargreaves, 1999) This might be a viable strategy to influence product choice of customers to the products retail managers want them to buy. In theory this sounds like a very useful effect of background music, but it is almost impossible to make changes to the nationality of the lyrics without decreasing the likeability of the music for the target audience. Even if for example Asian music is played in a supermarket to promote big discounts on Asian foods, Western customers still prefer Western music over Asian music. A positive impact on customer moods is a lot more important than nudging them towards certain product categories, so this effect of background music can be very hard to implement in a profitable manner.

Almost all reviewed literature concerning the topic state that music preference and likeability have the biggest influence on sales, shopping time and customer satisfaction. Because of this top 40 is in almost all retail environments the best option because it appeals to the most customers. Therefore, the typical top 40 songs currently played will be used for this experiment.

1.8 Summary literature

Literature identifies several effects that changing the background music can have on consumer behavior in a retail environment. These are:

- Higher pitches induce happier moods than lower pitches.
- Changing music genre to one that is preferred by customers can lead to them spending more money and has the ability to increase their satisfaction. Changing the nationality of the lyrics could influence which products consumers buy.
- Music volume can decrease the amount of time spent at a venue without decreasing sales. Also, High volume music could lead to unhealthier food choices.
- Music tempo was found to impact shopping time, traffic pace, amount of money spent, time perception and customer arousal.

