THE INFLUENCE OF AUDIBLE STIMULI ON CONSUMERS IN E-COMMERCE ENVIRONMENTS

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Abstract

Purpose

The influence of background music on consumer behaviour in shopping environments has interested researchers for decades, and a range of studies have investigated the impact of a variety of musical stimuli in different environments. Results are relevant for marketing practitioners and managers, who constantly seek to optimize their sales environments, with the aim of customers having the most pleasant buying experience and consequently increasing their spending.

With the growth of online sales in recent years, researchers' interest in shopping environments has again increased. However, compared to the number of studies in traditional offline environments, online research has been limited. Moreover, online studies are constrained to laboratory experiments, with relatively small sample sizes and often of poor design. This research aims to contribute to knowledge on online consumer behaviour by conducting a large-scale field study to establish how and to what extent background music (altered in genre/loudness/tempo) influences consumer behaviour in a real-life setting.

Methodology

In this field study, product videos were implemented in an online shop of a German company and accompanied by different variations of background music. Three consecutive experiments in three time periods with different musical stimuli were conducted, and in a quantitative approach, real-time data on the behaviour of all website visitors in the online shop were collected. The experiments examined (a) customer behaviour in terms of conversion, (b) if converted, payment method, and (c) if effects were mediated by session duration (time on the website). The conversion probabilities were subsequently analysed using a linear probability model (LPM).

Findings

The analysis of the data from all three experiments showed that background music (of all variations of genre, tempo or loudness) a) has no significant influence on consumers' decisions regarding conversions, b) that there is no significant influence on the payment method, accordingly c) the hypotheses regarding mediation effects could also be rejected.

Contributions

One of the main contributions of this study is that it is the first large-scale empirical field study conducted in the research area. The findings do not confirm those of previous laboratory studies in fictitious online shopping environments, which are themselves inconsistent. The results of this thesis support the theory that there is no effect of music on online consumer behaviour. Accordingly, the outcomes also indicate that, in general, the findings from laboratory studies on online consumer behaviour are not reproducible in practice due to the different environments to which website visitors are exposed.

Practical Implications

As an implication for practice, marketing practitioners should not, as a matter of everyday practice, use music in online shopping settings. If music is requested by the management, then an appropriate music selection should be carefully tested with the individual target group.

Limitations / Suggestions for Future Research

Suggestions for future research centre on using variations of the musical stimuli in all dimensions of the music used, and investigating other shopping websites and other forms of online shopping, Furthermore, variations in the experimental setup should be used, and finally, qualitative studies in this area should be carried out to offer a basis for further quantitative examination.

Keywords: online consumer behaviour, background music, online shopping, environmental

Author's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire, and is original, except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed ……...……. Date 12 May 2023

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List of abbreviations

B2C	Business to Consumer
BPM	Beats per Minute
DBA	Doctor of Administration
GA	Google Analytics
LPM	Linear Probability Model
PAD	Pleasure, Arousal and Dominance
RO	Research objective
RQ	Research question
SEO	Search Engine Optimization
S-O-R	Stimulus-Organism-Response
VBG	Verwaltungsberufsgenossenschaft

1 Introduction

Developing shopping environments involves identifying and enhancing different environmental stimuli within a specific *retail* context. Management research has shown that changes in the atmosphere of a shopping environment, such as colour, light, scent and sound, can impact consumers and sales (Machleit & Mantel, 2001).

A variety of studies in offline environments have focused on the influence of in-store music on consumer behaviour, e.g., Areni and Kim (1993), Milliman (1982), North et al. (1999) and Yalch and Spangenberg (1990, 2000). However, there is a paucity of research in online environments, especially concerning audible stimuli. Therefore, this research aimed to recognize and assess how background music affects consumers' actions and decision-making when shopping online, intending to enhance the overall online shopping environment management, leading to increased sales and conversion rates.

This chapter introduces research on the impact of music on consumer behaviour and the specific use case in online environments where this concept will be applied. It also peruses the practical relevance of this thesis, its background and empirical context, scope, research aim, objectives, and questions. Moreover, it provides an overview of the research process, including the expected original contributions to theory, methodology and practice.

1.1 Study background

Although music is generally regarded as an entertainment medium we know from everyday life, it can also be used for other purposes. In particular, background music is used in factories, offices, stores and supermarkets to stimulate certain desired attitudes and behaviours in employees and customers (Milliman, 1982). Nowadays, music is not only used for entertainment but is also intentionally employed, for example, in German train stations, to drive out people experiencing homelessness (Schloemann, 2018). in operating theatres, staff report that music makes them calmer and more efficient (Ullmann et al., 2008) and can have therapeutic effects on patients during and after surgery, reducing anxiety and pain levels (Ahmad, 2017), to name a few.

Furthermore, music in environmental psychology research has garnered significant attention and scholarly interest because researchers hypothesized that it could affect

consumers' emotions, influencing buying behaviour in turn (Morris & Boone, 1998). More specifically, researchers found that a well-fitting piece of music can enhance consumer attention, create positive feelings, as well as trigger positive associations towards a product or brand, reinforce core messages and increase purchase intent, which subsequently leads to increased sales (Oakes, 2007b).

The literature on the impact of music is extensive. However, it has produced inconsistent or contrary results to the effects described, which has caused a standstill in general research interest in this area (Oakes, 2007a). This is unfortunate because music is an atmospheric variable that the management of a retail store can easily control (Milliman, 1982). Furthermore, previous decisions on using background music in retail environments are based on intuition or folklore rather than empirical findings (Burleson, 1979). Therefore, more specific recommendations are of managerial interest regarding this.

Notably, consumer behaviour research in the field of music reached its peak during the 1980s and 90s, with great academic interest and momentum in the field of „music and advertising" (Abolhasani, 2017). At the time, the influence of music on consumers was tested in various environments, such as restaurants, wine stores, supermarkets, shopping malls, cafes and similar locations. Most of the studies focused on the independent variables of genre, tempo, loudness and liking of the music and the impact on outcomes such as the evaluation of the environment, time spent, money spent, waiting time and the perceived length of stay. However, research on music in advertising has received less consideration than it might deserve (Oakes, 2007b).

> James Kellaris (University of Cincinnati), author of many studies in this area, states, "Research topics come and go and come back again. The tapering off of a research topic does not necessarily indicate that the topic is irrelevant; rather, it can be an artefact of the career stage of the researcher. I did a lot of music-related research pre-tenure. After tenure, I was not under any pressure to continue this stream of research, I got involved in other topics (primarily those of my PhD students), and other duties at the university …" (Abolhasani, 2017, p. 3). And additionally:
> "If I were to make a matrix identifying all the dependent and independent variables in the context of music and advertising, I would discover a lot of empty, un-studied cells, any of which could become a dissertation" (Abolhasani, 2017, p. 4)

In other words, Kellaris believes there are several opportunities to contribute to this line of research. Considering all the variables related to music consumer research, such as shopping, selling, and marketing, there are many opportunities for future research. The significant expansion of e-commerce makes it necessary to examine the impact of music, a multifaceted form of media, on the behaviour and preferences of shoppers in a setting where haptic and olfactory perceptions are absent and where visual and visual and audible impressions dominate.

1.1.1 Overview (and classification) of research on environmental stimuli

Marketing researchers recognized early on that environmental stimuli can impact consumers when they experience them while shopping. They, therefore, recommend the creation of a *managed* atmosphere for most shopping environments (Turley & Milliman, 2000). Additionally, Bitner (1990) notes that such environmental management can mean the difference between the success and failure of a business (Mushevska, 2018).

Although many articles dealing with the effects of atmospherics on consumer behaviour argue that Kotler (1974) gave the impulse for this literature stream, the work in this area predates his article by almost ten years (Jesensky, 2013). Furthermore, even though Kotler was the first to use and define the term "atmospherics" as the planning, structuring and control of environmental stimuli, Turley and Milliman (2000) also state that numerous other researchers had already manipulated and analysed elements of the environment in their studies before Kotler's article, e.g., Cox, 1964, 1970; Curhan, 1972; Frank and Massey, 1970; Kotzan and Evanson, 1969; Smith and Curnow, 1966 (Jesensky, 2013).

Notably, Kotler effectively promoted this concept and drew concerted attention to the topic of the "conscious designing of space" in a marketing environment (Kotler, 1974). The idea of atmospherics, also known as spatial aesthetics (Maclaran & Brown, 2005) and servicescapes (Bitner, 1992), claims that the atmosphere creates a setting, in this case, the shopping environment. Kotler (1974) states that artificial environments can be just as attractive as natural environments (such as nature, a landscape, trees, or a park) and thus positively affect the activities and outcomes of customers in retail.

The intentional design of atmospherics is primarily aimed at evoking affective and behavioural responses in consumers to enhance the likelihood of a product sale by generating attention and conveying a desired image and service level to potential and actual customers,

thereby triggering emotional responses (Kotler & Scheff, 1997). Distinguishing between the atmosphere that is intended and the atmosphere that is perceived is crucial for the focus of this study: On the one hand, a manager could have an idea of ways to evoke these reactions in the consumer, e.g., by manipulating different variables, like colouring or lighting. However, it is beyond the control of the seller that the intended atmosphere may have a different effect on one particular consumer than another, depending on their background, expectations and experiences. In other words, the attraction of carefully selected stimuli is neither inherent nor universal but can be developed and varies significantly between individuals and cultures (Turley & Chebat, 2002).

However, marketers can influence a range of atmospheric cues designed to elicit desired behavioural responses, faster decisions and increased spending (Wilson & Black, 2015). In the first, somewhat simplified version of his atmospheric theory, Kotler's approach emphasizes that the human senses perceive the environmental atmosphere and transmit via sensory channels (Cheng et al., 2009), commonly known as sight, hearing, touch, smell and taste. The earliest classification of atmospheric dimensions derived from the human senses, and Kotler´s article (1974) presents the following four categories (without taste since atmosphere cannot be tasted):

	Human sense	**Environmental dimension**
01	Visual (sight)	colour, brightness, size, shape
02	Auditory (sound)	volume, pitch, tempo
03	Olfactory (smell)	scent and freshness
04	Tactile (touch)	softness, smoothness, and temperature

Table 1: Kotler's classification of environmental dimensions (Kotler, 1974)

Against the background of shopping and sales, vision and sound are inarguably most prevalently used in both offline and online retail (Rv & Ramaswamy, 2015). Moreover, vision is probably the dominant sense and key to creating the very first impression. The brain is particularly fast at processing visual elements, such as lighting, colours, depth and three-dimensional structure. The aural sense, which follows closely on the heels of vision, is highly effective in evoking recall and emotions crucial for building a solid connection between a consumer and the product, brand or service on offer. Research has shown that music that matches the product directly impacts overall satisfaction and can influence the consumer's mood (Rv & Ramaswamy, 2015). This suggests that music is a potentially powerful stimulus

worthy of specific attention. However, there is also a requirement to consider the context in which it is used – and here, considerations of online and offline are particularly pertinent.

1.1.1.1 Traditional offline retail versus the growing relevance of online sales

Creating a suitable shop atmosphere via environmental cues can be achieved offline (in the shop) and online (on the website). Given better access to and lower prices of technologies such as mobile devices and ever-improving worldwide access to the internet, online shopping in Germany reached a share of almost 16% of total retail sales in 2020, compared to 9.1% in 2015 (Rusche, 2021). This impressively illustrates the increasing relevance of online trade in the last decade. Anecdotally, e-commerce saw an 18% increase due to the global Covid-19 crisis, while retail sales (offline) decreased by 14% (Davis & Toney, 2020). However, even after the pandemic, "[…] online shopping is likely to gradually replace offline shopping, making decentralization imperative for the industry" (Shoppers Stop, 2020, p. 51). It can be argued that such a development justifies a focus on atmosphere research in online retailing, where empirical research is still scarce. Furthermore, most of the research conducted on online atmospherics with music as a stimulus was accomplished in laboratory environments (e.g. Anwar et al., 2020; Dad et al., 2018; Damen et al., 2021; Fujiwara et al., 2017; Hwang & Oh, 2020; Klein et al., 2021), not providing the appropriate, essential and, therefore, ecologically valid conditions for the simulation and analysis of an online purchase. The existing literature has dealt exclusively with laboratory studies. Thus, a large-scale field study is, to date, absent (Ballouli, 2011).

1.1.1.2 Retail (in-store) atmospherics

Assuming that the atmosphere in a retail setting is of crucial importance, it is unsurprising that as part of their marketing mix, retailers nowadays invest an enormous amount of time and effort in designing the environment of their shop. The aim is the development of consumer-friendly sales environments that can potentially generate commercial advantage (Fujiwara et al., 2017). Therefore, retailers must create conditions for customers to have a pleasant, comfortable, relaxed and memorable shopping experience when they enter the shop to attract and retain customers' attention (Dabija et al., 2014).

Physical retail has the characteristic that it operates in a highly complex environment, which is not limited to visual and acoustic stimuli. In addition to the use of lighting, acoustics, and visuals, managers of in-store establishments can also utilize scents and tactile experiences to influence the emotions and moods of customers (Machleit & Mantel, 2001). If limited to

the basic concept proposed by Kotler (1974) of the four sensory dimensions that determine atmosphere, it could be argued that this concept is insufficient to capture the various other variables related to the atmosphere that influence a retail environment. Later concepts are, therefore, primarily based on Kotler's classification of environmental dimensions but also consider variables not fitting into one of the four categories (Baker et al., 1994; Bitner, 1992; Turley & Milliman, 2000). These changes and additions can be grouped into three categories, each containing several environmental factors, that are:

	Environmental Dimension	**Environmental stimulus**
(1)	store image	lighting, music, and scent
(2)	design of the facility (interior and exterior)	colours, displays, flooring, wall coverings, cleanliness, and design of the changing rooms and the corridors;
(3)	social factors	the sellers, the customer characteristics

Table 2: Extension of Kotler's classification of environmental dimensions

Turley and Milliman (2000) classify atmospheric variables in perhaps the most comprehensive approach, including crowding, consumer features, privacy, and staff behaviour. The authors' approach that the relevant environmental factors may be more diverse and complex than Kotler's original classification is reasonable. However, it is clear that most of these additional factors relate to offline retailing, where influences such as staff behaviour, changing rooms and cleanliness have an essential impact. As this thesis focuses on online retailing, Kotler's basic terminology is sufficient to investigate the effects of audible stimuli on consumers.

1.1.1.3 Web atmospherics

As already mentioned, online marketers cannot exploit web atmospherics (also called e-atmospherics) to the same extent as offline, in-store environments. In short, offline and online retail shops employ their atmosphere differently. However, e-commerce has quickly caught up with offline retail in recent years and has grown to become one of the fastest-growing sales channels in the retail industry (Kim et al., 2009). Therefore, it seems essential that online shops provide the customer with a positively-evaluated emotional and cognitive experience, similar to in-store shopping (Putri & Balqiah, 2017). Although research on online atmospherics is significantly less, there are indications that customers' emotional and cognitive states, and purchase intentions, may be influenced in the same way online as in a retail shop (Kim et al., 2009).

In general, the principles of atmospherics in offline commerce also apply to those in online shopping environments, even though there may be some limitations when using certain atmospheric variables, e.g., scent or touch. Due to this downside, marketers need to focus on the website's visual appearance and audible cues (Kim et al., 2009). The online consumer perceives visual cues first (as colours, forms, and font size) and probably also background music, which triggers reactions in the subconscious that might evoke pleasure and excitement in the consumer.

Eroglu et al. (2001) further divide the information of a website atmosphere into *high task-relevant* and *low task-relevant*. The high task-relevant category of the online shop includes descriptive elements such as product, price information, delivery and return conditions, as well as sales and navigation elements. These make it easier for shoppers to use the online shop because it helps them achieve their purchase goals. On the other hand, information not directly related to consumer spending is classified as low task-relevant, like colours, frames, patterns, fonts, animations, music and sounds. The entertainment value, pleasure and excitement, as well as a pleasant sensory simulation through colours and music, are key atmospheric elements in an online shopping environment, leading to an increased willingness of customers to process information and a higher willingness to buy (Wang et al., 2011).

Given these challenges, several models have been proposed to illustrate and understand the relationship between the stimuli used, the shopper and the buying behaviour. This research is based on the approach of the Stimulus-Organism-Response model, which is among the most widely used frameworks related to consumer behaviour (Buxbaum, 2016).

1.1.2 The S-O-R model and the focus on background music

In environmental psychology, several models serve as the basis for decisions made by marketers. One of them is the so-called **S**timulus-**O**rganism-**R**esponse-Model (S-O-R). Mehrabian and Russell´s work from 1974 and Zajonc's theory of emotions (1980) form the foundation for the S-O-R framework, which maps consumer behaviour in a three-step process (Mazaheri et al., 2011). First, the atmospheric stimuli (S) that are designed in a shopping environment serve as a starting point and affect consumers (organism; O) where the emotions of pleasure, arousal and dominance (PAD) are generated (Mazaheri et al., 2011), and ultimately leads to an approach or avoidance response (R), e.g., a purchase. This model is depicted graphically in the figure (Figure 1) below:

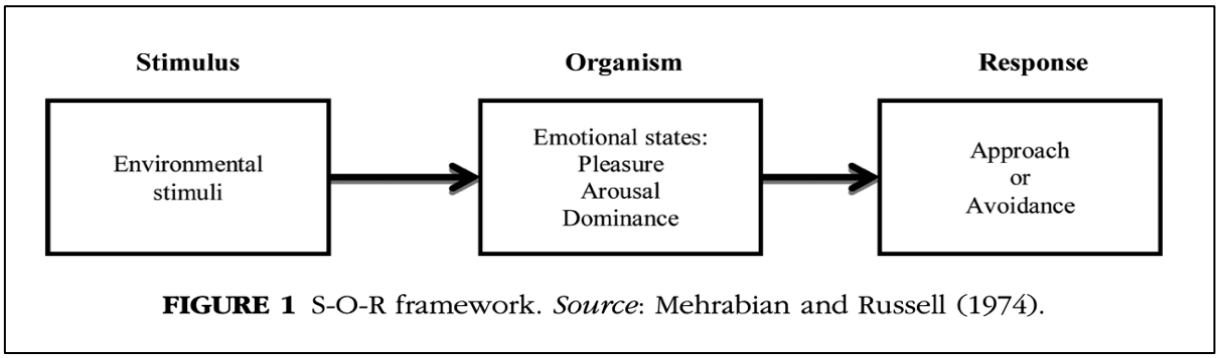

FIGURE 1 S-O-R framework. *Source*: Mehrabian and Russell (1974).

Figure 1: S-O-R-framework (Mehrabian & Russell, 1974)

Initially, Mehrabian and Russell (1974) concentrated solely on affective reactions, while the model's most recent revision suggests a „[….] integrative S-O-R framework [that recognizes] cognitive and affective systems that incorporate all previously engaged experiences that involve long-term memory“ (Kim et al., 2020, p. 71).

The model ultimately aims to predict whether particular stimuli (e.g., background music) will affect the consumer (mood/effect/cognition) and, ultimately, whether an offered product will be bought or avoided. The following overview (Table 3) illustrates some of the *sector variables* to understand better the categories of stimulus, organism, and response:

Stimulus (the environment)	**Organism**	**Response**
Conditions of the product	Social norms and values	*Cognitive reactions*: Gestures and
Design	Age	body language, spoken words,
The atmosphere of the store	Gender	actions.
Attributes of the product	Mental/affective reactions	*Physical/physiological reactions*:
	(pleasure, mood)	eye fixation, dilation of pupils,
		behaviours related to
		communication, smiles.

Table 3: Possible factors within the S-O-R-Framework (Jacoby, 2002)

Although a variety of atmospheric cues that marketers can evaluate, control and manipulate directly affect the product (e.g., design, conditions), mostly independent variables are chosen and manipulated to affect the organism, aiming to influence shopping behaviour positively.

Against this background, this thesis deals with music as an atmospheric stimulus in environmental psychology and the related properties that marketers' control to generate buying or desired behaviour. Besides using video to communicate with online consumers, music is the most commonly used element influencing consumers' moods. Moreover, atmospheric stimuli that influence consumers' perceptions are limited in an online environment, as only audio-visual cues can be controlled. Kellaris (2008) notes that music is an essential component in consumer psychology, as it can be used to trigger memories, process information, form evaluations and evoke emotions (cited in Santos & Freire, 2013). Since music is omnipresent in daily life, it is one of the most significant and influential cues in marketing (Allan, 2008).

In this sense, marketers manipulate music differently by varying the characteristics of music that they think fit well with the offered product to seek an increase in the likelihood of purchase. Most often, these properties relate to feelings (happy/sad), familiarity (familiar/unfamiliar), likeability, genre (e.g. Pop/Classical), tempo (slow/fast) and loudness (soft/loud), which are further discussed in the literature review. Of particular interest in the context of this thesis is how such stimuli influence consumer behaviour in terms of registration (conversion), method of payment, and visit duration in an online shopping environment.

The literature review in Chapter 2 follows the three dimensions of the S-O-R model and details the multiple variables listed in Table 3. After this section has given an insight into the study background, the following section provides a contextualization of this thesis in the area of research.

1.2 The empirical context of this thesis

This piece of research focuses on improving the sales funnel and conversion rate of e-commerce websites, specifically using the case study of a German education service provider's online shop. The study is grounded in empirical evidence. The online shop aims to present the company´s course programme to the public, offer online registrations and purchases of the course tickets, plan the available spaces better, and offer a better service to prospective customers.

The company and its website, were started in 2003. Today, the course programme covers emergency training, a legal requirement for a driving licence in Germany, some

university courses (such as sports, medicine or teaching), and occupational health and safety. The courses are offered and conducted in almost 200 cities in Germany. Accordingly, the three largest target groups are learner drivers, university students (both self-payers) and company first responders (whose costs are partly covered by the accident insurance institutions). As learner drivers are usually minors when they attend the first aid course, there is the particularity that the buyer (the learner driver) is often not the purchaser of the course, as both PayPal and debit or credit cards are required for online payments and are not issued to minors by most banks. This could lead to the purchaser (the parents) having some influence on the purchase decision, which should be considered when choosing background music for the online sales process, which was established in 2015. Previously, customers could attend the courses without any form of online registration or payment.

The optimization of the web presence is twofold: on the one site, the company operates Search engine optimization (SEO), and on the other hand, the company engages in onside conversion optimization to optimize its online sales process for the website visitors to achieve higher conversion rates.

SEO should lead to first positions in organic search results in search engines (Zilincan, 2015) and can be divided into two areas: On-page SEO (modifying the structure of the website) and off-page SEO (actions that are carried out aside from one's own website). Besides SEO, optimising the sales funnel on the website itself refers to the already discussed atmospheric stimuli (here: web atmospherics) in the previous section. It addresses the web visitor, not the search engines. Criteria such as layout, colours, images, ergonomics, button-placement and headlines are modified to influence the consumer behaviour on the website, to increase time spent in the online shop and, as a result, the number of sales.

As outlined in section 1.5, research into the impact of background music on online consumer behaviour is considered a worthwhile empirical contribution to gain a more comprehensive understanding and classification of the existing literature in the area and provide recommendations for managers in this area. Notably, a company website with a steady stream of visitors provides a rich empirical context for exploring the influence of the selected independent variable *background music* on consumer behaviour.

The use of the online shop of a German service company, as an empirical background, is significant for knowledge and practice, as already shown in section 1.2.: since the year-on-

year percentage of online trade in Germany is still increasing.

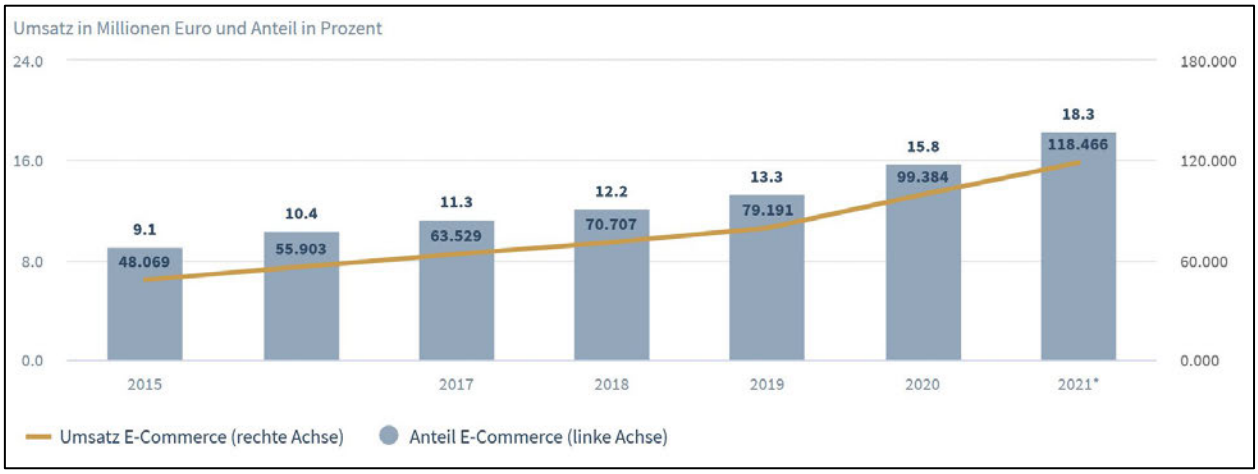

Figure 2: E-Commerce turnover in Germany (Rusche, 2021)

As growth rates in Germany's online retail have exceeded those of overall retail in recent years, the share of e-commerce in total retail sales has also increased. While the share was only 9.1% in 2015, it increased almost linearly to 13.3% in 2019. The share is estimated to be close to 16% in 2020 and more than 18% in 2021 (Figure 2). This means that by now, almost every fifth euro spent in retail is via the internet. The estimated total turnover by the German Federal Statistical Office for 2021 (excluding sales tax) was 118.5 billion euros (Rusche, 2021). In this light, researching online consumer behaviour to optimize online conversion rates and sales has considerable scaling effects in absolute numbers, even if the relative potential for optimization of each element on the website might be relatively small.

After this subsection has highlighted the empirical context of the thesis, the following subsection (1.3) presents the research questions, the aim, and the objectives.

1.3 The research aims, research questions and objectives

Based on the identified gaps and the assumption that in empirically conducted experiments, a cause-effect relationship in the form of independent and dependent variables is investigated (e.g., Milliman, 1982; Milliman, 1986; North et al., 2003; North & Hargreaves, 1998), it seemed appropriate to develop research questions and objectives using the S-O-R model, introduced in section 1.2. Therefore, this study focuses on the S and R elements, broadly speaking, the what of change and, if applicable, the how should be investigated, not the *why*.

Therefore, the aim of the research is:

> *To investigate, analyse and evaluate how and to what extent background music influences consumer behaviour within the online shop of a German company.*

The background information discussed in the previous sections raises the following general research question:

> *Can background music on a website influence online consumer behaviour, and if yes, to what extent?*

Based on this general question, three sub-questions were formulated to concretize the direction of the research and to form the basis for the experiments:

> RQ 1. What is the influence of background music on conversions in an online shopping environment?
> RQ 2. What is the influence of background music on the type of payment method selected in an online shopping environment?
> RQ 3: Is any inter-relationship mediated by session duration?

The objectives are as follows:

> RO 1. *Test the influence of background music genre in an online shopping environment on conversions and the type of payment method selected.*
> RO 2. *Test the influence of background music genre, combined with tempo, in an online shopping environment on conversions and the type of payment method selected.*
> RO 3. *Test the influence of background music genre, combined with tempo and loudness, in an online shopping environment on conversions and the type of payment method selected.*

The development of the presented research questions and objectives and the appropriate hypotheses is discussed in detail in Section 2.9 (Literature Review). After presenting the research aim, the research questions and objectives, and the contributions of this study are presented in the following section (1.4).

1.4 Contributions of the study

In answering the above research questions, the author anticipates making the subsequent original contributions:

1.4.1 Research gaps and theoretical contribution

The study objectives and aims set the direction of the theoretical contribution. Moreover, the literature review in Chapter 2 provides the theoretical basis for understanding the current state of the art concerning the influence of audible stimuli, especially background music, on consumer behaviour, in offline and online retail environments. A detailed development and justification of the research gaps is given in Section 2.8 of the literature review. In summary, from this literature review, the following research gaps were derived:

Research gap (1): There is a stated need for research on the impact of music and, specifically, in terms of background music in online retail settings.

Based on the theoretical background, it must be mentioned that the literature review of this study revealed that previous studies demonstrated positive signs of the influence of music on consumer behaviour. However, most of them were conducted in offline environments. Compared to the numerous studies in offline retail environments, there are still only a few studies on the influence of music on consumer behaviour in online shopping settings (Fujiwara et al., 2017), which can be seen in numerous calls for further research. The first expected contribution was a statement about whether background music influences online consumption behaviour and, if so, to what extent.

Research gap (2): The existing studies are purely laboratory based and, therefore, of little relevance to practitioners. To the best of the authors' knowledge, there is no field study.

The exploration of online consumer behaviour in the context of an authentic field study regarding the influence of background music is novel, as it has not been conducted before. As mentioned earlier, multiple authors (e.g., Ballouli, 2011; Cialdini, 2009; Knoferle et al., 2012; Oakes, 2007a) recommend future research conducts a field study, as previous research has only focused on experiments conducted in laboratory environments. Thus, it represents the second original contribution to the understanding of online consumer behaviour in general and the influence of background music, in particular, in an online shopping

environment. Therefore, the thesis responds to the call for empirical research on the impact of music in e-commerce settings on online consumer behaviour.

Research gap (3): Existing laboratory studies, off- and online, have relatively small sample sizes. There is also a general lack of studies with extended periods of data collection, different conditions (e.g., different genres, tempo and loudness), and the use of a control group.

Ballouli (2011) noted that no large-scale study in this research area has been conducted yet in a real-world setting. With the designed experimental approach, this research is expected to collect a large sample over a relatively long period compared to current studies. This was achieved through the digital automation of data collection, which was possible online. Different genres, volumes and tempos were tested with a reference (control group: no music). With this setup, it was possible to collect a correspondingly large and meaningful amount of data, and the criticized methodological shortcomings of previous studies could be overcome.

Furthermore, a contribution to future research was the developed concept, which defined and introduced *relative loudness*. It describes a concept that allows the researcher to emulate a feeling of volume to the subjects, even when the sound source itself cannot be directly influenced, by varying the sound levels from different audio tracks in one arrangement against each other, e.g., the voice of a speaker against the background music. The concept is further described in the Methodology, Section 3.5.

1.4.2 Expected methodological contribution

Probably the most significant contribution is that this study is, in all likelihood, the first empirical study in the field of research on the shopping behaviour of consumers under the influence of audible stimuli in an authentic online environment. This prepares the ground for further research that could follow from this study.

Also, the technical implementation, the technique of A/B testing and data collection on the company's servers, as well as the setup of the experiments in the form of videos to implement background music on a website, have not been done in this way in research about consumer behaviour.

1.4.3 Expected practice contribution

Finally, the question is if music plays a role in optimising online shopping environments and if yes, to what extent it is of managerial interest. Marketers, but also online retail managers, are interested in answers when it comes to future investments concerning digital shopping solutions and corresponding marketing budgets. Results from laboratory studies in fictitious online shopping environments show promising results in this regard.

The results of this study firstly indicate whether the implementation of background music in e-commerce solutions can influence the conversion rate of the website visitor and, thus, sales. Secondly, the study examined whether individual characteristics (genre, tempo, loudness) influence a possible result. Thus, it can ultimately answer the question of whether an investment in custom music production can be beneficial for an online shop or not.

After presenting the expected contributions of this study, the following subsection (1.5) provides an overview of the research process applied.

1.5 Overview of the research process

This research applies a quantitative approach, as it allows the generation of a big data set over an extended period. Data collection was carried out as part of an empirical, web-based field study directly in the online shop already mentioned.

The first step of this research project was developing a literature review on the influence of music on consumer behaviour, which can be found in Chapter 2. The review included more than 100 on- and offline studies, mainly dealing with the musical variables of genre, tempo and loudness. On this basis, gaps related to online consumer behaviour in the current literature were identified, related research questions and objectives derived, and hypotheses formulated. Finally, a theoretical framework derived from the S-O-R model was developed and served as a conceptual basis for the empirical study.

The philosophical paradigm of post-positivism guided the research. It focused on the analysis and improvement of an online sales funnel. It thus aimed to provide practical suggestions for continuous development for marketing practitioners (especially managers, consultants and marketers) who manage and develop online shopping solutions in the described field.

A survey was conducted to identify which loudness the target group perceived as soft, medium and loud. The equivalent states of slow, medium and fast, concerning tempo, were determined based on a literature review. Moreover, the genre was also considered through this initial mechanism. Based on these parameters, a total of 18 videos were created, with identical content but different background music, in all variations of tempo, loudness and genre.

Data were collected in 3 separate experiments: In the first, the independent variable *background music* was tested in terms of genre (Classical / Pop) against the control condition of *no music*. The second experiment additionally introduced the condition *tempo* (slow/medium/fast), resulting in 6 different conditions and the control condition (*no music*). The third and last experiment dealt additionally with l*oudness* (soft/medium/loud), so the experiment incorporated 18 different conditions alongside the control condition (*no music*).

The data were exported directly from the company´s server and analysed using the quantitative data analysis software SPSS. After this brief overview of the research process of the present work, the next section (1.6) reviews the researchers' background.

1.6 Researcher’s context

The motivation for the study of consumer interactions in online environments, especially in the context of background music, is that the author of this work, after nearly 20 years of work and continuous training in the field of online marketing, remains fascinated by the ever-changing opportunities and developments it presents, as well as the complex and dynamic nature of this field.

Furthermore, the author has been an active musician since childhood, composing, recording and producing music on a small scale for local acts in a semi-professional sound studio. Also, the professional backdrop with a bachelor’s degree in business informatics and a master’s degree in educational management provided the perfect background to investigate the online sales channel of an educational service company.

Moreover, since the author has been entrusted with several web platforms' SEO (Search Engine Optimization), he has first-hand experience in strategic development and technical implementation of measures concerning analysing and optimising online conversion rates.

The author’s decision to pursue the Doctor of Business Administration (D.B.A.) programme was motivated by the opportunity to combine many years of professional experience with theoretical knowledge (Husman, 2018). The D.B.A. is designed primarily for business practitioners (MacLennan et al., 2016). Nevertheless, MacLennan et al. state that the D.B.A. also represents a viable basis for a possible career in academia, expanding the author's future professional options.

After this section has highlighted the background and motivation of the author, the following subsection (1.7) gives an overview of the structure of the entire thesis.

1.7 Thesis outline

The work is divided into six chapters. The structure primarily follows the research process. *Chapter 1* gives an introduction and overview of this thesis. It highlights the project rationale and outlines the study's research questions, aims and objectives. It also gives an overview of the chosen methodology and introduces the expected contribution of this study.

The results of the literature review are presented in *Chapter 2*. This chapter explores the field in terms of the research questions and establishes a conceptual framework that identifies gaps in the current literature that guide the research for this thesis.

Chapter 3 explains and discusses the research paradigm and the research design. The chapter also provides deeper insights into the selected methods and procedures used in data collection, as well as the study's technical structure and sample design.

Chapter 4 provides a detailed insight into the data analysis and is followed by *Chapter 5*, which discusses the results of the empirical data analysis. Chapter 5 also details the answers to the research questions and addresses the conceptual framework.

Finally, *Chapter 6* contains the contributions of the research findings to theory, methodology and practice. It also discusses the strengths and limitations of the study and makes several recommendations for further research in this area.

After this chapter has given an introduction and overview of the present thesis, the following chapter (Chapter 2) contains a literature review of the current state of research in this field.

2 Literature Review

2.1 Introduction

This chapter presents the findings of previous literature. This thesis aims to gain insights into the influence of audible stimuli, in particular, background music in an online shopping environment, on consumers' emotional, cognitive and behavioural responses (time spent, conversion and payment). In this context, there is a particular focus on the musical variables of genre, tempo and loudness, and the degree of variation in musical characteristics. The quantitative study conducted as part of this research has its foundation in the literature review provided below.

The chapter starts by recapping the S-O-R model mentioned in the introduction and reviewing the relevant literature. In contrast, the presentation of the findings will follow the S-O-R paradigm. Furthermore, the identified research gaps are presented, followed by the development a conceptual framework. Finally, this chapter concludes with the derived research questions, objectives and hypotheses that have set the direction of this study and closes with a summary.

2.2 Recapitulation of the concepts of atmospherics and S-O-R

The following is drawn from the extant literature on the impact of background music on consumer behaviour in conventional (in-store) and online retailing. While it is acknowledged that laboratory and field studies have increasingly produced results on music as an environmental variable that affects consumers' attitudes, moods and purchasing behaviour in brick-and-mortar retailers over the past decades (Dad et al., 2018), research on the effects of music online is still relatively scarce. This is because results in this field are inconsistent and heterogeneous (Milliman, 1982; Oakes, 2007a), and the retail sector has changed rapidly in recent years. In addition, the technological developments of the last two decades have transformed this sector and reshaped the retail industry, which has also seen tremendous growth in online shopping. While stationary and online retailing are very different in certain areas, it is safe to assume that marketers and sellers consider the use of music to be a powerful tool to motivate consumers to purchase, regardless of the sales environment. This gives rise to many new research questions that need to be explored regarding the influence of background music in in-store and online retail.

Considering this, the literature review starts with an overview and recap of atmospherics and the derived S-O-R model, as discussed in Section 1.1.2 (Introduction).

2.2.1 Atmospherics

Atmospherics can be seen, in its original meaning, as a marketing instrument used to design a tangible setting that can impact the human senses, including sight, hearing, touch and smell (Kotler, 1974). To sum up, according to the concept of atmospherics in environmental psychology, customers' purchasing decisions are influenced by numerous surrounding details of the environment and not only by the offered product or service (Kotler, 1974). In concrete terms, this implies that all the factors that make up the atmosphere are the leading causes that influence consumer behaviour. The vital sensory channels for the perception of the atmosphere are seeing, hearing, smelling and touching (Moorhouse, 2019). Marketers and salespeople optimize the sensory dimensions of the environment surrounding a product of purchase in order to affect consumers' perceptions, which can change the emotional and cognitive state of customers and thus directly affect the likelihood of purchase (Kotler, 1974). In retail shops, the visual, audible, olfactory and tactile stimuli refer to the environmental variables that make up the shopping atmosphere, such as design, colours, music, scent and lighting. In online shopping environments, the dimensions are more limited and restricted to visual and auditory cues (Kim et al., 2009). The environmental factors the marketer controls include font type and size, colours, images and videos, headlines and background music.

2.2.2 The S-O-R model

While atmospherics describe the factors that form the (shopping) environment, the S-O-R model by Mehrabian and Russell (1974) provides a framework to explain the relationship between environmental stimuli and their impact on consumers. In brief, this three-dimensional model suggests a link between a stimulus-rich shopping environment (S), the consumer organism (O), and a reaction (R) which is either approach- or avoidance-oriented. In other words, it aims to predict whether a specific stimulus (like classical music) will impact the consumer's mood, affect, and cognition, and ultimately whether they would approach or avoid a product or service on offer for purchase.

This present thesis and, accordingly, this literature review focus on background music as stimuli in shopping environments and the effects on consumer behaviour and purchase decisions. The following sections of the literature review examine and present the findings of the literature based on the three dimensions of the S-O-R model, starting with the first

dimension, ‘S’, the stimulus.

2.3 The ‘S’ in S-O-R

The *S* in S-O-R represents the different stimuli applied in the marketing context in offline or online settings. The following sections emphasize the current status of the research literature concerning the role of music as an atmospheric cue in the context of online shopping environments.

2.3.1 General insides on music and the concept of musical congruity

Music is one of the most commonly used atmospheric stimuli in both online and offline advertising. Therefore, much research has been done in this area: In various marketing contexts, consumer behaviour has been investigated in numerous laboratory experiments over the past forty years, focusing on the impact of various music dimensions (Abolhasani, 2017). Research on the influence of atmospherics (e.g., music) in online shopping will likely increase. Of particular interest is research into consumers' emotional responses to music. Services such as Deezer, Spotify, Apple, and others enable customers to permanently hear their favourite music (Abolhasani, 2017).

2.3.1.1 Mechanisms of music as a stimulus

Since the positive evaluation of music is associated with the product or brand, music creates a significant economic advantage in advertising (Gorn, 1982). As music conveys, emphasizes, or supports the advertisements’ persuasive ideas, it is called the “catalyst of advertising” (Gleich, 2015). The concept of *musical congruity*, which refers to the similarity or divergence between the music used in advertising and the commercial´s and the brand´s central message, is frequently used to explain and analyse the impact of music in advertising (Abolhasani, 2017). A critical factor of music in marketing is the perception of congruence between the music and the brand (MacInnis & Park, 1991). In this sense, it is believed that music has a similar impact potential as visual components (Kellaris et al., 1993). Previous studies show relatively consistently that, in general, any (background) music influences the consumer positively, compared to no music at all (Assis & Giraldi, 2012).

Music is of high relevance in both offline and online environments. Fiore and Kelly (2007) found that primarily larger companies utilize audible features on their websites to improve the display of their products, according to their examination of the application of

audible stimuli in online shopping contexts. However, not for all products, sounds are utilized consistently. They are implemented to enhance the product display and diminish the perceptual distance between customers, products, and the online shopping environment, as noted by Fiore and Kelly (2007). On the other hand, however, the use of music can also trigger negative responses. For example, Fujiwara et al. (2017) finds that music that is present while surfing may negatively affect arousal/enjoyment and excitement/flow. Another study also concluded that including background music is more beneficial after the start of browsing. However, it is not beneficial to include background music directly at the beginning of the visit to the shopping website (Fujiwara et al., 2017).

Using music in advertisements helps to create a coherent and continuous flow, contributing to a clear structure and continuity (Huron, 1989). The use of music also increases recall, as it supports the memory of the brand messages (Kellaris et al., 1993). Consumers usually prefer brands they trust and recognize, a connection that music can help to strengthen. Additionally, it appears that music can effectively convey a message without the consumer consciously noticing it. Finally, different music styles can also be used to appeal to a specific customer segment (Huron, 1989). The following subsections further elaborate on these ideas.

2.3.1.2 Congruity

Scholars have examined how verbal and non-verbal elements of advertising interact, using various definitions of the terms congruent/incongruent, consistent/inconsistent and expected/unexpected, to explore how the presentation of information that is (in)congruent with consumers' expectations might influence their information processing, e.g., Lutz & Lutz, 1977; Mitchell & Olson, 1981; Childers & Houston, 1984; Houston et al., 1987; Kellaris et al., 1996 (cited in, Abolhasani, 2017). Various studies on congruence have yielded contradictory results on various processing variables, such as perception, product and brand evaluation, attitude and memory (North & Hargreaves, 1999).

Heckler and Childers (1992) defined congruence in their widely accepted approach by identifying two elements of congruity: Relevancy and Expectancy. Relevancy describes the stimulus's conformity or deviation from the advertising message. In contrast, Expectancy considers, from the perspective of the stimulus, the match between the elements of the stimulus and the consumer's expectations concerning the advertising (Heckler & Childers, 1992). In addition, congruity can help explain consumers' cognitive and behavioural reactions towards music. According to MacInnis and Park (1991), musical congruity refers to a

consumer's individual perception of the degree to which the music aligns with the primary advertising message regarding appropriateness or relevance.

Yeoh (2009), in turn, defined congruity in her comprehensive thesis on musical fit effects as “A recent concept [...] concerning how a correspondence between the properties of a product and those of contemporary background music can influence the choice between competing products or prime recall of those products” (Yeoh, 2009, p. II). She noted some significant limitations of musical fit, namely (1) it cannot affect one's preferences towards everyday goods; (2) an influence on shoppers is only detectable if no product preferences exist; (3) product selection is only influenced when customers are short of time (Yeoh, 2009). Accordingly, Yeoh and North (2012) reported that matching music could impact product selection for shoppers who do not have a clear product preference. Otherwise, the commercial value of musical fit would be limited (Yeoh & North, 2012).

Studies indicate that the concept of congruence is more complex than one might expect (North et al., 1999). For example, according to a 2011 study by Brodsky, who tested custom compositions for two General Motors (GM) car brands, consumers are capable of perceiving the underlying intentions of composers who aim to communicate brand attributes and product features. The findings are in line with research that has shown that watching a commercial while listening to music that embodies the brand improves recall of product details (Brodsky, 2011). Therefore, it seems crucial to contemplate various forms of congruity in the realm of music in advertising.

Against this background, many studies focus on product congruity, with a musical stimulus as the independent variable. According to Johar and Sirgy (1991), more effective and convincing advertising is produced when the appeal of an advertisement and the appeal of the product are compatible. If the musical stimulus used contains a similar emotional appeal to the advertisement, more significant responses are triggered in the consumer (Johar & Sirgy, 1991). Similar to this, Gardner (1985) and Park and Young (1986) reported that when there is congruity between the emotions, behaviour, and the actual message of an advertisement or medium, the effectiveness of a stimulus is increased. Additionally, according to Zinkhan and Hong (1991), advertisements consistent with how consumers view themselves achieve higher advertising effectiveness. It can be assumed that music has a similar affective impact on advertising. Music that appeals to consumers’ preferences may generate more reactions (Zinkhan & Hong, 1991). This is in line with the research of Kahle and Homer (1988), who

discovered that the congruity of two elements of an advertisement and the target market strongly contributes to the effectiveness of the advertisement.