2. Hypotheses

2.1 Conceptual model

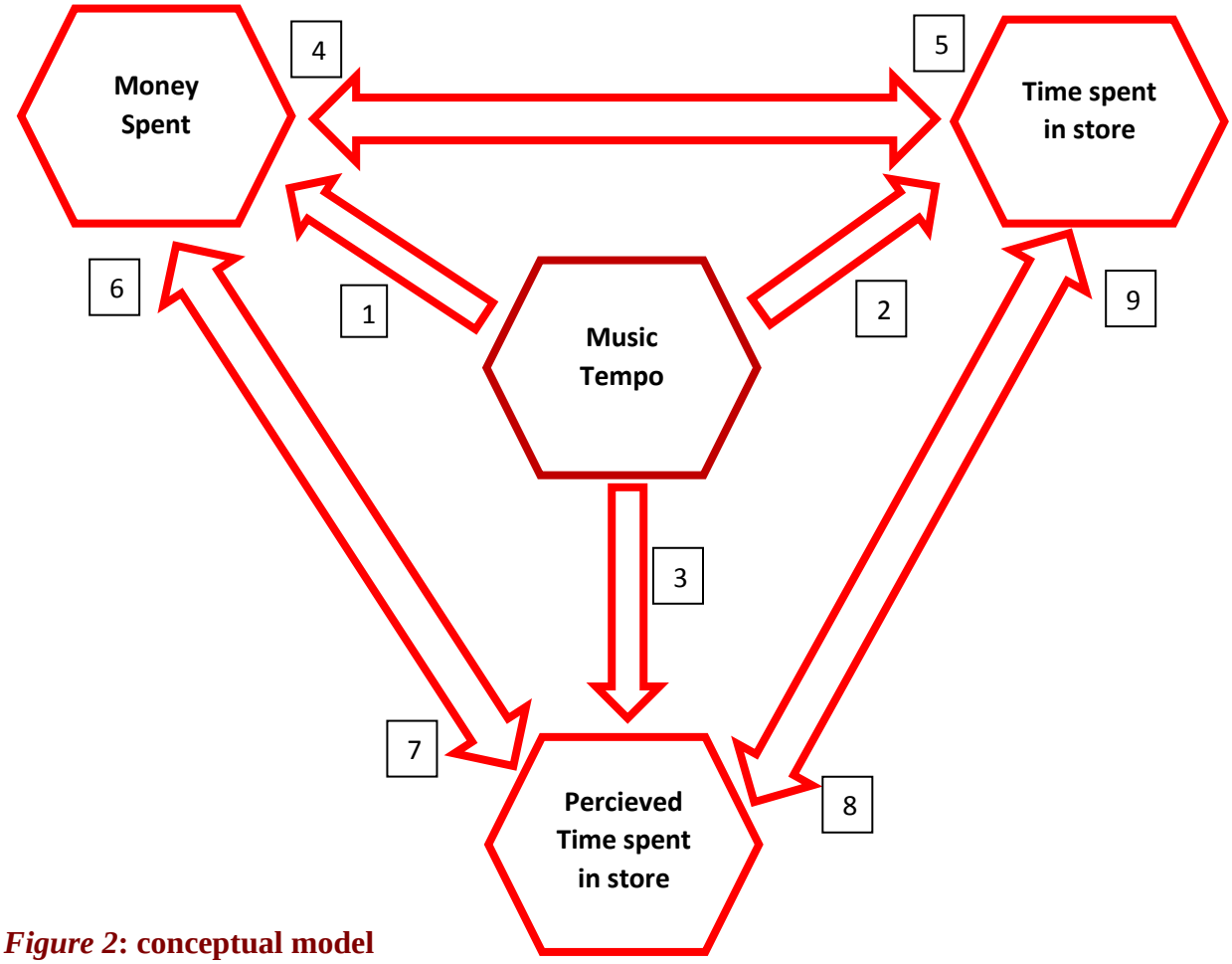


***Figure 2*: conceptual model**

This model explains how the variables studied in this experiment might relate to each other. Each number corresponds to a hypothetical relation between the two variables explained below. Effects 4 / 9 state hypotheses based on reviewed literature and logical thinking about why there might be an interdependence present between the three independent variables. These are not statements, but rather offer an insight into the hypothetical relations between the variables.

1. Slower music could customers spend more money indirectly, by making them spend more time shopping (effect 4), and decreasing the perceived shopping time (effect 6)
2. Slower music causes customers to spend more time shopping by decreasing their physical movement speed (Milliman, 1982).
3. Slower music contains less information to be processed by customer's brains, making them perceive their shopping time as being shorter (Ornstein, 1969). Customers could also base their perceived shopping time on the time they normally need for buying the same amount of groceries. If this takes less time, the perceived shopping time will be decreased even more.

4. If customers spend more time shopping, they have more time to inspect different kinds of products and discounts. This will make it more likely for them to buy products that weren't on their grocery list (Milliman, 1982).
5. If Customers spent more money, they typically buy more individual products, which takes longer to do.
6. If customers are in a rush and perceive their shopping time as longer, they might leave earlier (effect 9). This in turn could cause them to spend less money
7. Customers could base their perceived time on how much money they spend. For example: spending €20 might normally takes them 15 minutes while spending €40 could take them 25 minutes.
8. This effect seems obvious. Spending less time in a store makes customers perceive that time as being shorter.
9. If customers are in a rush and perceive their shopping time as longer, they might leave earlier. This could make the perceived shopping time having an influence on actual shopping time.

2.2 Hypotheses

If the tempo (BPM) of the music is increased by 25%-

1. **-The shopping time will be shorter-**

The main reason for this hypothesis is the increased traffic pace Milliman (1982) found in his study. If customers walk faster through the store, they have less time to examine the products and inspect the different kinds of discounts the store has to offer. This would logically lead to them spending less money, especially in stores with a large selection of products like furniture stores or big supermarkets. The increased perceived time found by Oakes (2003) and Schallmoser et all. (2017) could also play a part in the shopping time reduction. Imagine you are in a rush and say to yourself that you want to spend 10 minutes in a store to be in time for the rest of your daily activities. If in this example the slow background music decreases the amount of time you perceive to be in the store, you might stay longer.

It will be interesting to find out if this effect is also present in online environments because traffic pace is not really a factor there. Navigating the website and clicking the mouse will take a negligible amount of physical movement, compared to walking through a store, searching for products and paying the cashier. It will also be interesting to see if music tempo influences the decision-making speed of the customers too, which is now probably the biggest factor contributing to their time spent shopping.

2. **-The respondents will spend less money-**

As a result of spending less time on the store. Because time spent in the store is one of the most important variables when predicting money spent, according to Milliman (1986).

3. **-The amount of perceived time in minutes will be longer-**

Oakes (2003) explains this effect as follows: **"**Memory-based storage-size models (e.g., Ornstein, 1969) suggest that perceived duration of a temporal event is greater when subjects are exposed to stimuli containing larger amounts of data to be cognitively processed"

-Then when the tempo (BPM) of the music is decreased by 25%.