MacInnis and Park (1991) expressed a similar viewpoint. With two musical elements as the stimulus (its alignment with the promoted message and its connections to previous highly emotional experiences), the authors tested the various effects of advertisements on consumers' high and low involvement in advertisement processing. According to prior studies, execution cues in advertisements primarily have an impact when there is low involvement due to processing via the peripheral route. In the low involvement condition, the authors verified that the cognitive processing and message awareness of individuals were affected by the congruity between the main advertising message and the music. Furthermore, adapting music to advertising affects peripheral processing through its influence on emotions. Conversely, Park and Young (1986) observed that viewers are distracted from effectively processing the advertising message when a television commercial uses inconsistent background music.

North et al. (2016) conducted three laboratory experiments with an in-depth analysis of the effects of music congruity. Menus with various international dishes were presented to the participants (American, Chinese, Indian) in a fictional restaurant setting, with different types of background music (American, Chinese, Indian, and no music). The effects on choice and recall of products were examined in Experiment 1, cognitive priming was examined in Experiment 2, and musical congruity and cognitive load were examined in Experiment 3. Several pieces of music with corresponding music genres were utilized in all three experiments. Results suggest that music congruity influences consumer decisions through its ability to anchor matching concepts in memory. For example, the first experiment showed that the corresponding music makes it easier to remember congruent items on a menu at a later time. In the second and third experiments, the effects of music congruence were extended to the assessment of the value of a product, measured by the customer's willingness to pay for it.

In research, different elements of musical congruity are categorized: emotion (happy/sad), familiarity, preference, genre, tempo and loudness (volume).

2.3.2 Feeling

The emotion that music is intended to convey is one of the most crucial aspects of music. However, music does not represent an objective truth for the listener but is defined by the meaning the listener attaches to it (Herrington & Capella, 1994). The definition of a piece

of music can be classified into structural features (such as genre, tempo, and volume; see Subsections 2.3.5 to 2.3.7) and emotional features. One of a piece of music's key characteristics is its emotional tone, according to Broekemier et al. (2008). Emotional tones are divided into two basic categories by Bruner (1990): happy and sad. According to Sparshott (1994), certain music possesses an affective quality that enables a skilled listener to associate it with a particular mood or feeling, such as sad rather than gay or vengeful instead of conciliatory. The responses of the listeners are usually broadly consistent with each other.

So, according to Broekemier et al. (2008), the various components of music can elicit and express emotions like happiness or sadness. According to theory, happy music should elicit positive feelings (Gardner, 1985) and vice versa. Broekemier et al. examined in 2008 in their research how happy or sad music affected customers in an unfamiliar retail setting. The selected songs used as stimuli were recorded and played from videotapes. According to the study's findings, the mood of the music can directly affect consumers' intentions to purchase.

In light of the above, Yalch and Spangenberg (1993) reported that perceived music can somewhat explain shoppers' perceptions. The researchers, however, did not examine the happy/sad condition. In contrast, Alpert and Alpert (1990) examined the effect of cheerful or mournful music on purchase intentions but found no support for Gardner's (1985) proposed association. The use of sad music, which could have been more appropriate for the product (greeting cards), or happy music, which could have been rather distracting, are potential explanations for the missing relationship (Alpert & Alpert, 1990; Kellaris & Kent, 1993). In addition, other elements must be considered, such as the tempo (Broekemier et al., 2008).

Research into the variable *feeling* is an essential part of consumer mood research. According to Clark and Isen (1982), who define mood, mood is a state of feeling that people perceive subjectively. Gardner (1985) claims that different moods can decisively influence affect, cognition and behaviour. Additionally, research suggests that when using music as a stimulus, the emotions expressed in advertisements cause people to evaluate them differently. For example, commercials following happy programmes are rated better than commercials that follow sad programmes (Goldberg & Gorn, 1987). In addition, the memory rate is higher for advertisements that follow a happy programme. For an advertisement to be perceived more positively, Kamins et al. (1991) showed that the emotional tone of the advertisement must match the mood of the program (for example, a happy advertisement with a happy program, a sad advertisement with a sad program).

See additionally section 2.4.2 for a detailed analysis of the research on emotional responses.

2.3.3 Familiarity

Familiarity in the context of music refers to an old song already heard compared to new, unfamiliar songs and is meant to evoke positive emotions and the feeling of nostalgia (Chou & Lien, 2010). Chou and Lien (2010) found in their studies that familiar music positively affects advertising because it evokes a good mood in consumers. The impact can be enhanced by using highly relevant lyrics. Furthermore, the authors demonstrated that consumers' familiarity with a song can have a positive effect on their attitudes toward a product. Yalch and Spangenberg (2000) investigated customer response in a retail setting and reached similar conclusions. The customers were exposed to background music in the shopping environment that was familiar to them to varying degrees while they examined the products. Perceived shopping time, their affective state and their evaluation of goods were positively influenced by familiar music. The findings also show a perception of longer shopping time when listening to familiar music. However, it appears that these effects are due to cognitive influences that have not been measured (Yalch & Spangenberg, 2000). The perception of a longer shopping duration in a familiar music environment might be attributed to the increased storage of information about the experience resulting from the presence of music (Kellaris & Kent, 1992).

Roehm (2001) performed an offline experiment and used two versions of the same song (vocal vs instrumental; low vs high familiarity). The study's emphasis was on the memory of advertising messages. According to the results, listening to an instrumental version of a song they are familiar with makes it easier for the subjects to remember a message. Roehm suggests that this result is due to the higher probability that clients mentally generate the lyrics of the advertisement while singing along with the familiar lyrics to the instrumental version (2001). The advertising message is more memorable through the use of song lyrics than through the airing of spoken advertisements. However, if the song is unfamiliar to the customers, then using a purely vocal version results in improved memory of the advertising message (Roehm, 2001).

Park et al. (2014) have analysed the concept of familiarity in more detail. They performed an offline experiment based on fictional television advertisements for sports shoes to investigate the impact of background music. The authors reported that consumer familiarity

with the music tends to influence the attitude towards the brand and purchase intentions. In contrast, the congruity of the background music influenced this relationship in the condition with high involvement. However, an essential factor in these results was consumer involvement. Involvement refers to the relevance of the topic or the content of the message for the personal attitude (Park et al., 2014). In the abovementioned study, involvement was divided into two types representing the degree of relevance and importance of personal attitudes: high and low involvement. In the low involvement condition, the familiarity of the background music had a more significant impact. However, the correlation of the background music with the product had a more significant effect on the condition with high involvement. This suggests that the characteristics of background music have a different effect depending on the consumer's involvement (Park et al., 2014).

In summary, the research findings to date are relatively consistent regarding the relationship between familiar music and actual and perceived purchasing time (Garlin & Owen, 2006). This is remarkable since there seem to be contrasting outcomes, indicating that familiar music can reduce consumers' shopping time. However, they perceive it to be more time-consuming (Yalch & Spangenberg, 2000).

2.3.4 Likability

Another important aspect of music is the customer's likability or preference for music. Various authors address music likability and the different affective or behavioural states associated with a particular preference. For instance, Little and Zuckerman (1986) examined how preferred music and sensation-seeking are related. They claimed that preference for rock music was associated with higher sensation seeking scores, and preference for slower music was associated with lower scores. Additionally, according to Arnett (1991, 1996), a positive relationship exists between high sensation-seeking and a predisposition for music from the heavy metal and rock music genres. The findings indicate that both genres are energizing, generating enthusiasm and a desire for sensations. More research was done on this correlation in 1999 by McNamara and Ballard, who found a link between music preference, arousal and sensation seeking in males but not females.

Likewise, McCown et al. (1997) discovered a gender-specific effect on music likability. They investigated whether gender and personality differences could explain why the subjects prefer amplified and exaggerated bass in pop and traditional music (Kotzee, 2012). The findings demonstrate that a preference for enhanced bass positively correlates with both

factors. The results are significantly influenced by gender, as men show a higher preference for bass-driven music. The authors conclude that musical producers may further amplify the bass to tailor the music to adolescent men (McCown et al., 1997).

While much research has been done on music preferences, little is known about the causes of musical preference, what factors influence a person's musical preference, and whether there are actually individual differences in music that people associate with particular styles of music (Rentfrow & Gosling, 2003). The last point, in particular, is crucial for advertisers, as the music chosen in a physical or online shop has to match the target group of the retailer. However, there is limited research examining music's likability and relevance to personality (Rentfrow & Gosling, 2003). Early research on how music may help to understand a person's personality was conducted by Cattell, Anderson and Saunders. The authors theorized that a person's musical preference could reveal insights into unconscious personality traits (Cattell & Anderson, 1953; Cattell & Saunders, 1954). They designed a test to identify music preference and found 12 factors for music preference, which they interpreted as unconscious reflections of certain personality traits, e.g., surgency, warmth and conservatism (Cattell & Saunders, 1954).

However, rather than providing a glimpse into the unconscious, most authors believed that music's likeability expresses specific personality characteristics (Rentfrow & Gosling, 2003). These research directions deal with the physiological correlation of music preferences and their cognitive or behavioural implications. For example, Herrington (1996) studied the influence of liked or disliked background music on the consumer. Their study in a grocery shop found that music preference positively impacts shopping duration and spending in the shop. Caldwell and Hibbert (2002) explored the likability of music to see if Herrington's results could be confirmed in a restaurant setting. His study discovered that the likability of music correlates positively with time spent in a restaurant and that likability explains spending in the service setting better than other factors (Caldwell & Hibbert, 2002).

Broekemier et al. (2008) investigated the effects of happy and sad moods, as well as the effects of musical preference. After completing one session, the subjects evaluated each subject's likeability based on the number of positive, neutral and negative commentaries they received about the music. The findings showed little impact on the behaviour of customers. Similarly, according to their tests with different variables, Kellaris and Cox (1989) could not discover a significant influence of liked and disliked music.

However, the results are not consistent. Gorn (1982) conducted a study that examined the effect of combining a neutral product with a background musical stimulus on subjects. The music stimulus contained liked and disliked music. The findings indicate that shoppers are less motivated to select items whose advertisements use unpleasant background music.

Rentfrow and Gosling (2003) have tried to look more at the nature of music preferences in light of this diversity and the need for music preference research. They carried out six studies, each focusing on a particular structural aspect. The first study examined laypeople's perceptions of music's importance to daily life. Studies 2, 3, and 4 explored the fundamental framework of musical tastes. Study 5 explored the psychological characteristics of several musical genres. Study 6 discusses the connection between personality traits and musical tastes (Rentfrow & Gosling, 2003). The authors found strong evidence that lay people believe that music is essential to them and that the music they like reveals something about who they are (Rentfrow & Gosling, 2003). In studies 2, 3, and 4, it was discovered that four distinct categories might be used to categorize music's likeability, and in study 5, the authors linked individual characteristics to the four categories, which are elaborated on in more depth below. Finally, study 6 found a relationship between musical preferences and personality, self-assessment and cognitive abilities. The following are the corresponding traits mentioned (Rentfrow & Gosling, 2003):

- First dimension: People who like listening to the music of the first dimension tend to be creative, have a strong imagination, love aesthetics, perceive themselves to be intellectual and tolerant, and reject traditional beliefs. First-dimension music includes introspective and sophisticated genres like the blues, classical, folk, and jazz.
- Second dimension: People who appreciate the passionate and rebellious music of the second dimension – Alternative, Heavy Metal, and Rock – tend to be inquisitive, like to take chances, have busy lives, and see themselves as intellectual.
- Third dimension: People who enjoy listening to third-dimension music are cheery and traditional (country, pop, religious, soundtracks), trustworthy, want to help others, and think they are physically appealing. They also tend to be pretty conventional and socially open-minded.

- Fourth dimension: People that enjoy fourth-dimension music are typically chatty, vivacious, and indulgent, think they are physically appealing, and reject traditional values. Fourth dimension music includes dynamic and rhythmic genres like electronic, rap, and soul.

Overall, the results show that research into musical preferences can contribute a lot to explaining psychological phenomena (Rentfrow & Gosling, 2003). The dimensions above also begin to highlight the concept of *genre*.

2.3.5 Genre

Some researchers pointed to significant effects of structural music elements (e.g., Brooker & Wheatley, 1994; Hahn & Hwang, 1999; Stout & Leckenby, 1988). Genre, tempo, and loudness are frequently mentioned dimensions. One way to define a genre is “labels created and used by humans for categorizing and describing the vast universe of music” (Tzanetakis & Cook, 2002, p. 293). A wide range of music genres and sub-genres exists, with the most popular globally being Pop, Rock, Hip-Hop/Rap, Dance/Electronic, Latin, Classical and R&B (IFPI, 2022). Genre is a highly subjective aspect of music, as different people prefer different genres. Studies on musical preferences demonstrate that individuals tend to favour environments where the music aligns with their feelings and attitudes and indicates their personality (Abolhasani, 2017; Widdess, 2012).

Rentfrow and Gosling (2007) conducted a study to examine stereotypes related to music genres, given the association that research has established between music and various psychological traits. Therefore, the study examined the information conveyed through musical taste, focusing on genre preconceptions. The genres were divided into four categories according to how the music was selected in relation to their previous studies (Rentfrow & Gosling, 2003, 2007):

- Reflective and sophisticated: Classic, Blues, Jazz and Folk; typically with a slower tempo compared to the other genres; acoustic instrument use is predominant; little singing; complex, expressing both happy and sad emotions and a lack of energy; the elements or the music are intricate.

- Intense and rebellious: Alternative, Heavy Metal, and Rock music with a faster tempo, primarily using electric instruments and some singing; Lyrics are energetic, moderately complex, and have a low positive to high negative affect ratio; The elements of music are pretty intricate.
- Upbeat and conventional: Country, Pop, Religious, and Soundtracks with a moderate tempo, use of acoustic and electric instruments, and moderate vocals; There is much positive energy and affect in the lyrics, which are straightforward and easy to understand; Simple and direct musical elements.
- Energetic and rhythmic: Electronic, Rap, and Soul Music with a moderate tempo, electric instrumentation, and singing; lyrics with a moderate amount of complexity, emotionlessness, and energy; The musical elements are moderate complex.

The authors note that these four categories can be universalized over time, population groups, methods and geographical regions (Rentfrow & Gosling, 2003). The results show that certain stereotypes are associated with specific music genres. Moreover, the extent of the evaluations was more significant than the authors had anticipated based on previous studies on interpersonal perceptions (Rentfrow & Gosling, 2007). The correlation that can be determined between the musical preference of the subjects and psychological attributes is most probably caused by the subjects' individual music experiences. These results are relevant for marketing research because they offer insights into the impact of different music genres and how they are perceived. Similar findings were made by Yeoh and North (2010), who discovered that classical music is associated with affluence and rock music with a stereotype of the rebellious. Furthermore, their study showed that the recall of rock items was higher than that of classical items when the subjects listened to rock music. When Classical music was played, the opposite was true (Yeoh & North, 2010).

Regarding genre stereotypes, Sullivan (1990) published a summary of the most relevant radio genre types and created in-depth descriptions for each format:

	Genre	Description
(1)	Easy Listening:	String orchestras perform covers of pop songs, a ban on vocal music, mellow and soothing music, and typically an audience in their thirties.
(2)	Adult Contemporary:	The average age of the audience is thirty; pop music all the time and only a few songs with a nostalgic flair.
(3)	Album-Oriented Rock:	Lengthy variety of rocking pieces aimed at young people; the primary market is men between the ages of eighteen and thirty-four
(4)	Top 40:	current greatest hits and a few songs from the past, jingle commercials aimed at teenagers; primarily females between the ages of 18 and 34 make up the audience.
(5)	Middle of the road:	The audience is twenty-five to forty-nine, the music played is a slower version of the current popular music chart, and a wider variety of music is played, covering multiple eras; hard rock is not included.
(6)	Country:	The music played can vary depending on the regional preferences and may include Country, Western, Nashville Sound, Modern Country, Bluegrass, or Hillbilly; the target audience is typically over twenty-five.
(7)	Black:	The focus is on black artists and a black audience; the music selection comprises soul, disco, Rhythm and Blues, and jazz.

Table 4: Radio genre types and in-depth descriptions (Sullivan, 1990)

These definitions are very valuable for marketers, as congruence and fit are significant in the selection of music. Therefore, knowing about these mechanisms and the intended audience is crucial when choosing music. Furthermore, familiarity (see section 2.3.3) plays a significant role in using music and analysing its impact. Sullivan (1990) confirms with the findings of his study that music, which was classified as highly involving, consistently had the highest impact on the products tested. Tom (1990) also analysed three different genres of music (Pop music, Pop music parodies, and music composed exclusively for television commercials). He concluded that the individual compositions provided the most helpful recall cues. The use of parodies, however, is usually more effective than the original (Tom, 1990). The results confirm the research outlined, as they show that the more consistent the information is at the input and output points, the more it is retrievable (Tom, 1990).

In that respect, Abolhasani (2017) shows in his laboratory online experiment with university advertisements that Pop music evokes the most positive reactions to a brand's

image, as perceived by consumers. The author used a mixed-methods approach to investigate the impact of several musical congruity parameters on the emotional, cognitive, and behavioural reactions of the subjects to advertisements. However, the author recommends being cautious when generalising the results, as only university students were involved as research participants. Assis and Giraldi (2012), e.g. found that consumer attitudes in a retail shop are influenced more positively by Country music than by the other two genres tested (Pop Rock and Axé). Additionally, Gopal (2010) shows that different music genres can produce different results. He conducted research with a mock retail store. He discovered that Western Pop music impacted shopping time, Indian Pop influenced expenditure, and Indian Classical music was more pleasurable (Gopal, 2010).

An offline experiment by Grewal et al. (2003) investigated the effect of the atmosphere on customers' waiting expectations in a jewellery shop. Classical music as atmospheric stimuli positively affected the evaluation of the atmosphere in the shop (Grewal et al., 2003). However, the authors suggest that various music genres can have varying effects on the environment in other settings. Similar to earlier research, this one emphasizes the significance of congruity or fit.

Congruity is also examined by North et al. (2016). However, they suggest that specific cognitive processes are triggered by genre. For example, listening to specific musical genres (e.g. Classical or Country music) activates the associated subconscious mental concepts, e.g., expensive, sophisticated, formal, and educated. This consequently influences recall, perception, and the selection of products (North et al., 2016).

Irrespective of the research mentioned above, preferences in terms of the genre are highly subjective. Factors like age, wealth, and education may also predict the type of music that appeals to listeners. In addition, different groups of customers are shopping at different times of the day. Therefore, according to Spangenberg et al. (2005), and Yalch and Spangenberg (1990, 1993), it is advisable to employ various genres tailored to the occasion and target audience.

The studies mentioned above focus on the influence of music on marketing. Kellaris (1992) proposed that to optimize music's positive impact on the audience, the musical design elements utilized in advertisements or sales settings ought to be crafted aesthetically pleasing. With this in mind, the term *music mode* does not refer to a particular genre. Instead, it

describes the distance between notes that together form a chord and the number of chords that collectively make up a song (Vaccaro, 2001). There are two categories of modes: major and minor. The distance between the individual notes of a chord in the same key differs depending on whether it is composed in a major or minor mode (Vaccaro, 2001). Notably, the music mode strongly influences the moods and emotions of consumers (Stout & Leckenby, 1988; Wedin, 1972). Studies on modes were conducted as early as the 1930s. The aim was to analyse how modes and tempo can influence human emotions in music (Hevner, 1935, 1937). According to Hevner's (1935) analysis of the interplay between different modes and tempos, positive emotions can be triggered by significant keys and faster tempos.

Following this examination of prior research on the variable genre, the subsequent subsection presents studies and findings related to tempo as an independent variable.

2.3.6 Tempo

The musical dimension of tempo is usually measured in beats per minute (BPM) and can be defined as the speed or pace of a music track (Canbay, 2018; Pfaffinger et al., 2022). According to Kellaris and Rice (1993), most of the music used in marketing situations is between 60 and 120 BPM, and most authors followed the recommendation of these key authors. Nonetheless, other authors recommended different speeds, such as slow and fast. For instance, music with a BPM of less than 72 was considered slow, while music with a BPM of more than 94 was considered fast (Milliman, 1982; Sullivan, 1990). Accordingly, there is no generally valid definition of slow and fast music.

Tempo influences the moods and behaviour of consumers in many ways. Ding and Lin (2012) found that the tempo of the background music, in a study on four fictitious online shops, positively influences the arousal of consumers. Moreover, tempo influences consumers' behaviour. According to the authors, a music tempo of 94 BPM or higher is considered fast, and one of 72 BPM or lower is considered slow (Ding & Lin, 2012). In addition, Milliman (1982) demonstrated that customers adjust the velocity at which they move through the supermarket depending on the music's tempo. Slow background music results in customers moving more slowly in the shop, and with a slower pace and longer shopping time, consumers also tend to spend more (Milliman, 1982). Fast music, in contrast, may distract customers and cause restlessness (Edworthy & Waring, 2006). Customers may become disinterested in background music played too slowly (Eroglu et al., 2005). With this in mind, it is observed that consumers prefer either music with a slow tempo and high density

or music with a fast tempo and low density when they are shopping (Eroglu et al., 2005). Additional effects of music tempo on consumer responses were observed in the behaviour of approaching or avoiding the stimuli and the extent of browsing activity.

Moreover, it seems as if the findings rely on specific research settings. For example, the background music for a radio commercial was the subject of an offline experiment by Brooker and Wheatley in 1994. They investigated how fast and slow music affected emotions, attitudes, unaided recall, and the chance of purchase. The authors found that the tempo variation had the effect they expected on how the music was perceived, but for rated variables, the effect was absent (Brooker & Wheatley, 1994). Additionally, Milliman (1986) reported that variations in tempo might have a significant effect on both the duration of time spent and the number of purchases made.

Furthermore, Kellaris and Kent (1993) investigated how variations in tempo can affect consumer responses. The authors performed an offline experiment at three speed levels (fast, medium, slow), three mode levels (major, minor and atonal), as well as two music genres (Classical music and Pop music). The researchers found that tempo variations influence pleasure and arousal and tonality influences the pleasure and surprise experienced. The genre had a moderating effect on the impact of tempo and mode. A faster tempo positively affected subjects in a classical music condition (Kellaris & Kent, 1993).

Oakes (1999), in turn, could not find any significant evidence of the influence of tempo in his experiments. In an offline study, participants listened to radio advertisements with different background music conditions. The study investigated to what extent the background music's tempo and the advertisement's perceived duration correlate. The tempo conditions of fast and slow and a control condition (no music) were investigated. Oakes (1999) could not find a significant effect on the perceived duration. However, in contrast, Oakes and North (2006) have shown in another study that the tempo of the music influences recall. Participants in their offline experiment were exposed to three variants of radio commercials with various musical backgrounds (slow/fast tempo and a control condition without music). The results of the slow-tempo advertisements showed a significantly higher recall of the content of the commercial in comparison to the fast music condition. However, compared to the condition without music, the presence of music significantly impacted the recall of the ad´s information. This finding should not be generalized. However, as Olsen (1997) has shown in his study, background music can increase memory. This study's findings

suggest that background music binds resources from information processing (Guido et al., 2015). Hahn and Hwang (1999) also suggest that the tempo of the music used determines the extent of the information load in advertisements.

Therefore, knowing about the effect of tempo as a moderator helps advertisers choose suitable background music, aiming to maximize the consumer's processing of the messages. It is therefore assumed that there is indeed an ideal tempo that maximizes the processing of messages. When the information content of the advertising messages is low, music at a fast tempo leads to better recall of the messages. Conversely, a slow tempo is suggested when much information is present (Hahn & Hwang, 1999).

Overall, the research findings already discussed show a diversity of cognitive reactions and different results. However, people's emotions can also be influenced by the music tempo. For example, a study by Iyiola and Olajumoke (2011) investigated the meaning of a piece of music to find out how music influences a person's emotions in the context of shopping. The findings showed a positive correlation between music tempo and emotions on subjects´ emotional evaluation, confirming the impact of music on emotions.

2.3.7 Loudness

Loudness and volume are measured in decibels. For example, Dalton and Behm (2007) define soft music as less than 60 decibels and loud music as over 80 decibels. However, its perception and evaluation contain a highly subjective component (e.g., pleasant, enjoyable).

Much research examines the influence of loudness on both on- and offline retail settings, with some studies dating back several decades. For example, Smith and Curnow (1966) showed that volume could influence the length of stay in a supermarket. However, there was no impact found on customer buying intention and overall satisfaction of the customers. The study was conducted in a natural environment in two large supermarkets, and the music varied in eight contrasting experiments at different volumes (from loud to soft). During the periods with loud music, the average length of stay was significantly lower. The volume of music can also influence consumers' perception of the duration of their shopping experience. Loud music can cause the perceived shopping time of customers to be longer than the actual time in the shop (Kellaris et al., 1996). Furthermore, music that is too loud can trigger unpleasant emotions, which leads individuals to avoid a situation (Herrington &

Capella, 1994). On the other hand, Yalch and Spangenberg (1990) found that when music is played at a low volume, it positively impacts social interaction between customers and sales staff.

Cameron et al. (2013) conducted a thorough investigation of loudness characteristics in an offline study. The effects of three loudness settings (soft, loud, and no music) on the mood and perception of the environment of the consumers were examined. Classical music was used as stimuli. According to the findings, loudness affects service evaluations, while the condition without music yields the best ratings. Consumers exposed to the low-volume condition had a longer perceived wait time, and the group in the loud music condition had the longest perceived wait time (Cameron et al., 2013). The volume of the music, on the other hand, showed no significant impact on the mood.

In an offline experiment, Morrison et al. (2011) investigated the effects of music volume (soft and loud) in a natural shopping environment. In addition, the music was linked to another stimulus, namely aroma (vanilla scent present or absent). The findings indicate that the impact of music volume and the perception of a vanilla flavour can significantly influence consumers' emotions and satisfaction (Morrison et al., 2011). The impact of the environment on pleasure was only confirmed in the condition with both loud music and the aroma present.

In summary, the findings indicate a correlation between loudness and how consumers perceive time. Following the examination of the ‘S’ component in this section, the subsequent section (2.4) will focus on the 'O' dimension for the organism of the S-O-R framework.

2.4 The ‘O’ in S-O-R

The main objective of vendors is to produce or use stimuli that affect the potential consumer's cognition and emotions, which in turn influence the buying behaviour and decisions. Sellers may find it challenging to regulate the multifaceted response of the organism (O) to stimuli, given that various variables can influence it. On the other hand, marketers can control the choice of stimuli and create an atmosphere that can influence the organism's response. Of course, every customer is different, with differences in their culture, experiences, personalities, ages, and gender (among other things). Therefore, within the confines of this work, it is not practical to address all of the factors that affect the subjects ´organism. However, a brief explanation of the influences of age, gender, personality, culture, and emotional and cognitive responses is provided, as they ultimately affect purchasing

behaviour, as previous research has shown. The literature on these factors in potential customers will thus be highlighted in the following sections.

2.4.1 Cognitive reactions

In the context of classical conditioning, several researchers studied how music affects consumer behaviour. Gorn (1982) suggested that if a positive response to the advertising music is generally anticipated, a positive attitude toward the product can be evoked by mentally associating a piece of this music with it. Gorn's results showed that the subjects' preference for a product colour changed when the product was accompanied by pleasant music or unpleasant music. The results of Gorn's study had a wide-ranging influence on the field of music and advertising (Abolhasani, 2017). However, other researchers have not been able to reproduce these results (Blair & Shimp, 1992; Kellaris & Cox, 1989; Pitt & Abratt, 1988). Kellaris and Cox (1989), for example, could not confirm the influence of liked or disliked music even when they controlled several factors. The findings of their study call the effects of single exposures into question, which merely change the attractiveness of the music used (Alpert et al., 2005).

In addition, Heckler and Childers (1992) examined how consumers cognitively respond to music. The authors believe that music that is congruent with the brand, the content, and the objective of the advertising usually leads to consumers perceiving the advertising and the brand better. Furthermore, various researchers show that the better the music matches the core message of the advertisement, the better the advertising message is remembered (Tom, 1990).

Hung (2001) also examined how background music in advertising affects consumers' perceptions. His study exposed subjects to different music genres, Classical and Rock music. As a result, it was found that under the Classical music condition, participants saw more images of success when they were asked about the images that the advertisements evoked (Hung, 2001). In contrast, Magnini and Thelen (2008) discovered in a laboratory study in a fictitious restaurant that music does not appear to influence perceived service quality significantly but does influence perceived brand personality and décor. However, the character of the study as a laboratory experiment may limit the validity of the results, as the emotional experience encountered during an authentic restaurant visit were not entirely present (Magnini & Thelen, 2008).

Studies reveal that background music can also influence the cognitive process involved in memory retrieval. Gorn et al. (1991) studied the influence of two conditions on older subjects: information only and information with music. They demonstrated that musical exposure increases visual memory. Hahn and Hwang (1999), in turn, found that famous music by professional musicians improves information recall. Guido et al. (2015) also researched music's impact on memory. They investigated how the inclusion of background music endings affects customers' recall of the promoted items and messages (Guido et al., 2015). Fictitious radio advertisements were tested with different versions of background endings (abrupt end and fade out). Guido et al. (2015) found that abruptly ending background music can distract the subjects and decrease their ability to recall products and messages.

Music can also affect the shopper's judgement. Studies have shown that the use of unloved background music leads consumers to judge the credibility of a product or brand worse than when it is treated without music (Simpkins & Smith, 1974). Similarly, North (2012) shows how the flavour of wine can be affected by background music. His study found that taste is affected by the mood the music evokes (North, 2012).

It was found that music and imagination are related more broadly. Miller and Marks (1992) tested one's capacity for mental imagery through an offline experiment. They tested four different verbal advertising messages in radio spots versus the same spot containing sound effects. According to the finding, using acoustic effects can help to improve people's imagination (Miller & Marks, 1992).

Although there is solid evidence that congruity affects memory and recall, it is necessary to look into how incongruent background music affects consumer perception, attitude development, and evaluation (Abolhasani, 2017). Various studies, e.g. Yalch and Spangenberg (2000), produced inconsistent or contradictory results. In their experiment in a simulated shopping environment, shoppers listened to music varied by familiarity. Customers were questioned about their perception of time spent in the store, their affective state and their evaluation of the products. The results showed that subjects reported a longer time with familiar music but spent more time in the shop with unfamiliar music. The researchers explained the shorter measured shopping time when familiar music was played with increased arousal. Even though emotional states influenced the product ratings, the trigger of these effects was not the music directly (Yalch & Spangenberg, 2000).

2.4.2 Emotional reactions

Further research identified another interpretation of the influence of musical effects in advertising, namely that music works through the emotional reactions it triggers in customers, e.g., by changing the attitudes, which have a positive influence on the perception of a brand or product and the acceptance of advertising messages (Alpert & Alpert, 1990; Gardner, 1985). According to psychological research, emotional responses are typically divided into pleasure and arousal (Mehrabian & Russell, 1974). Pleasure is felt when an individual experiences positive feelings, such as joy, satisfaction, happiness, or contentment. Arousal is a term used to describe a condition of heightened stimulation, activity, or alertness in an individual (Mehrabian & Russell, 1974; Menon & Kahn, 2002).

Alpert and Alpert (1990) examined the relationship between the emotional responses to advertising and the effects of music and developed an alternative theory to classical conditioning. The authors hypothesize that music in advertising can impact consumer responses by influencing perceptions of the products, brand and advertising, independently of cognitive processes (Abolhasani, 2017; Alpert & Alpert, 1990). Similar results were obtained by Dad et al. (2018) with their experiments. The authors investigated whether background music impacted a 3D servicescape taking place in an online virtual world (Second Life). They demonstrate that music affects arousal and pleasure and, thus, the resulting buying behaviour. However, several researchers criticize this theory saying it neglects the concept of musical congruence to explain the influence of advertising music on consumer reactions (Abolhasani, 2017).

The use of music is considered one of the most essential elements in advertising, which can evoke different emotions regarding the advertising, brand and the advertised products (Dibb & Simkin, 2008). Music acts as a support for an advertising message to reach the recipients better. As a result, a more appealing advertising message receives more attention from customers. This, in turn, leads to positive feelings towards the brand or product, which improves product evaluation and facilitates acceptance of the advertising message (Hahn & Hwang, 1999).

In an analysis of 150 scientific papers that used background music as a stimulus, Garlin and Owen (2006) discovered that familiarity and musical preferences positively impacted consumers. They also found that the mere presence of music was enough to impact consumers' perception of pleasure positively (Ferreira & Oliveira-Castro, 2011). Similarly,

Cheng et al. (2009) point out that music and colours significantly impact consumers' affective reactions. Participants had higher arousal and well-being related to fast music and warm colours (Jain & Bagdare, 2011).

North and Hargreaves (1998) studied how different music genres influence perceptions of the commercial environment. They found that Classical music reinforces sentiments of elegance and high culture, while Popular music is linked to optimism and confidence but not peacefulness.

Yalch (1991), in turn, found that well-fitting song lyrics stimulate people's positive perception that enhances the association with the advertised product by evoking good feelings. Similarly, MacInnis and Park (1991) discovered that a highly congruent song lyric related to the advertisement message led to a positive affective reaction and consequently reinforced positive attitudes toward the brand and the company. Finally, four critical uses of lyrics were discovered by Anisimova et al. (2014) after researching the impact of song lyrics:

	Area of focus	**Key use**
(1)	Focus on the emotions:	The texts can trigger emotions in the listener pertaining to the narrative or the offering.
(2)	Focus on the central character:	The lyrics have the power to conjure connections and the feelings they evoke.
(3)	Focus on the story:	The texts serve either as a means of transmitting the story or as a support for visual advertisements.
(4)	Focus on the relationship between character and product/brand:	Song texts verbally explain the relationship between a character and a product or brand.

Table 5: The four critical uses of lyrics by Anisimova et al. (2014)

According to their application, song lyrics can influence various responses, such as moods and identification (Anisimova et al., 2014).

When it comes to attitudes toward advertising and brands, Park and Young (1986) looked into the impact of music and its absence of it. They found out that music serves as a persuasive aid that has a positive effect on customers' attitudes towards advertising and results in support for brand attitudes. Hahn and Hwang (1999), in turn, examined whether audible cues may evoke positive emotions, which can positively influence attitudes towards the

advertised brand. Against this background, various researchers show that a higher degree of congruence between the music used, and the advertising message evokes positive emotions (Lord et al., 1995; MacInnis & Park, 1991).

Wang et al. (2017) performed an online study on various retail websites and studied the effects of background music. Their results show that appropriate background music on the homepage of a website triggers positive emotions, e.g., arousal, pleasure and perceived happiness (Wang et al., 2017). However, this correlation is influenced by the gender of the subjects. The influence on enjoyment was more significant for men than for women. Music also leads to a significantly higher degree of perceived usefulness in men. Wang et al. (2017) found that arousal had a significant measurable impact on men but not on women.

While considerable research suggests that music can elicit emotional reactions, certain studies show contrary results. Kim et al. (2009) conducted an online study based on the S-O-R model, analysing the effects of music (present/absent) and product presentation (model vs flat). The authors discovered that product presentation could significantly influence consumers' emotional response, while surprisingly, the music had no influence (Kim et al., 2009). Several possible interpretations are given to explain this unexpected result. The study focused on only one genre of music (Pop music), chosen because of consumer awareness and preference. Referring to other research, the authors note that other musical dimensions like tempo and fit are equally relevant regarding positive affective reactions. Similarly, Milliman (1982) summarized that music selection must match the context where it is being used.

Many studies deal with the concept of nostalgia in relation to advertising. Nostalgic elements are used to evoke a longing for the past or a fondness for objects associated with memories of one's youth (Holbrook, 1993; Holbrook & Schindler, 1991). Likewise, nostalgia refers to the positive or sentimental memory of past events, generally associated with positive emotions such as happiness and contentment (Davis, 1979). Nostalgia is, therefore, a concept that marketers frequently use. Studies have shown that nostalgia in advertising elicits more positive reactions than without nostalgic elements, regardless of consumers' associations with a brand (Muehling et al., 2014). Advertising backed by old, nostalgic music can trigger nostalgic feelings in the consumer, even if neither the product in question nor the advertising itself contains nostalgic elements (Chou & Lien, 2014). The authors also discovered that listening to older songs can produce more positive feelings of nostalgia than listening to more recent songs.

2.4.3 Age

Although age data is frequently reported in experiments in marketing research, the influence of age, as a standalone factor, has seldom been considered in the assessment of the shopping ambience (Yildirim et al., 2015). The issue with defining age is one of the causes of this. Although age is often viewed as a biological phenomenon, it is generally accepted that psychological and sociological ageing result from life experiences (Moschis et al., 1994).

Unsurprisingly, certain companies and products appeal to various demographics and, consequently, various prospective customers. Therefore, it can be inferred that some commercials are aimed at particular age groups, even though the intended result is obviously to provide the best overall buy result, regardless of the age of the customers. Tobacco, alcohol, and energy drinks are examples of well-known products that appeal to a broad spectrum of prospective consumers (Friedman et al., 2018). That teenagers are more vulnerable to such commercials may not be unexpected given their lack of experience, uncertainties and anxieties, desires for autonomy, social status and relationships, and peer connections, which have been linked to drug or alcohol usage (Lovato et al., 2011). In addition, studies have indicated that younger individuals, due to their age, tend to be more prone to taking risks than older and more experienced individuals and that these advertisements elicit cognitive and emotional responses and purchasing behaviour. Despite a lack of in-depth investigation in earlier studies (Aloise-Young et al., 2006; Friedman et al., 2018), one advantage of such commercials is that they offer atmospheric stimuli through the combination of both audible and visual elements like pictures and videos, which tend to be more attractive to younger individuals than reading advertisements.

In contrast, studies using neurological fMRI to investigate the link between age and the probability of responding to advertisements for goods showed that individuals are more likely to produce avoidance responses as they get older. According to prior studies, people become more resistant to change as they age. For this reason, even when designed for elderly consumers, some products may instead have an avoidance effect rather than an approach effect. The cause is that as people age, a pattern of avoidance develops due to nostalgia for more familiar, older products that helped shape earlier memories (Cartocci et al., 2016). As a result, for these individuals, there is less desire to take a risk and purchase something new because they may be content with an old product that has served its purpose for many years.

Studies in a furniture store have explored the impact of age on responses to various

atmospheric stimuli such as music (genre, tempo, loudness), colouring and light, primarily in offline settings, with a particular emphasis on the atmospheric conditions within a store. The use of colour and music has garnered significant interest as atmospheric stimuli. Younger shoppers are more drawn to stores with warmer colours, according to Yildirim et al. (2015), while customers in their middle age showed a preference for a broader spectrum of warm and cool colours. In terms of music, younger shoppers spent more time in stores exposed to medium-tempo pop music, while middle-aged individuals preferred slower pop and art music. Age is frequently examined as a dependent variable in atmospherics research, so there is still enough room for further research into this factor. However, it is essential to remember that this variable is anything but straightforward.

2.4.4 Gender

Additionally, gender is another variable for which one can gather information about the organism. However, while gender is commonly assessed as a dependent variable in experiments, there is still a lack of research on how men and women perceive advertisements (Cartocci et al., 2016).

It is a common stereotype that women enjoy shopping more than men. However, this assertion may not necessarily be accurate since it depends on both the nature of the products being bought and how the atmospheric elements are employed in the sales setting. Females and males also react in different ways to certain atmospheric factors that are cognitively and emotionally specific. Since hormones or sex chromosomes are believed to contribute to variances in emotions and character, it is uncertain whether biological factors are responsible for these distinct responses (Putrevu, 2001). Furthermore, the centrality of gender-role identification in society must also be considered, contributing to different male and female behaviour. Therefore, differentiating between cognitive, affective, and purchase behaviour variations that stem from biology or socialization may not be feasible. Nonetheless, research has revealed that “[…] consumers prefer products described in terms that match the gender attributes they perceive as both characteristics of and important to themselves” (Yildirim et al., 2015, p. 715).

The notion of disparate emotional perceptions in males and females forms the basis for the assumption that each sex (biological) and gender (socialized) shows unique reactions to particular advertisements. Although the differences between genders may be regarded as

substantial, it may not always be possible to determine the exact reason for the observed gender effect. Earlier studies suggest that women tend to show a greater interest in items linked to feminine characteristics, such as perfume advertisements (Cartocci et al., 2016). Following this, men react positively to advertisements more so than women, especially those that display stereotypically masculine traits, like car ads. In the study by Mateusz (2018), men and women were exposed to the same video advertisement. EEG measurements revealed that women's emotional response was triggered at the start of the video (showing a child), possibly due to their attention. At the same time, men responded emotionally towards the end of the clip (showing a car). Researchers interpreted this discovery as an indication that women tend to have emotional reactions to commercials that contain feminine content. In contrast, commercials with masculine content do not elicit the same response.

Certain products may lead to gender differences in males and females. However, making generalizations or preconceptions about what is deemed “manly” or “womanly” is not advisable because such perceptions are not always defined biologically. Numerous investigations have examined specific products and brands that can be considered "gender-neutral" since they are not particularly linked to one gender, for example, tobacco or alcohol advertisements. The results of these studies demonstrate that various products elicit distinct reactions in males and females (for example, Anderson et al., 1999; Kellaris & Rice, 1993; Wang et al., 2017). For instance, according to Kellaris and Rice (1993), the impact of loudness varies depending on gender, with women exhibiting a more positive response to music played at lower volumes, for example.

According to research, women are more involved shoppers than men regarding retail atmospherics or the shopping environment. They tend to be more inclined to strategize their purchases, actively analyse product information, take more time with their purchases, and are better at finding bargains than men (Borges et al., 2013; Dholakia, 1999). Studies indicate that women tend to have a more pleasurable shopping experience than men in terms of their interest in specific details. Nevertheless, all of these suppositions have been made based on the notion that women tend to shop more than men because men are more practically minded and prefer efficient shopping in a utilitarian store environment (Borges et al., 2013). Women pay attention to environmental features, as shown by recent research. Borges et al.’s (2013) study revealed that although the store's enjoyable environment did not influence men’s perception of price, women may be more sensitive to pricing than men. However, women are still willing to purchase a product at a higher price when it is offered (Zeithaml, 1988). Men

are said to be more logical and analytical, eliminating unimportant attributes. In contrast, women are often more subjective and intuitive in their ability to interpret nonverbal cues (Everhart et al., 2001), more visually oriented, and internally motivated (Holbrook, 1986). Furthermore, Hidayetoglu (2015) investigated the gender effects of music and colour in a furniture store and found that females tended to favour warmer hues and brighter rooms than males.

2.4.5 Personality

Research suggests that different processing mechanisms within the consumer can result in contrasting effects in response to music in advertisements (Craton et al., 2017). Some mechanisms, for example, are strongly influenced by a person's listening history (Huron, 2006; Margulis, 2014). Abolhasani (2017) states that one´s perception of music relies on individual preference, as the same piece of music can be highly likeable for one individual, while another consumer feels great dislike. According to the author, it is essential to realize that the individual experiences consumers have had in their lives have an impact on the value of music in an advertising context. Furthermore, Oakes (2007a) summarizes that a particular piece of music can bring back memories of an experience that can influence consumers' evaluation of a brand. Similarly, Kerrigan et al. (2014) found that subjects exposed to certain music recalled specific memories related to positive past experiences. Music that consumers associate with negative, nostalgic or sad feelings can, in turn, have a negative impact on listeners' evaluation of the brand (Blair & Shimp, 1992).

Similarly, when music is played that the consumer perceives as genuine, it can evoke memories of the past and bring that past to life (Grayson & Martinec, 2004; Walsh, 2001). Furthermore, it is important to know prospective customers' preferences, motivations and attitudes toward choosing the appropriate music (Oakes et al., 2013). Abolhasani (2017) suggests that listening habits can also influence the way consumers perceive and react to advertisements.

2.4.6 Culture

Traditional, folk or indigenous music that is deeply rooted historically, culturally and linguistically is an essential feature of national identity (Danabayev et al., 2021). In these musical styles, linguistic, traditional and cultural elements are closely interwoven. Scholars, therefore, argue that the cultural link with music can affect attitudes towards the brand, regardless of whether one likes a piece of a particular music or not (Abolhasani, 2017).

Against this background, Mazaheri et al. (2011) note that ethnic groups have very different shopping habits when compared to each other (e.g., Canadians versus Chinese). These different behaviours can be compensated for through the selection of appropriate music. North et al. (1999) show that the response of people from different origins to different music genres varies accordingly. They demonstrate that French wines sold better than German wines when accompanied by French music, while German music had the opposite effect. The study analysis found that consumers were unaware that music influenced their decisions (Spangenberg et al., 2005).

After presenting the ‘O’ of the S-O-R in this section, the dimension ‘R’ for the organism will be reviewed in the following section (2.5).

2.5 The ‘R’ in S-O-R

In this subsection, the third stage of the S-O-R model, namely the desired *response* and, thus, the approach to the offered product, is discussed in more detail. Consumer reactions represent the final result, expressed in an approach or avoidance behaviour (Eroglu et al., 2001). As the name suggests, approach behaviour is a positive response to a particular stimulus, such as time spent in a shop or willingness to act or perform in a specific way. In contrast, avoidance behaviour is when the stimuli drive the consumer away from the product he or she intended to buy. An environmental cue initiates either an approach or an avoidance reaction in the consumer based on the individual interpretation (Ferreira & Oliveira-Castro, 2011). Perception of the environment is relevant as it can influence customers' buying behaviour regarding shopping time and expenditure, product and brand loyalty, and spending more time on the website to shop (Eroglu et al., 2001). Turley and Milliman (2000), who discovered 60 articles in an extensive literature search (from 1964 to 1997), also describe this effect, showing significant relationships between atmospheric stimuli, such as music, on consumer behaviour (Ferreira & Oliveira-Castro, 2011). The authors show that the effect of musical stimuli on consumers may be mediated through several variables, especially by age, tempo and music taste (Turley & Milliman, 2000).

The use of music is an essential measure in environmental design, as it impacts consumers' feelings and can thus lead to a change in purchasing decisions (Abolhasani, 2017). The main idea of an advertisement and a corresponding offer is to sell. Therefore, an advertising message more relevant to the recipients seems to receive greater attention from the consumers, which in turn may positively impact consumers’ purchase intent (Abolhasani,

2017). Background music is a correspondingly important function in this context, which is widely disseminated on radio, television, and online platforms (Hahn & Hwang, 1999).

Morin et al. (2007) investigated the influence of music extensively, comparing the outcomes of two experiments (offline and online). The initial research was conducted in a laboratory setting. It employed simulated videos of a service counter in a traditional bank. At the same time, the second investigation was carried out in an online environment, which involved an online catalogue sales service for a retail store. The researchers compared the effects of music with a no-music condition in both environments. The study found that the use of music impacted the outcomes, as it reinforced the perceived quality of the shopping environment in a holistic way (Fujiwara et al., 2017). Furthermore, with pleasant music playing, a double mediation effect could be demonstrated, in which the valence of the music was transferred to the attitude of the environment, which directly affected service ratings (Morin et al., 2007).

According to Abolhasani (2017), Baker et al. (1992), and North et al. (2003), researchers focused their investigations on a total of four behavioural responses, namely (1) spending, (2) willingness to buy, (3) product selection, and (4) service evaluation. The following sections present and discuss the literature on these factors.

2.5.1 Expenditure

North et al. (2003) discovered a general effect between different genres of music (Classical, Pop and no music) and how these affect spending per person. When Classic was played, the expenses exceeded those for Pop and no music. Areni and Kim (1993) also studied how different genres affect consumers' purchase behaviour and found that customers prefer more expensive wines when Classical music is played. According to research by Andersson et al. (2012), shoppers are more likely to spend more money when background music is playing in a store. Furthermore, Turley and Milliman (2000) support the theory that consumers feel more comfortable with background music and therefore shop longer, leading to higher spending (Siddiqui, 2018). Similarly, Ferreira and Oliveira-Castro (2011) find that playing superior-rated music can positively impact sales. Nevertheless, Andersson et al. (2012) show that other factors strongly influence music's impact on spending and attitudes, such as gender or the type of shop.

Sullivan (2002) investigated the effects of music on the atmosphere in a restaurant, particularly the impact on spending. The results of this study showed that spending on food and drinks varied significantly as a function of the musical background. The condition without music resulted in the lowest spending among all settings (Sullivan, 2002). Moreover, the music volume, in particular, significantly impacted the expenditure. Other variables like music genre, preference or tempo showed no substantial impact on spending. Low music volume, in turn, can positively impact expenditure (Sullivan, 2002).

Jacob et al. (2009) found that spending rates significantly increased when clients were exposed to Romantic music compared to other music types. No higher spending rates were measurable for Pop music compared to the control condition (no music). The setting of the study was a flower shop, and the authors appropriately stated that romantic music appears congruent with the environment. This suggests that congruity can have an essential effect on expenditure. If the musical elements used are related to the shopping context, the brand's image or the product offered, then the likelihood that customers will react positively increases (Jacob et al., 2009).

However, congruity is not the only moderating variable that needs to be considered. Herrington (1996) notes that one's preferences also have an essential impact. According to Herrington and Capella (1994) and Herrington (1996), music preferences are usually determined by genres and specific interpreters. In an offline experiment, the authors gathered information from customers of a retail establishment. Music preference was recorded on a scale based on the participants' ratings, and instrumental music was played at different tempos (slow and fast) and volumes (soft and loud) conditions. The tempo and volume of background music showed no significant impact on shoppers' spending, but music preference did (Herrington, 1996). The extent to which music preference matched the background music influenced spending and time spent in the store, independent of tempo or loudness (Herrington, 1996). The author, therefore, suggests developing a concept for using background music that corresponds to the client's taste and preferences as closely as possible (Herrington, 1996).

Nevertheless, Vida et al. (2007) discovered that the use of music only has an indirect impact on consumer spending. When background music was heard in a real-life retail shopping environment, it positively impacted time spent in the store, which consequently has an indirect impact on consumer spending. Accordingly, only shopping time directly influences

consumer spending, but not music (Alexiadou, 2013).

Yalch and Spangenberg (1993) also recommend that the influence of music should be analysed, among other variables. Three musical variations (foreground, background, and no music control condition) were tested in an offline experiment at a nationwide clothing retailer in two distinct sections (sportswear for men and dresses and coats for women). The music selection was based on its appeal to customers by age (25, 25–49 and over 50) and gender (Yalch & Spangenberg, 1993). The findings indicate that using an appropriate music selection for a particular section improves the atmosphere, leading to more customers and higher expenditures (Kearney, 2012). Music in the shopping environment is related to age; gender, however, has no influence. Other influences, such as shopping alone or in a twosome, searching for a specific product and shopping during the week or at the weekend, do not significantly impact customer behaviour (Yalch & Spangenberg, 1993). Even the customers' moods could not explain the effect of the music. These findings confirm that background music influences consumer behaviour by stimulating cognitive processes and not altering affective states (Yalch & Spangenberg, 1993).

A generalization of these assumptions is impossible, as this might ignore potential interactions among behavioural, cognitive, and emotional responses. For instance, Wakefield and Baker (1998) investigated the correlation of three variables influencing shoppers' enthusiasm and willingness to spend time in a shopping mall. The variables identified were 1) the diversity of tenants, 2) the shopping centre atmosphere and 3) engagement in shopping. The three factors all influence enthusiasm and willingness to stay to varying degrees, which has a corresponding impact on consumer behaviour (Wakefield & Baker, 1998). Excitement, itself an emotional condition, thus influences cognitive responses and behaviours.

2.5.2 Willingness to buy

Willingness to buy describes the attitude or intention of the consumer concerning a planned purchase transaction and refers to the behaviour towards it (Shanteau & Ptacek, 1983). Many researchers have identified a positive relationship between listening to music and the intention to buy (Kellaris & Kent, 1991). A congruity between the mood triggered by music and the product offered can increase the willingness to buy (Alpert et al., 2005). In addition, customer's willingness to purchase is likely to rise if a positive correlation exists between the songs used and the product (Oakes, 2007a). The study of Baker et al. (1992) examined the influence of various environmental stimuli, including music, and discovered

that a suitable type of music could increase the willingness to buy by increasing customers' enjoyment. The experiments took place in a retail store. Classical music with a constant tempo was used as an independent variable, while the lighting and ambience of the shop served as additional cues.

Swinyard (1993) also showed that mood influenced purchase intentions if the consumer shopping experience was perceived as good and a high level of product involvement was observed. If musical stimuli and the consistency of the music trigger positive feelings in customers, then positive reactions can be generated in the context of a retail setting (Vaccaro, 2001). Also, Chou and Lien (2014) also point out that a familiar song positively influences consumers' perception of the product and purchase intention. The authors, therefore, assumed that familiarity with the music could lead to positive reactions, which can be transmitted to the advertised product or brand, subsequently increasing the efficacy of the advertisement.

In addition, Broekemier et al. (2008) found that participants who viewed video clips of an unknown store while listening to different types of music demonstrated a greater intent to purchase when exposed to upbeat and popular music. Likewise, Mattila and Wirtz (2001) report that popular music positively influences customers’ purchase intentions. If the scent of the shopping setting and the musical stimulus are congruent, the evaluation of the environment increases significantly. Customers show a higher degree of approachability and tend to make impulse purchases (Park et al., 2008). In turn, Garlin and Owen (2006) reported that the time spent shopping is increased by high tempo, high volume and less familiar music, and time spent shopping is overestimated when the tempo and volume are high. The music is less pleasant (Ferreira & Oliveira-Castro, 2011). According to Chou and Lien (2014), using highly relevant lyrics in advertisements can enhance the audience's sentiment in relation to the company and the campaign and increase purchase intent.

According to Alpert et al. (2005), the likelihood of a purchase increases when the music played matches the symbolism of the purchase. Different types of music were used (happy/sad/neutral) when the subjects were presented with the products (greeting card displays). The cards were for both happy and sad events. Emotions that were influenced by the music and matched the corresponding mood in such situations increased the intention to buy (Alpert et al., 2005). Bower (1981) supports the theory of increased purchase intention with congruent music and mood on happy and sad occasions by pointing out that happy (or

unhappy) people tend to choose activities and social situations that support their mood (Alpert et al., 2005).

On the other hand, Hussain and Ali (2015) indicate that multiple factors must be considered when analysing environmental stimuli and their impact on the intention to buy. The authors conducted an offline experiment and investigated the influence of atmospheric variables on customers' purchase intention in international retailers. Six other characteristics – cleanliness, aroma, temperature, lighting, colour, and display – were also examined. The findings reveal that neither music nor colour significantly affects customers' purchase intentions. On the other hand, cleanliness, scent, lighting, and display all positively affected purchase intention. However, the temperature in the shopping area did not influence at all.

The inclination to make a purchase can also be influenced by background music in online shopping settings. Lai and Chiang (2012) investigated the timing of background music in an online setting. They placed the background music during surfing in three placement points (two, four and six minutes after the user started surfing). The findings show that all three conditions lead subjects to show increased approach behaviour, while in the no-music condition, approach behaviour decreased. This suggests that integrating musical elements during browsing improves the atmosphere of a shopping website (Fujiwara et al., 2017).

Overall, it seems that the evidence on purchase intentions or decisions is relatively unclear, and future studies will therefore need to explore the influence of various other factors (Santos & Freire, 2013). The findings so far indicate that background music has an impact on buying decisions; however, Santos and Freire (2013) note that it is still unclear how this influence is generated.

2.5.3 Product choice

Several studies have shown that music can influence clients' decision-making when it comes to selecting products. A study by Gorn (1982) demonstrated that consumers are less inclined to choose products if advertising is surrounded by unpleasant music. Mittal (2015) reported that music influences product selection when liked music is played in the environment of the product. When consumers listen to a positively rated piece of music, it increases their product preference. In contrast, the presentation of an identical product and less popular music can negatively influence the preference for this product (Mittal, 2015). Shimp (1981) also suggests that music influences individual attitudes to a brand, which can

majorly impact brand preference and purchase intent.

Moreover, song familiarity positively impacts customers' perceptions of a product (Chou & Lien, 2014). Familiar and adequate music also influences the evaluation of the product. Wang and Spence (2015) found that music selected to match a product (wine) significantly influenced subjects' experience of taste and flavour as well as the acidity and fruitiness of the selected wines.

Grewal et al. (2003) also confirmed that consumers' purchase decisions could be influenced by music. They suggest that retailers can, to a certain extent, influence the factors that specifically impact customers' purchasing choices. However, some of these factors are only partly obvious to the consumer (Gajanayake et al., 2011). For example, a study's results show that jewellery shop customers are more willing to visit the store and give recommendations if they do not expect waiting time and rate the shop atmosphere positively (Grewal et al., 2003). The atmosphere in the shop was determined by one music and one non-music condition. In this research, using classical music led to a positive evaluation of the shop environment, which aligns with earlier findings (Hui et al., 1997).

2.5.4 Service evaluation

Under both music and no-music conditions, Andersson et al. (2012) examined consumer behaviour in a service store. It revealed that the music condition increased consumers' shopping time compared to the no-music environment. Likewise, North and Hargreaves (1996) conducted a study in a cafeteria and discovered a relationship between the ratings of the background music and the customers' intention to revisit the shop. Similarly, Vaccaro et al. (2012) report that liked music improves the consumers' prior-shopping experience and increases the frequency of shop visits and intention to return.

Several studies have shown that the perceived time spent waiting in a store negatively correlates with overall environmental satisfaction (Evangelist et al., 2002; Jones & Peppiatt, 1996; Tom & Lucey, 1997). From this, it can be inferred that the perceived waiting time can impact a service's ranking. Since this influences satisfaction, it is advantageous to understand how long customers estimate their waiting time (Bailey & Areni, 2006). Against this background, North and Hargreaves (1999) investigated how the perception of waiting time was affected by three different levels of musical complexity against a no-music control condition. According to the authors, subjects in the condition without music waited the

shortest time, and no differences were found between the three music treatments. The findings suggested that these results could be due to an internal timing mechanism, where participants are distracted by the music (North & Hargreaves, 1999). In a field experiment, Guéguen et al. (2007) found similar effects in an outdoor market. Their findings reveal that customers stayed longer at the stand when popular music was played (Guéguen et al., 2007). In addition, Morrison (2001) found that the atmosphere in a shop, which includes personalized musical elements, can influence perceptions of product uniqueness and the level of service and may also positively influence the length of stay in the shop and the travel duration.

Kellaris and Kent (1992) conducted a detailed analysis of the relationship between music and perceived duration. They found that for listeners of positively valenced music, participants perceived the most extended duration when there was no music and the shortest duration when they were exposed to negatively valenced music. The authors chose Pop music with different modes (major, minor, atonal) as control variables. Kellaris et al. (1996) added that the effect of congruity on perceived duration is moderated by arousal.

Bailey and Areni (2006) provide a survey concerning atmospheric music and time perception and conclude that the research results do not consistently show whether music increases or decreases consumers' time perception. The research explored multiple dimensions of music, and the results are contradictory:

	Dimension of music	**Findings**
(1)	Presence vs absence:	Presence generally leads to shorter time perception (Guéguen & Jacob, 2002; MacNay, 1995; North & Hargreaves, 1999; Roper & Manela, 2000).
(2)	Tempo:	It has little or no impact (Caldwell & Hibbert, 1999; Chebat et al., 1993; North et al., 1998); longer time estimates result from higher tempo (Oakes, 2003).
(3)	Likeability:	Preferred music reduced time estimation (Cameron et al., 2003; Lopez & Malhotra, 1991); preferred music resulted in increased time perception (Hui et al., 1997).
(4)	Familiarity:	According to Yalch and Spangenberg (1993), exposure to familiar music decreased time perception, while Gulas and Schewe (1994) and Yalch and Spangenberg (2000) found that familiar music led to increased time perception.

Table 6: Dimensions of music and appropriate findings

Therefore, it seems that further study of the relationship between music and time estimation would be necessary, taking other factors that might have an impact into account.

After discussing the ‘R’ of the S-O-R in this section, a subsuming framework will be provided in the following section (2.6).

2.6 Subsuming framework

Morrison et al. (2011) published a framework in their study that outlines the relationship between different input variables, emotional response and behaviour.

They suggest that different factors (including aroma and music) trigger emotional reactions (pleasure and arousal), which subsequently result in certain behaviours. The framework is shown in Figure 3 (Morrison et al., 2011):

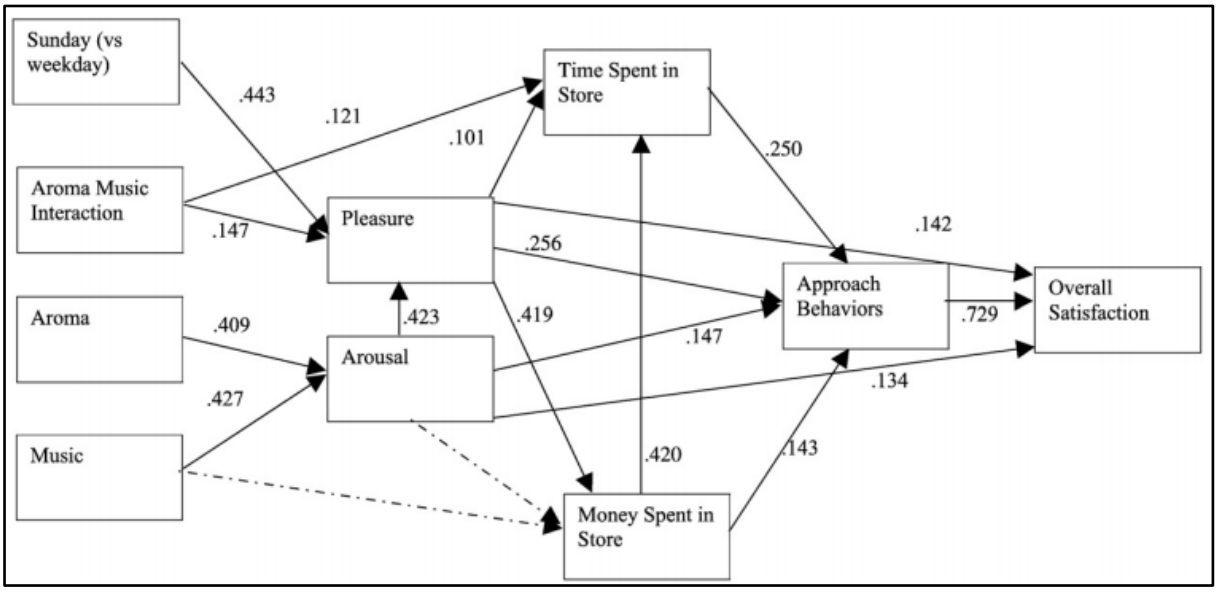

Figure 3: Framework by Morrison et al. (2011), affective and behavioural reactions

The graph illustrates that music (loudness) and scents (presence) influence consumers' emotional states in a natural shopping environment and consequently affect their behaviour. Music and scent positively affect arousal, which increases the degree of pleasure, which in turn influences consumer behaviour, including the length of stay in the shop, expenditure, shopping behaviour and overall shopping enjoyment (Morrison et al., 2011). The study’s results indicate a direct link between arousal and behaviour and interaction or congruence

effects of music and scent on enjoyment and dwell duration (Morrison et al., 2011). In particular, combining loud music and vanilla aroma increases pleasure, resulting in higher expenditure and length of stay. However, no corresponding effects were found for arousal.

These and many other authors point out that music may be an independent stimulus to elicit affective or behavioural responses. However, the results suggest that the right balance of different atmospheric cues is essential for evaluating the shopping environment and, accordingly, for the impact on the outcome variables and responses. Therefore, congruence is an essential element concerning the S-O-R model.

After presenting a summary framework in this section, the relevant conclusions of the literature will be provided in the following section (2.7).

2.7 Relevant conclusions from the literature review

The following subsections summarize the points made in the previous sections before concluding by explaining why this gives occasion for investigation, the research gaps identified and what exactly is being investigated.

2.7.1 Music as ‘S’ – stimuli

Several models aim to categorize musical stimuli in the context of marketing (Abolhasani, 2017). However, regardless of which categorization is used, there is consensus in research about the importance and influence of musical stimuli in general and the influence of congruity in particular (Abolhasani, 2017; Johar & Sirgy, 1991; MacInnis & Park, 1991). In this regard, music has a stimulating effect in several respects:

- Emotions: The emotional aspect of a musical piece is considered by Broekemier et al. (2008) as one of the most essential dimensions of music. According to Bruner (1990), one's perception of music can be either happy or sad; thus, happy music theoretically leads to positive emotions and sad music correspondingly to negative emotions (Gardner, 1985). However, research findings on this theory are partly contradictory (Alpert & Alpert, 1990; Broekemier et al., 2008; Kellaris & Kent, 1993).
- Familiarity: the concepts of familiarity and nostalgia are closely related, so music is likely to enhance mood (Chou & Lien, 2010). The perception of shopping time, affective states, the memory of advertising messages, and the evaluation of services are all

positively influenced by familiar music (Kellaris & Kent, 1992; Roehm, 2001; Yalch & Spangenberg, 2000).

- Likability: According to Broekemier et al. (2008), likability refers to the preference for a specific music style and correlates slightly with consumer behaviour. However, the relationship between musical preferences and psychological effects is the primary focus of this field of study (Rentfrow & Gosling, 2003).
- Genre: music genre is highly individual because it is linked to the listener's musical preferences (Abolhasani, 2017; Widdess, 2012). However, ongoing efforts are to identify objectifiable outcomes for the impact of music genres in marketing settings. According to research (Abolhasani, 2017; Assis & Giraldi, 2012; Grewal et al., 2003), Pop, Country, and Classical music can elicit the highest positive reactions. Nevertheless, since genre preference is highly individual, several factors must be considered to match the customer's tastes.
- Tempo: research shows that the tempo of music positively correlates with affective, cognitive, and behavioural responses. Slow music tempo results in slower movements (Milliman, 1982), a better evaluation of the shopping experience (Eroglu et al., 2005) and a better recall of content (Oakes & North, 2006). Fast tempo can lead to distraction (Edworthy & Waring, 2006) but also results induce pleasure (Kellaris & Kent, 1993). The amount of information in advertising has a moderating effect (Hahn & Hwang, 1999).
- Loudness: the music volume also correlates positively with affective, cognitive and behavioural responses. High-volume music results in less time spent shopping but a perceived longer duration (Cameron et al., 2013; Kellaris et al., 1996) and can also lead to unpleasant emotions (Herrington, 1996). However, the research is not consistent.

2.7.2 Music and ‘O’ – organism

Various factors influence the internal processing of an environmental stimulus, e.g., the consumer himself, all marketing variables, and the setting (Vaccaro, 2001). The internal responses of consumers are the aspects that fall under the ‘O’ category of the S-O-R model. These variables have a moderating effect on the impact of music on the emotional and cognitive state of the consumer and thus also lead to responses in behaviour.

Music appealing to and matching particular consumer traits may evoke more favourable reactions. However, these reactions are dependent to a large extent on the

individual consumer. Therefore, it is essential to identify the target group and address it accordingly. A musical stimulus must not only fit the setting (e.g. the product, advertisement, location, and many others) but also consider the audience's preferences (e.g. emotions, familiarity, liking, type of music, tempo, loudness). Retailers have been aware for more than 20 years that their music selection must reflect the characteristics of their target group. If not, there is a chance that the customers' moods will change, and they will adopt a negative attitude towards the purchase (Rubel, 1996).

According to the S-category, marketers have to decide what kind of responses they want to trigger in the consumer concerning the O-category. As a result, it is crucial to understand the audience and its characteristics (such as age, gender, personality and culture), and also the affective and cognitive reactions that the musical stimuli elicit:

- Possible emotional reactions: Music can affect consumer pleasure and arousal (Dad et al., 2018). Familiarity and the liking of music also positively influence consumer pleasure (Garlin & Owen, 2006). Pop music can trigger moods of optimism and confidence, while Classical music is associated with elegance (North & Hargreaves, 1998). Furthermore, song lyrics significantly influence emotional responses (Anisimova et al., 2014).
- Possible cognitive reactions: The consumer will perceive the commercial and the brand more positively if the music is congruent (Heckler & Childers, 1992; Tom, 1990). On cognitive functions, classical music has a significant impact (Hung, 2001). In addition, music that is familiar to consumers improves recall (Hahn & Hwang, 1999), while disliked music lowers the credibility ratings of a product (Simpkins & Smith, 1974).

In conclusion, familiarity and musical preferences affect consumers positively. Merely having music around can also be beneficial, first for consumers directly and then for perceived enjoyment (Ferreira & Oliveira-Castro, 2011).

2.7.3 Music and 'R' – response

In research, various behavioural responses have been observed to be triggered by different musical stimuli:

	Behavioural response	Findings
(1)	Expenditure:	The genre of Classical music seems to affect spending positively (Areni & Kim, 1993; North et al., 2003), and so does low volume (Sullivan, 2002). In this context, the concept of congruence seems important (Jacob et al., 2009).
(2)	Willingness to buy:	Purchase intention is significantly affected by both emotion and congruity (Alpert et al., 2005; Oakes, 2007a). The familiarity of the music, and song lyrics that are congruent with the product or brand, can also have a positive impact on customers' inclination to make a purchase (Chou & Lien, 2014).
(3)	Product selection:	Familiarity with music also positively affects attitudes to a product and, when congruent, influences the evaluation of products (Chou & Lien, 2014; Wang & Spence, 2015).
(4)	Evaluation of the quality of service:	Studies confirm that consumers' perceptions of time directly influence the evaluation of services. However, there is some ambiguity in the findings regarding the connection between music and perceived time duration (Bailey & Areni, 2006).

Table 7: Behavioural Responses and research findings

In summary, congruence is the most critical element in addressing behavioural responses. The music selection must match the products, setting, audience and all the other cues. Nevertheless, only a limited amount of research deals with behavioural responses (Garlin & Owen, 2006). This may be partly because several primary behaviours of interest to the research are partially captured in other studies.

After this section has highlighted the relevant conclusions of the literature review, the following section (2.8) presents the rationale and derivation of the research gaps of this thesis.

2.8 Research gaps

The literature review aims to identify research gaps (Müller-Bloch & Kranz, 2015). Webster and Watson (2002) note, "A review should identify critical knowledge gaps and thus motivate researchers to close this breach" (p. 19). The literature review showed the focus and results of previous research.

There are a few gaps addressed by this thesis, and they will be thoroughly developed throughout the work. The gaps addressed by this thesis are:

1. there is a stated need for research on the impact of music and, specifically, in terms of background music in online retail settings;
2. the existing studies are purely laboratory studies and, therefore, of little relevance to practitioners. To the best of the authors' knowledge, there is no field study, and
3. the existing laboratory studies, off- and online, have relatively small sample sizes. There is also a general lack of studies with extended periods of data collection, different conditions (e.g., different genres, loudness and tempo), and the use of a control group.

The rationale for the choice of gaps is presented in the following subsections:

2.8.1 Research gap 1: Offline- vs online-research

When investigating the effects of environmental stimuli in general and musical elements as an environmental variable in particular, it is essential to bear in mind that substantial differences exist across offline and online studies. Studies in the field of atmospherics in offline retail environments date back towards Kotler (1974) and, in some cases, even earlier. Studies on the online atmosphere and its influence on consumer behaviour have only existed from the early 2000s onwards (Manganari et al., 2009). The emphasis in this field has expanded these two decades from real-life to online research, producing a multitude of new findings. Ten years back, the impact of music in the online marketing context was a reasonably unexplored area.

Online merchants are facing the task of creating the most pleasant sales environment possible that contributes to a positive shopping experience. The aim is to apply the knowledge available from offline studies, of the shopping experience, to the online shopping setting (Manganari et al., 2009). The limited online environment, however, enables the online marketer only in a limited way to make the customers feel like they are in a physical shop (Manganari et al., 2009). At the very least, the choice of colours and layouts, the interactivity, the graphics and all other controllable atmospheric variables should be consciously planned and designed and not purely random (Manganari et al., 2009).

Besides empirical research in the online world, research has shown that several interpersonal dynamics and behaviours that typically occur in face-to-face interactions also occur in online interactions (Stewart & Shamdasani, 2017). The personal and demographic characteristics of subjects utilized in offline studies can also be used in online studies. However, when researching online, other environmental factors may be relevant (Menon & Kahn, 2002). Therefore, exploring the different approaches between offline and online sales is essential to interpret offline results properly. Also, a framework and appropriate experiments that consider the relevant factors should be designed.

According to the S-O-R model, it is assumed that internet users who come across appealing websites are more likely to engage in corresponding purchasing behaviour as a result (Menon & Kahn, 2002). Applying this knowledge to the use of music online, online retailers should consider the psychological effects of the first interaction of a website visit (Menon & Kahn, 2002).

While laboratory and field experiments have produced increasing findings over the past decades in the area of in-store atmospheres and music as a stimulus that affects consumer attitudes, mood and purchasing behaviour (Dad et al., 2018), there is still a dearth of information regarding the effects of music in online environments.

Numerous authors call for further research in the area of online consumer behaviour, and specifically music as a stimulus, as the online applications of this topic offer marketing researchers a unique opportunity to infuse the discipline with new paradigms and techniques (Eroglu et al., 2001). In their review, Cheung et al. (2003) consider the research field to be “under-researched” and encourage new variables to be explored, including in the area of environmental influences. Sautter et al. (2004) justify their call for further research with the assumption that companies will continue to expand their online presence. This trend calls for more research into online retailing and underscores the need for a systematic study of online shopping behaviour (Sautter et al., 2004).

Park et al. (2005), who conducted studies on online product presentations, recommend that future researchers investigate effects such as complementary music. Fiore and Kelly (2007), who have researched sound use in online stores, recommend further investigating sound's social and experiential implications. Finally, Manganari et al. (2009) note that two variables – music and crowding – that have attracted much research interest in traditional

retail are overlooked in studies of the online atmosphere.

Therefore, it is a significant research gap that remains to be addressed, especially considering the numerous studies and experiments conducted to understand music's effects better. As per Bode (2006), the scenario can be described as: “[...] the same music, heard in a laboratory, on an mp3-player, in a club or a commercial, might be perceived differently” (p. 581). Because there is potential for varying outcomes, it is necessary to repeat all studies done offline in an online environment.

Price-Rankin (2004) adds that the field of online retailing is still in its early stages. Therefore, an important goal should be to continue working on a solid theoretical framework that academics and practitioners can benefit from to expand their knowledge about environmental factors in online commerce. Wang et al. (2011) additionally observed that many websites contain background music and various sounds for instructions and buttons, and accordingly pose the question to future researchers: How can the aesthetic experience of consumers via visual and acoustic channels influence their behaviour?

Kim and Lennon (2012) note that relatively little is known about the effect of low-task-relevance cues (such as music) in online environments and suggest that further research should be conducted to capture the effect of music on consumers’ emotional states in online environments better.

In conjunction with their experiments on background music on retail websites, Wang et al. (2017) recommend future research into a range of musical properties, such as tempo, on online consumer behaviour. Finally, Park and Stoel (2018) confirmed in their study that the role of music in online retail websites has been under-researched.

The field experiment of this thesis thus, on the one hand, continues the tradition of earlier investigations on music in offline shopping environments, but on the other hand, further contributes to the fundamental understanding of the impact of music on consumer behaviour, in this specific case in an online shopping context. With this in mind, this study aims to address these numerous calls for future research on the influence of music in online shopping environments to contribute to understanding online consumer behaviour and the influence of music.

2.8.2 Research gap 2: Laboratory vs field experiments

In recent years, a few studies have already been published in the area of online shopping environments and the influence of audible stimuli, sounds, or background music. However, all studies published to date with a link to the online world have been laboratory studies, and “despite the numerous studies conducted on the effects of music and scent in the conventional store, there are no published empirical studies that investigate their impact on consumers’ responses online” (Ballouli, 2011, p. 40).

Accordingly, several researchers in the field are calling for empirical field studies to explore the impact of music on online consumer behaviour. In the interest of more comprehensive scientific knowledge, phenomena should be studied in laboratory environments and the real-life environments within which they occur (Knoferle et al., 2012). Cialdini (2009) also notes that field studies should be given a higher priority in the social sciences than has been practised in the past. The call for a more intensive study on the factors that influence human behaviour is backed by the research of Anderson et al. (1999), which shows that the magnitude of implications in laboratory and field experiments are often concurrent. The authors also point out that the external validity of laboratory studies and the internal validity of field studies are often higher than many researchers have assumed (Knoferle et al., 2012).

Oakes (2007a) notes that future empirical research is consequently needed to assess the relatively neglected potential of the selective use of creative and targeted musical incongruity in advertising. Ding and Lin (2012), who conducted two experiments on fictitious websites in their study on music in online shopping, note that similar experimental research with real online shops would further increase the validity of the results. Similar comments are made by Xu and Sundar (2014), who describe their current experiment as taking place in a computer lab. They suggest that future studies could consider field experiments that allow participants to complete the task in a more natural setting, which would increase the ecological validity of the study.

Park and Stoel (2018) highlight an advantage of their laboratory experiment in that it efficiently controlled waiting time duration and the presence of music, but also that laboratory environments are not close to real shopping situations. Finally, Anwar et al. (2020) also recommend that future research mimic their study but in a field study with an actual online shop equipped for the above purposes.

The present study took this repeated call as an opportunity to investigate the influence of music on consumer behaviour in an online shopping environment in a real-life field study and thus to check whether findings from the abovementioned laboratory studies can also be empirically proven.

2.8.3 Research gap 3: Experimental design

In general, much research in the area of consumer behaviour in shopping environments, both in-store and online, lacks a poor experimental design. This is evident in small sample sizes combined with short data collection periods, studying only one condition (e.g., only one genre or one constant tempo instead of different) and the absence of a control condition (no music). This results in a lack of interpretation and generalization. Authors from the research field call for experimental designs to be set up accordingly in future studies in order to close gaps in interpretation.

However, it is essential to look at various customer groups and shopping environments in order to generalize the findings. This is visible in the calls for future research from different authors who have conducted research in the field of online consumer behaviour. For instance, Kim and Lennon (2012) mention that the extent to which their results can be generalized across different samples needs to be investigated.

Dad et al. (2018), whose experiment was conducted in a virtual reality retail store, also note that their small sample size (105 participants) does not allow for the generalization of the research. The researchers write that the sample size was acceptable due to time constraints and health and safety issues. However, future studies should be conducted with a larger sample size to generalize the results. This applies to many of the previous studies.

Hwang and Oh (2020) pick up on this point by confirming that expanding their study to a larger sample of the general public can both compensate for the limitations of the current study in terms of demographic and cultural diversity and ensure a higher potential for generalizing the impact of interactive music beyond the controlled setting. Moreover, Anwar et al. (2020) also note that their research hypothesis should be explored with more extensive and diverse samples. As summarized by Ferreira and Oliveira-Castro (2011), “Research approaches with […] a comparison between different musical genres, and extended periods of data collection are still to be pursued”.

When reviewing the abundant literature in the field of research on the influence of environmental stimuli on consumer behaviour, it is striking that, with a few exceptions, most published papers deal with just roundabout one hundred subjects. A few papers deal with a few hundred subjects, often only from one specific target group, in most cases university students from the same university from the same subject area. This raises an interpretation problem, as results obtained in a single laboratory setting over a short period with an identical composition of subjects may differ from the effects of music in different settings.

The second common shortcoming in environmental research, in terms of the research design, is that much of the research in the field of consumer behaviour in shopping environments has only examined the effects of a single environmental stimulus, and usually only in a single shopping environment (Ferreira & Oliveira-Castro, 2011). Moreover, often this variable was not varied (e.g., in the genre) but only tested against a control condition.

Dubé et al. (1995) conducted the first study to investigate the influence of music-induced pleasure and arousal on consumers' desire to engage in buyer-seller interactions. They used videotapes of a bank situation but also pointed out that the methodological limitations were related to the student population and the use of Classical music alone.

Practical problems also limited the study by Ferreira and Oliveira-Castro (2011). Additionally, the authors note that some improvements (e.g., more participating shops, more reversal procedures, comparisons between different music genres, and more extended data collection periods) would allow greater confidence in the results obtained.

The study by Kim and Lennon (2012) tested the presence and absence of music, using only slow-tempo music. The control conditions did not involve music that had a fast tempo. However, the limitation is that the study only used slow-tempo music, which makes it difficult to distinguish whether the impact of the music on emotional states is due to the slow tempo or simply the presence of music.

Moreover, Cuny et al. (2015), who conducted their research in a virtual art gallery, found that the selected music represents only one option type. Further research should investigate the robustness of the proposed model and its generalisability to other websites or to other music.

Another example is the study by Wang et al. (2017), who also compared only the mere presence and absence of music, controlling for what respondents perceived as congruent and likeable music.

Finally, the study by Park and Stoel (2018) used only Classical music as a musical stimulus. However, the researchers note that since people respond differently to different genres of music, future research could manipulate different genres or different musical factors (e.g., tempo, pitch) to see if consumers' internal and behavioural responses to the music stimulus vary by these different music features.

The third gap that is often mentioned concerning experimental design in the field of environmental research is the lack of a control group.

Already the well-known Wine Store study by Areni and Kim (1993), which tested Classical against Top-40 music, did not use a control condition. Oakes (2007a, p. 94) remarks that it is "…unclear whether classical music facilitated or pop music inhibited [the] selection of expensive wines."

The lack of a control group could be one of the reasons why some of the research findings so far are not generalisable. Garlin and Owen (2006) also explore the issue of generalisability or external validity. They performed a meta-analysis and noted that a large number of the studies dealing with the impact of background music in the retail sector failed to apply useful statistics and employed a "…poor experimental design, such as the lack of a control group or poor balance across conditions in field studies" (Garlin & Owen, 2006, p. 762). Therefore, well-designed replication studies that overcome these limitations are needed (Garlin & Owen, 2006).

In their study of perceived time, Bailey and Areni (2006) note that an additional limitation of their research is that neither experiment used a control condition (i.e., no music). Indeed, an easily applicable factor in strengthening the research validity is implementing a control condition for each experiment, at least music vs no music (Bailey & Areni, 2006). If a control condition had been included, previous findings could have been interpreted more accurately (Bailey & Areni, 2006).

Guéguen and Jacob (2014) report that previous research examining the effects of background music on consumer behaviour has used music in conjunction with song lyrics and has not used a control condition without music. In addition, Xu and Sundar (2014) suggest that future studies may benefit from including a baseline condition with no arousal. Damen et al. (2021) also point out that future research should include a no-music control variable to assess music's influence on shopping behaviour further.

Based on the experimental design developed for this work, it is possible to address the call by previous researchers in the field for the application of the sound methodology, in particular 1.) a large sample size in conjunction with an extended period of data collection, 2.) the use of different genres and 3.) the application of a control condition (no music).

2.8.4 Summary

In summary, the gaps which will be addressed with this study are:

1. There is a stated need for research on the impact of music and, specifically, in terms of background music in online retail settings.
2. The existing studies are purely laboratory studies and, therefore, of little relevance to practitioners. To the best of the authors' knowledge, there is no field study, and
3. the laboratory studies, off- and online, have relatively small sample sizes. There is also a general lack of studies with extended periods of data collection, different conditions (e.g., different genres, tempo and loudness), and the use of a control group.

A research design that depicts different genres, loudness levels and tempi and involves a control group (no music) implemented in an online shopping platform represents a rich environment for a field study. Furthermore, it allows the researcher to achieve a large sample size to generalize the results as much as possible.

After presenting the research gaps in this section, the conceptual framework and the development of the research aim, the research questions, objectives and hypotheses underlying this study are provided in the following section (2.9).

2.9 Conceptual framework and hypothesis development

The previous sub-sections presented detailed insights into marketing research, focusing on the relationship between the S-O-R model and the music cues utilized by marketers and retailers. A conceptual framework is developed based on the literature and the research gaps. Furthermore, research questions, objectives and hypotheses are formulated and discussed.

2.9.1 Framework

The S-O-R framework has been widely used for research on the influence of the shopping atmosphere (Fujiwara et al., 2017). It is the dominant model and the basis of almost all research in the field of environmental psychology when investigating the effects of audible stimuli on consumer behaviour in offline environments, e.g. Sherman and Smith, 1986; Baker et al., 1992; Turley & Milliman, 2000; Spangenberg et al., 2006; Day et al., 2009; Ha & Jang, 2010; Vaccaro et al., 2017. In addition, many authors refer to Kotler's theory of atmospherics (Kotler, 1974) and assign the relevant stimuli to the respective stage in the ‘S’ aspect of the SOR model.

Therefore, it is evident that a model based on the S-O-R framework should be developed to study how music affects the environment of online purchasing since many previous authors and recent studies in offline environments (Kearney, 2012) and also in online environments refer to this model, e.g. Kim et al. (2009), Koo and Ju (2010), Mazaheri et al. (2011), Ding and Lin (2012), Kim and Lennon (2012), Floh and Madlberger (2013), Wang et al. (2017), Anwar et al. (2020). Therefore, applying the SOR model to research in online environments is not new. Although the model itself dates back to when online shopping did not exist, it has been, and continues to be applied, to offline and online environments.

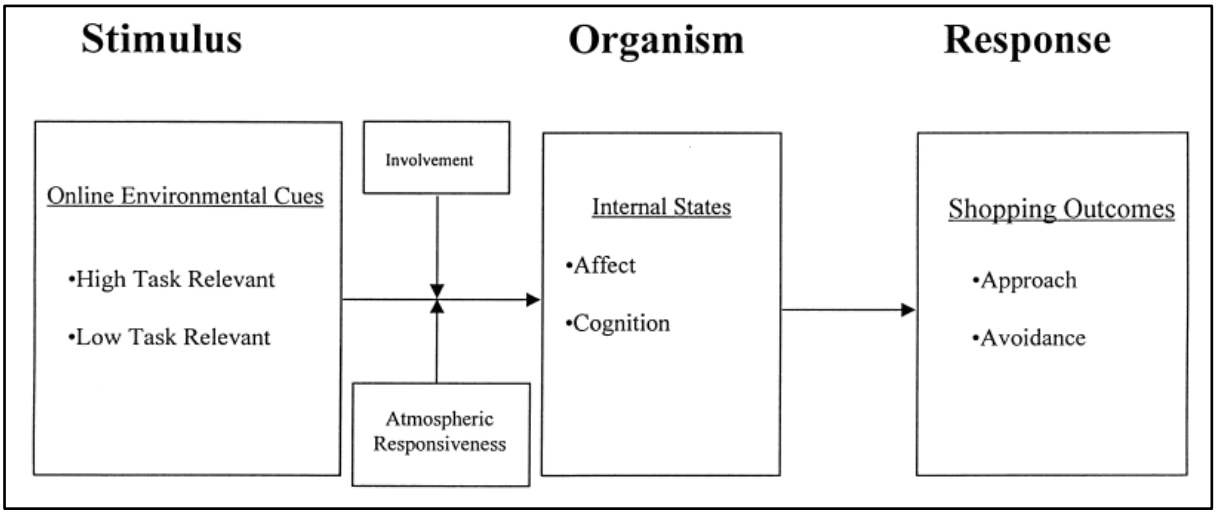

Figure 4: S-O-R-model of online consumer behaviour (Eroglu et al., 2001)

Eroglu et al. (2001) presented their conceptual model design, on which the possible influence of the atmospheric stimuli of an online shop can be investigated (Siomkos, 2006). The model (Figure 4) assumes that the characteristics of the shop atmosphere influence the behaviour of online customers in the form of approach or avoidance reactions through the influence of emotional and cognitive states that act as intermediaries (Siomkos, 2006). The model aims to explore the impact of the atmosphere on e-commerce and supports the assumption that certain atmospheric factors affect the emotional and cognitive inner states of the consumer in the online shop. As indicated by Moorhouse (2019), these inner states, in turn, affect whether individuals tend to approach or avoid the online shopping procedure.

According to Eroglu et al. (2001), environmental features in online shopping are “the sum total of all the cues that are visible and audible to the online shopper” (p. 179). In their experiments, they divided the environment features into two categories: (1) a setting with high task-relevance (stimuli present on the website that help to complete website visitors´ shopping tasks) and (2) a setting with low task-relevance where the website content is of limited importance for achieving the purchase goal (Siomkos, 2006). The low task-relevant features include music (Eroglu et al., 2001). According to the S-O-R paradigm, high and low task-relevant cues can both influence internal states (Jung-Hwa et al., 2009). The model discussed above can therefore serve as the foundation for the design of this framework.

The conceptual framework shown in Figure 5 serves as the underlying model and visualizes the research approach of this study. It refers to previous research in the field of

online shopping, most of which directly refers to the SOR framework (e.g. Kim et al. (2009), Koo and Ju (2010), Mazaheri et al. (2011), Ding and Lin (2012), Kim and Lennon (2012), Floh and Madlberger (2013), Wang et al. (2017), Anwar et al. (2020), and extends the SOR diagram in the frame below with a flowchart that depicts the consumer's possible decisions.

Based on the S-O-R paradigm, this framework outlines that certain atmospheric elements of the online shopping environment influence consumers' internal states, which results in approach/avoidance reactions to the online shopping environment (Eroglu et al., 2001; Moorhouse, 2019).

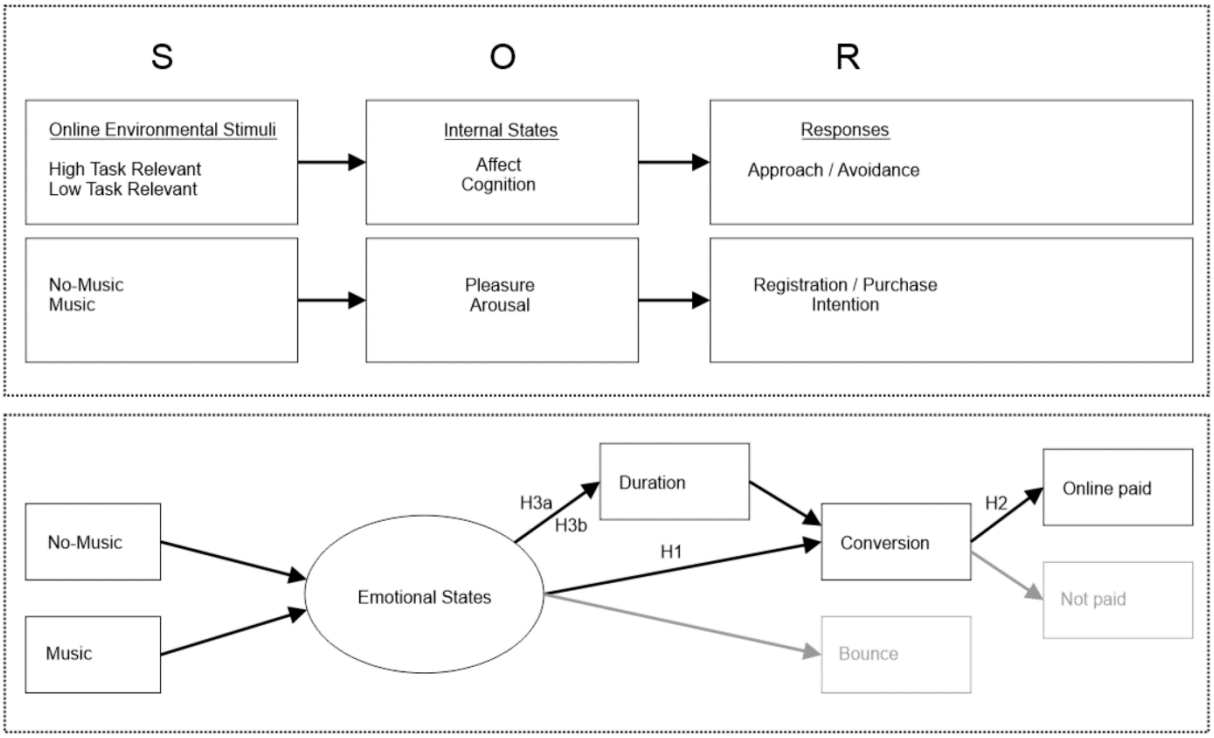

Figure 5: Conceptual Framework of this Thesis (Author)

The online shop environment contains several stimuli that the customers' senses can experience to varying degrees, which were previously described as high and low task-relevance. The totality of the stimuli forms the web atmosphere of the respective websites. Each stimulus varies across many parameters. For instance, the background music varies by volume, tempo, pitch and genre (Yalch & Spangenberg, 2000).