3. Method

The examined effect of music tempo on (perceived) time spent and money spent in the store is a cause and effect relationship, which is best examined using an experimental research design. The experiment used a between-subjects research design where the independent variable music tempo is split into 2 groups (Fast & Slow). The dependent variables are perceived time spend, spending, and time spend in the store.76 of respondents were selected based on their gender and age. The gender was measured as the gender the respondent was born as; either male or female. Only the male respondents were a part of the experiment. The age was measured in full years by asking in what year the respondent was born. Respondents below the age of 18 and older than 26 will not continue to the experiment either. The reason for selecting males of a certain age is to reduce the within-group variance of the results. This will make it easier to analyze if the average of the two groups within the sample are statistically far enough apart to confirm the hypotheses. The respondents were divided over 2 groups by alternating the speed of the playlist every time a new respondent starts the experiment. They will be referred to as the "slow music group" and the "fast music group". After confirming the respondents gender and age, the respondents were asked to wear earbuds and shop for groceries online at the website " www.jumbo.com ".
One of the reasons the experiment is not held in a physical store is that "Internet retailing is the fastest growing global channel through 2022 at 73 percent to become a larger channel than traditional grocery retail" (Euromonitor International, 2017). It will be interesting to confirm if the effects background music has on physical stores also could be applied in an online environment. If online retail will be larger than traditional physical retail in the future, the information this experiment provides is many times more useful when conducted in said online environment.

The respondents listened to a premade playlist consisting of music in the corresponding tempo, which is either sped up or slowed down by 25% using the time stretch feature of the digital audio workstation Fruity Loops 8. The songs are re-rendered to avoid pitch changes and distortion. The playlist is a selection from the actual playlist from the physical Jumbo stores found on Spotify. The selection is based on BPM so that songs that are originally fast or slow are evicted. Generally, songs between about 80-120 bpm are selected. The reason for this is that slowing down very slow songs or speeding up very fast songs can make them very unpleasant to listen to and also could cause the lyrics to be indecipherable.

The playlist was played on shuffle, so the fast music group doesn't hear songs in the end that are not played for the slow music group. The volume was high enough to drown out all ambient noise but low enough to avoid discomfort (see figure 1). Based on the literature review the change in tempo will influence their shopping time, amount of money spent and the time perception of the respondents, so these are going to be the variables that were measured. The shopping time was measured in seconds using a stopwatch. The moment the respondents open the webpage until the moment they proceed to the payment screen was the period considered as their shopping time. The amount of money spent was measured by the total price in eurocents of their grocery list. When this measurement is finished the respondents were asked how many minutes they think they were shopping to measure the perceived time that has passed. After this experiment a statistical analysis tested if the found effects are significant or not.

An independent sample t-test with a 95% confidence interval was used to check if the average (/perceived) shopping time and money spent of the fast music group was significantly lower than the slow music group.

TITEL	ARTIEST	ALBUM
Het Regent Zonnestralen	Acda en de Munnik	Adem
Father And Friend	Alain Clark	Father And Friend
Girl On Fire	Alicia Keys	Girl on Fire (Remixes) - EP
Grenade	Bruno Mars	Doo-Wops & Hooligans
A Night Like This	Caro Emerald	Deleted Scenes From The Cutting Room Flo...
Get Lucky (feat. Pharrell Williams & Nile Rodgers) - Radio Edit	Daft Punk, Pharrell Williams, Nile Rodgers	Get Lucky (feat. Pharrell Williams & Nile Ro...
I'll Be Your Man	James Blunt	Some Kind Of Trouble (Deluxe Edition)
All of Me	John Legend	Love In The Future (Expanded Edition)
Rock Your Body	Justin Timberlake	Justified
I Was Made For Lovin' You	KISS	Dynasty (Remastered Version)
Sweet Goodbyes	Krezip	Best Of/Live DVD
Uptown Funk	Mark Ronson, Bruno Mars	Uptown Special
Payphone EXPLICIT	Maroon 5, Wiz Khalifa	Overexposed Track By Track
Waves	Mr. Probz	Against The Stream (The Original Soundtra...
Unwritten	Natasha Bedingfield	Unwritten
Sexy Als Ik Dans	Nielson	Sexy Als Ik Dans
Feel	Robbie Williams	Escapology
It Wasn't Me	Shaggy, Rik Rok	Hot Shot (International Version #2)
Hold the Line	Toto	Toto
Outlaw In 'Em - Single Edit	Waylon	Outlaw In 'Em
Rolling in the Deep EXPLICIT	Adele	21

***Figure 3*: Playlist**

3.2 Procedure

First a male respondent will be selected by estimating that their age lies within the range of 18-26 and they will be asked if they want to join the study. If they agree they will be brought to a nearby room with a pc within the university. The respondent will be asked the questions; “In what year were you born?” After they answered and it is confirmed they don’t fall outside the 18-26 range, they will be told to pretend to go grocery shopping online @ www.jumbo.com . while listening to one of the two playlist speeds, which will alternate every respondent to make sure they are divided evenly. As soon as they click their mouse to navigate the webpage the music and a stopwatch will be started. Once they are ready to pay (which they can do if they want) the time will be stopped and noted in a notebook next to the respondent’s number, group, age and genre. After that the total price of their grocery list will be copied into the notebook from the screen. Lastly, they will be asked how long they think they were shopping (the stopwatch wasn’t made visible to them) and that time will be noted as well. Once this is done the research is finished and the respondents will be thanked for their participation.

4. Results

Df=74 N(slow/fast=36)	Speed	Mean	Sig. (2-tailed)
Money Spent (€)	**Slow**	**22.75**	**,264**
	Fast	**20.00**	
Time Spent(sec)	**Slow**	**930**	**,248**
	Fast	**843**	
Overestimation	**Slow**	**-93**	**<0.001**
	Fast	**66**	

***Table 1*: Results**

The data was statistically analyzed by SPSS using an independent sample test. To compare the results correctly, the estimated time and actual time spent were converted to seconds. Estimated shopping time alone cannot test if music tempo has an influence on perceived shopping time because it depends on the difference between the actual and perceived time. Therefore, overestimation is the new variable that needed to be created by subtracting the actual time from the estimated time.

The dependent variables are now Money spent (€), Time spent (sec) and the Overestimation(sec) and the independent variable is music speed (fast, slow). For display the money spent was rounded up or down to eurocents and the time to whole seconds. The Levene's test was insignificant for all variables, so equal variances were assumed.

The respondents in the fast music group spent on average €2.75 less than the respondents in the slow music group. This increase lacked significance.

The respondents in the fast music group spent on average 87 seconds less time shopping than the respondents in the slow music group. This increase also lacked significance.

The respondents in the fast music group overestimated their time spent with 66 seconds. The slow music group underestimated their time spent shopping by 93 seconds. This result was statistically significant(sig<0,001).

5. Conclusions

Hypothesis 1. If the tempo (BPM) of the music is increased by 25% the shopping time will be shorter than when the tempo of the music is decreased by 25%.

This hypothesis was rejected. Music tempo did not significantly impact shopping time. The fast music group did however spend 87 seconds less time on shopping on average.

Hypothesis 2. If the tempo (BPM) of the music is increased by 25% The Respondents will spend less money than when the tempo of the music is decreased by 25%.

This hypothesis was also rejected. Music tempo did not significantly impact the amount of money spent.

Hypothesis 3. If the tempo (BPM) of the music is increased by 25% The overestimation of the shopping time will be larger than when the tempo of the music is decreased by 25%.

This hypothesis was confirmed(sig.<0.001). Music tempo had a significant impact on time perception. Faster music caused the respondents to overestimate their time spent shopping by 66 seconds, while slower music made them underestimate their shopping time by 93 seconds.

6. Discussion

6.1 Reflection on the results

To explain the lack of significance of hypotheses one and two we can look at a few aspects of the variables, the respondents, the research and the research method to identify several possible causes.

The fact that the research focused on online shopping eliminated over 95% of the physical movement needed from the respondents to purchase their products. It could very well be true that music tempo mostly affects physical movement speed and not necessarily cognitive tasks like the decision making involved. This elimination of physical movement could be the main cause of the music tempo not having similar effects on shopping time. If music would significantly affect walking speed it would logically impact shopping time in medium to large physical stores. Respondents also didn't have to physically search for the products (because the website has a search bar), enter and exit the store, wait in line for the checkout and pay. If one looks at the difference between the results of this experiment and the results from the experiments in the literature, these aspects of shopping seem to be the ones that are affected the most by music tempo.

Maybe the delivery of the music using earbuds made the respondents process the music more consciously, instead of in a more subconscious way when it its played over a speaker in the background. This, in combination with the fact that this was an experiment and the respondents could easily figure out they were being manipulated by the music, might change how the respondents react to the music.