The organism, located on the second base of the S-O-R paradigm, is generally characterized by the inner states of affect and cognition and thus influences the behaviour (R)

when visiting the website (Jung-Hwa et al., 2009). Mehrabian and Russell's framework (1974) states that individuals respond to their environment along three basic dimensions: pleasure, arousal and dominance (PAD) (Yalch & Spangenberg, 2000).

According to the appraisal theory of emotions (Frijda, 1994), the match between the environment and a person's expectations, background or goals can result in positive emotions. Conversely, a mismatch may result in negative emotions. For example, a dark environment can trigger positive emotions when a person wants to sleep and negative emotions when a person wants to read (Peng & Kim, 2014).

The PAD model has been tested in both retail and non-retail settings (Yalch & Spangenberg, 2000). Donovan and Rossiter (1982) observed that shopping behaviour was related to measures of pleasure and arousal but not dominance (Yalch & Spangenberg, 2000). It remains unclear whether the difficulties encountered in identifying behaviours related to dominance reflect the low impact on behaviour or the need for improved measurement (Kearney, 2012).

Approach or avoidance responses (R) are outcomes in the S-O-R paradigm (Kim et al., 2009). Therefore, the influence of the stimulus background music (S) on the purchase behaviour and the length of stay in the (online-) shop (R) were the focus of the present thesis. Approach behaviours refer to all positive actions towards the environment, such as the intention to register or buy. In contrast, avoidance behaviours are negative actions towards the environment which will result in a negative purchasing result (Kim et al., 2009).

The proposed conceptual model focuses on the relationship of music as a low task-relevant cue on the online shopping outcome, which is shown in the flowchart in terms of:

1. conversions (registrations to a seminar), and
2. choice of payment method (online or offline).

The structure of the specific online shop used in the experiments of this study lets the customer first register for a seminar and, in a second step, choose if they want to pay online or not. If clients decline direct online payment, the fee will be paid in cash on the day of the seminar. The influence of background music online, classified as a low task-relevant cue, is presumed to be a relatively minor, subconscious effect. However, previous findings concerning *tempo* as an independent variable suggest that background music has an indirect,

mediated effect over the visit duration on consumer behaviour. For example, in the supermarket experiment by Milliman (1982), slow background music leads consumers to spend more time in the market, relative to no music or fast music and therefore causes more dollar sales volume. A similarly designed study in a restaurant (Milliman, 1986) also showed that subjects spent more time in the restaurant and therefore consumed more.

The research framework's flowchart shows the SOR model's application in this study. Therefore, it uses *session duration* as a mediator to test the hypothesis of whether these findings from the offline world can also be verified online in this setting.

2.9.2 Research questions

This work aims to contribute to human behaviour research, particularly online consumer behaviour. The aim is to explore whether a significant influence of background music plays a role in online purchasing behaviour. The table below summarizes the relevance of the research and highlights the areas where further research is needed (Table 8):

Research relevance	**Research gaps**
In retail and service companies, measures are studied and implemented to influence customers' length of stay and purchase decisions. Trade, in particular, has shifted considerably from offline to online in recent years. A website has, equally to a shop or a restaurant, atmospherics (layout, colours, music), which can be influenced by the marketer or researcher. Inadequately designed e-atmospherics can lead to increased bounce rates, high failure rates of marketing measures or an entire website.	1. There is a stated need for research on the impact of music and, specifically, in terms of background music in online retail settings. 2. The existing studies are purely laboratory studies and, therefore, of little relevance to practitioners. To the best of the authors' knowledge, there is no field study. 3. Existing laboratory studies, off- and online, have relatively small sample sizes. There is also a general lack of studies with extended periods of data collection, different conditions (e.g., different genres, tempo and loudness), and the use of a control group.

Table 8: Research Relevance and research gaps

The following research questions guided the research process to ensure that the steps taken were in the right direction and followed the outlined plan. Therefore, the *general research question* for this study is as follows:

Can background music on a website influence online consumer behaviour, and if yes, to what extent?

This research question aims to fill the mentioned gap in the literature. The open and explorative nature of the research question offers exciting research opportunities on consumer behaviour. The focus of the research question is, on the one hand, on *consumer behaviour* (B2C) and, on the other hand, on the *online* area. It explicitly excludes choices that have been labelled as "online" in previous research. For example, a laboratory study in which participants purchase under observation in a fictitious online shop is effectively an offline study in a laboratory, not a web-based one. As discussed in section 2.8.1., people act differently when they operate under observation in a simulated situation compared to their behaviour in their natural environment and under normal circumstances.

To allow a detailed examination of this research question, three sub-questions were created to concretize the overall question and form the basis for the experiments:

RQ 1. What is the influence of background music on conversions in an online shopping environment?
RQ 2. What is the influence of background music on the type of payment method selected in an online shopping environment?

To be able to investigate the influence of background music on authentic website visitors empirically and in more detail, a holistic overview is necessary for a better understanding and modelling of the experiments. On the one hand, integrating background music into the natural environment of the visitor is crucial. Therefore, the technical approach chosen in this thesis is the integration of product videos. Further details are discussed in Chapter 3. Furthermore, the authentic behaviour of consumers should be investigated, and they should not have the impression of acting in a research environment. Accordingly, the company’s real website and the real services' purchase process will be used to conduct the experiments.

The first two research questions examine the influence of background music (as the independent variable) on the dependent variables a.) registrations to a service, called *conversion* and b.) if there is a registration, if the customers pay online, or not.

In addition to RQ1 and 2, the possible connection between visit duration on the website and consumer behaviour in terms of conversions and purchase behaviour will be examined:

RQ 3: Is any inter-relationship mediated by session duration?

As seen in the literature review, the variable shopping time (time spent in the store) has been addressed by various researchers in previous studies (e.g., Andersson et al., 2012; Garlin & Owen, 2006; Gopal, 2010; Milliman, 1982; Vida et al., 2007; Yalch & Spangenberg, 2000). Background music often has a mediated rather than a direct effect (e.g., Milliman, 1982; Vida et al., 2007). The focus here will be on investigating whether this effect can also be demonstrated online and, if so, to what extent.

2.9.3 Aim, objectives, and derived hypotheses

The aim of answering the research question and its sub-questions is:

To investigate, analyse and evaluate how and to what extent background music influences consumer behaviour within the online shop of a German company.

Since this aim is still quite general, a work breakdown structure is drawn up to cover the individual components. These components are known as objectives. The general aim can be achieved by determining the answer to each objective. The objectives of this study are:

RO 1. *Test the influence of background music genre in an online shopping environment on conversions and the type of payment method selected.*
RO 2. *Test the influence of background music genre, combined with tempo, in an online shopping environment on conversions and the type of payment method selected.*
RO 3. *Test the influence of background music genre, combined with tempo and loudness, in an online shopping environment on conversions and the type of payment method selected.*

Hypotheses are formulated and derived from the research questions and objectives. Hypotheses are statements that express either an expected difference between groups or a relationship between variables. In general, a hypothesis is a statement that can be supported or rejected by a statistical test. Based on the literature, the following hypotheses are made for all three objectives:

H1: When x* music is played on the website, there is a different conversion rate compared to no music.

Several previous studies showed that music use could influence consumers' product choice (see Literature Review, 2.5.3). For example, Grewal et al. (2003) confirm that music can influence customers' purchasing decisions. Going further, Gorn (1982) shows that consumers reject products when they are surrounded by unpleasant music, while Mittal (2015) confirms that music perceived as pleasant positively influences product choice. The study by North et al. (1999) is also well-known. It was shown that French wine achieves significantly higher sales rates when stereotypical French music is played in the salesroom. In contrast, stereotypical German background music leads to higher sales figures for German wines. A subject's musical preference towards certain music can therefore be transferred to the products available for selection.

In turn, this thesis seeks to investigate whether the results of previous studies from offline environments are also verifiable in online environments. Accordingly, hypothesis 1 explores whether background music in an online environment influences the purchase decision (conversion from prospect to buyer).

H2: If converted and x* music is played, there is a different preference for the type of payment method selected compared to no music.
H3a: The relationship between background music and conversion rate is mediated by session duration.

In the literature, it has been demonstrated in various places that background music influences the consumer's expenditure behaviour and decisions. There are numerous studies in shopping malls, supermarkets and shops as well as restaurants that show a correlation between selected background music and expenditure, e.g. Areni and Kim (1993), Yalch and Spangenberg (1993), Turley and Milliman (2000), Sullivan (2002), North et al. (2003), Jacob et al. (2009), Ferreira and Oliveira-Castro (2011), Andersson et al. (2012) and many more (see Literature Review, 2.5.1). In the online shop chosen for this study, the customer does not have the choice between different types of courses (and thus prices) but chooses when (on which date) to attend a course. However, the buyer can indirectly influence the price by selecting the type of payment: at checkout, the customer can choose whether to pay online (PayPal, credit card, or direct debit – all of them with a discount) or later offline, on the day of the seminar in

cash (further information, see Methodology 3.4.2). Although there is research precedence for the influence of background music on the consumer's expenditure behaviour and decisions, the choice of online vs offline payment does not usually exist in offline environments. As such, this specific behaviour has not yet been studied in the context of environmental research, but it does represent a type of spending behaviour or decision. Hypothesis 2 explores whether background music in the purchase process can influence the customer's chosen payment method.

H3b: The relationship between online and offline payments, when converted, is mediated by session duration.

In his supermarket study, Milliman (1982) demonstrated that different music tempos influence customers' total sales. The study became so well known that it is even cited as an example in German marketing lectures. However, the relationship between music and sales is not directly mediated by the speed at which customers move through the market. Slower music leads to a slower speed of in-store traffic flow, and customers spend more time in the shop, leading to higher spending (Milliman, 1982). These findings are in line with the results of the studies by Vida et al. (2007). Mediating effects are also found in many other studies, as music often seems to have no direct but rather an indirect influence on the subjects. Indeed, mediating effects were found in numerous studies, e.g. over servicescape attitude on service ratings (Morin et al., 2007), over national identities on music preference (national music styles) (Boer et al., 2013), over pleasure and arousal on shopping behaviour (Dad et al., 2018), over immersion and experience on e-behavioural intentions (Cuny et al., 2015), over pleasure on purchase intention (Ding & Lin, 2012) and over increased pleasure levels on shopper behaviours (Morrison et al., 2011). With hypotheses 3a and 3b, the intent is to determine whether music's influence might also be mediated by session duration in an online context.

*The music mode x corresponds to:
RO 1: the genres Classical, Pop and a non-music condition
RO 2: the genres Classical and Pop, both in 3 different loudness levels (soft, medium, loud) and a non-music condition
RO 3: the genres Classical and Pop, both in 3 different tempi (slow, medium, fast), all tempi combined with three different loudness levels (soft, medium, loud), and a non-music condition.

The hypotheses thus describe an expected change in consumer behaviour. However, this behaviour cannot be predicted in the context of this work. Nevertheless, based on the literature, a change in, e.g., the tempo should influence user behaviour as follows:

Slow tempo: the customer stays on the website longer and engages more intensively with the products, the purchase rate increases, and correspondingly the opposite happens for music with high tempo (Milliman, 1982, 1986). In this way, assumptions may be derived from previous research, and corresponding hypotheses can be formulated. However, the context of the internet is special. Except for streaming platforms, websites are nowadays usually a relatively silent medium. Shopping in online shops in 2021/2022 is usually not accompanied by background music if only because of technical limitations, see Chapter 3 (Methodology). Integrated music could therefore irritate website visitors instead of motivating them, and music tends to deter visitors from a website. This could lead them to leave the page immediately (higher bounce rate, lower conversion) or act more quickly to leave the page faster, thus buying less.

The hypotheses are therefore formulated neutrally (*different* registration rates), neither positive nor negative. The hypothesis is accepted in both directions, based on the definition of the ’O’ (organism) of the S-O-R model: Because visitors are pleased or motivated (pleasure or arousal), they stay longer on the website. If they are deterred, they leave faster or bounce directly. Accordingly, this work examines whether music has any influence at all.

After presenting the conceptual framework, the development of the research aim, the research questions, objectives and hypotheses of this study in this section, the following section (2.10) summarizes this chapter.

2.10 Summary

This chapter presented the literature review conducted in the research area of the influence of atmospheric cues, particularly music, on consumer behaviour. The findings of the previous literature are presented, analysed, and critiqued.

The chapter starts with a recap of the S-O-R model mentioned in the introduction, followed by a review of the relevant literature. Then, the presentation of the findings follows the S-O-R model. Furthermore, the identified research gaps were presented, and a conceptual framework based on the S-O-R paradigm was developed. Finally, this chapter concludes with

the developed research questions, objectives, and hypotheses that served as this study's compass.

The following chapter will present this thesis´s methodology, subdivided into the research philosophy and design, the method of data collection and the development of the audible stimulus for the experiments.

3 Research Methodology

3.1 Introduction

This chapter introduces the methodology applied to test the hypotheses presented in Chapter 2 – Literature Review.

In the previous chapter, a review was presented that summarized the main findings of the existing literature regarding the influence of background music on consumer behaviour in both offline and online shopping environments. It included a critical analysis of the findings of the existing literature in this area. Moreover, it identified underlying patterns, and the elaboration of existing gaps, which also serve as the basis of this thesis.

This methodology chapter is intended to provide a better understanding of the study conducted in this thesis, the research methods used, and, where appropriate, the empirical context. It is organized into five sections that focus on research philosophy, research design, an introduction of the applied data collection method and a description of the video creation process.

The chapter gives an overview of the most relevant research paradigms and describes and justifies the philosophy for the chosen research approach. In addition, justifications for the methodology used and the research design are discussed. Furthermore, the data collection methods and tools and practical considerations of the data collection process used in this thesis are presented. Finally, the necessary steps taken to create the videos are presented.

3.2 Research philosophy

Research philosophy is about “the development of knowledge and the nature of that knowledge” (Saunders et al., 2009, p. 665). Moreover, it outlines basic assumptions regarding how the researcher sees the world (Saunders et al., 2009). The research philosophy, also called the paradigm, tells researchers what is necessary, legitimate and meaningful. Simply put, paradigms are a way of distinguishing different perspectives in science about how to study and understand the world (Czernay, 2020).

Research philosophy is mainly dependent on two components: Ontology and Epistemology. Ontology examines the nature of reality. It answers the question: What is the

nature of reality? Epistemology describes how reality can be examined. It answers the question: How do we know about reality?

The author chose post-positivism as the underlying theory for this work. As the prefix *post* suggests, post-positivism is an adaptation and further development of the ideas of positivism.

3.2.1 Positivism vs post-positivism

The general idea of positivism is to identify causal relationships in the social sciences. If A occurs, then B is likely to follow. This involves developing and statistically testing hypotheses against empirical reality. It requires the researcher in positivism to separate his or her person from the objective reality. The two have no connection; the researcher remains neutral, and the social science analysis is objective (Bieler, 2016).

Positivists are not concerned with what reality should be, but they analyse what reality is. Therefore, the positivist theory's task and potential are to describe, explain, and predict a relationship. For example, if A happened in the past, then B will probably follow in the future (Bieler, 2016).

Due to problems inherent to positivism, post-positivism developed, in particular:

- The positivist theory is static and cannot adapt to structural changes;
- The reasons for actors' behaviour are assumed to be constant, but the social interactions of individuals are more likely to be explained by subjective actions and decisions than objectively;
- By separating values from facts, positivists overlook that their normative assumptions already influence the structure of the reality they are trying to explain (Bieler, 2016).

The post-positivist paradigm emerged as a progression from the positivist paradigm. It deals with the subjectivity of reality and moves away from the purely objective view of the logical positivist position (Natha, 2020).

The ontology of post-positivism is that there is a reality out there; it exists. In this respect, it is very similar to positivism. Post-positivists, however, acknowledge that there are limits to what research can accurately capture (Norman, 2019).

Post-positivist epistemology is: a researcher can create an approximation of the object of research but never an absolutely truthful picture of everything it encompasses. The researcher is a collector of data and not a perfect expert on the subject (Norman, 2019).

3.2.2 Justification of chosen research philosophy

The author chose post-positivism as the underlying paradigm primarily because of its unique characteristics. This paradigm allows the researcher to classify the nature of things based on his own perceptions and understanding. Additionally, it requires the researcher to be aware of his own biases and potential limitations that may affect his research outcomes. The post-positivist approach also accepts various research methods and techniques, making it a flexible and adaptable research paradigm. Finally, the paradigm relies on statistical tests to confirm or reject hypotheses developed during the research process, which adds rigour and validity to the results obtained. Overall, the post-positivist approach offers a comprehensive and systematic framework that ensures the accuracy and credibility of the research findings.

The author believes that reality exists but that it is not easy to capture it precisely. For example, in environmental psychology, in which the complex atmosphere of a shopping environment is examined, many factors play a role here. On the one hand, there are a wide variety of atmospheric variables that affect the consumer, and on the other hand, are intrinsic factors pertaining to the individual (e.g., feelings that can be influenced for a wide variety of unpredictable reasons, the person can be tired or hungry). A complete data collection and analysis is, therefore, hardly possible.

Post-positivists argue that reality is not based on positivist determinants, but that research should refer to true reality. Even if objective reality is assumed, it can only be imperfectly measured because human perception is flawed (Alvesson & Sköldberg, 2009). The intent of the post-positivist perspective is that not everything is entirely knowable (Krauss, 2005). Furthermore, positivists underline the independence between the researcher and the person/object being studied, in contrast to which post-positivists assume that theories, hypotheses, background knowledge and values of the researcher can affect what is observed (Robson, 2002).

Post-positivist theory accepts from the very beginning that theories have a direct impact on research. Thus, the researcher's own assumptions are problematized from the very beginning (Bieler, 2016). The researcher is aware that he has his own ideas, values and assumptions and

that these could inevitably influence conducting of the study, if only through his own musical tastes, choice of method or the design of the experiments through his own professional background.

In addition, post-positivism offers a degree of methodological pluralism. Phillips and Burbules (2000) note in relation to post-positivism, that individuals or groups can be studied, that individual actions or patterns occurring at a higher level of social aggregation can be explored, that intentions or unintended consequences can be studied and that variety of methods (e.g. experiments, interviews, observations) can be used.

Finally, the post-positivist approach to research aims to find adequate and appropriate justifications for conclusions by testing and, if necessary, rejecting hypotheses (Phillips & Burbules, 2000). The approach of this study was also to test hypotheses derived from previous research in the field of consumer behaviour. Accordingly, recent research in the field of consumer behaviour was successfully conducted using a post-positivist approach.

After presenting the research philosophy in this section, the developed and applied research design will be provided in the following section (3.3).

3.3 Research design

3.3.1 Selecting the research method

With reference to the post-positivist paradigm and the desire to conduct the most objective, broad-based investigation possible, the decision was made to pursue quantitative research methods, as they require „detachment of the observer, especially in experimental method where personal involvement can affect the outcomes of the research“ (Balnaves & Caputi, 2001, p. 105). Quantitative research deals with the gathered information at hand and requires data to prove or disprove a particular theory. “Quantitative research is grounded in the scientific tradition, so description and inference with the potential to lead to causal explanation and prediction are its core business” (Williams et al., 2022, p. 3). Silverman (2016) argues that perhaps nothing illustrates the difference between qualitative and quantitative methods better than the differing logic underlying the sampling approaches. Quantitative research focuses broadly on large samples, while qualitative research focuses narrowly on relatively small, purposively selected samples.

For the purpose of this study, the present work is based on an experimental design that examines the quantifiable elements of the user experience on a specific website. Both the design of the experiment and the chosen research philosophy (post-positivism) ultimately led to the decision to make the data collection quantitative. In addition, a look at the existing studies in the literature review in this area over the last 50 years shows that most of these studies have been qualitative, and only very few have taken a quantitative approach.

Quantitative methods are generally seen as having the advantage of being more objective, especially in the social sciences, where human actions are part of the experiments. Regardless, it is essential to note that quantitative and qualitative data collection methods can both have several advantages and disadvantages (Abolhasani, 2017).

Quantitative studies test hypotheses or theories by investigating and analysing the correlation between variables through statistical methods (Creswell, 1994). Furthermore, quantitative data are hard and reliable data that are not abstract and measure tangible and countable features of the world (Abolhasani, 2017; Bouma et al., 1995).

Quantitative research can, in turn, also have its limitations, e.g., in interpreting dependencies between different variables or in neglecting the importance of context. Section 6.4.2 – Limitations deals in more detail with the gaps and limitations of this study, which are also due to the quantitative approach.

However, to achieve the goal of this study to obtain empirical data objectively, quickly and in large numbers, the chosen quantitative approach is superior to any conceivable qualitative approach.

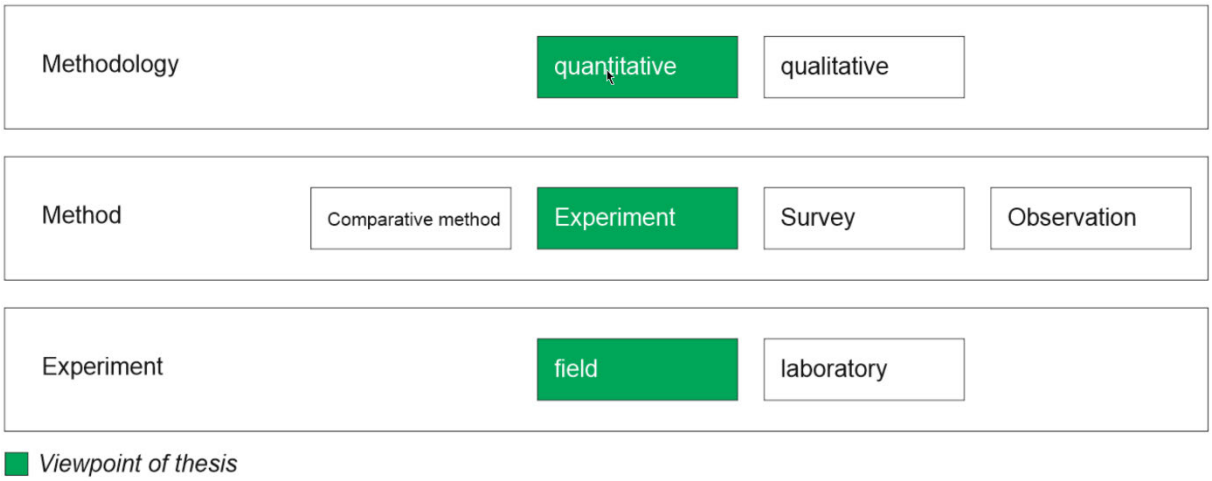

Figure 6: The thesis´ methodology

3.3.2 Method design

In order to be able to collect the necessary data for this study, an experimental design was chosen that can detect a possible influence of the independent variable music/non-music on consumer behaviour. The method *experiment* was chosen for several reasons:

Firstly, one advantage of this method is the identification of causal relationships. This results from the high degree of control over the independent variables that can be exercised in experimental test setups (Price-Rankin, 2004). To obtain precise and independent results concerning the research questions and the testing of the hypotheses, it is necessary to be able to influence the variables directly and, if necessary, to be able to change, eliminate or keep variables constant. The researcher can manage the influence of the parameters precisely by setting the conditions of the experiment. The results can then be interpreted unambiguously as the subjects respond to the variables controlled by the researcher (Price-Rankin, 2004).

Secondly, the method *experiment* was chosen for this study because it was used in several laboratory experiments before. One of the aims of this study was to test if the findings of previous investigations can be verified in a field study under actual conditions. To achieve this goal, it was necessary to do so under similar conditions and using similar methods. A product video was embedded in the online shop of a website. In this video, the background music, varying in genre, tempo and loudness, was played randomly from a series of pre-created versions each time a visitor loaded the website. All other elements of the website were otherwise identical. In this way, the independent variable music/no music was varied during three different experiments between May 2021 and January 2022. The music was neutral versions of Popular

and Classical music, selected by an online marketer specialising in designing online sales funnels and creating lead pages.

The individual studies included the following setup:

Experiment 1 examined the influence of the genre. Three different versions were tested (from 10.05.2021 until 01.07.2021): A no-music version competed with *Pop* and *Classical music*. Loudness and tempo were neutral.

In experiment 2, the influence of loudness was added to the independent variables. Seven different versions were tested (from 18.08.2021 until 13.10.2021): A no-music version competed against *Pop music* (soft, medium and loud) as well as *Classical music* (soft, medium and loud).

Experiment 3 observed 19 different versions of background music (from 18.10.2021 until 17.01.2022): A no-music version against each of 9 different versions of *Pop music* and *Classical music*, both genres in all possible combinations of loudness (soft, medium, loud) and tempo (slow, medium, fast).

After highlighting the research design in this section, the data collection method will be presented in the following section (3.4).

3.4 Data collection method

3.4.1 Participants

Participants of the three experiments conducted in this study were all website visitors who randomly visited the online shop's website under investigation during the observation periods. All active sessions were anonymously and automatically tracked to check how much time the participants spent on the website, whether they registered for a seminar, paid directly online, or opted for offline payment.

3.4.2 Company and website

The company is well-known in Germany in the area of preclinical emergency training. Public courses are offered in different locations in Germany. In bigger cities, the company has its own training centres. In smaller cities, subleased seminar rooms are used for the courses,

e.g., in hotels, seminar centres and other educational institutions, which are rented just for the day of the course. The courses are conducted by freelance trainers, who attend special, standardized medical-pedagogical training in the company's academy before they start their career as trainers.

Registration for the courses is available online and over the telephone, whereby most customers register themselves online and get a discount for online registration. There are two payment options available at the online registration. Customers can register for a course:

- without paying online for it, or
- pay online per credit card, PayPal, and similar online payment methods.

Customers who only register for a course online, without paying for it, tend to be more unreliable than customers who have already paid for the course. The no-show rate (people who register but do not attend a course) varies under normal conditions between 9 and 12% every month (Source: data of the Company, Appendix 1). Consequently, customers who register and pay directly online get an extra discount on the price of the course.

Due to high competition in this area of courses, the company performs different marketing activities. Competitors are not only the *big four* NGOs (Malteser, Johanniter Order, Red Cross and Samaritan) but also more than 1000 private competitors all over Germany, from freelancers (one-man-show) to more prominent, nationwide organizations. The company's marketing activities are conducted offline, like sending flyers and other advertising materials to interested parties and assumed multiplicators, alongside online activity. Furthermore, the company's website is constantly optimized for search engines (the so-called SEO: search engine optimization) and also promoted through Google Ads.

However, having visitors on the website does not automatically lead to sales or registrations.

3.4.3 Definition: Interested person, visitor and conversion

Online and offline buying and selling processes usually follow a particular pattern. For example, in their study on marketing communication, Berthon et al. (1998) describe the individual buy stages and which role the website of a company plays in this process (Figure 7):

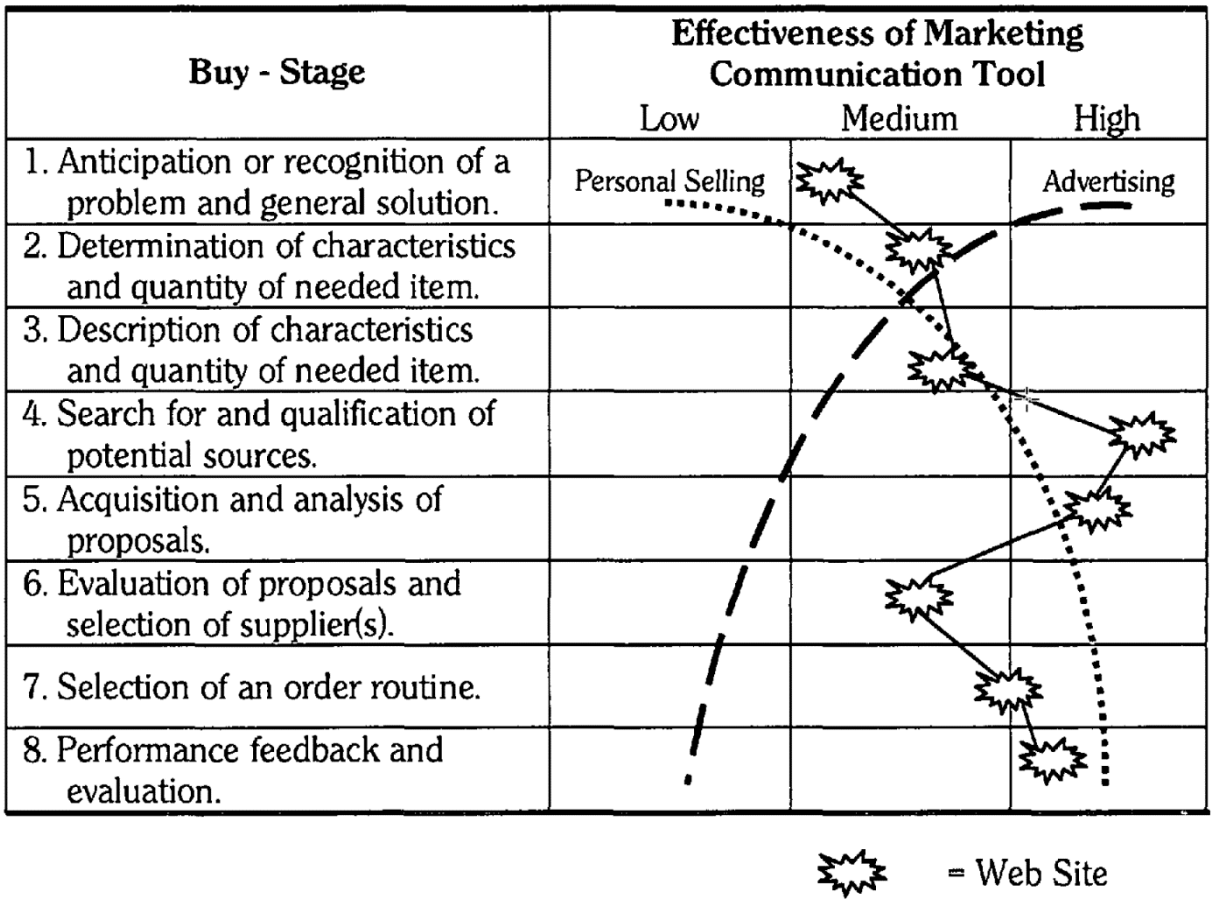

Figure 7: Buying and selling processes and the website as part of the Marketing Communication Mix (Berthon et al., 1998)

In online marketing, *traffic* is the description of the flow of visitors on a website, the way they come to the website and the way and amount of time they navigate on the website until they leave. Traffic can be generated in different ways: utilizing search engines like Google or Bing, via links from other websites, e-mails, social media shares and advertisements like web banners or social media (Facebook, Instagram), search engine advertisements, or direct type-ins in the browser.

As described in the buy-stage figure, a person feels a need or recognizes a problem (1), in this case: to attend a first aid course (2,3), which ends up in a purchase recognition (Kotler et al., 2019). Then, this interested person starts an information search (4), which can be asking friends and family members for recommendations and doing an online search (5).

In the early years of the internet, search engines like Altavista or Yahoo were widely used; however, in the last decade, Google has established itself as a quasi-standard in the

Western world. 85,53 % of all search queries worldwide are conducted via Google (Statista, 2023). Figure 8 presents the worldwide desktop market share of leading search engines of the last years between January 2015 and March 2023 (Statista, 2023):

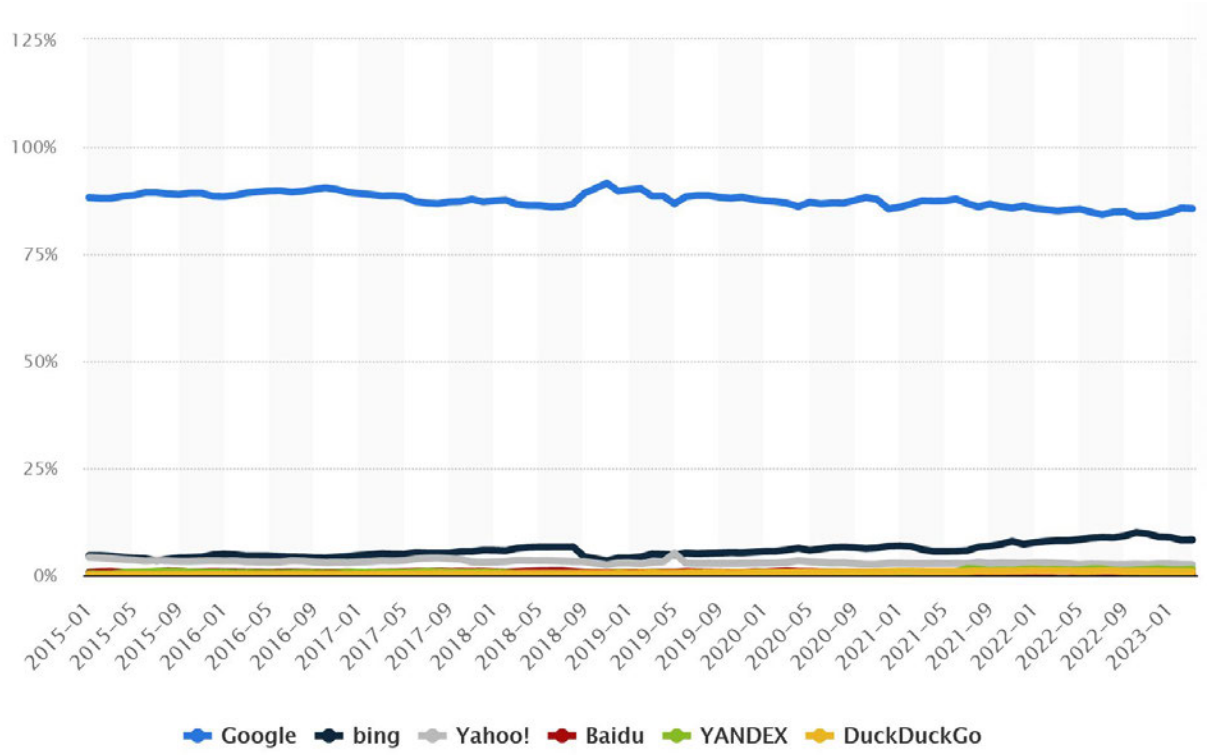

Figure 8: Worldwide desktop market share of leading search engines, 01-2015 – 03-2023

Since the appearance of search engines, the number of search queries has been growing steadily. While in 2016, there were still almost 3.3 billion searches recorded worldwide in the entire year, this had increased in 2019 to 3.4 billion searches per day (SEO blog, n.d.). The annual increase in Google search queries of the last years is shown in Figure 9 (Statista, 2021):

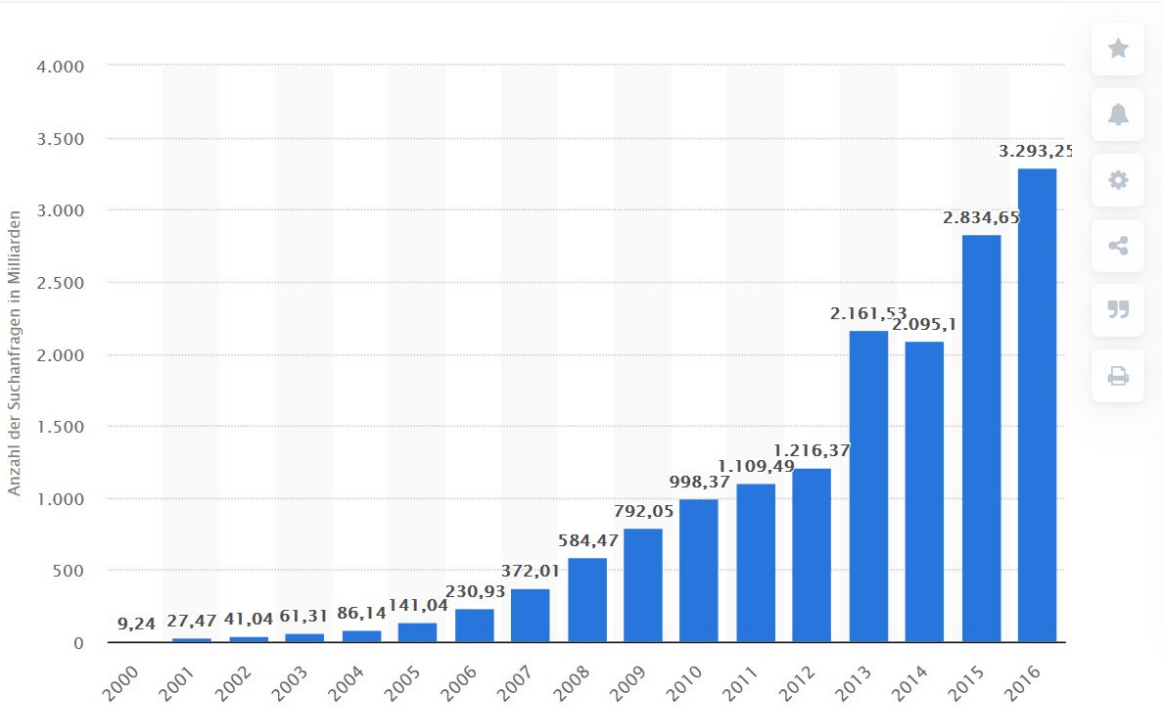

Figure 9: Number of search queries on Google worldwide, 2000 – 2016, in billions

Each Google search query corresponds to a problem or questions the user has at the time of the search and is looking for a solution or answer. At this stage, the term *prospective customer* or *interested person* searching for a first-aid course in the context of this study might apply. The interested person obtains and compares different offers and (online-) proposals (5), finally decides on one offer or one provider (6) and chooses a way to order the product or service (7).

Every interested person who arrives on the company's website with this intention becomes a visitor automatically, and now there are two possibilities:

1. The visitor navigates on the webpage but closes the browser tab without performing any action. This is called *bounce*, and a bounce rate is measured accordingly.
2. The visitor carries out a desired action. This can be a registration, a purchase, a click on a specific link, a download (e.g., from an e-book) or the registration to a newsletter. The visitor converts through this process, and the *conversion rate* is measured. The visitor becomes a customer.

The main goal of web admins and online marketers is to optimize the conversion rate of websites, which means performing appropriate measures to maximize the percentage of visitors

who become customers. In online marketing, this is called conversion rate optimization (King, 2008).

3.4.4 Conversion optimization

The company on which this study was based already adopted the usual SEO measures on its website (on-page), which are recommended by practitioners and in the literature (Max, 2018) in the areas of Web Design, Navigation, Ease of Use, Interface, Usefulness, Reliability, Security.

Initially, the company's website was built with industry standards in mind. Like different supermarket brands, which are all similarly structured and set up, a basic structure of online shops has also established itself as a quasi-standard on the internet. Customers have become used to this structure: design, the position of the buttons, the structure of the forms, navigation points and the order and structure of the purchase process are usually implemented very similarly in all existing e-commerce solutions. As a reference, the company also used websites like amazon.com or the Shopyfi E-Commerce Platform, both well-tested online shopping solutions.

The ongoing conversion optimization of the website is achieved through regular implementation of customer feedback, implementation of current security standards, measurement and improvement of website load times, and integration of the latest payment methods.

3.4.5 Test methods and data collection

The procedure of conversion optimization in practice is shown below: The marketer chooses one website (e.g., a Sales page) to be optimized and creates a copy of this website. The element to be tested on this copy, e.g., the colours, the headline or the button placement, is changed. Both versions of the website can be accessed online. The URL of the copy has, e.g., an attached *–2*. The incoming traffic is then directed equally and randomly to the two website variants. Both variants receive a randomly controlled, equally large subset of visitors.

After a total sample size passes the experimental environment, statistical software is used to analyse the customers' behaviour on the website. The focus of practitioners is always on the bounce- and conversion rate. In most cases, one will get a *winner* and a *loser* version after passing the minimum number of visitors for a significant outcome. The winning version

will be used as the new default version from then on and can be optimized in another loop.

Figure 10: Conversion measurement with A/B testing (Blogging-techies, 2020)

The method described above is called A/B testing, also known as Split-testing. A/B testing is an effective way to identify potential improvements on a shopping website that can significantly impact the online shop's success. From a scientific point of view, this method is located in user experience research (Young, 2014) and is one of the most essential test methods in online marketing.

In 2000, Google engineers conducted their first A/B test to find the optimal number of search results for the search engine's results page (Pardot, n.d.). In 2012, an employee of Google competitor, Microsoft, conducted a test on the Bing search engine to examine numerous possibilities for displaying headlines. The alternative version produced a 12% increase in sales within a few hours without affecting the user experience (Kohavi & Thomke, 2017).

Today, this approach is widely used by practitioners in Online Marketing. It has also been utilized for several years in business marketing literature, focussing on the effectiveness of e-commerce websites like improving the conversion rate of website visitors and click-through rates of advertisements (Arento, 2010; McGlaughlin et al., 2006; New Media Age, 2010). For A/B testing to be effective and for the results to be valid, there must be a sufficient sample size.

As mentioned above, this study will test two website variants and several versions against each other, which differ in relation to the embedded video. Testing different versions of a website is called *multivariate testing* (or multinomial tests). Multivariate tests are similar to A/B tests but can simultaneously test more than two versions or use more controls.

The enterprise software market is fiercely competitive and rapidly growing, with many companies offering affordable and user-friendly testing tools. These companies include Optimizely, SiteSpect, Convert Experiences, HubSpot, AB Tasty, Adobe Target, Google, and many more (Miller & Hosanagar, 2020; Westland, 2022). Also, the most well-known and most used Open-Source Content Management System (CMS) in the world, WordPress, with a current market share of 50% (Web Technology Surveys, n.d.), offers countless plugins that can be used to extend the platform with various functions. Among the currently available 55.000 plugins, there are also some SEO plugins like *OptinMonster*, *MonsterInsights* or *Simple Page Tester*, with which the A/B testing can be easily set up and performed (Official WordPress Plugin Page, 2021).

The widely used test tool for measuring website traffic and conversions is the in-house tool from Google itself, *Google Optimize*. This tool was initially a stand-alone tool named *Google Website Optimizer*. However, since August 2012, it has been a part of the website analysis tool *Google Analytics*, the most frequently implemented website analysis tool on websites (Web Technology Surveys, 2019). While Google Analytics was found on only 18% of German-language websites in 2008 (Beus, 2008), in 2016, around 80% of websites in German-speaking areas already used Google Analytics (Sobiraj, 2016).

Google Analytics aims to track, control and report website traffic. Web admins receive in-depth information about the traffic on the corresponding website. Google Optimize allows users to set up Split tests with a few mouse clicks. It automatically measures the traffic and reports the results.

Unfortunately, Google Analytics, with the integrated Google Optimize Tool, is designed as a stand-alone solution for end-users. This means that the data collected by Google Analytics can be analysed within Analytics, and the results can be displayed tabular or graphically. However, end-users cannot export the data, which would have been required to use the system for the experimental arrangements of this study.

However, the solution used for this thesis is technically identical to Google Analytics / Google Optimize and was implemented as follows: A plugin was installed directly in the website's code by the administrators, which seamlessly and automatically integrates into the CMS that manages the company´s website. Next, the administrator got instructions from the researcher about the experimental setup and which measurements must be performed to be able to provide the needed data for the statistical analysis. Finally, the described plugin was set up accordingly so that every session, i.e., every user who enters the website, is automatically tracked (User1, User2, User3, ...).

The following events were tracked:

- which video was played,
- conversion (registration or bounce),
- if converted, then if free or paid,
- gender (only from converted),
- age (only from converted),
- time spent on the website (session duration).

A known gap in website- and visitor tracking on the internet is the existence of bots. Bots are software programs (robots) which automatically visit websites and crawl the world wide web. More than 50% of average website traffic is believed to be bots (Priebe, 2017). The plugin used, however, already has a strong bot filter built in, which recognizes most bots. To reduce the influence of bots to a minimum, two additional measures are in place on the website. Firstly, the website is behind Cloudflare (an online security service), which in turn filters many bots. Secondly, the website administrators implemented a further filtering solution that regularly retrieves the public open-source databases in which the known bots are listed and filters them. The data were exported directly from the company's server by the administrator.