The group of respondents that was researched (males, ages 18-26, mostly studying at Wageningen university) might not be affected in the same way as other demographic

categories like women or the elderly. A reason that this specific group might be a lot less affected by tempo changes in top 40 music than other people is that most respondents acted quite negatively to the music. So, while top 40 music is inherently liked by the masses, this was not the case for most of the respondents. This could be one of the factors explaining the difference between this experiment and the one from Milliman (1982). Most reviewed studies stated that music preference has the biggest effect on the amount of money customers spent and plays a small part in time spent shopping. The respondents were purposefully selected to be similar in age and gender to reduce the within group variances. More research needs to be done to confirm that the hypotheses are not significant in other demographic groups as well.

Some songs of the playlist are in a major mode. To requote a part of the literature: "music in a major mode did not vary in effectiveness on sales by tempo while music in a minor mode was significantly more effective when accompanied by a slow tempo. That is, the Milliman effect was eliminated for music in a major mode" (Klemens et al., 2011).

The increase and decrease of the music could have been too small to make a significant impact on shopping time, maybe a 50% change would make enough difference to show significant impact on shopping time and money spent. The reason for this notion is that faster music did decrease time spent by 86 seconds, however not significantly.

6.2 Theoretical implications

Theoretically this experiment confirms the hypothesis that faster music increases perceived time passed found by Oakes (2003) and Schallmoser et all. (2017). The results also suggest that Ornstein (1969) was correct in his reasoning. Increasing the number of stimuli for the brain to process (by increasing the speed of the music) makes an event be perceived as longer. However, the experiment could not replicate the results found by (Milliman, 1982; ; Milliman, 1986; Hibbert, 1999; Garlin & Owen 2006) that music tempo influences the time spent shopping or that music tempo has an effect on sales, found by (Milliman, 1986; McElrea & Standing, 1992;North & Hargreaves, 1998;Stafford & Dodd, 2013).

6.3 Managerial implications

Music tempo significantly impacts the amount of time customers think they are shopping. This information could still be useful on its own. The main implication would be for retail settings with long waiting lines, for example restaurants and very busy stores. The time spent waiting will probably have a significant negative effect on customer satisfaction, so customers perceiving this time as shorter by playing slower music could hypothetically lead to an increase in customer satisfaction. This information is useful because music is present in nearly all retail environments. Retail managers can use the positive effects of music on consumers without any additional costs (because the music is usually played anyway). This explains why music could be a very cost-effective way to influence consumer behaviour.

6.4.1 Internal validity

The main problem with the internal validity of this experiment is that that the manipulation of the tempo might not have been strong enough, but that is something that has to be tested to be confirmed.

6.4.2 External validity

For the external validity of the research the main problem is the very small amount of demographic differences between the respondents. One could not say these results hold true

for the entire population because the effects were just tested for males between ages 18-26, mostly from around the Wageningen area. The fact that the results were gathered in an online environment could also lead to the results not being reproducible in other types of (physical) stores.

6.4.3 Reliability

The variables were measured in a very scientific manner by defining and measuring and manipulating the variables in a way that there will be no debate on if the data was reported could be any different from the actual data for this specific case. The shopping time could be a second more or less due to human error, the amount of money spent is exact since it was copied from the price of the grocery list. The estimated time is accurate to the minute. This could be estimated in seconds to match the actual shopping time. But, since most respondents couldn't guess accurately to the minute, the addition of seconds wouldn't have a large enough impact to alter the results of this experiment. Because of these reasons the reliability of the results seems to be very high.

6.5 Limitations

Originally it was the plan to conduct the experiment in a physical retail environment. Due to the inability to find shops that wanted to cooperate this idea was discarded. After this, a new plan was made to conduct the experiment in a simulated retail environment. Due to the lack of funding and the complexity of setting up such a thing in a large enough scale to affect customer movement- and decision-making speed, this plan was deemed unrealistic as well. Several components of music such as pitch, timbre, genre, volume and lyric content were also omitted from the independent variables to decrease overall complexity and the number respondents needed. This was done to comply with the time constraints provided with the experiment. Gathering the data for the current experiment alone took about 40 hours, increasing the number of respondents and variables would significantly increase the time needed.