3.4.6 The (ideal) purchase process on the company's website

A brief look at the ideal purchase process shows which pages are monitored by the described plugin and which data are thus collected or made available later:

Therefore, the measurement's starting point is the described landing pages, which are visually identical but differ in the built-in video. Starting from this landing page, the website visitor must go through several steps until they have booked (registered) and bought (purchased) the course (screenshots of the registration and purchase process, see Appendix 2):

Figure 11: The purchase process on the observed company´s online shop (Author)

When the visitor has gathered the necessary information on the landing page and is ready to book or buy the product, they click the *Book Now* button. Next, the user is taken to a list of bookable dates. Here, the customer chooses a course date and is then asked for personal data – a necessary but sensitive step in Germany due to the last few years' data protection debates, including name, date of birth, address and e-mail address.

In an additional step, the visitor can select and deselect additional offers. For example, learning drivers can select an eye test or passport photos as an addition to the course, as both are required for the driver's license application in Germany.

In the last step, the visitor chooses whether to pay for the course online or finish the registration without payment. Paying directly online gives the customer a discount. Once the purchase process is complete, the customer will see the thank-you page, where a short message is shown regarding the purchase and the notice that confirmation with further information will be sent by e-mail.

After presenting the data collection method in this section, the development of the stimulus will be provided in the following section (3.5).

3.5 Stimulus development

3.5.1 Selecting the genres

As seen in the literature review (Chapter 2), most studies conducted in the field of consumer behaviour were related to the genres of Classical and Pop. The use of these genres showed significant results in several studies.

Since this study is intended to test whether the findings made regarding an offline environment in the past can also be transferred to the online world, the most frequently used genres (Classical and Pop) were also chosen for this study.

3.5.2 Dealing with the influence of music familiarity

Several studies have investigated the effects of familiar vs unfamiliar music and background music on the behaviour and decisions of respondents, including Tom (1990), Hahn and Hwang (1999), Park et al. (2014) and Bailey and Areni (2006).

In a study about *Marketing with Music*, the recall from television commercials was examined by playing only the (background) music of the spots to the participants, both the music created especially for television commercials, as well as parodies and originals of Popular music. As a result, the study participants could remember the corresponding commercials while listening to music specially created for advertisements, with an average of 77.6 per cent correct. The same, with an average of 43.6 per cent, is valid for parodies of Hit music and 23.6 per cent for the use of original music for products advertised in television commercials (Tom, 1990).

Nine years later, a study of message recall under familiar and unfamiliar music conditions showed that familiarity with background music significantly affected message recall (Hahn & Hwang, 1999). The study used Classical-type music, composed originally for this study, as background music for a 30-second television advertisement for a fictitious soap. Familiarity with music seems to play a particular role in the message processing of the subjects. On the one hand, unknown music may require more resources for processing than familiar music. On the other hand, the result of the study further suggests that familiar music can increase the efficiency of message processing.

In a study about attributes of background music and consumers' responses to TV commercials, the different effects of attributes of background music on consumers' attitudes, especially familiarity with the music used, were examined (Park et al., 2014). Participants in this study were significantly more likely to have a positive attitude towards advertising if they had familiar background music than unfamiliar background music. However, there was no significant impact on brand attitudes and purchase intentions.

Another interesting study by Bailey and Areni (2006) dealt with the estimated duration of a given interval in relation to waiting time. Respondents who waited idly reported shorter duration estimates when listening to familiar music, as opposed to unfamiliar music, but only when listening to a sufficient number of songs during the waiting time (Bailey & Areni, 2006). On the other hand, respondents who participated in a memory task estimated the duration to be longer when listening to familiar music than when they listened to unfamiliar music, but again only if they listened to a sufficient number of songs (Bailey & Areni, 2006).

The study's authors conclude, “Compared to relatively anonymous music, familiar music is more likely to draw the attention of individuals who would otherwise monitor the passage of time. Hence, for respondents in the waiting condition, familiar music should reduce estimates of duration compared to more anonymous music …” (Bailey & Areni, 2006, p. 192)

The aim of this section on the influence of familiar versus unfamiliar music was not to present a comprehensive literature review but to highlight that the familiarity of music, in general, can influence subjects' behaviour.

This study, in turn, does not aim to examine the impact of background music on the attitudes of website visitors but focuses on the direct effects on decision-making and buying behaviour. Nevertheless, it is clear from the studies discussed that the choice of music in terms of familiarity can impact participants’ behaviour. This means that when selecting music, care must be taken to ensure that the background music chosen is as unfamiliar as possible to the target group to avoid possible influence.

3.5.3 Dealing with the emotional dimension of music (*happy and sad*)

As seen in their theory on the influence of music, Mehrabian and Russell (1974) showed that the environment influences the emotional reactions of the individual; this, in turn, influences the two contrasting behavioural reactions to either approach or avoid the environment. The Mehrabian–Russell S-O-R framework assumes that the environment influences three affective states: pleasure, arousal and dominance (Mehrabian & Russell, 1974). Regarding the S-O-R model, these states are located in the S-O-R model's second column (organism). Later research found that shopping behaviour was related to measures of pleasure and arousal but not dominance (Yalch & Spangenberg, 2000).

However, the influence of music on consumer mood has been studied experimentally in several ways, and the states of pleasure and arousal have been widely verified in research, as shown in the literature review (Section 2.4.2).

Many researchers (Areni & Kim, 1993; Mattila & Wirtz, 2001; Milliman, 1982, 1986; Wakefield & Baker, 1998; Yalch & Spangenberg, 1990) investigated consumer behaviours in retail service environments and positively reported the influence of background music in retail environments on the customers (Broekemier et al., 2008).

While music can be controlled relatively easily by retailers, it has many dimensions, like tempo, loudness, pitch, or emotion. Music is a complex construct, and studies that examine only one aspect of music may be limited (Broekemier et al., 2008). In contrast to structural dimensions like tempo or volume, music can be interpreted effectively. Bruner describes the emotional dimension of a composition as *one of the most fundamental*. Some songs are rated *happy*, while others are rated *sad* (Bruner, 1990).

Gardner (1985) developed the theory that positively perceived music leads to a positive mood (happy) in the consumer, which results in positive evaluations and behaviour towards the brand and company. Park et al. 2005 summarized that those positive moods, which were influenced by a pleasant shop environment (e.g., background music), resulted in a greater intention to buy than negative moods.

Authors of several studies investigated precisely this question, whether music, which was classified as happy or sad, in other words *emotionally coloured*, also influences the (buying) behaviour of the study participants. Alpert and Alpert (1990) examined the impact of happy/sad music on purchase intention concerning happy/sad greeting cards. In this study, the authors found no evidence for the behaviour assumed by Gardner (1985). One explanation for the results of Alpert and Alpert (1990) was that the sad music used was more congruent with the greeting card stimulus than the happy music (Broekemier et al., 2008).

In another study by Alpert et al. (2005), the influence of happy/sad background music was again investigated with greeting cards – this time in the context of advertisements. In this study, a significant correlation was found between happy/sad background music, scores on the measured mood index, as well as the purchase intention when the greeting card was chosen with a particular intention (for a friend who was having a birthday vs for a friend who was sick

in the hospital) (Alpert et al., 2005).

Finally, a study by Broekemier et al. (2008) examined the influence of happy and sad music on shoppers in an experimental retail setting. The results showed that happy/sad music significantly influences purchase intentions (Broekemier et al., 2008).

Conclusion: Since this thesis does not deal with the internal states of the subjects, it should be excluded that the music used in the experiments influences the visitors' emotions (happy /sad). The intention to influence emotional states through one of the music pieces would change the whole experiment. Therefore, the music should be perceived as neutral as possible. Accordingly, this affective criterion (happy/sad) was included in a check when the music was chosen from the platforms.

3.5.4 Selection of music

No commercial music was used to meet the described criterion of using non-familiar music. Instead, music by unknown artists was chosen. For this purpose, the two audio platforms, epidemicsound.com and artlist.io, were searched for corresponding titles. Both are specialized platforms that allow unknown artists to make their music available to a specific target group, e.g., video producers find a wide selection of music that can be used royalty-free in videos. The music access requirement is a paid membership on the platforms.

The author searched explicitly for instrumental versions of Classical and Pop, analogous to Milliman (1982), who recommended avoiding vocals in the music used. He noted that the exclusive use of instrumental pieces would allow better control over the music stimulus. In addition, no consideration would have to be given to female or male singers and popular or less popular artists (Milliman, 1982).

In addition, there is a risk that the lyrics would influence the mood of website visitors (Anisimova et al., 2014; Yalch, 1991). Most importantly, however, in the context of this study, lyrics would interfere with consumers' perceptions, as the spoken video presentation would then either no longer be understandable or at least difficult to understand.

From the Classical and Pop categories, the author selected pieces of music unfamiliar to him, that made a neutral impression, contained no voice or vocals, did not have significant differences in volume and were at least 30 seconds long. Since the music was sourced from

alternative music platforms, it was ruled out from the outset that familiar music would be chosen by chance or accident. The audios were also checked by a video marketing specialist who has worked in this field for many years for the above criteria of familiarity and neutrality (no happy or sad sentiment).

The selected audio tracks were:

Genre	Title	Artist	Platform	Original Tempo
Classical Music	The Garden Repertoire	Francis Wells	Epidemic Sound	97
Pop Music	Free Wheel	Rex Banner	Artlist	105

Table 9: Artists and titles of the selected audio tracks

3.5.5 Technical implementation of music on the websites

As seen in the literature review, most research in online consumer behaviour is experimental laboratory research, and there are no genuinely empirical experimental studies to date.

When it comes to the technical implementation of the experiment, it turned out that the planned experiment was not easy to set up. This might be one of the reasons why there was no study like the current one performed yet. This work aimed to determine whether the results of experiments with background music as an independent variable, achieved in simulated online environments, could also be verified in a real-life online shopping environment.

In the early days of the world wide web, it was possible to play music automatically in the background of a web page, at a time when Netscape 4 and early versions of the Internet Explorer were the browsers used by the majority of people (Heng, 2018). However, since the introduction of HTML5, music can only be integrated via a player, and since 2019 at the latest, all browsers now prevent self-launching audio.

For this reason, a trick/workaround had to be used to vary the website visitors' background music automatically. First, a product video was embedded in the product page of the online shop, which contained one of the different background music variants, or as a reference, no background music (see Figure 12). Then, when the website was loaded, the video started automatically. This procedure was still technically possible in 2021, although relatively

unpopular with website users (Sternberg, 2013). However, playing random background music to users this way was possible.

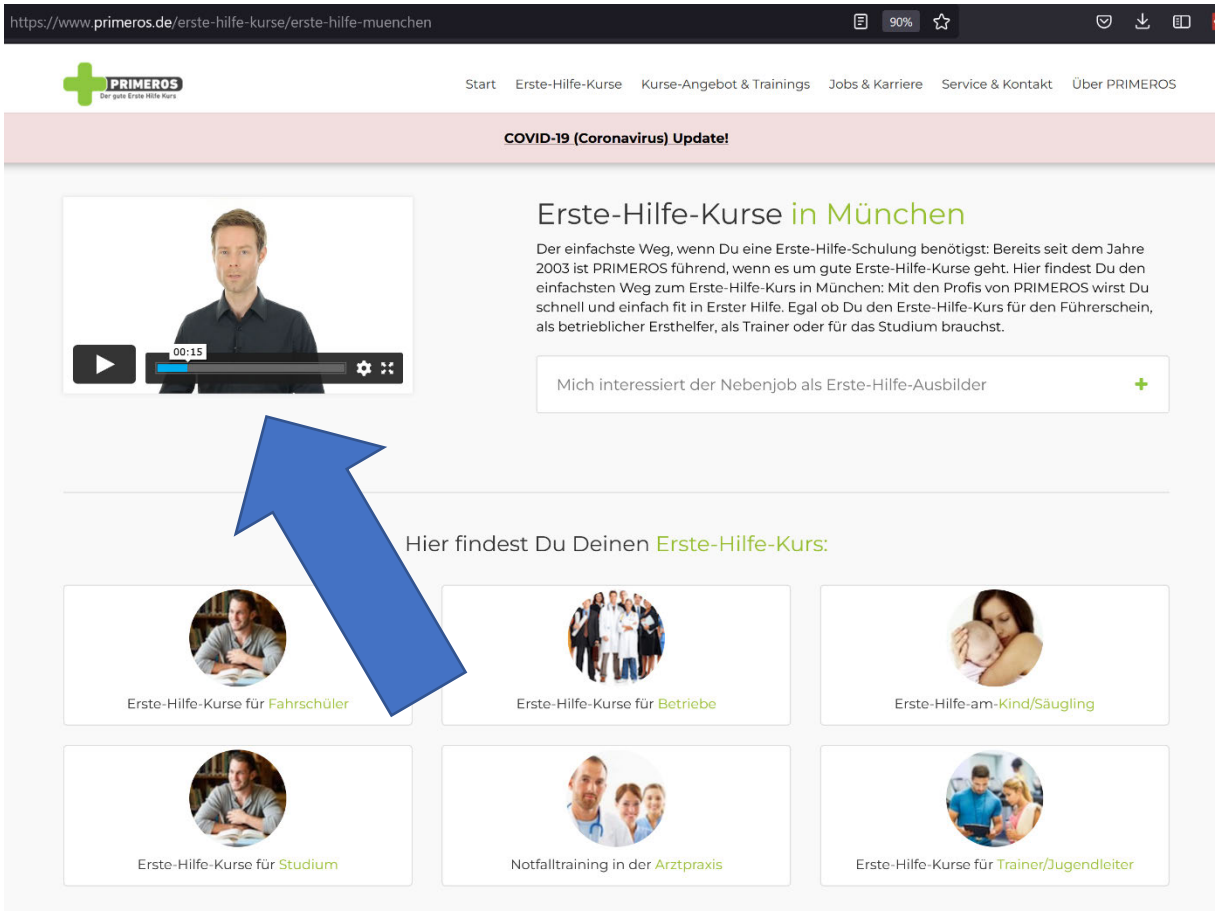

Figure 12: Over-the-fold screenshot of the product page of the online shop

3.5.6 Different versions of the video background music

The company created a video in cooperation with an online marketer focusing on video marketing. The video is a typical explanation video in which the founder of the company briefly introduces the company, explains the courses offered, explains the USP (high quality of the seminars), and ends with a call-to-action (“click under the video on the link, and choose the course you want to attend”). The video's audio track contained only the voice of the speaker and played as a no-music version on the company's website for almost two years.

With the video software Camtasia for Windows, different background audio tracks (music) were integrated into the video so that after completion, there were 19 different versions of the video: a no-music version, 9 Classical versions, and 9 Pop versions (Table 10). In addition, the video clips with background music varied in loudness (soft/medium/loud) and

tempo (slow/medium/fast).

High	Tempo high	Tempo high	Tempo high
	Loudness soft	Loudness medium	Loudness loud
Medium	Tempo medium	Tempo medium	Tempo medium
	Loudness soft	Loudness medium	Loudness loud
Slow	Tempo slow	Tempo slow	Tempo slow
	Loudness soft	Loudness medium	Loudness loud
Tempo / Loudness	**Soft**	**Medium**	**Loud**

Table 10: Overview of all music conditions for the experiments

Tempo and loudness were selected as stimuli, firstly because of the findings of previous studies and secondly because, according to Bruner (1990), they represent two crucial musical dimensions: time and texture. It is important to note that these two properties of the background music can be influenced by the experimenter/researcher.

3.5.7 Manipulation of loudness: A survey conducted

While the determination of the tempo of a piece of music is still measurable (BPM), the situation is different from the volume or the volume perceived by the user.

In connection with the reaction to background music, the studies conducted on consumer behaviour on websites so far are all laboratory studies. Therefore, they are relatively easy to carry out but not meaningful in actual significance. Nevertheless, the design is always similar: subjects are asked to navigate on a created website or to shop in a fictitious online shop, while music selected by the experimenter is played in the background (e.g., Cheng et al., 2009; Cuny et al., 2015; Jung-Hwa et al., 2009; Wang et al., 2017). This makes it easy to influence the volume of the background music measurably.

The situation is different in the present field study. The test subjects naturally elude the experimenter. They are sitting at home, or at work at the computer or are somewhere accessing the internet via mobile phone. So, it is not possible to objectively influence the *volume*. Instead, each user sets the volume of his loudspeakers or headphones to what they find most comfortable. In order to be able to influence the volume perceived by the user, the concept of relative *volume*, here called *loudness*, is introduced for this study. This refers to the relationship between the speaker's volume and the background music.

The underlying assumption is that users usually adjust the volume of their devices so that they hear the speaker's voice comfortably. In the study on loudness, the background music is varied in such a way that it is either barely audible (soft), pleasantly accompanies the speaker (medium) or is perceived as too loud (loud).

Since the perception of relative loudness is relative, and this can also differ depending on the device used (loudspeaker, mobile phone, simple or high-end headphones), a survey was carried out to determine the ideal loudness versions of the titles produced.
For this purpose, 8 video versions were created for each genre, Pop and Classical, ranging from barely audible to completely overlapping background music.

The participants of the survey were asked for each version: “How do you feel about the background music?” The possible answers were:

- (too) soft
- normal
- (too) loud

3.5.7.1 Survey, selection and hosting of the videos

The survey was conducted on a convenience sample of 94 employees of the company. The company has over 400 freelance trainers of all ages, living in or near cities all over Germany where the company offers the courses. Thus, the sample group is very similar to the company's customers. In addition, the subjects were asked in an email newsletter of the company if they wanted to complete a survey about the marketing videos on the company’s website. Ninety-four people showed interest in this pre-test.

A survey using Google Forms (hidden for search engines, see Appendix 3.1) was created and emailed to the participants in December 2020. It contained all 16 videos visualized in 2 Sets, with the request to complete the survey within seven days:

Experiment	Videos	Music	The volume of the background music
Set 1	Eight videos	Classical background music	different volume, from very low to very high
Set 2	Eight videos	Pop background music	different volume, from very low to very high

Table 11: Survey to determine the volumes

For each video, the participants had to rate their impression of the background music.

3.5.7.2 Evaluation, the result of the survey

The survey results (Appendix 3.2) clearly showed the cut between the different loudness levels of the perceived background music. The videos with these background music levels (soft, medium and loud) were taken, each in all three tempo levels (slow, medium, fast), and uploaded on the online video platform *Vimeo*, where the company has a premium account.

The settings of the videos have been set so that they do not show a player when integrated into a web page, but only the video itself, frameless and on autoplay. The website visitor has to stop the video intentionally if he does not want to see (and therefore hear) it.

Vimeo provides an HTML code for each video. If this is inserted into the website, the corresponding video will appear at this point. The 19 different source codes from Vimeo were accordingly inserted into separate landing pages on the company's website.

3.5.8 Manipulation of tempo

Researchers in the 20th century, who wanted to change the tempo of a recording, could do so by varying the speed of a tape recording. However, this method confused tempo with duration and pitch. Alternatively, researchers could record several versions of the same piece at different speeds; however, this approach was very costly, time-consuming and had the disadvantage of confusing tempo and performance (Kellaris & Rice, 1993). The problem with manipulating the tape speed of the recording is that the pitch increases with it. Even Pavarotti's deep voice sounds like Mickey Mouse's at higher speeds.

In order not to confuse tempo and pitch, the different audio versions were created using recent audio software. The musical parameters can be edited so that one variable is changed at a time while all other variables are kept constant. For experiment 3, the tempo was varied without changing the pitch. For editing the audio, the free software *Audacity* was used to manipulate the tempo of the music.

To create the slow and fast audio variations, a brief analysis of the tempos used in the published studies of recent years was carried out, as shown in Appendix 4.1. According to Kellaris and Rice (1993), most of the music used in marketing situations are in between 60 and 120 BPM, and most authors followed the recommendation of these key authors. Looking at the outliers of the 19 studies which dealt with tempo, there are, for example, studies that describe a value of up to 129 BPM as *slow*, while other authors already refer to a value of 90 BPM as

fast. The consensus is that there is disagreement about the definition of *slow* and *fast*. The author did not want to commit to whether 50 BPM is slow or 90 BPM is slow, as this is subjective, and there is no objective truth here.

Therefore, the following approach was chosen for this study: previous studies were compiled, and the mean value of all *slow*, *medium* and *fast* tempos was calculated (see Appendix 4.2). As a result, the mean value of *slow* is 70.85 BPM, *medium* 97.59 BPM and *fast* 124.33 BPM (see Appendix 4.3).

The original tempo of the music pieces (see Table 9 and below) was chosen close to the mean value of the *medium*, and the slow and fast versions were then created from these versions.

Track: Free Wheel by Rex Banner, downloaded from Artlist.io
Tempo: The selected pop music originally had a BPM of 104.
The iPhone App Pro Metronome determined the tempo.

Track: The Garden Repertoire by Francis Wells, downloaded from Epidemicsound
Tempo: The selected Classical Music originally had a BPM of 97.
The tempo is already shown on the website.

The software Audacity has an easy-to-use effect *tempo*, with which the tempo of an imported audio file can be transposed upwards or downwards. Furthermore, the calculated file can be exported in wav or mp3 format and imported into the Video Software Camtasia.

After this section has highlighted the development of the audible stimulus, the following subsection (3.6) summarizes this chapter.

3.6 Summary

This chapter introduces this thesis's methodological approach, the studies conducted, the research methods used, and, where appropriate, the empirical context. It presents justifications for the chosen research philosophy and design, illustrates the required steps to conduct the study effectively and describes the data gathering and analysis methods. The following chapter addresses the data collection and analysis.

4 Data Collection and Analysis

In this chapter, the data collection and data analysis are presented. It also includes the models and theories used for the test statistic and further considerations made to investigate the impact of background music on online consumer behaviour.

In the data collection section, the significance level used is justified, the population and sample size are presented, and an overview of the individual experiments is provided.

In the data analysis section, the interpretation of the mediations is explained, as well as the linear probability model and the coefficient of determination R2 are presented. Finally, the data screening, preparation and data descriptives are shown.

4.1 Data collection and conducting the experiment

4.1.1 Introduction

The following section provides an overview of the theoretical assumptions and the target group that was defined to provide the basis for conducting and analysing the field studies.

Firstly, the population for this study was determined, and the sample and sample size were discussed. Secondly, the data screening and preparation measures are described. Thirdly, an overview of the sample demographics is given, and the descriptives are presented. Finally, an overview of all three experiments and the audible stimuli is given.

4.1.2 Population

Before planning the sampling, conclusions must first be drawn about the target population. When conducting scientific studies, there is often the challenge that a population cannot be covered entirely. A representative sample is an instrument to describe the population employing inference.

The company whose sales process is investigated offers first-aid and emergency training courses for different target groups in Germany. The author of this thesis is in a long-term professional relationship with the company, and permission to use the data was granted subject to confidentiality and compliance with the GDPR. The most prominent target groups for the courses of the company are:

Target group 1: young people living in Germany, between 16–30 years old. The average age of the course attendees is 25.64 years (source: company actual data, 2021). These subjects need to attend a first aid course for the application for a driving licence (car, motorbike or truck) or for their university studies (medical-, sport- and education students).

Target group 2: First responders in companies of all ages, but mainly older cohorts, the average age of the course attendees is 45.75 years (source: company actual data 2021). In Germany, every company is responsible for providing first-aid training for a specific percentage of its employees as first responders and repeating this training every two years.

Target group 3: University students who have to complete a first aid course as part of their studies. In Germany, this applies to medicine, education and sports science students.

The company operates all over Germany, in most major cities. Therefore, the experiment is limited to the population living in Germany, well-diversified all over the country.

The last official published numbers from the German Public Accident Insurers (Berufsgenossenschaft), the Federal Statistical Office (Statistisches Bundesamt), Federal Motor Transport Authority (Bundesverkehrsministerium) and public education resources are shown in the following Table 12:

Target group	**Amount**	**Source**
First responders in companies	2,185,086 attendees per year	S. Palme, VBG, personal communication, 24.05.2018
Students (university)	73,731 attendees per year	Sport students 30,944 (Rudnicka, 2022), medical students: 101,712 (Radtke, 2022), education students: 236,000 (Tiefenthal, 2020) – student total 236,000. Since the average duration of studies is five years, the need for first-aid courses per year is equivalent to 73,731 attendees per year
Driving students	New driver's licence: 1,217,044 per year	Kraftfahrtbundesamt, 2021
Estimated population size:	**3,475,861 subjects**	

Table 12: Estimated population size

The population for this study consists of internet-savvy consumers willing to search, book and pay for the needed services online. The company and the corresponding online shop were selected because the complete registration process for the mentioned first aid courses is available online at this company. Accordingly, it appeals to customers searching the internet for a first aid course in their area and would like to book a course date online.

4.1.3 Samples and sample size (sampling)

Researchers use samples instead because it is often impossible to observe the entire population. A sample is a piece of the target population that is intended to be representative of it. Three different samples were drawn for this study, each for every experiment. Participants in the experiments were the mentioned website visitors actively searching for a first-aid course online.

As this study offered exploration of an under researched domain, to the best of the researcher's knowledge, multivariate testing was chosen for the data collection (see Chapter 3.4.5 for further information). The ongoing A/B (or multivariate) testing technique is common practice among practitioners. However, it is also a widely used method in academic research, particularly in fields such as psychology, marketing, and economics (Kohavi & Longbotham, 2017). In natural settings, even minor effects can have a significant impact. For example, Internet businesses routinely run A/B (or multivariate) tests with thousands of customers daily to optimize click-through rates and online sales on their e-commerce platforms. These tests typically investigate small changes in website layout, persuading "nudges" and contextual information that impacts consumer behaviour. Such changes can achieve substantial economic impacts by combining numerous minor effects (Vermeulen & Beukeboom, 2015). Even relatively minor behavioural effects from music can be significant in this context.

Moreover, random sampling was determined to be the most appropriate sampling strategy. Random sampling is a statistical method that involves selecting a sample from a population in a manner where each member of the population has an equal probability of being chosen to obtain a representative sample (Bryman & Bell, 2015). This also helps minimize bias.

The resulting random sample used in this study consisted of participants who were digitally observed browsing the website during the relevant periods. In other words, the sample for this study consists of all recorded sessions on the website in a specific period.

Ethical considerations

Some ethical aspects of data collection had to be considered, according to the principles of the ethical guidelines of the University of Gloucestershire, the company involved and the GDPR (General Data Protection Regulation of the EU), e.g., anonymity, confidentiality, data storage and destruction. In addition, the researcher obtained permission from the company for the data collection (Authorization confirmation letter, see Appendix 6).

For anonymity, the decision was made to deal only with anonymized data which promoted compliance with the ethical guidelines and especially the European GDPR rules. Identifying information such as names, addresses, phone numbers, and email addresses was not obtained. Instead, the data was numbered consecutively by default, and a number was assigned for each session started (session ID). For this, the data were exported from the company servers directly and anonymously. No IP addresses or names were included, so there was no means to assign the data to individuals. For confidentiality, the data access was limited to the company's developers and the researcher. The data was stored securely on a password-protected computer and on a password-protected Dropbox account and did not need to be archived. After completion of the DBA, the datasets are deleted.

With these measures, the researcher has ensured that the privacy of the study participants is protected and that the data is collected anonymously.

Sample composition and sample size

Recorded for each session were the following events:

- which video was played,
- conversion (registration to a course) yes/no,
- if converted, then if free or paid,
- gender (only from converted),
- age (only from converted),
- time on the website (session duration).

To obtain solid results in quantitative research, it is therefore essential to determine an appropriate minimum sample size (Simbarashe, 2020). The size of the target population (3,475,861) is used as the basis for calculating this sample size.

There are different methods to determine the sample size for a quantitative study. A standard formula (Qualtrics, 2021) for calculating the sample size of small or medium-sized populations is as follows:

$$\frac{[z^2 * p(1-p)]/e^2}{1+[z^2 * p(1-p)]/e^2 * N} = \text{required sample size}$$

Specifically:

- Total population size (N) = 3,475,861
- Z-score (z) = 1.96 (at 95 % confidence level)
- Margin of error (e) = 0.1
- Standard deviation (p) = 0.5
- Sample size = 9577

Considering this, a sample size of 10,000 could be considered sufficient. However, since the total population has a significant influence on the results, and especially since, in the case of website visitors, it is unclear who visits the website with what motives, bias has the potential to be present whether possibly minor effects can be captured by the experiment. Potential bias is possible since a real field study was conducted to collect data. The setup is subject to corresponding limitations, e.g. we do not know whether the website visitors are real customers or haphazard visitors, job seekers or competitors. In addition, the influence of background music is considered low task-relevant information, and the influence of this stimulus is assumed to be relatively low. Furthermore, since the experiments are real field studies and assuming that most website visitors are real customers, it is unclear when, where and how the subjects access the website and whether the background music is actually perceived due to technical limitations. For more about this, see Chapter 6, Limitations.

The rule of thumb is that the larger the sample, the more statistically significant the results, i.e., the probability that the results are random, is lower (Surveymonkey, 2021). Moreover, the automated collection of large samples is relatively easy with the methodology developed once the experiments are technically set up. Therefore, to be able to recognize and measure possible effects, even if they are only minor, and to achieve an appropriate sample size, the limitation by sample size was waived. The lack of robust sample size in previous studies was also identified as an existing research gap (gap3, see section 1.4.1).

That means that the experiments were not designed to observe only a certain number of visitors (e.g., 10,000 participants) but that consumer behaviour was continuously observed and recorded during a period (e.g., experiment 1: 53 days) to obtain as large as possible sample for the reasons mentioned above. The experiments on the website were performed for a correspondingly long period once the experiment had been set up, and all active sessions in this period were recorded anonymously.

A separate sample was taken for each of the three experiments. The aim was to obtain samples of a similar size. The first experiment collected over 200,000 sessions, so experiments 2 and 3 were performed until the sample size was larger than 200,000 (see Table 13). The first sample was collected in 53 days, from May to the beginning of July 2021. Since the number of participants and registrations decreases seasonally towards the end of the year, the online experiments for the two other studies had to run correspondingly longer, to achieve a similar sample size. Experiment 2 ran for 57 days, from mid-August to mid-October 2021, and Experiment 3 for 92 days, from mid-October 2021 to mid-January 2022.

The recorded sessions include the following sample sizes:

Experiment No.	Sample size	Date	Days
Exp 01	215331 sessions	10.05.2021 – 01.07.2021	53
Exp 02	202351 sessions	18.08.2021 – 13.10.2021	57
Exp 03	215350 sessions	18.10.2021 – 17.01.2022	92

Table 13: Sample sizes and periods of data collection

4.1.4 Data screening and preparation

This section describes the data screening, cleaning and preparation activities carried out. Screening techniques for data and statistical analysis must be applied to verify the data's integrity (reliability, validity) and exclude potential measurement errors (Engelke, 2020).

Reliability refers to the extent to which a measure consistently produces the same results over time and across different situations (VandenBos, 2015). In other words, a reliable measure is one that produces consistent results each time it is used. As mentioned in 3.5.4, reliability was promoted in the selection of music. Subsequently, demonstrating interrater reliability, the

author and the video marketing specialist independently coordinated to determine the most appropriate selection of music. Through this kind of interrater reliability, the selected music pieces fit the criteria (i.e., unfamiliar, made a neutral impression in terms of the emotional tone) and were suitable for the study.

Validity is a term used in research to refer to the degree to which a test or measurement accurately measures its intended measure (Streiner & Norman, 2015). In other words, a test is considered valid if it actually measures what it is supposed to measure and if the interpretations and uses of the test scores are supported by evidence and theory. Measurement errors (e.g., outliers, sessions with zero duration, sessions with limited long duration) may reduce the survey data quality and affect the statistical findings and significance (DeSimone & Harms, 2018).

In addition, possible measurement errors in survey data can introduce biases and distortions that affect the accuracy of statistical findings, making it essential to correct them to ensure the data's quality and reliability. To promote quality and reliability, data checking and preparation aim to obtain reliable data with correct information to reduce the possibility of these negative consequences. The screening techniques used for the present study are as follows: As a first measure, in each experiment, the variable *video* was transformed, due to its categorial character, into a series of dummy variables required for later analyses. A dummy variable is coded 0 and 1 and indicates the occurrence (=1) or non-occurrence (=0) of a certain event, in this case, a particular video category.

Additionally, to exclude implausible values (outliers), the following decisions were made:

1. all cases with a session duration of 0 were excluded;
2. all cases with a session duration belonging to the upper one percentile were excluded. This was done to exclude possible forgotten sessions and left running by website visitors who open several tabs in parallel in their internet browser.

A session duration of 0 is caused either by bots that were not detected by the bot filters or by users who visited the website but closed it at the same moment.

Next, the researcher promoted the internal validity of the experiments by ensuring that the characteristics of the music impacted consumers. Internal validity refers to the degree to which a study design and its execution minimize systematic errors and allow for a causal

inference between the independent and dependent variables. Moreover, the video categories had the same frequencies by design. This equal distribution does not change significantly after data cleaning. Thus, there is no systematic bias with respect to the excluded cases.

Furthermore, the following measurements were performed to limit bias and promote objectivity and rigour: Prior to the actual study, pre-tests (pilot tests) were conducted to identify potential challenges or difficulties and ensure clarity. The study employed a multi-step analysis process that was regularly checked for quality, including data cleaning and checking for normality. In addition, descriptive and inferential statistical analyses were conducted, along with demographic checks. With a considerable sample size, the study has promising implications for generalizability. Moreover, data was collected from an authentic online shopping site outside the research, adding real-life value to the study.

4.1.5 Overview of the sample demographics

The method *experiment* as a field study (instead of a laboratory study) was chosen and used in this research to obtain meaningful results for practitioners and, as far as possible, a generalization for the company's industry (service industry, education).

The study monitored the online store of the mentioned company and initially recorded all sessions of website visitors who accessed the website in the specified periods of the experiments. Against this background, the results of the experiments were considered and compared in relation to the data of the company in order to assess the representativeness of the collected data. As a result, the characteristics of the samples are shown in the following table:

Gender/age	Experiment 1	Experiment 2	Experiment 3	Company database
Female	44,7%	45%	43,4%	42,9%
Male	55,3%	55%	56,6%	57,0%
Age: mean	25.67 years	25.77 years	25.66 years	26.95 years
Age				
Below 20	40,2 %	41,1 %	40,5 %	37,6%
20 – 29	31,2 %	29,4 %	30,4 %	30,5%
30 – 39	17,6 %	17,5 %	17,7 %	17,8%
40 – 49	7,4 %	7,5 %	7,0 %	8,2%
50 – 59	2,8 %	3,6 %	3,5 %	4,2%
60 and above	0,8 %	0,9 %	0,9 %	1,3%

Table 14: Sample characteristics, Experiments 1–3

To assess the generalisability of the samples, comparative values were retrieved from the company's customer database and compared with the values of the samples. The company's values from the year 2021 are shown in Table 14 in the last column. As illustrated, the samples are very close to the average data of the customer database.

However, the age structure of internet users in Germany clearly differs from the company's customers. For example, the statistic of German internet users for the year 2020 who regularly purchase on the internet (at least once a month) is shown in the following chart:

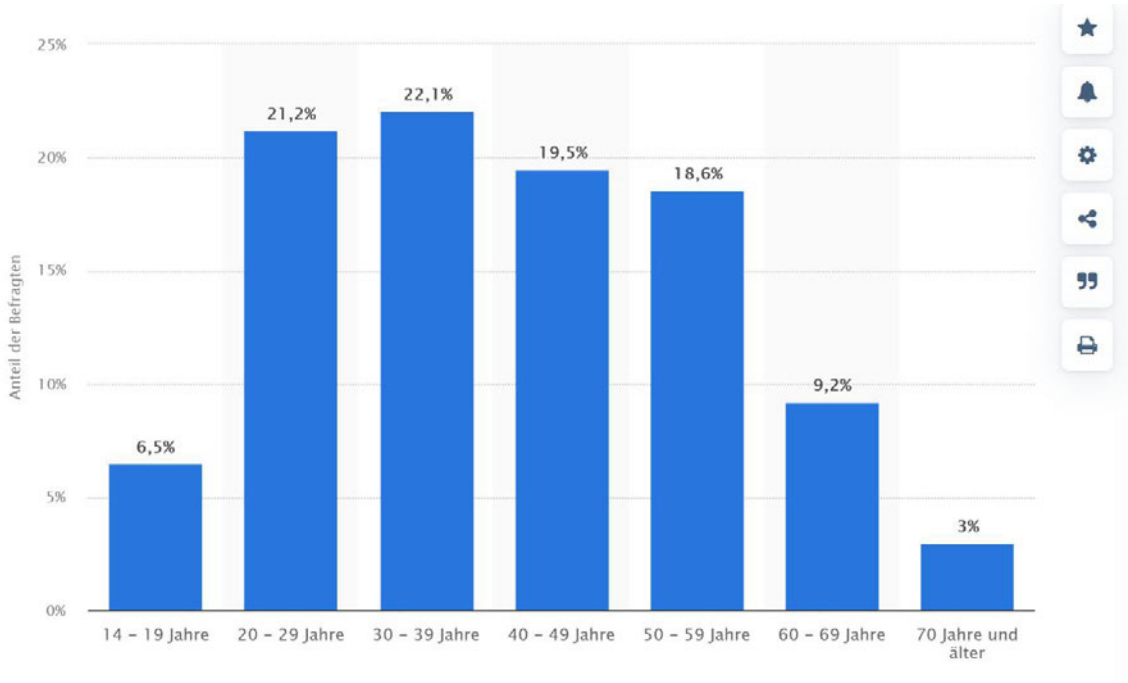

Figure 13: Share of online shoppers in Germany by age in 2020 (Pawlik, 2022)

This means that the study has limited relevance concerning the representativeness of the entire German population. Although this is due to the average age structure of the company's target group, it still represents a limitation. It is possible that the results of this study would be different for companies with different age structures of clients.

4.1.6 Conversion metrics

In today's digital age, companies allocate significant resources in online marketing strategies to drive website traffic and convert visitors into customers. However, without an understanding of conversion metrics, it can be challenging to evaluate the effectiveness of these efforts. Conversion metrics are measurements used to track and analyse a website's or marketing campaign's performance. The conversion rate reflects how many visitors take a desired action, such as purchasing or filling out a form (McFarland, 2013).

Marketers can identify areas for improvement by measuring different conversion metrics and adjusting their strategies accordingly. this section explores different types of conversion metrics and how to use them to evaluate and improve website performance and marketing campaigns.

Berthon et al. (1998) proposed a model (shown in Figure 14) for website performance that highlights the importance of conversion metrics as drivers of website success. With regards to this study, the model connects to the buy-stages mentioned in the Methodology Chapter (3.4.3) of the website traffic (or “flow of surfer activity”). More precisely, the model suggests that Marketing Communication Activities lead to a six-stage website performance process, including surfers, target surfers, website hits, active investigators of the website, and purchase and re-purchase. However, the key ratios considered in this study are the following three: attractability efficiency, contact/engagement efficiency, and conversion efficiency.

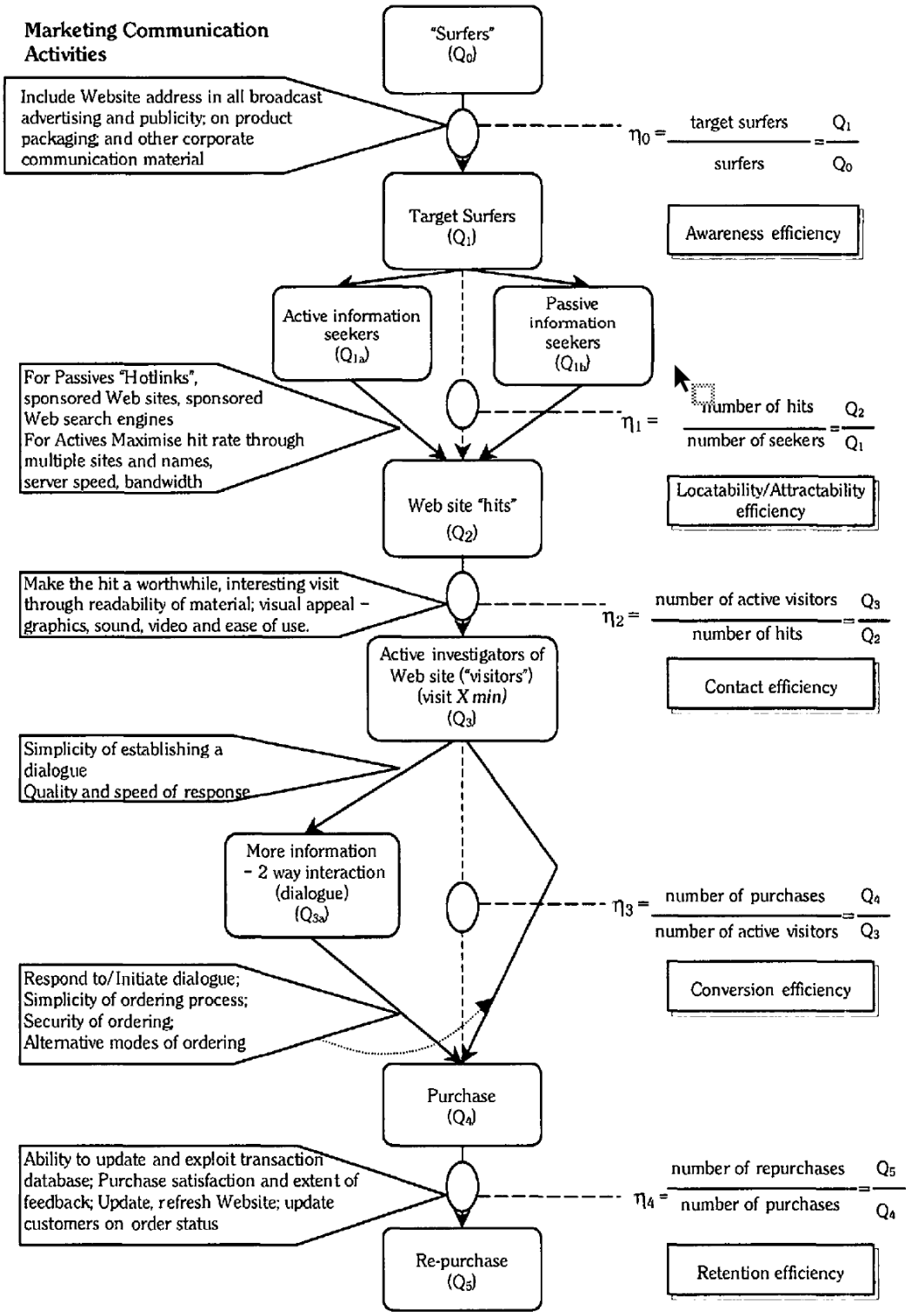

Figure 14: A model of the conversion process on the web (Berthon et al., 1998)

First, attractability efficiency concerns getting the target surfers to find the company's website. It identifies the efficiency with which an organization can facilitate target surfers who, on the one side, actively seek out the website or, on the other side, draw in passive seekers who are not actively seeking the website. In this study, the attractability efficiency value indicates

how well an organization converts target website visitors (here called "active" and "passive" seekers) into website hits. The company’s Google Analytics account shows a number of 943,646 users (Appendix 7) for the year 2022. With a population of 3,475,861 (see Chapter 4.1.2), the attractability efficiency results in an average value of:

Attractability efficiency = 943,646 / 3,475,861 = 0.2714

This means that for every 1000 people in the population, the website attracted around 271 visitors. This metric can help evaluate the effectiveness of a website's marketing and outreach efforts in affecting and attracting potential visitors. However, it should be noted that attractability efficiency alone does not provide a complete picture of a website's performance, as visitor engagement and conversion rates are also important factors to consider. Nonetheless, by tracking and analysing attractability efficiency alongside other metrics, website owners and marketers can gain valuable insights into improving their website's overall performance and achieving their goals.

Second, engagement efficiency, the third stage of the conversion model, represents the contact effectiveness of the company's website, which is only visited actively by a small portion of the target hits. This metric gauges how well the company converts hits on its website into real visits. This is necessary because not every website visitor actually interacts with every website they visit. For example, many visitors stay only a few seconds and then bounce off the website or go back to, e.g. the results of a search engine. This phenomenon should be captured with engagement efficiency because it provides insights into the effectiveness of a website in engaging and retaining its visitors. In addition, the percentage of non-active sessions is represented by the bounce rate, which is the opposite of the engagement rate. A high bounce rate or short visit duration may indicate a lack of relevance or value in the website's content or user experience. In contrast, a low bounce rate and long visit duration suggest that visitors find the website helpful and engaging. By measuring engagement efficiency, website owners and marketers can identify areas for improvement and optimize their strategies better to meet the needs and expectations of their target audience.

Google Analytics (GA), already mentioned in Chapter 3.4.5 and installed on the company's websites, provides reliable figures on the bounce rate of website visitors. The Google Analytics Bounce rate is defined as: “For example, let's say someone visits your website, reads some of your content for less than 10 seconds, and then leaves. While they were on your

website, they didn't trigger any events or visit any other pages. Google Analytics will count the session as a bounce" (Bounce rate – Analytics Help, n.d.). The Google Analytics Bounce rate considers a visit under the authors' definition of the underlying conversion model (a website visitor who stays less than 10 seconds and does not interact with the website).

Experiment No.	Website Visitors	Bounce rate (GA)	Active visits	Engagement Efficiency
Exp 1	323,477	45,74 %	175,519	0.5426
Exp 2	305,705	49,22 %	155,237	0.5078
Exp 3	439,012	49,73 %	220,692	0.5027

Table 15: Conversion metrics: Engagement efficiency

The bounce rate indicated by Google Analytics refers to visitors to the entire website, not just the sales pages. However, since no further data on user behaviour is available, the author uses these values (Table 15) accordingly, which results in an engagement efficiency between 50.2 and 54.26%. An engagement efficiency between 50 – 55% on a website indicates that half of the visitors who landed on the website have interacted with it in some way, such as by clicking on links or buttons, scrolling, or filling out forms. The other half of the visitors, however, have left the website without taking any action.

Third, conversion efficiency (or conversion rate) connects to how the website visitor must carry out a particular action once there. This can involve signing up for an email list, downloading an eBook, placing an order, or making a direct product purchase. In other words, conversion efficiency refers to the capacity to convert visitors into customers. Once the number of active visitors has been identified, the conversion efficiency determines the ratio between the active visitors and the conversions, i.e. the visitors who carry out an action desired by the website operator.

Experiment No.	Active visits	Conversions	Conversion efficiency
Exp 1	175,519	11,384	0.0648
Exp 2	155,237	12,318	0.0793
Exp 3	220,692	12,420	0.0562

Table 16: Conversion metrics: Conversion efficiency

In the case of this study, one conversion corresponds to the registration for a seminar place. A conversion efficiency between 5.8 and 7.9% (see Table 5) on a website indicates that around 6–8 out of every 100 visitors to the website complete a desired action, such as making a purchase or filling out a form, which many industries consider to be a good benchmark. To put these figures in context: Typically, a satisfactory e-commerce conversion rate falls within the range of 2 to 5 per cent. The mean e-commerce conversion rate in the United States is 2.63%, whereas the worldwide average website conversion rate is 4.31% (Özsahan, 2022).

However, it is essential to note that the conversion efficiency of a company's website depends not only on the design and technical optimization but also varies widely depending on off-page factors such as the marketing channel through which visitors come to the website and the industry in which the company operates.

Average website conversion rates by different traffic channels like Amazon, Google and Paid search (Özsahan, 2022) are shown in the following table:

Channel	Average Conversion Rate
Organic	16%
Amazon	10–15%
Amazon Advertising	9.47%
Microsoft Advertising	2.94%
Google Ads	3.75%
Paid	2.5%
Social Media	0.71%

Table 17: Average conversion rates across different marketing channels

The statistics show that the average conversion rate of organic vs paid traffic differs significantly (Table 17). The average conversion rate of two competing websites operating in the same industry will, therefore, also differ according to the online marketing mix chosen by the companies.

Furthermore, research by Unbounce (2021) reveals that conversion rates differ significantly in different industries. For example, 74.5 million visits to more than 64,000 landing pages of Unbounce's platform were examined in a broad study. The median conversion rate throughout all industries varied between 2.4 and 9.8 per cent, for Events and Leisure, 5.2%

and for Education, 5.8 per cent (both categories could match the website of this study). This indicates that the Conversion efficiency of the company’s website is slightly higher than the industry's average rate.

4.1.7 Descriptives

Descriptive statistics are numbers summarising a sample and describing quantitative data (Engelke, 2020). They are needed to interpret large data sets but are unsuitable for generalizations beyond the data (Holcomb, 2017).

Relevant indicators presented in this section for the variable session duration are the distribution with values from minimum to maximum, the *mean* as the mathematical average of the set, and measures such as standard deviation and the overall shape (skewness and kurtosis).

As shown in the flow model of the conceptual framework, firstly, whether consumers convert on the website or abandon the process (bounce) is measured. C*onversion* simply means that the website visitor has registered for a course online.

The second step indicates if the subjects only register for a seminar (converted free) or make an online payment (converted paid). The decision to pay directly online for the booked course could be interpreted as a higher level of trust that these users express towards the company. Studies have shown an increased purchase intention if customers believe their information is safe, secure, and confidential (Kouser et al., 2018; Mcknight et al., 2002). In addition, Mcknight et al. (2002) indicated that consumers are more likely to share payment information to make purchases for organizations or companies for the same reason. On the other hand, customers who pay directly online receive a discount on the purchase price, attracting customers who want to buy the course as cheaply as possible. It, therefore, seems questionable whether meaningful conclusions can be drawn from the purchase (converted paid) rate.

The following table presents the description of the conversion number in each experiment:

	Converted	Converted free	Converted paid
Experiment 1, N=113,803	9.4 %	4.1 %	5.3 %
Experiment 2, N=105,374	11.0 %	4.8 %	6.2 %
Experiment 3, N=105,728	11.0 %	4.9 %	6.1 %

Table 18: Conversions per experiment

Figures 15, 16, and 17 show the session duration distributions from the three experiments, including the ideal normal distribution curve. Again, all three distributions have a clear positive skew, indicating that most sessions last for only a few minutes.

Additionally, the diagrams show the values of the standard deviation and the mean.

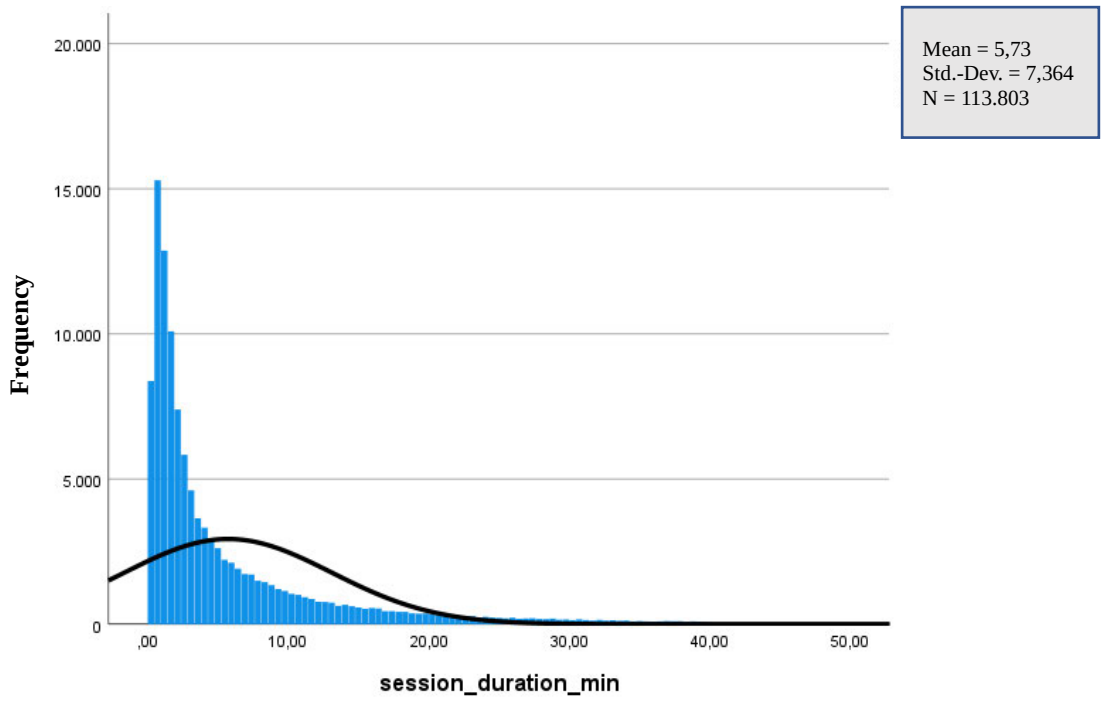

Figure 15: Distribution of session duration in minutes, Exp. 1, density functions and ideal normal distribution curve

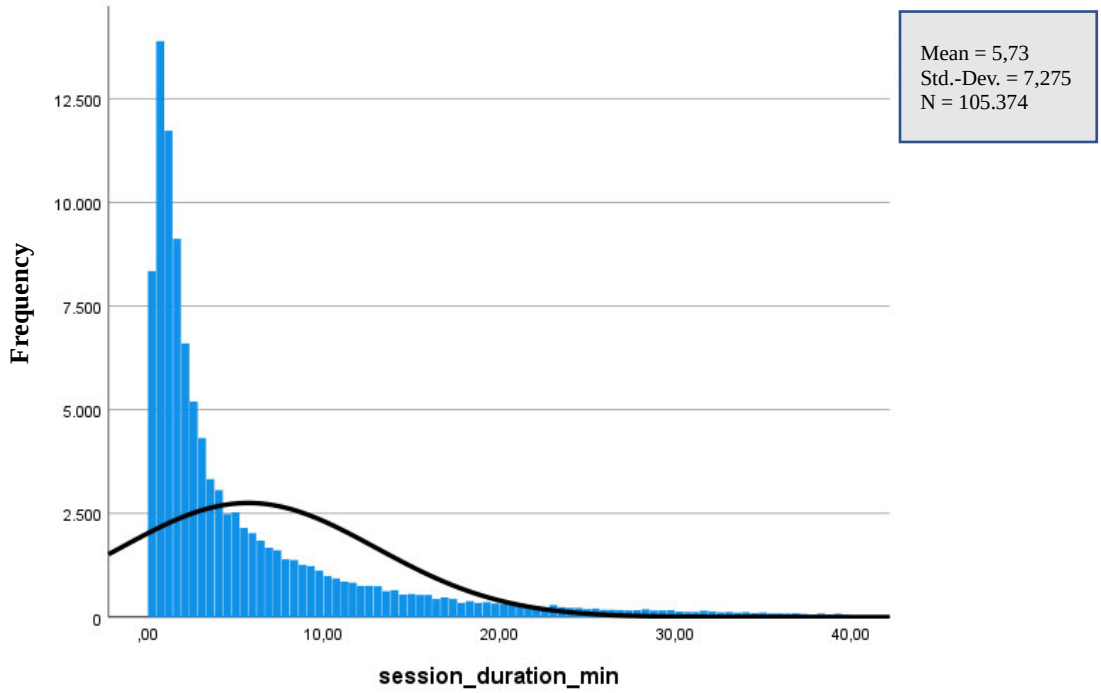

Figure 16: Distribution of session duration in minutes Exp. 2, density functions and ideal normal distribution curve

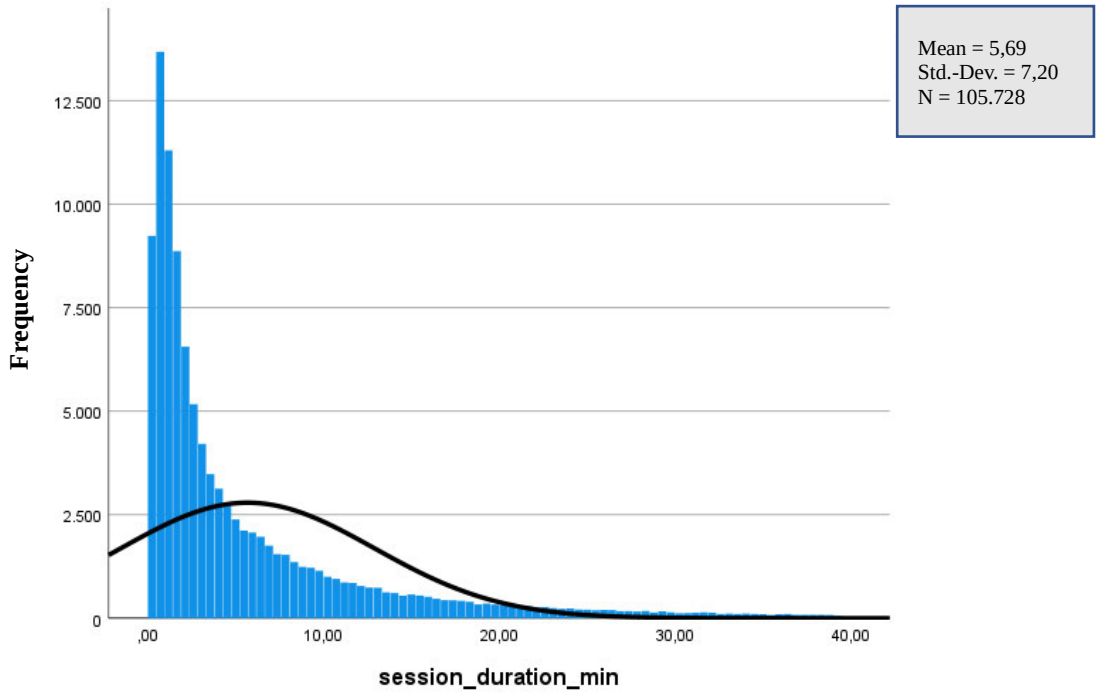

Figure 17: Distribution of session duration in minutes Exp. 3, density functions and ideal normal distribution curve

All experiments show broadly comparable rates of conversion and session duration times.

4.1.8 Overview of experiments carried out

Three separate experiments were conducted to achieve this study's aim and assess the defined research questions. These experiments are:

Experiment 1: Testing different genres

The first experiment examines if there is a change in consumer behaviour in the online shopping environment under the influence of different genres and if the relationship is mediated by session duration.

Stimulus (the independent variable) is *Genre*; the landing pages and different genres chosen are shown below in Table 19. Loudness and Tempo were medium.

	Page (Video)	**Stimulus**
(1)	Landing page 1	No Music
(2)	Landing page 2	Classical
(3)	Landing page 3	Pop

Table 19: Experiment 1: Landing pages and stimulus

The test period was from 10.05.2021 until 01.07.2021; all sessions in this period were recorded.

Experiment 2: Genre and Loudness

In addition to the first experiment, this experiment tested whether loudness influences online consumer behaviour and whether it is mediated by session duration. The following Table 20 shows the landing pages and different musical variations used in Experiment 2:

	Page (Video)	**Stimulus**
(1)	Landing page 1	No Music
(2)	Landing page 2	Classical Music, Loudness: soft
(3)	Landing page 3	Classical Music, Loudness: medium
(4)	Landing page 4	Classical Music, Loudness: loud
(5)	Landing page 5	Pop Music, Loudness: soft
(6)	Landing page 6	Pop Music, Loudness: medium
(7)	Landing page 7	Pop Music, Loudness: loud

Table 20: Experiment 2: Landing pages and stimulus

The Tempo of the background music was medium.
The Test period was from 18.08.2021 until 13.10.2021, the administrators recorded all sessions during this period.

Experiment 3: Genre, Tempo and Loudness

In the last experiment, the independent variable (background music) was varied by genre, loudness and tempo, which ended up in 18 combinations. The research question was the same as in the two previous experiments. The used musical combinations and landing pages are shown in Table 21:

	Page (Video)	**Stimulus**
(1)	Landing page 1	No Music
(2)	Landing page 2	Classical Music, Loudness: soft, Tempo: slow
(3)	Landing page 3	Classical Music, Loudness: medium, Tempo: slow
(4)	Landing page 4	Classical Music, Loudness: loud, Tempo: slow
(5)	Landing page 5	Classical Music, Loudness: soft, Tempo: medium
(6)	Landing page 6	Classical Music, Loudness: medium, Tempo: medium
(7)	Landing page 7	Classical Music, Loudness: loud, Tempo: medium
(8)	Landing page 8	Classical Music, Loudness: soft, Tempo: fast
(9)	Landing page 9	Classical Music, Loudness: medium, Tempo: fast
(10)	Landing page 10	Classical Music, Loudness: loud, Tempo: fast
(11)	Landing page 11	Pop Music, Loudness: soft, Tempo: slow
(12)	Landing page 12	Pop Music, Loudness: medium, Tempo: slow
(13)	Landing page 13	Pop Music, Loudness: loud, Tempo: slow
(14)	Landing page 14	Pop Music, Loudness: soft, Tempo: medium
(15)	Landing page 15	Pop Music, Loudness: medium, Tempo: medium
(16)	Landing page 16	Pop Music, Loudness: loud, Tempo: medium
(17)	Landing page 17	Pop Music, Loudness: soft, Tempo: fast
(18)	Landing page 18	Pop Music, Loudness: medium, Tempo: fast
(19)	Landing page 19	Pop Music, Loudness: loud, Tempo: fast

Table 21: Experiment 3: Landing pages and stimulus

All sessions in the test period from 18.10.2021 until 17.01.2022 were recorded.

4.1.9 Methodological considerations

Strengths of the methodology: A quantitative technique is used, reflecting a positivist orientation. This is supported by the collection of objective data, meaning that the data collected is based on observable and measurable phenomena, and is not influenced by the subjective

opinions or biases of the researcher or participants. Similarly, all of the study's hypotheses may be evaluated using statistical analysis. Furthermore, the data collected was obtained in a real field study. In contrast to a laboratory study, field studies have the advantage that the participants cannot be influenced by the laboratory environment, other participants, or the researcher. The methodology also allowed the researcher to collect a large, robust sample for each experiment, making the results more meaningful and, in the context of this study, more generalizable than a comparatively small sample (Gosling et al., 2004). The strengths of the study are outlined in more detail in Chapter 6.4.1.

Limitations of methodology: However, the chosen methodology also has certain limitations. For example, the chosen data collection form can generate a large sample and determine precisely how the subjects acted, but not why. Nevertheless, the reasons for user behaviour could be explored in future research with qualitative research, e.g. if the subjects heard the music, in which mental state and mood they were when they arrived on the website, if and how the music affected their mood, and so on.

Moreover, the selected online platform, which is strongly focused on one country (Germany), one sector (education) and one product (first aid courses), also represents a specialization on the one hand and a limitation on the other. The results might have a moderate generalization for similar online shops, target groups and geographical areas. However, they cannot be transferred to other countries, industries or target groups without further examination. The experimental setup itself is also a limitation. First, this is due to the short playing time of the audio (1:29), which, compared to the offline store, does not play during the entire purchase process. The type of video (tutorial/explanation) could also play a role. Additionally, the participants' attention towards the video (and, accordingly, the music) could be different from other video formats (image video, storytelling).

Furthermore, it is unclear whether the subjects heard the background music at all. The play mode was set to autoplay to increase the chance that the video was played and the background music was noticed. However, it is not possible to determine whether the video and/or the music was actually being played in the browser of the customer (or if the website visitor stopped the video directly) or if the client muted the browser audio, or if the speakers of the device were switched off. Although an large sample was generated to detect minor effects, the rate of participants hearing (or not hearing) the audio remains unclear.

Finally, the choice of music and genres is also a limitation; the results could be different with a different selection of the background music used (e.g. other tracks, artists, genres). The limitations of the study are outlined in more detail in Chapter 6.4.2.

4.1.10 Summary

The purpose of this section was to provide an overview of the primary considerations and assumptions regarding the data collection.

The population for this study was determined, and the sample, and the sample size for this study, were discussed. Next, the data screening and preparation measures were described, and an overview of the sample demographics and descriptions of the quantitative data was given. Finally, after giving an overview of all three experiments and the audible stimuli used, the strengths and limitations of the methodology were presented. The following section presents the analysis of the data gained in the three conducted experiments.

4.2 Data Analysis

4.2.1 Introduction

This section presents the considerations and measures done concerning the data analysis. First, the concept of mediation analysis is described; second, the linear probability model is introduced, thirdly, the significance level is defined; and finally, the function of the coefficient of determination (r-squared) is explained.

Data were analysed by using SPSS 27.0 from IBM. The software was employed for descriptive statistics and multivariate analyses.

The section closes with a summary.

4.2.2 Mediation analysis

In order to evaluate the postulated mediation of the music stimuli by session duration, a mediation analysis was performed.

As seen in the conceptual flow model, here recapitulated in Figure 18, H3a and H3b claim that there might be mediating effects through time spent on the shopping platform (session duration).

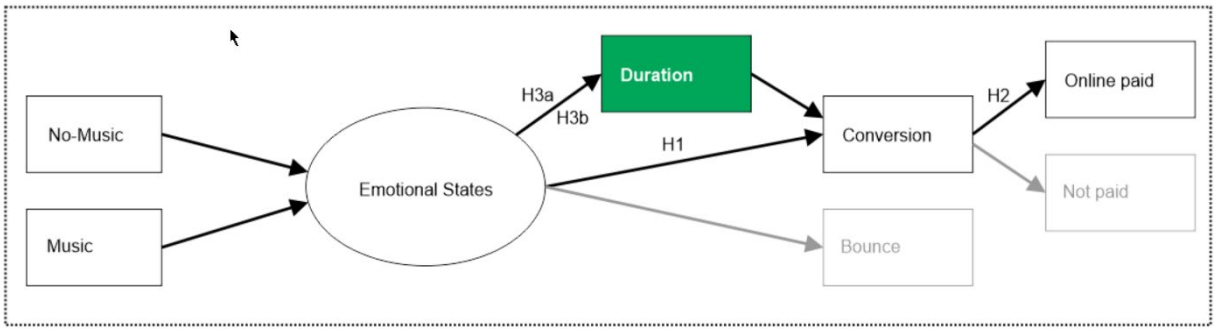

Figure 18: Conceptual flow model, highlighted session duration

A mediation model attempts to identify and explain the mechanism or process underlying an observed relationship between an independent variable (A) and a dependent variable (B) through the inclusion of a third variable or mediator variable (C) (D'Amato & Gallo, 2019). As a part of the causal relationship between the independent and the dependent variable, a mediator, C – as the name suggests – transfers (part of) the effect of A to B (D'Amato & Gallo, 2019).

A → C → B

In other words, C is the mechanism behind the influence of A on B. This differs from a confounding variable; a confounding variable affects both the outcome and the explanatory (independent) variable.

Mediation analysis is usually performed in two steps:

1. Model (x.1 and x.3), with B as dependent and A as independent variables
2. Model (x.2 and x.4), with B as dependent and A, as well as C, as independent variables

A potential mediation is recognisable in the change in the coefficient for A between two models:

- A smaller coefficient for A in the second model indicates mediation. If a significant effect for A becomes insignificant, the mediation is absolute.
- A more significant coefficient for A in the second model indicates the suppressor effect of C (Tim, 2013).

  A suppressor is a variable with no elements in common with the dependent variable but

irrelevant elements in common with the independent variable (Salkind, 2007).

4.2.3 Linear probability model

The outcomes of the experiments were analysed using a linear-probability model (LPM). An LPM uses multivariate linear regression to explain qualitative events (Hartung et al., 2019). Linear probability models have repeatedly been applied in social studies from different fields that analyse qualitative outcomes (Ceccagnoli et al., 2011; Dreger et al., 2022; Forman et al., 2008; Hartung & Hillmert, 2019; Wessling & Meng, 2020). Using a binary coded dependent variable (0/1), the coefficients of a linear model can be interpreted as the change in the probability of a particular event, given a one unit change in the independent variable, all other co-variables remaining constant (Dreger et al., 2022).

Linear probability model:

$$Pr(Y=1) = ß_o + ß_1 * X_1 + \ldots + ß_n * X_n$$

The main advantage of an LPM over non-linear models dealing with categorical dependent variables, such as logit or probit estimators, is its relative ease of estimation and intuitive interpretation of model coefficients (Wooldridge, 2006). Another disadvantage of non-linear models, which can be avoided by using LPM, is the difficulty of comparing coefficients across models (Mood, 2010). This, however, is important to identify the mediations in the applied research design. A mediation is identified if the coefficients of the model variable changes when the mediator variable is additionally added to the model. For this reason, the coefficients from two models (with and without the mediator) have to be comparable in size, which is not the case in non-linear models but can be done using LPM. Thus, based on the data structure, the research design and the ease of interpretation, LPM seems an appropriate application to test the hypotheses and answer the research questions.

However, a weakness of using this method is that some combinations of values of independent variables can lead to prediction probabilities less than zero or greater than one (Wooldridge, 2010). The outcomes of the LPM were, therefore, carefully reviewed for plausibility.

In multivariate models, there are two independent variables: categorical and numeric (Tabachnick & Fidell, 2013). These indicate different levels of measurement. Categorial data represent characteristics or categories (e.g., gender, hair colour), while numerical data reflect data that are numbers-based by nature (e.g., age, height, weight). In the case of numeric explanatory variables (here, duration time), the coefficient can be interpreted as a simple marginal effect on the probability of a defined event. When using a categorical variable as explanatory, single categories (here, video formats) these must be dealt with as dummy variables with one category as reference (here: no music). The coefficients then indicate the difference in the probability of a defined event between the considered and reference categories.

As seen in Chapter 1.1.6., the distribution of the explanatory variable ‘duration time’ is visually not normal in all three datasets. To substantiate this impression, a Kolmogorow-Smirnow-Test for normality was performed in each dataset using SPSS. A normality test was chosen to assess the distribution of the explanatory variable 'duration time' as it is vital to confirm the normality assumption for many statistical analyses (Field, 2017).

The normal distribution of the variable is the null hypothesis. Thus, passing the normality test means *not* having a *significant* departure from normality. On the other hand, the test shows a highly significant result (p=0.00) in all three datasets, meaning that all three durations are *not* normally distributed. However, the normal distribution of model variables is not necessarily an assumption of regression analysis, unlike the normal distribution of the model residual. This assumption is, however, compulsory violated in the case of an LPM due to the binary character of the outcome. Nevertheless, studies show that LPM produces results that are broadly comparable with those of generalized-linear models (Battey et al., 2019). Further, the accuracy of the p-values that are affected by the non-normality of the residuals can be compensated by the sample sizes (Lumley et al., 2002), which are large (> 200,000) in all three experiments.

4.2.4 Statistical testing

The study aimed to discover if there is an influence of background music on consumer behaviour in an online shopping environment. Therefore, the collected data were subjected to statistical tests to uncover if the measured impacts were significant. The level of statistical significance is the central product of statistical testing and is expressed in *p*-value, which ranges between 0 and 1.

The general procedure for a statistical test is following: At first, the researcher formulates a null hypothesis. The null hypothesis indicates no relationship between the two variables under study (one variable does not influence the other) (McLeod, 2019). Then, a test statistic is computed according to the applied test method, e.g., a t-test. The test statistic can be seen as a random variable with only one observation. By drawing another sample, another observation would be gained of that variable, and so on. This variable's other values are unknown, as there is only one sample, but an assumption about its density function can be met (this function is known for every test method). This function assigns to every test statistic value a probability that the null hypothesis can be rejected. The *p*-value is the reversal of this probability (1–). The interpretation of the *p*-value (level of significance) is as follows: the probability that the null hypothesis is correct, although it has been rejected.

The researcher decides on the acceptable level of significance. Typically, this is ≤ 0.05, meaning a p-value less than 0.05 is statistically significant (McLeod, 2019). This provides strong evidence against the null hypothesis since the probability that the null hypothesis is correct (and the results are random) is less than 5%. Therefore, the researcher rejects the null hypothesis and accepts the alternative hypothesis.

If a model coefficient is tested, the null hypothesis states that there are no effects in the population, i.e., the expected value of the effect is zero. Accordingly, a not significant coefficient means that this can be true. For the purpose of this study, consequently, a significance level of 0.05 was applied.

4.2.5 Coefficient of determination, R^2

The R-squared (R2) indicates the proportion of the variance of a dependent variable explained by an independent variable in a regression model (Fernando, 2021).

While the strength of the relationship between an independent and a dependent variable is explained by correlation, R-squared explains the extent to which one variable's variance explains the second variable's variance (Fernando, 2021). For example, if the R2 value of a model is 0.50, about half of the variation examined can be explained by the model's inputs. That means:

- The smaller R-squared, the more likely it is that the information in the model (background music) does not explain consumer behaviour (conversion).
- In turn, an R-square of 1.0 (100%) means that the variance of the dependent variable is entirely explained based on the movements of the independent variable(s).

4.2.6 Measurement of stimuli for each experiment

The following section presents the three experiments and each video's respective number of sessions. Exemplary raw data from the three experiments are located in Appendix 5. Tables 22, 23 and 24 overviews the different landing pages with the stimulus used in each case and show the corresponding number of sessions played.

Experiment 1

	Music stimulus	**Sessions**
Landing page 1	No Music	71773
Landing page 2	Classical	71887
Landing page 3	Pop	71671
Sum		215331

Table 22: Measurement of stimuli, Experiment 1

Experiment 2

	Music stimulus	**Sessions**
Landing page 1	No Music	29077
Landing page 2	Classical Music, Loudness: soft	29028
Landing page 3	Classical Music, Loudness: medium	29062
Landing page 4	Classical Music, Loudness: loud	28674
Landing page 5	Pop Music, Loudness: soft	28917
Landing page 6	Pop Music, Loudness: medium	28843
Landing page 7	Pop Music, Loudness: loud	28750
Sum		202351

Table 23: Measurement of stimuli, Experiment 2

Experiment 3

	Music stimulus	Sessions
Landing page 1	No Music	11171
Landing page 2	Classical Music, Loudness: soft, Tempo: slow	11240
Landing page 3	Classical Music, Loudness: medium, Tempo: slow	11306
Landing page 4	Classical Music, Loudness: loud, Tempo: slow	11269
Landing page 5	Classical Music, Loudness: soft, Tempo: medium	11110
Landing page 6	Classical Music, Loudness: medium, Tempo: medium	11359
Landing page 7	Classical Music, Loudness: loud, Tempo: medium	11302
Landing page 8	Classical Music, Loudness: soft, Tempo: fast	11339
Landing page 9	Classical Music, Loudness: medium, Tempo: fast	11368
Landing page 10	Classical Music, Loudness: loud, Tempo: fast	11322
Landing page 11	Pop Music, Loudness: soft, Tempo: slow	11532
Landing page 12	Pop Music, Loudness: medium, Tempo: slow	11290
Landing page 13	Pop Music, Loudness: loud, Tempo: slow	11485
Landing page 14	Pop Music, Loudness: soft, Tempo: medium	11352
Landing page 15	Pop Music, Loudness: medium, Tempo: medium	11411
Landing page 16	Pop Music, Loudness: loud, Tempo: medium	11341
Landing page 17	Pop Music, Loudness: soft, Tempo: fast	11363
Landing page 18	Pop Music, Loudness: medium, Tempo: fast	11385
Landing page 19	Pop Music, Loudness: loud, Tempo: fast	11405
Sum		215350

Table 24: Measurement of stimuli, Experiment 3

4.2.7 Summary

The previous section presented the considerations and measures done with regard to the data analysis of the experiments on how background music affects consumer behaviour in an online shopping environment.

Firstly, an explanation was given of how to interpret the mediations. Secondly, a description was provided of the linear probability model (LPM) that formed the basis for the analyses and a definition of R-squared. Thirdly, the significance level was defined concerning the considerable sample size, and finally, the function of the coefficient of determination (r-squared) was explained. The following chapter contains a presentation, discussion and interpretation of the results of the conducted experiments.

5 Results and Discussion

5.1 Results

5.1.1 Introduction

The purpose of this section is to present the analysis results. The data from Experiments 1, 2 and 3 are analysed and presented to evaluate the experiments' results concerning the research's defined aim.

The aim of the research, as presented in Chapter 2, is: *To investigate, analyse and evaluate how and to what extent background music influences consumer behaviour within the online shop of a German company*.

The hypotheses of this research were reviewed and discussed against the background of the results of the experiments conducted. Finally, the chapter concludes with a Summary.

5.1.2 Analytical results of the experiments

This section presents the analytical results of the three experiments carried out. The analyses are performed using the introduced LPM in two steps. Accordingly, there are two separate models for each experiment, presented in Tables 25 and 26, 27 and 28 and 29 and 30:

x.1 with *Converted* as the dependent variable
x.3 with *Converted free* as compared to *converted paid* as dependent variable given *converted*

Models x.2 and x.4 (in the tables, accordingly columns 3 and 4) include *session duration* as an additional independent variable in order to assess its possible mediating effect. A smaller coefficient for a video category in the Model (x.2 or x.4) would indicate mediation.

5.1.2.1 Experiment 1

Table 25: Linear probability model (LPM); Experiment 1; Dependent variable: converted

	Model 1.1		Model 1.2	
Classical music	–0.001	(0.764)	–0.001	(0.515)
Pop music	–0.001	(0.605)	–0.003	(0.202)
Session duration (min.)			0.014*	(0.000)
Constant	0.094*	(0.000)	0.017*	(0.000)
Observations	113,803		113,803	
R^2	0.000		0.117	

p-values in parentheses

* $p < .1$

The first and third columns of all tables show the coefficients. This indicates the deviation from the reference (control group: *no music*).

The second and fourth columns of all tables contain the according p-values. This describes the significance of the coefficient test and can be defined as the amount of uncertainty if claimed, that the coefficient in the population is unequal to zero (if the null hypothesis is rejected).

Table 26: LPM; Experiment 1; Dependent variable: converted free if converted =1

	Model 1.3		Model 1.4	
Classical music	–0.001	(0.955)	0.001	(0.907)
Pop music	0.001	(0.950)	0.002	(0.877)
Session duration (min.)			–0.004*	(0.000)
Constant	0.439*	(0.000)	0.490*	(0.000)
Observations	10,679		10,679	
R^2	0.000		0.004	

p-values in parentheses

* $p < .1$

5.1.2.2 Experiment 2

Table 27: LPM; Experiment 2; Dependent variable: converted

	Model 2.1		Model 2.2	
Classical loudness high	0.001	(0.846)	0.001	(0.804)
Classical loudness normal	0.004	(0.240)	0.005	(0.143)
Classical loudness soft	0.002	(0.490)	0.003	(0.385)
Pop loudness high	0.003	(0.353)	0.005	(0.140)
Pop loudness normal	0.003	(0.339)	0.004	(0.290)
Pop loudness soft	–0.005	(0.171)	–0.003	(0.413)
Session duration (min.)			0.015*	(0.000)
Constant	0.109*	(0.000)	0.021*	(0.000)
Observations	105,374		105,374	
R^2	0.000		0.124	

p-values in parentheses

* $p < .1$

Table 28: LPM; Experiment 2; Dependent variable: converted free if converted =1

	Model 2.3		Model 2.4	
Classical loudness high	0.024	(0.171)	0.025	(0.148)
Classical loudness normal	0.017	(0.334)	0.016	(0.340)
Classical loudness soft	0.010	(0.553)	0.010	(0.567)
Pop loudness high	0.027	(0.118)	0.026	(0.126)
Pop loudness normal	–0.009	(0.619)	–0.009	(0.618)
Pop loudness soft	0.017	(0.332)	0.016	(0.362)
Session duration (min.)			–0.003*	(0.000)
Constant	0.427*	(0.000)	0.470*	(0.000)
Observations	11,578		11,578	
R^2	0.001		0.004	

p-values in parentheses

* $p < .1$

5.1.2.3 Experiment 3

Table 29: LPM; Experiment 3; Dependent variable: converted

	Model 3.1		Model 3.2	
Classical loudness high tempo fast	0.005	(0.406)	0.002	(0.682)
Classical loudness high tempo normal	0,004	(0.480)	0.002	(0.673)
Classical loudness high tempo slow	–0.005	(0.373)	–0.004	(0.479)
Classical loudness low tempo fast	0.001	(0.830)	–0.002	(0.693)
Classical loudness low tempo normal	–0.006	(0.305)	–0.006	(0.274)
Classical loudness low tempo slow	0.002	(0.763)	–0.001	(0.794)
Classical loudness medium tempo fast	0.004	(0.516)	0.002	(0.679)
Classical loudness medium tempo normal	0.002	(0.730)	0.000	(0.980)
Classical loudness medium tempo slow	0.002	(0.792)	0.002	(0.770)
Pop loudness high tempo high	0.001	(0.869)	–0.001	(0.962)
Pop loudness high tempo low	–0.003	(0.559)	–0.005	(0.359)
Pop loudness high tempo normal	0.000	(0.983)	0.001	(0.920)
Pop loudness low tempo fast	0.000	(0.963)	–0.003	(0.628)
Pop loudness low tempo low	–0.003	(0.632)	–0.003	(0.581)
Pop loudness low tempo normal	0.001	(0.904)	–0.002	(0.677)
Pop loudness medium tempo fast	–0.004	(0.516)	–0.005	(0.351)
Pop loudness medium tempo low	0.000	(0.938)	–0.001	(0.874)
Pop loudness medium tempo normal	0.005	(0.378)	0.006	(0.285)
Session duration (min.)			0.016*	(0.000)
Constant	0.110*	(0.000)	0.022*	(0.000)
Observations	52,298		52,298	
R^2	0.000		0.123	

p-values in parentheses

* $p < .1$

Table 30: LPM; Experiment 3; Dependent variable: converted free if converted =1

	Model 3.3		Model 3.4	
Classical loudness high tempo fast	0.007	(0.797)	0.007	(0.793)
Classical loudness high tempo normal	–0.010	(0.724)	–0.007	(0.798)
Classical loudness high tempo slow	0.002	(0.939)	0.002	(0.953)
Classical loudness low tempo fast	–0.018	(0.533)	–0.015	(0.606)
Classical loudness low tempo normal	0.023	(0.426)	0.025	(0.399)
Classical loudness low tempo slow	0.000	(0.996)	0.001	(0.974)
Classical loudness medium tempo fast	0.011	(0.700)	0.014	(0.620)
Classical loudness medium tempo normal	0.005	(0.847)	0.007	(0.805)
Classical loudness medium tempo slow	0.009	(0.747)	0.011	(0.706)
Pop loudness high tempo high	–0.030	(0.297)	–0.027	(0.334)
Pop loudness high tempo low	0.017	(0.548)	0.021	(0.462)
Pop loudness high tempo normal	0.012	(0.663)	0.014	(0.614)
Pop loudness low tempo fast	–0.025	(0.389)	–0.022	(0.435)
Pop loudness low tempo low	–0.002	(0.945)	–0.001	(0.961)
Pop loudness low tempo normal	–0.009	(0.743)	–0.009	(0.743)
Pop loudness medium tempo fast	–0.049*	(0.088)	–0.049*	(0.091)
Pop loudness medium tempo low	0.001	(0.965)	0.001	(0.979)
Pop medium high tempo normal	–0.036	(0.195)	–0.033	(0.235)
Session duration (min.)			–0.004*	(0.000)
Constant	0.452*	(0.000)	0.499*	(0.000)
Observations	5,655		5,655	
R^2	0.003		0.009	

p-values in parentheses

* $p < .1$

In all experiments, the R2 variance score for background music was at 0.00, which means that music probably does not contribute anything to the explanation. However, as soon as session duration is considered, the explanatory power of the model increases to 11.7% (model 1.2), 12.4% (model 2.2), and 12.3% (model 3.2). The explanatory power of the variable *session duration* is considerably high.

Of all the experiments and tests, there was only one significant result: if converted, there is a 5 % more probability to convert paid instead of free if *pop loudness medium tempo fast* is played. There is no mediation by session duration. However, this result was achieved at a significance level of 0.1. Since the significance level of 0.05 was set to evaluate the study's outcome, the final result is that all experiments remain without significant effects.

Session duration is consistently positively associated with conversion, but the conversion is rather free if converted.

5.1.3 Hypotheses testing

As a first step, the study considers the coefficients relating the influence of background music in an online-store product video to online consumer behaviour, described in H1. In all three experiments, the observation focused on the sales or conversion rate, measured in the number of registrations for the seminar places offered in the online shop.

Experiment 1 examined the influence of genre only on consumer behaviour, measuring the difference between Pop and Classical music against the control variable of *no music*. For the coefficients Classical music ($p = 0.764$) and Pop music ($p = 0.605$), the experiment shows no significant deviation from the control group.

Experiment 2 also considered the possible influence of loudness with the same test setup. Six different videos, each Pop and Classical, in the loudness levels soft, medium and loud, were tested against the control group. The lowest p-value of 0.171 was achieved by *Pop loudness soft*, with a barely relevant coefficient of –0.005, and the highest p-value of 0.846 was achieved by *Classical loudness high*. As a result, experiment 2 also showed no significant relationship for any of the background music tested.

Finally, Experiment 3 additionally tested the variable *tempo*. The experiment comprised 18 videos with different background music. The lowest p-value of 0.305 was measured for *Classical loudness low tempo normal,* and the highest p-value for *pop loudness low tempo fast* with 0.963. Hence, hypothesis H1 is rejected.

Related to H1, hypothesis H3a postulates the session duration as a mediator of the relationship between background music and registration rate. As seen in the literature review, previous research has shown time duration as a mediating element, so a similar effect was assumed in this context (online consumer behaviour). Interestingly, the results of experiments 1, 2 and 3 showed no significant relationship between background music and sales rate. Therefore, according to these results, H3a is automatically rejected as there is no relationship to mediate.

Next, the paid purchase rate is investigated for converted customers under certain background music conditions. The aim was to find out if consumers who have to decide to pay for a service online or offline act differently, depending on the background music (H2).

Experiment 1, which tests only the two genres (Classical and Pop), showed no significant results. The p-values 0.955 (Classical) and 0.950 (Pop) clearly show no recognisable connection between background music and purchase preference.

In experiment 2, the effect of loudness was tested in addition to the genre. The analyses yield identical (no) results regarding the significance and relevance of the supposed relationships. The lowest p-value (0.118) was determined for *Pop loudness high*, and the highest p-value (0.619) was measured for *Pop loudness normal*.

Finally, experiment 3 examined genre, tempo and loudness as dimensions of the independent variable. For the combination *pop loudness medium tempo fast*, the coefficient of –0.049 was obtained, meaning that there is a 5% more probability to convert paid instead of free if *pop loudness medium tempo fast* is played, but only under the assumption of a significance level of $p < 0.1$. However, since the statistical significance for this study was set at $p < 0.05$ due to a large amount of data, this value is also not considered significant here. Accordingly, H2 is also rejected.

In a final step, the study examines if session duration mediates the purchase rate of converted website visitors. Experiments 1, 2 and 3 showed no significant results on the purchase rate, based on $p < 0.05$. Accordingly, there can be no mediation effect here. Accordingly, also H3b is rejected.

5.1.4 Summary

The purpose of this section was to present and describe the data and the analysis results. The sample demographics confirm a high match between the samples and the data from the customer database. This suggests that the data represent the company and possibly the industry.

The analysis of the data of all three experiments shows no significant deviation of all variations of the background music compared to the no-music condition. Accordingly, no mediated effects were observed. Therefore, H1, H2, H3a and H3b were rejected.

The interpretation of the presented results will follow in the following section.

5.2 Discussion / Interpretation

5.2.1 Introduction

The purpose of this section is to interpret the results of the three experiments of this study and to set them in relation to the research questions.

The results will also be linked to the existing research to investigate if the findings are consistent with the existing literature and, where not, explore potential reasons before this.

Firstly, a brief summary of the key findings is presented. Next, the research questions are reviewed, and findings from previous studies and this study are compared and presented. Thus, the research questions were answered.

In the last two sections of this chapter, the results of this study will be interpreted further. Also, possible effects of the experiments that were not the target of the measurements of this study are discussed.

The section closes with a summary.

5.2.2 Summarizing the key findings

In three consecutive experiments, the present research investigated the influence of background music, implemented in an online sales video, on prospective buyers in an online shop. The aim was to investigate the possible influence of background music on (a) purchasing behaviour in terms of conversion and (b), if converted, on buying/paying behaviour: *registered only/pay-later* or *paid online*. In addition, possible results should be examined for mediated effects through session duration (time on the website).

Due to a large amount of data available, an acceptable level of significance of 0.05 was chosen. All three experiments were aimed at the same question mentioned above, only the characteristics of the used stimulus were different: experiment 1 varied the genre (Classical and Pop, tested against no music), experiment 2 also investigated the influence of loudness, and Experiment 3 added the influence of tempo.

After evaluating the data from all three experiments, the results suggest that there is no significant influence of genre, loudness or tempo variations on consumer decisions regarding conversions/registrations. Furthermore, the data support the theory that there is no significant influence on the payment method (paid conversions compared to non-paid registrations) in all three experiments. Accordingly, the hypotheses relating to mediation effects could also be rejected.

5.2.3 Addressing the research questions and linking to the literature

This chapter examines the findings from the previous chapter in relation to the thesis's objectives and research questions, in addition to analyzing how they align with existing literature. The aim of answering the research question is:

To investigate, analyse and evaluate how and to what extent background music influences consumer behaviour within the online shop of a German company.

The research questions of this thesis are:

Research question 1: What is the influence of background music on conversions in an online shopping environment?
Research question 2: What is the influence of background music on the type of payment method selected in an online shopping environment?
Research question 3: Is any inter-relationship mediated by session duration?

This study aims to help practitioners increase sales- (conversion) and spending (purchase) rates in their e-commerce solutions. Various studies provided the reason for the assumption that background music could influence consumer behaviour, some of them older, which had produced results in various offline environments. There have also been some recent laboratory studies in simulated online environments, some of which have confirmed background music's influence. However, it was questionable, and therefore the basis of this study, whether similar results could be achieved in a real field study in an authentic online store. Even if the results were minimal, they would considerably impact practitioners and managers, considering the total sales volume of internet purchases worldwide.

For this purpose, three experiments were conducted, which examined the influence of the stimuli genre, tempo, and loudness independently of each other. These have been most

effective in the past on consumer-and-purchase (or payment) behaviour. The experiments also examined a possible mediation of the results by session duration (time spent on the website).

To answer the research questions, in the following sections, the results of consumers' response to the stimuli genre, tempo and loudness of the conducted experiments are presented in relation to the existing literature.

5.2.3.1 Addressing the independent variable *Genre* (Experiment 1)

The first experiment investigated the influence of two of the most common genres in the Western world, Classical and Pop, against a control group (no music). The purpose of this first experiment was to determine whether background music has any influence at all on the website visitor. Genre is a highly individualized aspect of music because different people have different preferences for different genres. In addition, research on musical tastes indicates that individuals tend to prefer environments that align with their attitudes, emotions, and personality traits (Abolhasani, 2017; Widdess, 2012).