6.6 Future research suggestions

For future research this experiment invokes a lot of questions that could be interesting to test. For example: Does Increasing the tempo change by more than 25% lead to significant results in this same experiment? Faster music did decrease time spent (by 86 seconds) however not significantly. If hypothetically doubling the tempo change to 50% also doubles the effect on the time spent, the effect might be significant after all.

Are the results of this experiment the same when researching other demographics? Everybody might recognize the moment that after a car ride they stay a bit longer in the car because their favorite song is playing. Selecting a group of respondents who prefer top 40 music could cause them to shop for longer and pay attention to the music more consciously. For these reasons they might be affected more by changes in tempo.

What are the differences between the effect of music on consumer behavior between physical and online retail environments? Comparing these two side by side in the same experiment, while also using physical movement speed and decision-making speed as dependent variables, could offer a lot of insight on the answers and remaining questions of this experiment.

In the end, more research needs to be done to fully understand the effect music has on consumer behavior.

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9. Appendix

Age(years)	Time Spent(min:sec)	Money Spent (€)	Estimated time(min)	Music Speed (S=fast, L=slow)
26	17:20	42	20:00	S
21	18:47	35.49	15	L
23	3:23	5.19	5	S
24	18:31	21.50	15	L
21	20:11	38	20	S
22	17:33	20.5	15	L
24	8:50	15	10	S
22	16:33	25.34	18	L
19	11:30	15.99	10	S
20	11:55	20.01	10	L
21	14:59	14.81	15	S
25	15:57	20.00	15	L
24	9:20	10.20	10	S
22	6:14	12.36	5	L
24	19:08	29.52	22	S
24	22:53	25.39	18	L
18	11:47	15.01	10	S
23	14:00	25.39	12	L
21	17:27	22.95	15	S
22	23:30	35.55	30	L
23	11:34	10.95	10	S
18	25:18	45.00	25	L
25	7:22	9.80	5	S
26	24:13	30	25	L
25	16:01	20.05	15	S
21	18:31	29.55	12	L
22	20:44	25.37	20	S
22	18:38	43.20	13	L
23	19:40	16.54	20	S
23	8:52	6.60	10	L
21	19:32	31.23	20	S
22	23:52	24	17	L
22	10:17	22.15	10	S
20	10:59	14.86	10	L
25	21:21	33.65	25	S
26	20:30	27.43	20	L
24	15:20	32.15	15	S
24	18:06	25.47	15	L
23	9:22	13.20	10	S
26	3:09	4.10	5	L
18	11:22	16.95	15	S

18	**5:58**	**8.67**	**5**	**L**
24	**13:04**	**20.21**	**15**	**S**
21	**21:52**	**42.24**	**20**	**L**
24	**16:41**	**18.27**	**19**	**S**
19	**7:03**	**5.00**	**5**	**L**
26	**3:39**	**7.50**	**5**	**S**
21	**12:54**	**14.20**	**14**	**L**
22	**14:57**	**25.00**	**15**	**S**
22	**7:50**	**10.10**	**7**	**L**
18	**8:23**	**14.30**	**10**	**S**
23	**12:35**	**10.99**	**15**	**L**
19	**12:18**	**12.30**	**15**	**S**
21	**16:31**	**35.29**	**12**	**L**
18	**11:46**	**7.65**	**14**	**S**
22	**16:30**	**23.62**	**15**	**L**
20	**16:28**	**24.64**	**15**	**S**
21	**18:32**	**15.83**	**15**	**L**
21	**20:39**	**29.74**	**25**	**S**
21	**15:50**	**39.76**	**17**	**L**
21	**12:23**	**20.65**	**15**	**S**
18	**18:03**	**14.94**	**15**	**L**
20	**18:37**	**20.24**	**20**	**S**
26	**7:47**	**8.43**	**5**	**L**
25	**4:09**	**6.49**	**5**	**S**
25	**7:38**	**20.50**	**9**	**L**
25	**19:14**	**35.62**	**20**	**S**
23	**17:04**	**27.63**	**21**	**L**
23	**14:16**	**19.27**	**15**	**S**
24	**16:41**	**25.61**	**15**	**L**
23	**19:25**	**13.96**	**20**	**S**
22	**20:17**	**46.98**	**10**	**L**
26	**11:19**	**10.65**	**16**	**S**
20	**17:33**	**10.85**	**15**	**L**
23	**20:10**	**32.86**	**30**	**S**
19	**10:20**	**12.25**	**10**	**L**

***Appendix 1*: Dataset**