The relationship between genre, the (audible) stimulus, and the shopping environment is often consistent in the context of environmental psychology and consumer behaviour (Oakes, 2007a). This approach goes back to Mehrabian and Russell (1974), who assumed that liked environments cause approach behaviour, whilst disliked environments result in avoidance behaviour. Literature showed that in multiple experiments, the impact of background music on consumer behaviour in traditional (offline) settings concerning increased spending or purchases:

Wilson (2003) found that restaurant patrons stayed longer, spent more money and reacted more positively to the atmosphere of a restaurant when congruent jazz music was played in the background than less congruent Classical music. Wilson also found that restaurant patrons exposed to jazz music in the background were willing to spend significantly more, as opposed to easy listening music.

A supermarket study has demonstrated the effects of cultural congruence between the background music used and the product on offer (North et al., 1999). The authors report that French wine sold significantly more when stereotypical French background music was played, while consumers preferred German wine when stereotypical German background music was played. Against this background, the consumer's experience that certain music is

associated with the product's country of origin influences the purchase decision (Oakes, 2007a).

Studies have also shown that using congruent music genres can increase spending and influence shoppers' decisions to buy more expensive brands. For example, North and Hargreaves (1998) reported that Classical background music in a cafeteria (compared to Pop music) increases purchase intention and can lead to higher expenditure by patrons in upscale restaurants (North et al., 2003). In addition, Baker et al. (1992) reported that environmental characteristics (Classical music and soft lights vs Pop music and bright lights) correlated with social characteristics (quantity and friendliness of staff) to affect customers' well-being, which in turn influenced their purchase intentions. Areni and Kim (1993) additionally showed that patrons in a wine shop bought more expensive wines when they heard Classical music in the background, compared to Pop music.

Effects of the genre have also been found in simulated laboratory studies on online shopping. In this context, Abolhasani (2017) has shown that the use of pop music is most effective concerning consumers' perceived image of a brand. Furthermore, the research also found a correlation between background music and consumer purchase intention.

Dikcius et al. (2019) also confirmed the stimulus-organism response relationship by using online stimuli that influenced emotions and attitudes towards the website (emotional/cognitive states) and, consequently, purchase intention (response). Their laboratory research on simulated shopping websites showed that Pop music in the background of the online shop led to an emotional response that was positively associated with purchase intention. In contrast, the emotional response without music had a negative impact on purchase intention.

Another study on a fictional website examined three conditions (the control condition with no background music, a static and an interactive background music condition) (Sundar et al., 2015). Consumers were more emotionally engaged in the shopping task in the interactive music environment than customers in the other two conditions due to the novelty dimension. The higher novelty levels of affective engagement accordingly caused a stronger purchase intent and more positive perceptions of the online shop and the brand.

Damen et al. (2021) also investigated the importance of music congruence in a

specially designed online environment. In their laboratory experiment, respondents were asked to select a bottle of wine from two different countries while listening to stereotypical music samples representing one of these countries. The authors concluded that auditory stimuli strongly influence consumer choice in an online environment.

Lastly, a study by Guéguen and Jacob (2014), in which background music was played while participants visited the website of a popular seaside resort, suggests that Djembe music tended to be associated with outdoor accommodation, while jazz music led to greater interest in hotel accommodation.

Although, as described earlier, a substantial body of research suggests that music elicits emotional reactions, some studies reach the opposite conclusion. Kim et al. (2009) used the S-O-R model in an online experiment to examine the effects of music (vs no music) and product presentation. According to the authors, music surprisingly had no effect at all. In contrast, the way the product was presented (model vs flat) significantly impacted consumers' emotional responses (Kim et al., 2009). Only one music genre (Pop music) was considered in this study based on consumer familiarity and liking.

Other aspects of background music, like tempo and fit, are also significant in terms of evoking positive emotions, according to other researchers. Similarly, Milliman (1982) noted that music needs to be appropriate for the context in which it will be used.

However, the number of studies already done in offline or simulated online environments (e.g., Areni & Kim, 1993; Baker et al., 1992; North et al., 2003; North & Hargreaves, 1998; Wilson, 2003) warranted an investigation into the possible impact of music in an authentic online shopping setting. The core of this study was a real empirical field study investigating user behaviour on an authentic website. While research has shown that results can be achieved in simulated online environments (e.g., Damen et al., 2021; Guéguen & Jacob, 2014), the results of this experimental setup do not show significant effects in a natural online environment. Compared to the previous studies mentioned above, the results of the experiments of this thesis with regards to Genre showed no significant impact on consumers´ behaviour or their purchase decisions on the observed website. Various reasons can cause these effects. One reason might be the population, which consists mainly of young people. This group may be focused on other environmental audible stimuli (e.g., music from a streaming service, a Podcast or YouTube) and have muted the browser audio. It could also be

that a number of subjects in each sample actually did not hear the music (because the browser audio was muted, or the sound of the device was turned off, etc.), and the proportion of subjects exposed to the music was too small. It could also be that the stimulus (approx. 1:30 min) was too short of impacting the mood of the website visitors.

Regarding the music selected, the intentional selection of neutral music (unfamiliar and no emotional tone) and the selected genres (classic and pop) could be responsible for the results. On the other hand, it could be that the music or the selected genres did not activate the target group enough, and their behaviour turned out to be neutral. Other music tracks or genres may produce different results here.

Regarding the practical applicability and generalizability of the results, the author is cautious about giving recommendations. In contrast to past studies in stimulated environments, the results of this study suggest that, at least in conventional online shops, the use of music does not seem to play a significant role. However, if a company wants to integrate music into the online sales process, the author recommends testing it carefully in the respective online shop. In Western countries, classical and pop music genres are probably the most suitable because they were used most frequently in studies in the past. In comparison, in Latin America, especially Peru, where the author has spent some time, other genres would have to be chosen (mainly Reggaeton), as Western classic and pop music does not play a significant role in everyday life there (Statista, 2018). The same will probably apply to other cultural areas such as Asia, India or Africa. While pop music ranks globally No. 1 on the ‘world´s favourite genres’, No. 1 in China is C-Pop, No.1 in India is Bollywood, No 1 in Nigeria is Afrobeats and No. 1 in Russia is Russian Pop (IFPI, 2022).

In summary, the studies on music genre suggest that a more significant match between music genre and shopping environment leads to a positive perception of the environment, changed purchasing behaviour and increased spending. Oakes notes 2007 that the studies consistently suggest Jazz and Classical music as more efficient than Pop or easy-listening music in creating perceptions of an upscale environment and increasing purchase intent. Since Jazz and Classical music are usually less popular than Pop music in the general population, genre preference seems an unlikely explanation for these responses (Oakes, 2007a). Oakes (2007a) also argues that it is possible that participants were responding to the external associations of the music genres rather than their internal structural characteristics, as the more *elite* genres of Jazz and Classical music tend to give the impression of upmarket

sophistication.

North et al. (2003) argue that the socially higher status of these *elitist* genres, and the associated mental images of wealth and prosperity, could lead to this association influencing behaviour accordingly. This then leads to an increased intention to purchase. They also suggest that elite genres may interact with other dimensions of an upscale restaurant environment to increase purchase intent. Research by Oakes (2003) supports this theory, showing a high proportion of university degrees and postgraduate qualifications for the Jazz and Classical music audience segments.

5.2.3.2 Addressing the independent variable *Loudness* (Experiments 2 and 3)

The second experiment investigated the influence of characteristics of genre (Classical and Pop) and loudness (soft/medium/loud) in all possible variations against a control group (no music). Sellers and researchers can easily change the music volume in retail and service divisions. Like the musical tempo, loudness is a variable that provides comparative measurements (Oakes, 2007a).

Most researchers have directly compared different audible stimuli at different volumes. Studies examining a single piece of music whose volume changes dynamically are rare.

Research from offline studies using the variable loudness has focused on volume congruity and perceived stay duration (Herrington, 1996; Kellaris et al., 1996; Kellaris & Mantel, 1996; Kellaris et al., 1996; Smith & Curnow, 1966; Yalch & Spangenberg, 1990) and the relationship between volume and spending. The perceived duration can affect the length of stay of consumers, so the effective management of this variable is relevant in the practitioner environment but not part of this study. Various offline experiments have already found an influence of loudness on consumer behaviour:

Although a long time spent in the shopping environment can result in higher expenditure, the relationship of such a correlation is necessarily context-specific. In a study by Smith and Curnow (1966), although no significant difference in total sales was found, it was noted that loud music leads to increased arousal, which increases consumer spending compared to quieter music.

However, a replication study by Herrington (1996) showed no effect of loudness on shopping behaviour. Therefore, it was assumed that music preference was more plausible to explain the differences in shopping behaviour. Yalch and Spangenberg (1990) discovered that customers had higher unplanned spending when they were exposed to soft (compared with loud) background music during conventional shopping hours (mornings and afternoons).

A later study by Yalch and Spangenberg (1993) found that shoppers aged 25–49 spent more money when loud music was playing up front, while shoppers aged 50 and older spent more money when soft background music was playing. They suspected that customers perceive the relevant departments as more appealing when the music is playing at an suitable volume, it can impact consumer purchasing behavior.

Lammers (2003) showed that restaurant patrons were willing to spend more money with soft (compared to loud) Rock and Classical background music and suggested that the reason was the congruence between the soft music and the calm environment of the restaurant. The elaboration probability model (Petty & Cacioppo, 1986) explains these results in that attitudes become beliefs indirectly without active thinking (as by associating the quiet restaurant environment with the soft, relaxing music). A high perceived congruity between the audible stimuli and the restaurant environment may have reinforced the attitude towards the restaurant, leading to increased spending.

In contrast to offline studies, musical congruity between the real- and the online world cannot be created in an online field study, as the website visitor is physically located in his or her individual environment, which the researcher cannot influence. Moreover, the author is unaware of any study in a simulated online shop regarding the influence of loudness in the existing literature. This might be a research gap for future research.

Based on the previous study results mentioned above (e.g., Lammers, 2003; Smith & Curnow, 1966; Yalch & Spangenberg, 1990, 1993), this field study also investigated the possible influence of the variable loudness. In offline settings, loudness is considered an influential dimension of music, and the influence of loudness has been demonstrated many times. However, while existing research has shown that results can be achieved in offline environments with the variation of l*oudness*, the results of this study do not show any significant effects in an authentic online environment.

On the one hand, the lack of significant effects in this study could be due to the approach chosen: Since the researcher cannot physically change the volume on the user's device, the concept of relative loudness (3.5.7) was developed to simulate music that is "too loud" or "too soft". Although this was demonstrated in pre-tests, there is a possibility that these differences are not or hardly perceived by customers who are in the buying process. Therefore, the changed loudness does not have a significant effect. On the other hand, as mentioned above, it could also be that out of the total number of sessions from each sample, too few clients actually listened to the music due to technical limitations (e.g., browser audio muted, speakers switched off, other music listened to), or the audible stimuli were too short, or the videos were stopped directly manually.

Since the application of loudness is challenging in practice and the studies carried out here have not shown any effects of loudness, the author recommends that interested practitioners first take care of the variable genre. For example, suppose marketers want to experiment with music in their online shops. In that case, it is advisable as a first step to leave the background music at a moderate level related to possibly spoken words since the music that is too loud (or too quiet) is usually perceived as disturbing.

5.2.3.3 Addressing the independent variable *Tempo* (Experiments 2, 3)

The third experiment investigated the influence of the musical characteristics of genre (Classical and Pop), loudness (soft/medium/loud) and additionally tempo (slow, medium and fast) in all possible variations against a control group (no music). Various previous studies have found an influence of tempo on consumer behaviour.

Especially the research on offline consumer behaviour, the independent variable *tempo* showed results in multiple studies with different outcomes: Eroglu et al. (2005) discussed tempo congruence and environmental assessment. Several studies confirmed the influence of tempo on perceived duration and emotional reactions to waiting times (Bruner, 1990; Oakes, 2003; Tansik & Routhieaux, 1999).

Moreover, the impact of tempo (and tempo congruity) upon spending, to which this study refers, has also been investigated by various authors: Roballey et al. (1985) studied the influence of music in a restaurant and found that fast music significantly increased the speed of eating, measured in bites per minute. McElrea and Standing (1992) confirmed these results by finding that students' drinking speed increased with fast versions of piano pieces compared

to slow versions. Milliman (1986) also found that fast-paced music in a restaurant caused patrons to finish their meals significantly faster than with slower music. However, musical tempo did not significantly impact the number of people who left the restaurant without being seated.

Further research has shown that significantly more alcohol was bought in bars when slower music was played than with faster music. Food sales showed no significant difference. Caldwell and Hibbert (2002) also found that consumers spent more time in a restaurant where slow music was played. They proposed that activating (e.g., faster) music encourages people to perform their tasks (e.g., consuming food and drinks) faster. The authors also stated that customers spend more money on food and drinks in restaurants when slow music is played.

In his well-known supermarket study, Milliman (1982) played slow and fast background music at a constant volume and found that daily sales rose when shoppers were exposed to slow music. Milliman attributed the increased shopping activity to the fact that supermarket shoppers moved more slowly and thus spent more time shopping when slow music was played than with fast music.

Herrington (1996) conducted a similar supermarket study, using slow and fast music, as Milliman did, but he used the same digitized pieces of music for all conditions. The researcher tried to ensure that the effects of tempo were truly determined and not confounded by other musical attributes (e.g., genre, melody, preference), as different types of music were used in the Milliman study. After evaluating the total measured time spent by customers in the sales area of the shop, he concluded, in contrast to Milliman, that shopping time was unaffected by background music tempo. However, it was claimed that preference for the music increased it. He also showed that tempo had no effect on shopping expenditure.

Based on the partially different results, Oakes (2007a) posits, in relation to music tempo, that an environment with moderate incongruence leads to better consumer evaluations than extreme congruence or extreme incongruence (Eroglu et al., 2005). In general, people tend to adjust their tempo – voluntarily or involuntarily – to the tempo of the music (Cheng et al., 2009).

A number of studies have also been conducted in web-based research against this background. Some studies from the online world from recent years that could confirm the

effects of varying the tempo of background music on the behaviour of website visitors are:

A laboratory study by Cheng et al. (2009) supports the assertion that when browsing the website of a simulated gift shop, participants experienced higher levels of arousal and pleasure when exposed to fast music and warm colours than those exposed to an environment with slow music and cool colours. In particular, fast music is reported to produce higher levels of arousal and pleasure than slow music.

Another laboratory study directly examines the effects of the tempo of background music, an emotional stimulus, on consumers' attitudes when shopping online. The authors (Ding & Lin, 2012) conducted two empirical studies using the same experimental design. Participants were asked to shop on a fictitious website, each with four different combinations of products and background music tempo. The results of both studies supported the central hypothesis of the study that the tempo of the background music has a positive effect on consumer arousal.

In a study by Anwar et al. (2020), with a simulated online shop, subjects were exposed to different combinations of music (slow and fast) and colours (warm and cool). Both cues significantly affected subjects' emotional responses and behavioural intention (Anwar et al. (2020). In contrast to the results of Cheng et al. (2009), in which fast music and warm colours had led to an increase in arousal and pleasure, here the questionnaire responses showed that cool colours and fast music showed higher levels of pleasure and arousal, compared to slow music with warm colours. Arousal and pleasure were also found to be significant parameters in predicting behavioural intention. In addition, respondents showed more approach behaviour to fast music with cool colours compared to slow music with warm colours.

In her dissertation, Price-Rankin (2004) examined the influence of colour (warm/cold) and background music (fast/slow) on website visitors to a fictitious website. Among other things, she studied two groups exposed to different (faster and slower) music in terms of emotions and internet purchase intentions. Unfortunately, both investigations yielded non-significant results.

However, the results are not always as clear-cut as they appear at first glance. For example, the results of Milliman's restaurant study could be replicated by other researchers, but the results of his supermarket study were not confirmed anywhere else. A sound

explanation of why the effects found occurred in some replication studies and not in others would facilitate their commercial adaptation. One explanation for this mismatch may lie in the different contexts that make the effects of tempo on purchase behaviour less predictable in more stressful, work-related environments (Oakes, 2007a).

Nevertheless, the previous findings mentioned above (e.g.,) indicated that the variable tempo may have an impact on consumer behaviour and was therefore considered in the research design for this study. After all, the tempo is one of the variables that has been shown to have the most significant impact on the musical character of a piece (Patel, 2007). However, while existing research has shown that in offline environments and simulated online environments, the tempo variation can produce results (see Literature Review, 2.3.5), the experimental set-up of this study in an experimental real-world environment shows no significant effects.

Since the different tempo levels were very clearly noticeable, it was at least ensured that the customers were aware of the corresponding (unnaturally fast or slow) music. Nevertheless, again, it is possible that, due to technical circumstances, the music was played for too few customers to deliver a significant result overall (e.g., browser audio or speakers muted, other music heard), that the video playing time (incl. audible stimuli) was too short, or that the videos were often stopped manually directly by the website visitors.

With reference to practice, the author recommends that interested managers first seek appropriate music for their online sales channel before experimenting with tempo. The tempo's influence was relatively low in absolute figures, even in previous offline studies. In the online area, where the effect of the low-involvement stimulus background music seems to be very low anyway, from the perspective of the results of this work, it can be considered correspondingly irrelevant.

5.2.3.4 Summary and review of the conceptual framework

This section discussed the findings of the experimental results and linked them to previous research.

The empirical findings show no significant results in any of the three experiments conducted. Furthermore, the variation of all three audible stimuli (genre, tempo, loudness) showed no significant effects on the dependent variable. Accordingly, there were no mediating

effects through session duration.

Generally speaking, the larger the sample, the more clearly significance should be visible (Surveymonkey, 2021). The samples obtained in the three experiments of this study were extensive (sample size > 200,000). Accordingly, if there is a relationship between background music and online consumer behaviour, it should be visible relatively clearly. However, this is not the case. Therefore, there does not seem to be a significant relationship between background music and consumer behaviour in online sales, at least in this experimental setup.

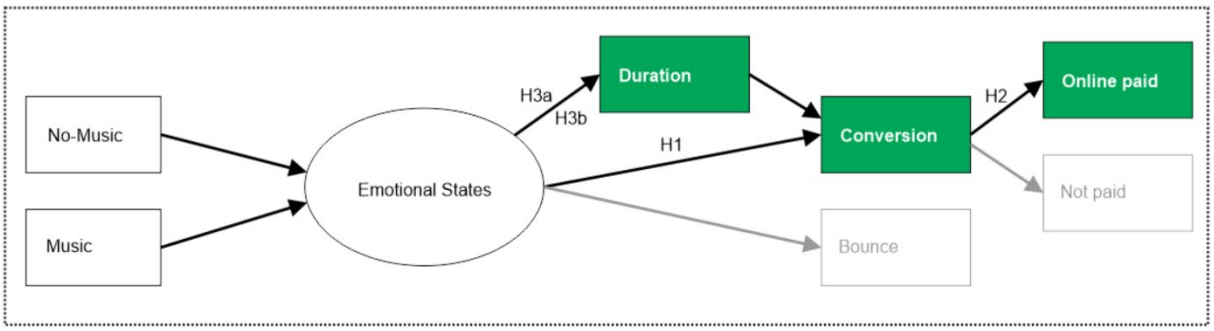

Figure 19: Conceptual flow model, highlighted the processes under observation

The results of the experiments concerning the conceptual flow model (Figure 19), and the formulated hypotheses, were:

H1: When x* music is played on the website, there is a different conversion rate compared to no music.
H2: If converted and x* music is played, there is a different preference for the type of payment method selected compared to no music.
H3a: The relationship between background music and conversion rate is mediated by session duration.
H3b: The relationship between online and offline payments, when converted, is mediated by session duration,

Since the hypotheses were all rejected, the conclusion must be drawn that the developed framework seems not to match the consumer behaviour in the online shopping environment under observation, at least not in this form. It remains unclear if this conclusion counts only for the context of this thesis or, in general, for all standard online shopping solutions.

After reviewing the analysis and the results and reflecting on the experiments, the author suspects that the conceptual framework depicts reality too simply. For example, background music is already considered a low-involvement element in the mix of environmental influences on consumers. To be relevant to the subjects, it might be necessary that no other stimuli from the low- or high-involvement spectrum significantly influence consumer behaviour.

The usual consumer faces a challenging process of decision-making, considering multiple websites and various products across several cognitive and social-psychological factors (Hallam et al., 2016). This might suggest that the influence of other intrinsic factors that may affect the consumer's state and mood ‘O’ in the S-O-R model) should be considered in the conceptual framework, e.g., a person who is stressed, hungry, tired, freezing, sick or in mourning might not respond to background music in the same way, or at all, in terms of their behaviour compared to a person, who is in an everyday or relaxed mood.

However, it is sensible to be cautious about generalizing these results, as the various influences on consumers in individual online environments are far too different.

Additionally, research questions 1 and 2, which examine decision-making and purchasing behaviour, can thus be answered:

RQ 1: What is the influence of background music on conversions in an online shopping environment?
There is no influence on consumer registration.

RQ 2: What is the influence of background music on the type of payment method selected in an online shopping environment?
There is no influence on the selected payment method.

Since no significant effects were found, the third research question can also be answered:

RQ 3: Is any inter-relationship mediated by session duration?
No, there are no mediating effects through session duration.

5.2.4 Further interpretation

This section will discuss further thoughts and assumptions concerning the results of this study. Firstly, it will highlight the main differences between online and offline environments concerning the atmospherics consumers are exposed to. Secondly, and derived from the former considerations, the implications for laboratory versus field studies in online environments will be discussed. Furthermore, the constraints imposed by the online shop used in the experiment, the company or the selected industry will be discussed.

The most significant difference between previous studies and the main contribution of this work is that for the first time, a real field study was conducted in an online environment about the influence of audible stimuli on consumer behaviour, and a large amount of data was collected.

There are known effects from the impact of background music on human behaviour in some (old) offline experiments concerning conventional shopping or consumption (e.g. in supermarkets, shopping malls, and restaurants). There were also effects found in laboratory experiments in the last years with simulated online shopping, which showed some effects concerning the variables genre and tempo. Previous online studies on consumer behaviour have always taken place in simulated online environments, and not surprisingly, the results of these studies differ from the present work.

5.2.4.1 Online versus offline environments

In order to understand the possible reason for this discrepancy, further investigations need to be carried out. Eroglu et al. (2001) consider that many atmospheric variables previously studied in physical shops (e.g., the visible presence of other people, scents, textures, temperature) are irrelevant to e-commerce. However, the authors only compared the characteristics of the traditional retail atmosphere or a traditional retail environment with the online retail context of online shops, reduced to a computer screen. This assumption is questionable because online shoppers move in two different environments at the same time:

(1) the physical environment in which human-computer interaction occurs, and
(2) the online shopping environment that is virtually experienced (Falk et al., 2006).

The point here is that in previous research, the subjects were operating in laboratory environments, which the researchers could easily manipulate. Research results in laboratory

environments might be applied to environments where people work or browse on computers. Managers can manipulate the environment accordingly, e.g., internet cafes, libraries, offices, etc.

In terms of online shopping environments, the experimenter cannot influence the physical environment of the website visitors, as their store visit is virtual. Therefore, researchers, who wish to make recommendations to practitioners and managers who design or manage an online-only environment, where website visitors stay in their natural environment, have far more limited options.

While it can be assumed that some website visitors are focused on visiting a website from home and viewing it from a computer with high-end sound, other visitors are distracted. These visitors switch back and forth between different tabs, possibly having the website open only on a mobile device while physically being on the bus, train, in a cafe, listening to a podcast while browsing, or at home with a TV on at the same time. This would mean that the possible effects of background music on a single website will probably be relatively small compared to laboratory environments.

The challenge for e-atmosphere researchers is integrating knowledge about these effects into a more comprehensive model of online shopping behaviour (Falk et al., 2006). Online retailers need to manage the direct impact of online shops on customers' internal states and anticipate or factor in the impact of the operator environment.

Therefore, it seems questionable whether studies in simulated laboratory environments and fictional online stores, as they have been conducted in recent years and labelled *online*, should be considered *online research* at all. For example, the conclusions by Damen et al. (2021), „The authors' conclusion: In an online environment, auditory stimuli strongly influence consumer choice …", by Wang et al. (2017), "Website music produces significant affective and cognitive responses …" and by Park and Stoel (2018), "this empirical study provides evidence that background music generates favourable responses from consumers …".

The author of this study would question such statements. The subjects in laboratory studies control a computer and navigate a simulated website. However, in some experiments, they only see website images in a PowerPoint presentation. Notably, the actual influence takes

place in a laboratory environment, which can undoubtedly influence the mood, and more, of the subjects, but this has nothing to do with the activity on the screen. It is instead the case that, in these instances, the music influences the mood of the subjects (e.g., slow music, slower action), as proposed in the S-O-R model. This affects the subject's activities, including surfing on a website, but this is not exclusively the case.

At the very least, this work has shown that laboratory studies in this research area are not automatically transferable to practical implementation. The result of this study is that the implementation of background music in the current standard online shops on commercial websites can be dispensed with.

In contrast to a laboratory environment, the subjects set up their natural, physical environment in a way they feel comfortable. Therefore, the author of this study suspects that background music disturbs the website visitor in his natural environment (see also Fujiwara et al., 2017) instead of stimulating them positively. However, there is no empirical evidence of this to date.

5.2.4.2 Emotional relevance of the products or services

The reason for the low, non-significant influence of the independent variables could also be the nature of the products/services offered by the company whose online shop was used for the experiments in this study. As described, the seminars offered are first-aid courses. These courses are a legal requirement in Germany, e.g., to become a first responder in a company, to proceed with a study program or to obtain a driver's licence. These courses are almost exclusively attended by participants who need a certificate in first aid for the purposes mentioned above and hardly ever by people who want to attend a first-aid course voluntarily.

Moreover, subjects do not visit the website or the online shop for playful internet surfing, entertainment or information but with the intention of booking a first aid course as quickly as possible. In contrast to conventional online shops, websites such as social media, news, entertainment, and more, tend to focus more on entertaining the customer, and the sales aspect plays a subordinate role. In these online environments, stimuli (such as background music) may be more likely to influence the emotional state of the website visitor (organism) and then have a corresponding effect on behaviour (response).

A customer who wants to buy a ticket for a specific intercontinental flight is unlikely to be impressed or influenced by background music on the sales page. This could be similar to a first-aid course, even if the courses are less specific and visitors can choose between different providers. So, there is a risk for the company that the user will leave the website if any element does not match the customer's satisfaction. The impact of music from a site like the one used in this study may be less because the website visitors need a course. Music may even be more of a deterrent.

In online shopping, a more significant influence of stimuli, such as background music, could be measurable on websites with a leisure-, entertainment or information character as described. This could also be the case for web shops offering products or seminars where emotions play a role, e.g., selection of clothes, holidays, or online seminars in the field of making money or dating.

This work views environmental psychology and online shopping from the perspective of the practising marketer. This study aims to improve conservative online shops and the sale of products or services that could be called *things of daily life*. With regard to these products or services, emotions play a rather subordinate role. Furthermore, in this context, it seems that people's focus is more on an effective *search, compare, buy*, and background music has no significant influence on this process.

5.2.5 Possible unobserved effects

The fact that no significant results were found in the context of this field study does not mean that background music has no influence on consumer behaviour or perception in the area of online shopping at all. Instead, it is possible that background music had effects in this experimental setup but that these were in domains unrelated to what was measured.

Firstly, existing research shows that background music can significantly affect the consumers' mood and feelings (pleasure or arousal), which could result in any possible approach or avoidance reaction. Liked music significantly could positively influence consumers.

Various studies show that consumers rate the environment more positively in relation to liked music (Dubé & Morin, 2001; Hui et al., 1997; Morin et al., 2007; North et al., 2000; North & Hargreaves, 1996; Sweeney & Wyber, 2002). However, liked music also increases

the perceived waiting time (Hui et al., 1997) and, in addition, increases expenses (Caldwell & Hibbert, 2002). A qualitative research approach in an experimental field could illuminate this question.

Secondly, existing literature shows that appropriate background music can influence the perception of a company, brand or product image, e.g., North et al. (2003), Magnini and Thelen (2008), Hwang and Oh (2020), Chang and Chen (2008). A qualitative research approach could investigate whether, for example, Jazz or Classical music is more likely to promote perceptions of elevated sophistication, as has been done in previous studies (Oakes, 2007a). North et al. (2003) suggested that the effects associated with these elite music genres may be due to the associated images of wealth and prosperity. This mental link may trigger corresponding behaviour resulting in increased purchase intention. In addition, background music may have effects on website visitors in online shopping environments, but the measurements of this study did not capture these.

Accordingly, reasons against a generalization of the results of this study are discussed in the Limitations chapter, including the selection of the music used, the nature of the companies that offered services and the design of the experiments.

5.2.6 Summary

The purpose of this chapter was to interpret the data, explain the meaning of the results concerning the research aim and the research questions, and also refer to the existing research.

After a short summary of this study's findings, the results are discussed in relation to the literature and previous research in offline and online environments. Finally, the research questions were answered accordingly.

In a further interpretation, possible reasons for the results of this study and the link to existing research were discussed, as well as the extent to which effects may be present but not captured by the measurements conducted.

After discussing the results and quality of this work, the following section draws a conclusion about the meaning of this research on the impact of background music on consumer behaviour in an online shopping environment, highlights the strengths and limitations of the research, and presents promising fields for future research.

6 Conclusions, contributions, limitations, and future research

6.1 Introduction

This section contains the final conclusions of this work and presents the main contributions to theory, methodology and practice.

After a brief summary of the main findings, the conclusions and contributions are drawn and discussed. The following section presents the strengths and limitations of this study, suggestions for future research, and practical implications. Finally, the chapter ends with a reflection on the researcher's experiences and a summary of the chapter.

6.2 Overview of the key findings

The present study deals with online atmospherics, especially background music and the derived consumer behaviour, against the background of online shopping to give practitioners advice and suggestions for improvement.

This study aimed to: *investigate, analyse and evaluate how and to what extent background music influences consumer behaviour within the online shop of a German company*. Three consecutive field experiments with authentic website visitors were conducted, with all possible variations of the musical dimensions of genre, tempo and loudness.

The following were investigated:
(a) the purchasing behaviour of the website visitors in terms of conversion,
(b) if the visitor converted, the buying/paying behaviour: *registered only/pay later* or *directly paid online*. Also,
(c) possible mediated effects through time spent on the website.

The results indicate that there is no influence of background music on consumer behaviour concerning traditional online shopping. Furthermore, neither the conversion rate nor the payment rate of already converted website visitors changed significantly under the influence of background music. Accordingly, further findings show no mediating effects through session duration.

Since the sample size of all three experiments is very large, it can be assumed that a significant result in this context should be clearly visible. The findings of the experiments indicate that background music plays a negligible role in conventional online shopping.

The following section summarizes the original contributions of this thesis. It reviews the identified research gaps in terms of understanding consumer behaviour concerning the influence of audible stimuli in an online shopping environment in relation to this research.

6.3 Original contributions and conclusions

As mentioned, and discussed earlier, the study´s empirical results form the basis for the theoretical conclusions that will be drawn in the following subsections concerning the research gaps. The general research question of the thesis was: Can background music on a website influence online consumer behaviour, and if yes, to what extent?

To answer this central research question, a review of the literature on Environmental Psychology and Atmospherics, the development of the S-O-R model, and offline and online consumer behaviour in relation to background music was provided. The literature review identified research gaps, and the author developed a conceptual framework to map the empirical research of this thesis. Using post-positivism in conjunction with a quantitative field experiment, empirical data were collected and interpreted via multivariate testing, consisting of automated website visitor monitoring. The empirical results were discussed and interpreted in the previous chapter, and propositions were formulated.

The original contributions of this work are threefold: it provides an original contribution to theory, an original contribution to methodology and, in addition, an original contribution to practice.

6.3.1 Research Gaps and theoretical contribution

The research gaps are the basis of a scientific study, describing unanswered questions or problems in the specific field. Based on the literature on the impact of musical stimuli on online consumer behaviour in e-shopping environments, the following research gaps were identified (see Section 2.8):

(1) There is a stated need for research on the impact of music and, specifically, in terms of background music in online retail settings.
(2) The existing studies are purely laboratory studies and, therefore, of little relevance to practitioners. To the best of the authors' knowledge, there is no field study.
(3) Existing laboratory studies, off- and online, have relatively small sample sizes. There is also a general lack of studies with extended periods of data collection, different conditions (e.g., different genres, tempo and loudness), and the use of a control group.

6.3.1.1 Addressing research gap 1

Addressing the first research gap, this study explicitly investigated how background music influences online consumer behaviour in an online retail setting. This thesis thus responds to the numerous calls for further research on the impact of musical stimuli in online shopping environments on online consumer behaviour (e.g., Cheung et al., 2003; Eroglu et al., 2001; Fiore & Kelly, 2007; Kim & Lennon, 2012; Manganari et al., 2009; Oakes, 2007a; Park & Stoel, 2018; Park et al., 2005; Price-Rankin, 2004; Sautter et al., 2004; Wang et al., 2011; Wang et al., 2017).

The result of the investigation could be summed up in one sentence: Background music has no effect on consumer behaviour in conventional online shopping.

The first derived conclusion from the empirical findings is that there is no significant effect in the context of this thesis. More concretely: the experiments show no influence of background music embedded in a product video on consumer behaviour in a conventional online shopping environment on the online customers.

Previous literature in offline settings indicates quite different results. Some studies have confirmed the influence of background music on the buying behaviour of consumers, e.g., the well-known studies in supermarkets, shopping malls, wine stores and restaurants, e.g., Smith and Curnow (1966), North et al. (1999), North et al. (2003), Areni and Kim (1993), Yalch and Spangenberg (1990, 2000), Turley and Milliman (2000) and North (2012). While for some research, replication studies yielded non-significant results, e.g., Smith and Curnow (1966) and Milliman (1982), others found differing results with the same set-up as previous research, but in a different context, e.g., Kim et al. (2009), Herrington (1996) and Anwar et al. (2020). This may be related to the many other influences to which consumers are exposed in a retail setting but also to the many dimensions of music, which are chosen

individually in each study.

In this study, the selected approach was to use music that is as unfamiliar and neutral as possible (not emotional or dramatic) and appropriate for a conservative online shop. The results might have been different if different music had been selected.

Therefore, a second general conclusion (drawn from the empirical findings) could be summarized as a consumer's emotional link towards the product, the brand or the shopping environment, which may influence online customers. What is meant as a result of this is that the results of this study might only apply to what the author calls conventional, conservative online shopping environments here.

On the one hand, this conclusion refers to the type of products and services offered by the observed online shop. On the other hand, this study refers to online shops, which are likewise operated by numerous companies selling conventional products or services online, usually goods with no emotional appeal. Customers do not visit such shopping websites for entertainment purposes; instead, they buy the goods they need quickly and safely and then leave the website. Moreover, the internal state of customers' intention to shop online is not focused on entertainment, pleasure, or fun but on product search and simple ordering procedures. Therefore, this study focuses on online shops, comparable to offline shops or stores that offer products consumers need for daily life, not products that serve entertainment or pleasure.

The service offered by the company whose online shop was observed in the experiments offers related non-attractive services that have no emotional appeal. The courses offered are typical daily-life offers. People who sign up for a first-aid course usually do not do so voluntarily but because they need the course due to legal requirements (for a driving licence, university study or their job). This could be another explanation for website visitors not being impressed by the music. Most customers visit the website with a high purchase intention, book the desired course and subsequently leave the website.

Background music's influence might differ for websites that focus on leisure, entertainment, or information (such as social media, news websites, and streaming platforms). Therefore, field studies on such online platforms may yield different results.

On the other hand, this conclusion is about the structural-technical aspect of conventional online shops. This can be found everywhere on the internet with a very similar structure: two-dimensional web pages, product pages, a shopping basket and a checkout- and payment process. The shopping experience on such ordinary websites is unspectacular and, in a way, boring. In contrast, Walmart (a global US retail group) published in January 2022 a video of a sales process that will soon be available in the Metaverse (Walmart, 2022). The Metaverse is one of several 3D worlds that consumers can enter with VR glasses and act (and shop) like in the real world, without physical borders. The shopping process looks and feels similar to a real Walmart, including interaction with virtual Walmart employees. Background music in such an environment could have far-reaching effects, similar to natural shopping environments and maybe even more intense, as there are no distractions for consumers. Dad et al. (2018) confirm *music* in their study of Second Life (a mature virtual world) as an atmospheric cue of 3D servicescape.

Implementation and research on audible stimuli in these new environments might be fruitful. For example, they could result in a classification of the influence of background music depending on the online environment in which a shopping process takes place. Therefore, this research in background music and consumer behaviour is far from clear-cut, and there is much room for future investigations. However, in summary, the results of the experiments provide strong empirical support for the assumption that the use of audible stimuli plays a subordinate role in optimising conventional online shopping environments.

6.3.1.2 Addressing research gap 2

Addressing the second research gap, in contrast to all previous studies on *online* atmospherics conducted in laboratory environments, this thesis contributes to the literature on online atmospherics and environmental psychology by performing the first real field study in a virtual shopping environment. Furthermore, new knowledge is created through the empirical application of the S-O-R model to an online shopping environment, drawing attention to the related online consumer behaviour.

This thesis thus responds to the call for empirical research in real-life settings on online consumer behaviour in general (e.g., Cialdini, 2009; Dad et al., 2018; Ding & Lin, 2012; Ferreira & Oliveira-Castro, 2011; Kim & Lennon, 2012; Manganari et al., 2009; Mazaheri et al., 2011; Xu & Sundar, 2014) and on interest in the environmental stimulus *background music* in particular (e.g., Anwar et al., 2020; Ballouli, 2011; Damen et al., 2021;

Knoferle et al., 2012; Oakes, 2007a; Park & Stoel, 2018; Wang et al., 2017).

Accordingly, a real online shop of a German company was chosen, with real sales volume on a daily basis. Since the researcher could not play the music via a stationary music player (like in laboratory experiments), it had to be placed instead in the physical environment of the website visitor, and an appropriate method had to be developed.

Since modern internet browsers suppress music playback on websites, the background music was implemented in a work roundabout. The background music was stored in a product video so that many different variations of the video with different background music (variations of genre, tempo and loudness) were stored on the company's server. Then, using a technique commonly used by practitioners called multivariate testing, one version of the video (including music) was randomly launched at each website visit. The website visitors' behaviour was anonymously recorded.

Previous laboratory studies on the influence of audible stimuli in fictitious online environments, in some cases, produced significant results on consumer behaviour. This thesis results provide evidence, in reference to the second research gap, that there are considerable differences in the application of music in experimental set-ups and in the customers' perception of the shopping process in laboratory and field studies.

The answer to Research Questions 1 and 2 could be summed up as follows: background music does not influence online consumer behaviour in a natural online shopping environment. Therefore, the third general conclusion derived from the empirical findings, and addressing research gap 3, is that the results of previous studies in fictitious online laboratory experiments might not be replicable in praxis.

The approach to explain this phenomenon is a more holistic one. It describes the online consumer as an actor in different worlds, on the one hand, in the online world where the shopping process is carried out, and on the other hand, in the physical world where the website visitor is located in his individual environment. In the case of the online customer, only one of the environments, namely the online shop, can be influenced by the marketer. In a laboratory environment, the researcher controls both environments and in all recent studies, the researchers kept both environments for all subjects constant: the laboratory environment and the online environment.

In contrast, the physical environment in real life is very diverse. Therefore, each website visitor acts out of their personal environment, time-wise, geographically (theoretically anywhere in the world) and physically (could be anywhere: at home, at work, on the bus or train or at the beach, from a mobile device).

The same counts for the previous research on consumer behaviour in offline retail environments (see research gap 1). The places where the subjects shop, where the consumer decisions are made, and where the customers are physically located are identical (supermarkets, shops, restaurants). Accordingly, it is easier for researchers to influence all consumers' senses, and the likelihood that audible stimuli will have an effect is significantly higher than in a real-life online shopping environment.

As already described in the discussion section, the author of this study is, therefore, at least critical of the fact that laboratory studies on fictional websites in this research area are referred to as online research or of practical use for internet marketers as laboratory results cannot be easily transferred to a real environment.

6.3.1.3 Addressing research gap 3

Addressing the third research gap: due to the technical set-up and thus the automated data collection, the experiments could run over long periods (53, 57 and 92 days) and collect large samples (sample size > 200,000) for all three experiments.

Additionally, when producing the video's background music, care was taken to use different genres (Classical and Pop), and a no-music condition was tested in the experiment setup, which served as a reference for the test statistics.

So far, this study has responded to the call of many previous researchers who studied this exact topic to design a proper experimental setup concerning larger sample sizes (e.g., Anwar et al., 2020; Dad et al., 2018; Ferreira & Oliveira-Castro, 2011; Hwang & Oh, 2020; Kim & Lennon, 2012; Xu & Sundar, 2014), the use of a variation of conditions (e.g., Cuny et al., 2015; Cheng et al., 2009; Dubé et al., 1995; Ferreira & Oliveira-Castro, 2011; Kim & Lennon, 2012; Park & Stoel, 2018; Wang et al., 2017) and the use of a no-music control condition (e.g., Areni & Kim, 1993; Bailey & Areni, 2006; Damen et al., 2021; Garlin & Owen, 2006; Guéguen & Jacob, 2014; Oakes, 2007a; Xu & Sundar, 2014).

The large sample size ensured the study was based on a robust, meaningful dataset, and the results obtained can be considered valid in the given context. However, since each of the individual experiments did not show any significant results concerning the influence of background music on consumer behaviour, no significant effects of the variations in genre, tempo and loudness were detectable.

6.3.2 Methodology contribution

The original contribution of this work to the methodology is the novel application of a quantitative empirical field study that provides access to the decisions and behaviours of online consumers under the influence of audible stimuli in an online environment. The work investigates website visitors' purchasing and decision-making behaviour by anonymously and automatically monitoring the consumer's movements under the influence of varied background music.

Furthermore, this thesis introduces the technique of A/B testing (or multivariate testing) used by marketers to test websites in research on environmental psychology and online consumer behaviour.

In addition, a strategy was developed to play background music into the environment of website visitors: the corresponding audio tracks were deposited in product videos embedded in the online shop, as integrating background music into websites would otherwise not be technically possible.

Moreover, a concept called "relative loudness" was developed that gives the listener the feeling of "too soft" or "too loud" background music by using different volume levels of background music behind a spoken audio track.

Therefore, the methodology used in this study opens up new methodological approaches for future research on online consumer behaviour in online shopping environments.

6.3.3 Practice contribution

The results of this work may have value for practitioners managing or administrating an e-commerce environment. The original contributions to the practice of this thesis, for the research on the impact of audible stimuli on online consumer behaviour in virtual

environments, are described in detail in Chapter 5.2.

Firstly, the experiments in this study showed no significant effects from the independent variables (audible stimuli) on online consumer actions in a conventional online shopping environment. It is therefore recommended to dispense with the inclusion of background music. Derived from this recommendation:

Secondly, the results of this study in relation to the literature on comparable laboratory experiments in the field of online atmospherics have shown that it does not seem advisable to adopt results from laboratory experiments unchecked in practice. This could be due to the different environments online shoppers are exposed to, which they are not in laboratory experiments. It could also be influenced by one's own target group (gender, age, cultural background) or one's own products, brand and company.

Thirdly, it is therefore recommended that the results of laboratory studies be taken as indications only and that the corresponding theories constantly be tested in practice on one's own platform.

After presenting the original contributions and conclusions in this section, the strengths and limitations of the present study and recommendations for future research will be provided in the following section (6.4).

6.4 Strengths and limitations of the study and suggestions for future research

This section describes the strengths and limitations of this thesis. Following this, promising directions for future research are outlined in Section 6.4.3.

6.4.1 Strengths of the study

Firstly, this thesis conducted a real online field study. Compared to laboratory environments, the advantage of a field study is that the subjects operate from their own natural environment and are thus not influenced by the researcher. It can therefore be excluded that the subjects are influenced by other influences such as the laboratory settings, the room, the researcher's instructions or other participants.

The spatial distance and anonymity of the participants, due to the chosen empirical-

experimental setup, speak for a high degree of independence of the results from any influences. The author thus assumes that the results of a field study reflect the real, natural actions of the participants.

Secondly, an empirical, quantitative study design was chosen to investigate the research aim and questions. One fundamental problem in quantitative data collection is sufficient participation (Engelke, 2020). In the presented field study, a test procedure (multivariate testing) was implemented in an online shop, which automatically recorded the behaviour of all users anonymously. It was thus possible to collect a large, robust sample for each experiment, which was also demographically diverse.

As the observed online shop is part of a standard commercial website (i.e., not specialized nor niche), website visitors from all over Germany were recorded, with no distinction for individual social class, education level, or age group. That is, the website simply recorded the number of visitors who were interested in the corresponding products of the online shop observed. No distinction is required across these groupings, partly because the courses are a legal requirement in Germany both for obtaining a driver's licence and for companies, since in each company, a certain percentage of employees – irrespective of status and qualification – needs to be qualified first responders. Furthermore, the courses are accessible for all ages and professions; there is no prior education required, no prerequisites, and no entry restrictions.

Therefore, the study results can be considered representative, at least for this type of e-commerce solution and this target group composition. Regarding broader transferability, the author is cautious about making too far-reaching recommendations. However, due to the genres chosen, classic and pop, it can be assumed that the findings may be generalized for comparable online shops from broader European and North American contexts, e.g., similar service providers in the same cultural area, like online sales of seminars or ticket platforms.

6.4.2 Limitations of the study

Every study is subject to some limitations. Although this work has made a respectable number of contributions to understanding the influence of audible stimuli on online consumer behaviour, this thesis has some limitations. Each limitation, in turn, could be addressed in future research. In the following, several limitations of this study, which relate to different areas, will be mentioned, namely:

(1) the choice of methodology;
(2) sampling;
(3) the choice of the case;
(4) the experimental set-up; and
(5) the choice of audible stimuli

6.4.2.1 Limitations through the choice of methodology

The researcher chose an empirical quantitative set-up to realise the goal of an online field study. This made it possible to collect a huge sample size relatively quickly, as every website visitor is also part of the sample. According to the experiments conducted, the statistical analysis results show how consumers behave under these conditions but not why. In future studies, insights into the reasons for consumers' decision-making could be gained through qualitative surveys.

6.4.2.2 Limitations due to sampling

This study deals with the online shop and the customers of a German company, so on the one side, this research is focused on Germany, but on the other side, it is also limited to Germany. Therefore, the subjects involved in the data collection represent only Germany and may not be representative of the entire population (e.g., other countries or cultures).

Furthermore, the target group composition of the company is not congruent with the demographic pyramid of the German population as a whole. The company's customers tend to be young consumers (deviation of the factor *age* from the overall German population). Therefore, it may not be possible to generalize the findings to online shops with products that appeal to other age groups.

6.4.2.3 Limitations through the choice of the case

Studies in a particular online shop are inherently limited by the industry of the company or the type of product or service. In the case of this study, it was a *seminar needed for a specific purpose* and not a seminar or event booked purely for entertainment. The results of the influence of background music on online consumer behaviour might be different for websites that focus on pleasure, fun, entertainment or information.

The same issues stand in terms of the broader transferability of the results. Due to the genres classic and pop, the results are not generalizable as much to, e.g., Asian, Middle

Eastern, African, or South American contexts, due to cultural differences.

6.4.2.4 Limitations through the experimental set-up

In order to conduct a field study on online consumer behaviour in an online shopping environment and to measure the effects of audible stimuli, the author had to make several decisions regarding the methodology. Unfortunately, some of them lead to limitations.

Notably, the background music was integrated into a product video that automatically started when the website was visited. This setup was necessary because background music embedded in websites is suppressed by today's browsers.

The first limitation of the methodology is the relatively short playing time of the stimuli. The background music can only be heard while the video is playing (1:29 min) and only while the client is on the product page of the seminars offered, which contains the video. This is possibly one of the reasons for a rather weak result. The effects on the consumer could possibly be more substantial if the video (and thus the background music) is played for longer, ideally during the entire sales process, which is technically not possible at present with the approach of videos used here and a multi-stage sales process. In offline- and laboratory studies, the music accompanies the entire buying process, which might be why much stronger effects have been measured in these studies.

Secondly, the chosen type of video could also be a limitation. For example, the video used was a tutorial- or product video, in which the company's founder introduces the company and the offered courses. The results might be different with a different type of video format, for example, an image- or story-telling video.

Thirdly, there are multiple advantages of conducting a field study, and the literature showed a stated need for empirical work in the area of online consumer behaviour. However, the limitation of a field study in an online environment is that the participants are actually in their natural environment. Therefore, it is unclear whether the subjects listened to the music. It is also possible that the website visitor listens to the music briefly and then mutes it directly. It might also be the case that the proportion of participants who listened to music is so small that this has no significant effect on the overall result. This is different in laboratory studies, where it is ensured that every participant listens to the music.

A solution here would be a *call to action* that displays or fades in "*Please turn on your speaker*". However, this would again manipulate the natural environment that a field study is supposed to represent, as such cues are usually not used.

6.4.2.5 Limitation through the choice of audible stimuli

The researcher selected the music used according to the following criteria:

- The genres Classical and Pop were chosen because they have been used and tested most frequently in literature in the past.
- The music was chosen to be as neutral as possible regarding emotional cues to avoid corresponding influences.
- Similarly, non-familiar music from unknown artists was selected from a specialized audio platform. Moreover, care was taken to ensure that the music did not match any generally known music in order to avoid any influence from familiarity.

These decisions all represent limitations as well:

It is quite possible that the effects measured in this study were limited by choice of music. Multiple offline studies have investigated congruent music towards the product or the brand, and it has been shown that the match between the connotations of the music genre, format or style and certain products can influence sales and perception (North et al., 2015). There is a wide range of possibilities to repeat the experiment with music that is assumed to be congruent with the website or products. The experiments' results could be different for other genres or styles.

Since the target group is extensive and includes nearly all age groups, as well as an entire country geographically, it was thus not known which music would be perceived as congruent by the target group and whether there is any music at all that the entire target group would equally consider as congruent. The audio tracks chosen by the author were, therefore, intentionally neutral. Existing research has shown that emotionally coloured music can influence subjects' moods, and thus purchase decisions can be appropriately influenced in a desired direction (Alpert & Alpert, 1989, 1990; Alpert et al., 2005; Cheng et al., 2009; Lai & Chiang, 2012). Emotional music in a cinema-like video could have a completely different impact on online consumer behaviour.

In summary: As this study intentionally avoided any familiarity, emotional colouring or congruity of music, these parameters represent opportunities for future research.

6.4.3 Recommendations for future research

This work focuses on the research of e-atmospherics, more precisely, the influence of audible stimuli on online consumer behaviour in online shopping environments. The results of this field study show significant deviations compared to previous laboratory studies, which need to be further explored.

The limitations described also provide an opportunity for further researchers to build on this thesis's results or improve the findings by overcoming the limitations of this work.

Firstly, this study followed a quantitative approach and showed how consumers act in a real experimental online shopping setting under the influence of different audible stimuli. A qualitative field study would help understand why consumers make purchasing decisions under these conditions.

Secondly, the generalisability of the insights gained in this thesis outside the research context still needs to be investigated.

Thirdly, the author chose a conventional online shop which usually sells *everyday products*. Future research could explore online shopping environments, which are linked to pleasure, leisure, fun or entertainment, to find out what influence the chosen sales environment (company, products) has. In order to stay within the research field of *consumer behaviour in online shopping environments*, possible research fields could be platforms. These could include online auctions for real estate, NFTs, or environments with a higher entertainment character, such as the Metaverse. The COVID-19 pandemic triggered a worldwide need to design and explore online alternatives to offline environments. New technologies are expected to shift more aspects of life to the online world, which will also be relevant for marketing.

Fourthly, future researchers could vary the experimental setup to investigate whether variations in video format or playing time lead to different results.

Finally, the music stimuli used in this study were selected as neutrally as possible. As literature shows findings with congruent, emotional or familiar music, future research could investigate audible stimuli with different characteristics to deepen the understanding of these cues in online environments.

After discussing the strengths and limitations of this work and outlining new perspectives and directions for future research, the following section summarizes the practical implications.

6.5 Implication for practice

The findings of this thesis shed light on the impact of audible stimuli on consumer behaviour in e-commerce environments, and this can succeed in optimising online sales. The findings may thus have value for practitioners managing or administrating online shopping solutions, especially conventional online shops. In particular, the findings could assist in optimising the online atmospherics of online shopping solutions.

Until a few years ago, website operators could play background music on the websites they managed. This option no longer exists today due to technical restrictions. However, music can still be played in online product videos, which are being integrated into an increasing number of online (shopping) platforms. The following managerial implications can be derived from the experiments conducted in this study on the influence of audible stimuli on consumer behaviour:

Firstly, this study's results suggest no significant effect of audible stimuli on online consumer behaviour. For managers and practitioners, these results indicate that spending time and effort on the selection and technical implementation of background music in e-commerce environments might be inefficient.

For example, Amazon (the most prominent online retailer) has experimented for years with product videos (up to 1 minute) in addition to product pictures. While in the beginning, only direct vendors were allowed to upload videos, especially verified and reputable resellers are now allowed, under certain conditions, to upload videos instead of only product pictures.

A Google search reveals that several consulting companies offer the creation of *product videos* for Amazon. Some also have packages to *optimize* clients' web videos with *sound*

design for conversion optimization in their portfolio. Based on this research, the advice from the author for marketers is that if music is requested by the management, to use a neutral audio track from a royalty-free platform, as the results show that there is no significant effect. Furthermore, it would be best to save money for individual music production.

The same recommendation applies to other standard online shops (Shopify, WooCommerce, Magento) or individual stand-alone solutions. As the use of background music seems not to create any advantages for sales, the use of music is generally not recommended.

Secondly, the results suggest that the findings of past offline studies, or even the results of online laboratory experiments about atmospherics, cannot be transferred to natural e-commerce environments. The recommendation for managers here is that the results of laboratory studies cannot simply be transferred one-on-one to e-commerce. It is therefore recommended to perform individual tests and investigate what works in practice and what does not. Results of laboratory studies in the field of atmospherics can deviate significantly from field experiments. This applies both to their own website and in case a provider (e.g., consulting, software or a sales solution) argues with results from previous laboratory experiments.

Finally, past studies have shown that studies of the same design by different authors can yield different results. This may be due to various reasons, but each shopping solution is a unique matrix of the target group, product, company, brand and website design. The fact that reactions to retail environments are not universal has already been described by Turley and Milliman (2000). They argued that different categories of consumers behave differently when confronted with the same atmospheric stimulus. Research has shown that reactions to different stimuli vary according to age and gender, for example.

Therefore, the author recommends that practitioners test their online shopping solutions individually and element by element in practice to find out what really works. The method of A/B or multivariate testing (depending on how many stimulus variants are to be tested) has proven itself in this study. These tests, once implemented on the server side, are relatively easy to perform, and such experiments can be used not only for audible stimuli but for all types of online atmospherics (e.g., store layout in terms of colours, fonts, structure and pictures, but also buttons, texts, headlines, and many more).

After discussing the managerial implications, the thesis concludes with the researcher's experiences conducting this study.

6.6 Researcher’s lived experience

This section describes the experiences of the researcher who conducted this study. Therefore, this section is written in the first-person perspective.

Analysing my notes on the research process over the last few years and reflecting on the mental and professional processes and challenges I have gone through, the following themes are particularly relevant:

Since I started the research project until today, my understanding and knowledge in consumer behaviour concerning music's influence have increased dramatically. This concerns the theory regarding the meaning of atmospherics in relation to consumer behaviour, with the impact of background music in particular. However, especially in the area of online shopping environments, which I have dealt with extensively, it was exciting to see my expectations as a researcher by setting up the project and the results were finally achieved. I, the developers involved and the CEO of the company whose online shop was used were amazed by the results and conclusions that were finally reached.

I have learned that results from academic papers in the field of e-atmospherics cannot automatically be linked to professional practice; they must be carefully checked. On the other hand, the essential data collection, evaluation, analysis and interpretation knowledge I acquired when dealing with quantitative data was also very enriching. This understanding will also give me a broader understanding of statistics, studies and their meaning in my future life and in other contexts.

In addition to the expansion of theoretical knowledge, my understanding of technical implementation and realization has also expanded significantly. It was helpful to experience that such experiments are not implemented overnight, even by experienced administrators. There are many challenges to consider, especially in collecting real data, which explains why many small and medium-sized enterprises probably do not pursue such measures. Persistence when an experimental setup does not work right away, patience in communicating with software engineers, and learning SPSS, were other areas of personal development. I recommend that practitioners first perform small, playful A/B tests and familiarize themselves

with the data and the analysis tools before starting a more extensive test. I faced minor issues initially in my study, so the first experiment had to be repeated several times.

One thing is the research itself; another story is to structure one's own thoughts, information, ideas and results and put them down on paper in an orderly way. I finally chose Evernote to document the research progress and the individual research steps and created a separate note for each relevant event, topic and conversation. This method is so handy that I now use this tool for many other aspects of my life to store information, thoughts, quotes, little to-do lists, etc., in one central place that is available online and easy to search from multiple devices.

Another point I struggled with was structuring the whole thesis. In the end, I analysed various DBAs, PhDs, articles and papers, read online tutorials on the subject, and created an individual structure piece by piece. Here, my recommendation for prospective researchers is to first create a structure for the entire thesis (which is not static but flexible and can be changed at any time) in order to be able to note down and collect one's thoughts at the appropriate place from the beginning, and thus make it easier to get a holistic picture of the thesis.

As a researcher, I developed a significant respect for the level of competence taught and expected. I learnt the process and went through the typical challenges of writing a doctoral thesis as part of a DBA student at a British university. This also helped me improve my English significantly, as otherwise, I would not have read many academic papers, articles and studies in English.

Furthermore, in the course of this work, I had the opportunity to interact with many interesting people from whom I learned theoretically, practically and personally, so I am very happy and thankful for the time I dedicated to this project.

In addition, the work on this project helped me get a deep understanding of online consumer behaviour in online shopping environments. It will help me in future to contribute to further investigations in this area.

After this section has highlighted the author's experiences conducting this study, the following section (6.7) summarizes this chapter.

6.7 Summary

This final chapter gives the conclusions, contributions, limitations and suggestions for further research.

The study's main finding and key conclusion are that background music has no significant impact on online consumption behaviour in conventional online shopping and that the results of laboratory studies may not be transferable to real-world applications.

Additionally, the original contributions of this study are presented. Finally, the strengths and limitations of the study are discussed, the derived suggestions for future research are given, and implications for practice are discussed. The chapter concludes with a reflection on the lived experience of the researcher.

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Appendix

Appendix 1: The no-show rate of the company

NUMBER OF PARTICIPANTS PER MONTH

No additional remark

Search:

Date	New registrations	Registrations	Actual attendance	Actual attendance %
12.2022	0	6	0	0 %
11.2022	0	6	0	0 %
10.2022	0	38	10	26.32 %
09.2022	0	51	0	0 %
08.2022	0	41	0	0 %
07.2022	0	158	0	0 %
06.2022	0	587	1	0.17 %
05.2022	0	4096	0	0 %
04.2022	9143	15550	8591	55.25 %
03.2022	17809	16376	14522	88.68 %
02.2022	16527	16593	15025	90.55 %
01.2022	20013	16905	15276	90.36 %
12.2021	9888	10033	8753	87.24 %
11.2021	14438	15542	13737	88.39 %
10.2021	16294	18302	16442	89.84 %

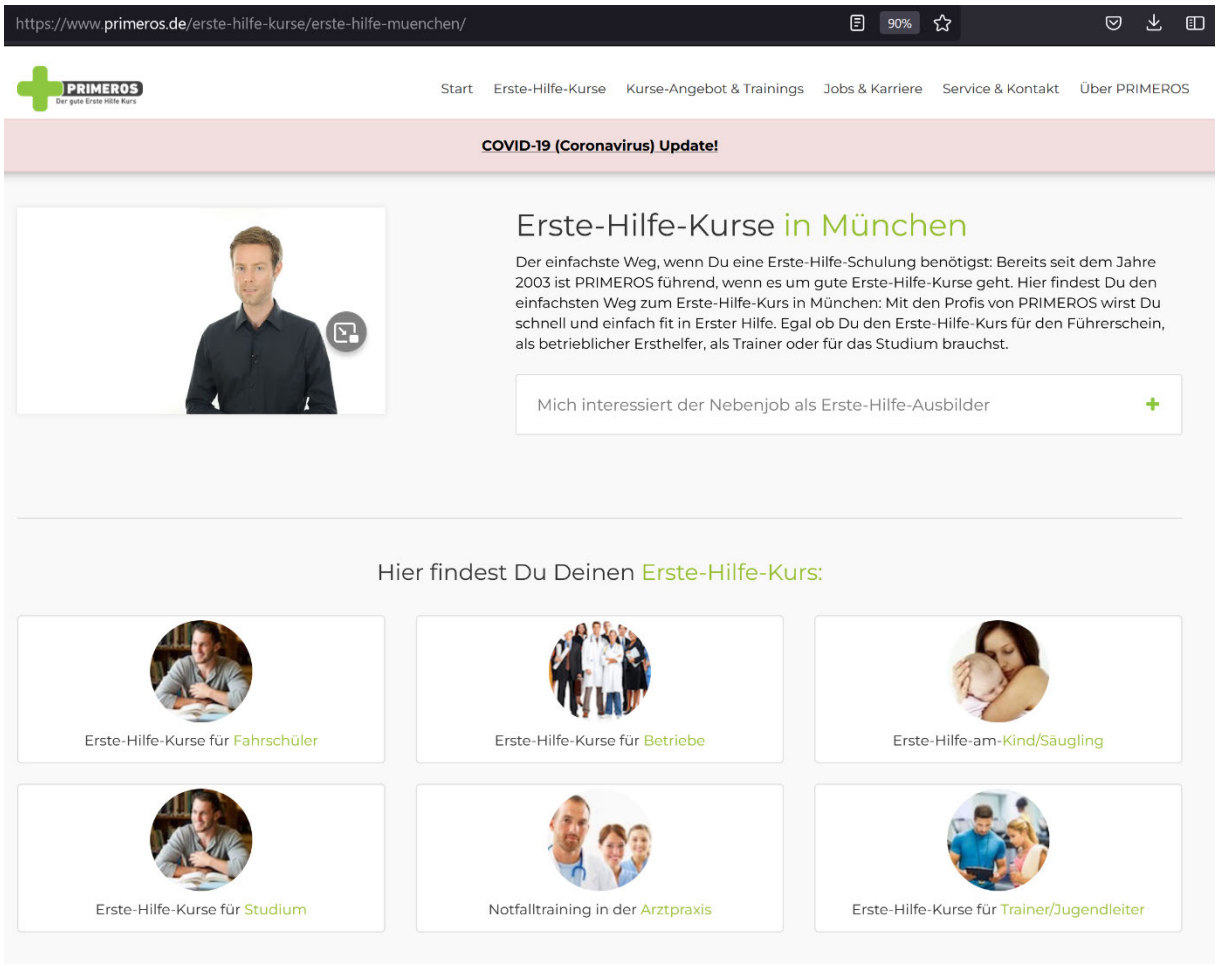
Date	New registrations	Registrations	Actual attendance	Actual attendance %
09.2021	15943	15464	13770	89.05 %
08.2021	15166	15636	13923	89.04 %
07.2021	15784	18277	16088	88.02 %
06.2021	15347	17096	15005	87.77 %
05.2021	16695	17868	15692	87.82 %
04.2021	16932	17825	15864	89 %
03.2021	20425	16294	14493	88.95 %
02.2021	11622	7243	5079	70.12 %
01.2021	9367	7877	5623	71.39 %
12.2020	7895	9360	7909	84.5 %
11.2020	14113	16243	14467	89.07 %
10.2020	15805	17282	15624	90.41 %
09.2020	17156	16827	15097	89.72 %
08.2020	15470	18959	16910	89.19 %
07.2020	17403	16873	15005	88.93 %
06.2020	18341	16741	14948	89.29 %
05.2020	15190	6619	5135	77.58 %
04.2020	1219	701	1	0.14 %
03.2020	8283	9605	7507	78.16 %
02.2020	15555	17885	16346	91.4 %
01.2020	17258	12835	11761	91.63 %
12.2019	8254	8587	7708	89.76 %
11.2019	12355	13796	12486	90.5 %

Date	New registrations	Registrations	Actual attendance	Actual attendance %
10.2019	13382	12450	11301	90.77 %
09.2019	14536	15131	13622	90.03 %
08.2019	14929	15488	13907	89.79 %
07.2019	16550	15088	13706	90.84 %
06.2019	13464	14672	13107	89.33 %
05.2019	14189	13461	12134	90.14 %
04.2019	13053	12914	11474	88.85 %
03.2019	14656	15846	14173	89.44 %
02.2019	13772	13747	12341	89.77 %
01.2019	14680	11709	10451	89.26 %
12.2018	6931	8171	7288	89.19 %
11.2018	10493	10529	9421	89.48 %
10.2018	12308	11816	10584	89.57 %
09.2018	12592	14306	12742	89.07 %
08.2018	12257	11335	10105	89.15 %
07.2018	12874	12691	11215	88.37 %
06.2018	12749	13997	12530	89.52 %
05.2018	11901	10851	9539	87.91 %
04.2018	12752	13234	11581	87.51 %
03.2018	13599	14307	12518	87.5 %
02.2018	12800	12841	11364	88.5 %
01.2018	14155	11187	9815	87.74 %
12.2017	6600	7755	6508	83.92 %

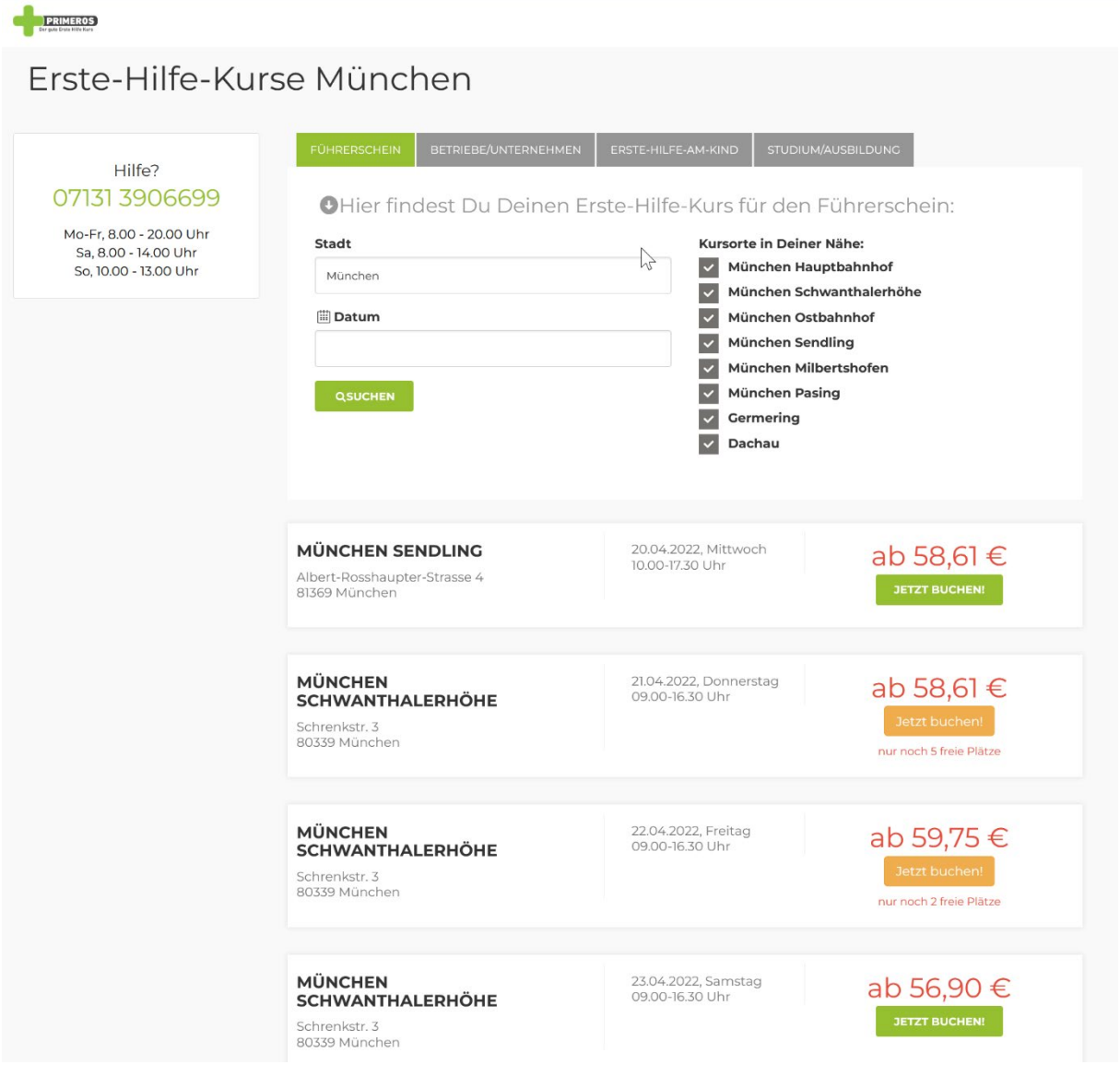
Date	New registrations	Registrations	Actual attendance	Actual attendance %
11.2017	11172	10496	9377	89.34 %
10.2017	10585	10720	9476	88.4 %
09.2017	10971	12004	10534	87.75 %
08.2017	11323	10823	9580	88.52 %
07.2017	12211	13316	11776	88.43 %
06.2017	10875	9480	8457	89.21 %
05.2017	10369	9550	8510	89.11 %
04.2017	9501	11625	10340	88.95 %
03.2017	11601	10301	9349	90.76 %
02.2017	10036	10074	9114	90.47 %
01.2017	10795	9525	8559	89.86 %
12.2016	5178	5479	4924	89.87 %
11.2016	8380	7950	7141	89.82 %
10.2016	8775	9826	8811	89.67 %
09.2016	8675	8482	7627	89.92 %
08.2016	8373	7632	6923	90.71 %
07.2016	8950	10122	9166	90.56 %
06.2016	8914	8012	7204	89.92 %
05.2016	7829	7253	6504	89.67 %
04.2016	8889	10285	9289	90.32 %
03.2016	8699	7408	6613	89.27 %
02.2016	8894	8465	7664	90.54 %
01.2016	7443	7145	6315	88.38 %

Appendix 2: Screenshots of the registration and purchase process

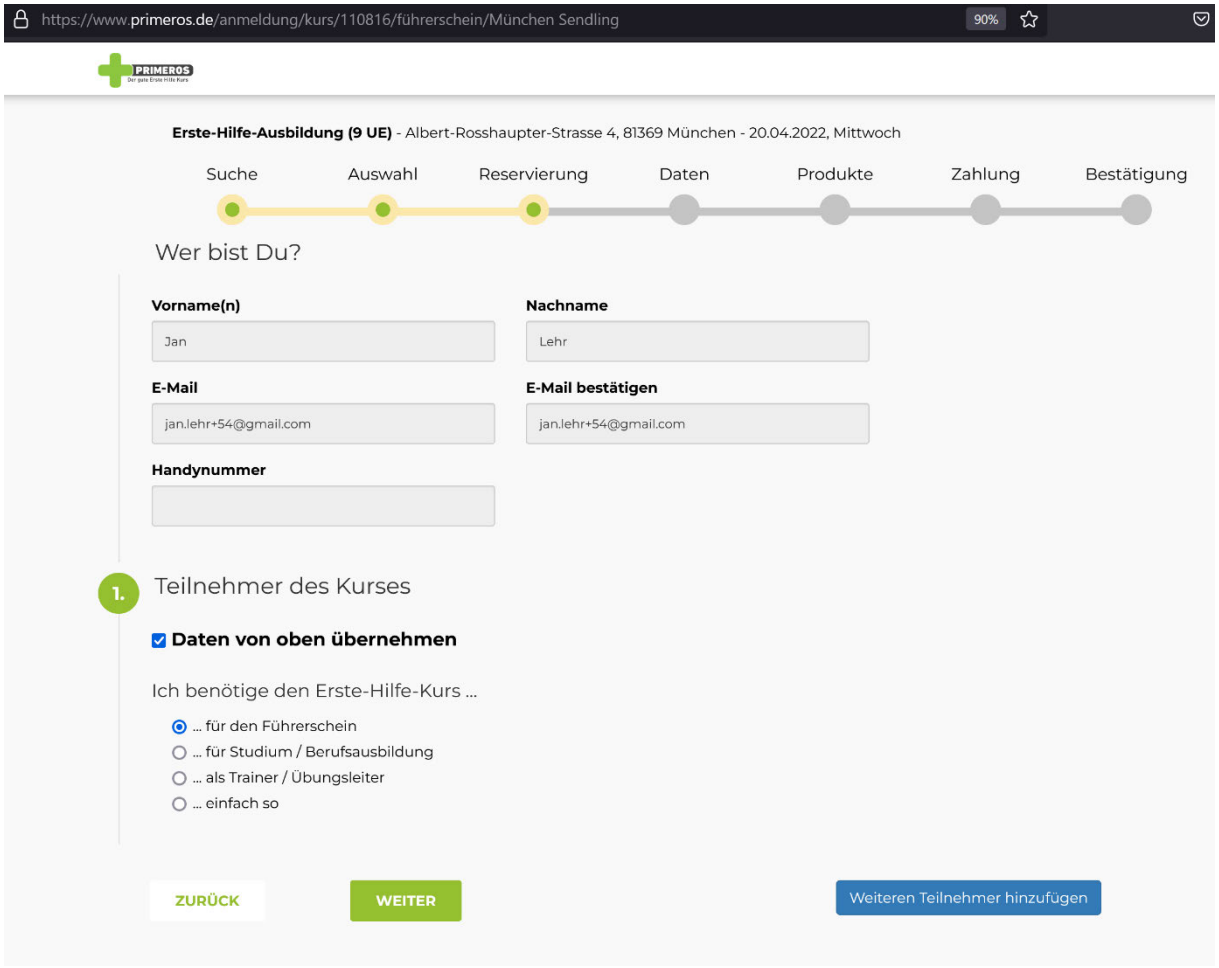
2.1 Landing page:



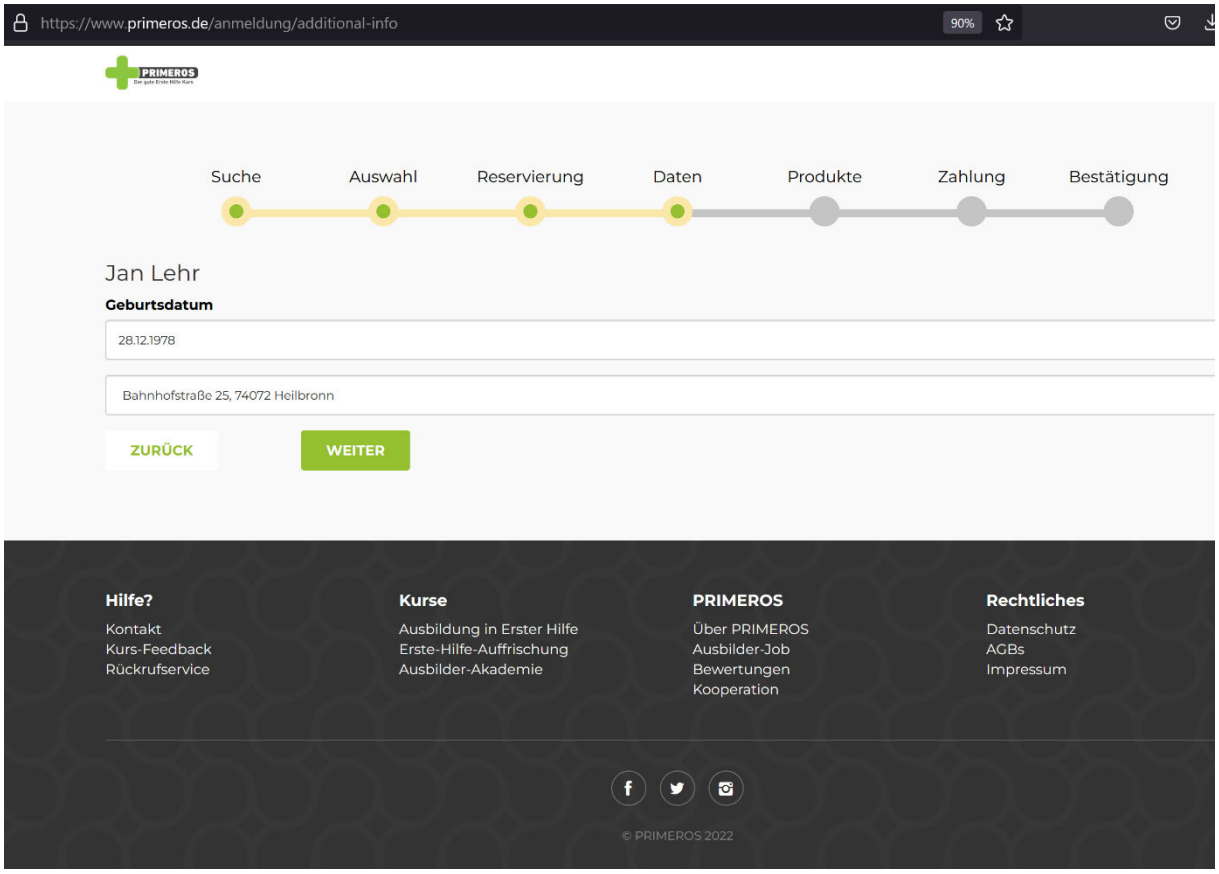
2.2 Course and date selection:



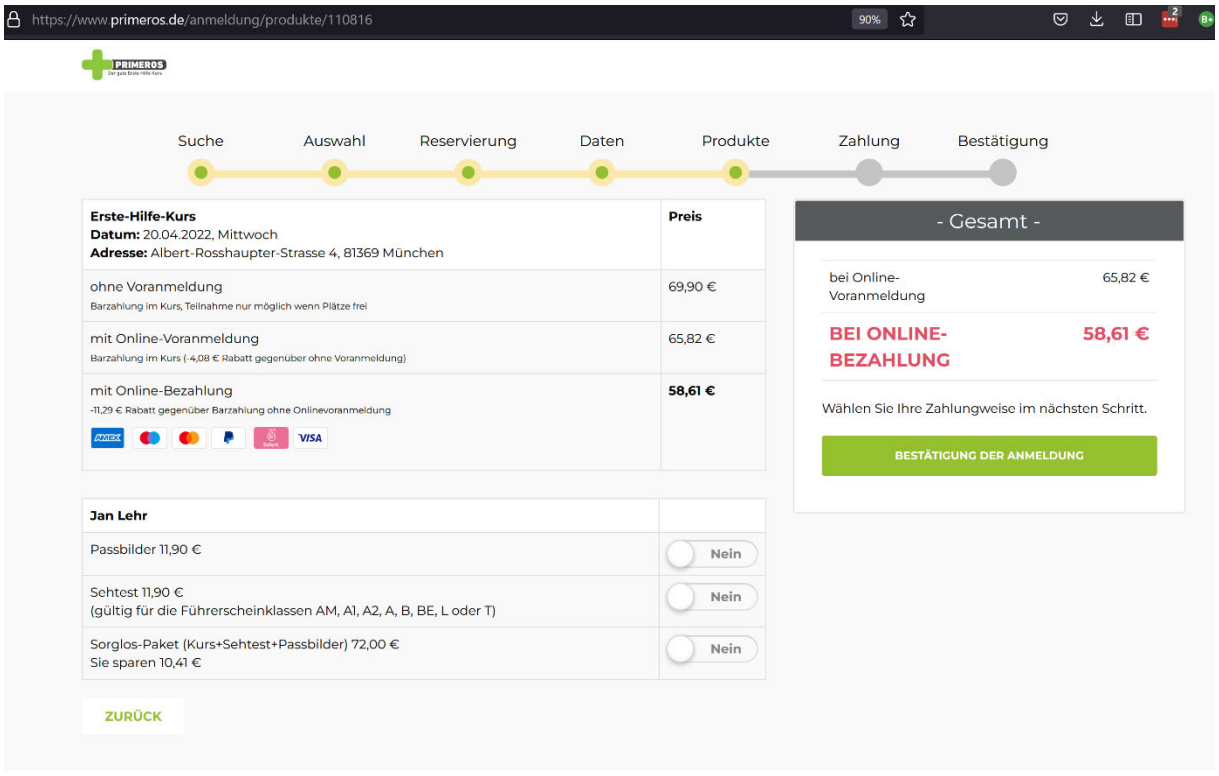
2.3 Data 1:


https://www.primeros.de/anmeldung/kurs/110816/führerschein/München Sendling
90%
PRIMEROS
Erste-Hilfe-Ausbildung (9 UE) - Albert-Rosshaupter-Strasse 4, 81369 München - 20.04.2022, Mittwoch
Suche
Auswahl
Reservierung
Daten
Produkte
Zahlung
Bestätigung
Wer bist Du?
Vorname(n)
Jan
Nachname
Lehr
E-Mail
jan.lehr+54@gmail.com
E-Mail bestätigen
jan.lehr+54@gmail.com
Handynummer
1.
Teilnehmer des Kurses
Daten von oben übernehmen
Ich benötige den Erste-Hilfe-Kurs ...
... für den Führerschein
... für Studium / Berufsausbildung
... als Trainer / Übungsleiter
... einfach so
ZURÜCK
WEITER
Weiteren Teilnehmer hinzufügen

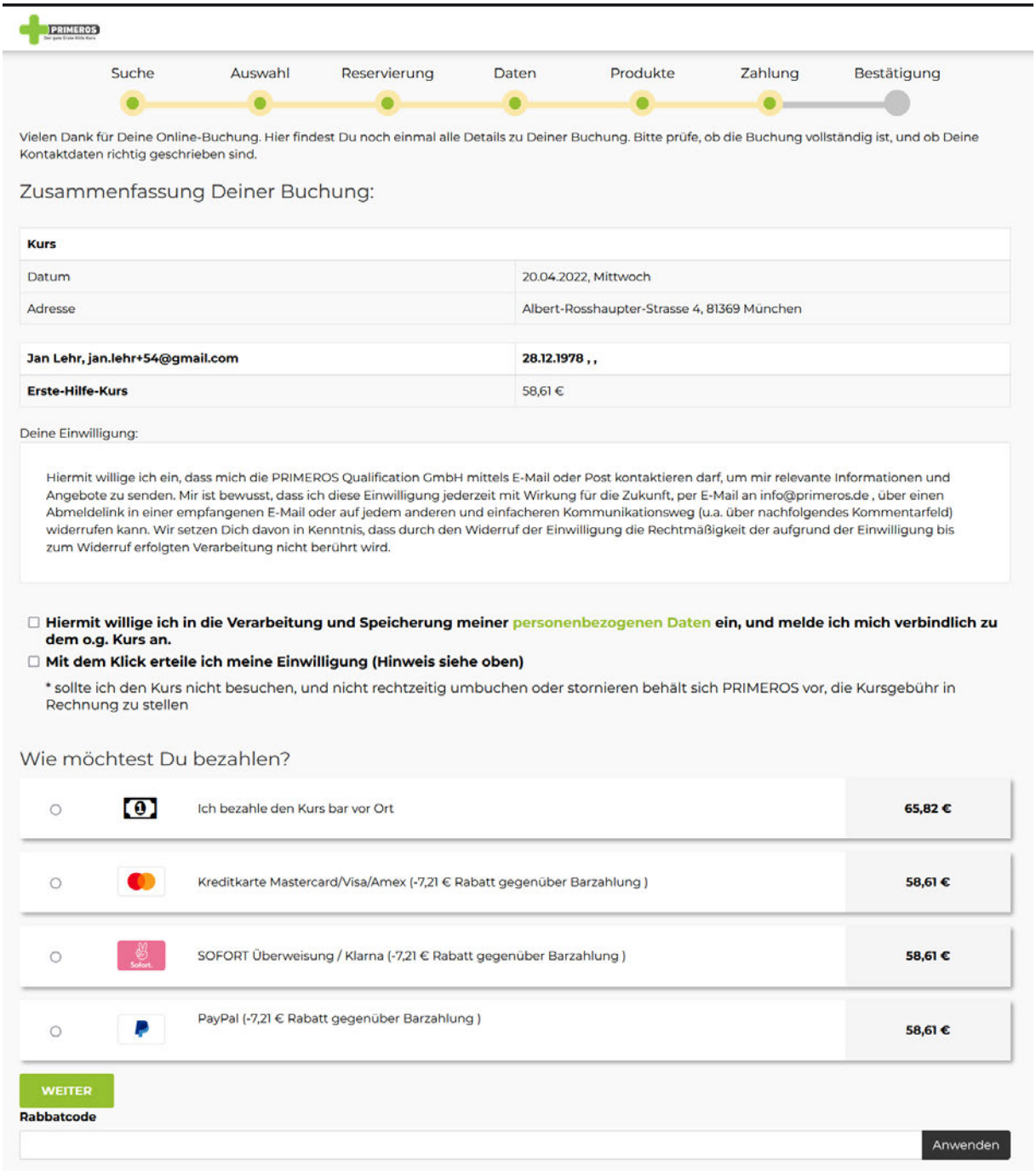
2.4 Data 2:



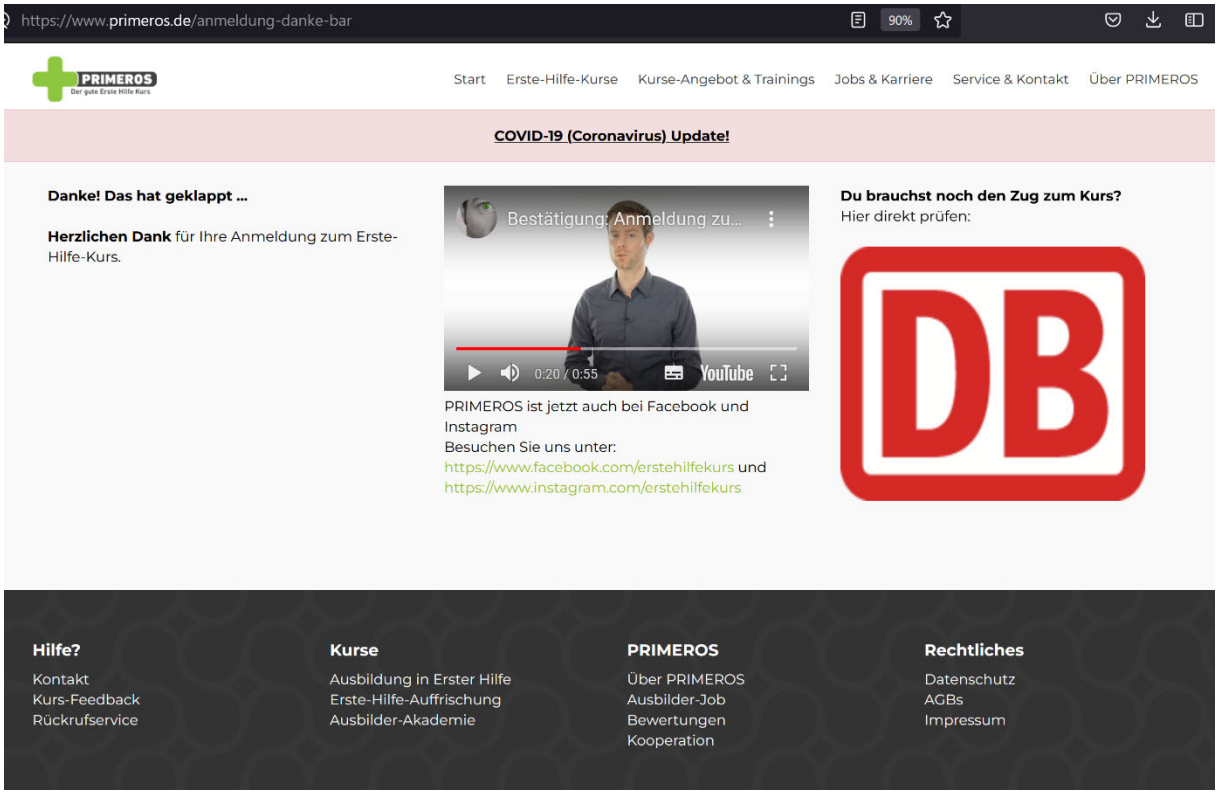
2.5 Selection of Add-ons:



2.6 Registration and payment selection (offline or online):



2.7 Thank-you page:



Appendix 3: Form and results of the survey to determine the loudness

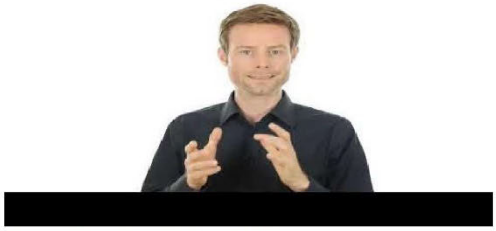
3.1 Form of the survey:

Umfrage Landingpage-Video: Lautstärke der Hintergrundmusik

Beschreibe, bei welchen Videos du die Hintergrundmusik als leise, normal und laut empfindest

* Erforderlich

Klassikmusik 1:



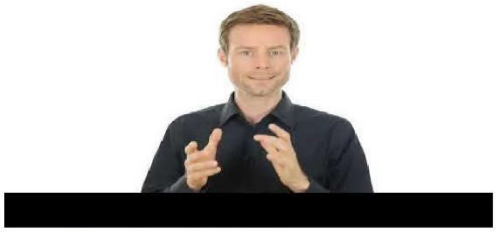
http://youtube.com/watch?v=Oqyf_CmorWY

1. Klassikmusik 1: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- ◯ (zu) leise
- ◯ normal / angenehm
- ◯ (zu) laut

Klassikmusik 2:



http://youtube.com/watch?v=eZMgYADvK6Q

2. Klassikmusik 2: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 3:

[redacted]

[redacted] http://youtube.com/watch?v=fakfq84Hm2A

3. Klassikmusik 3: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 4:

[redacted]

[redacted] http://youtube.com/watch?v=A_JbF7RVjY4

4. Klassikmusik 4: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 5:

[redacted]

[redacted] http://youtube.com/watch?v=dw45QgWBzpM

5. Klassikmusik 5: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 6:

[redacted]

[redacted] http://youtube.com/watch?v=xVieHizbK3E

6. Klassikmusik 6: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 7:

[redacted]

[redacted] http://youtube.com/watch?v=ZA5LBOEq5fw

7. Klassikmusik 7: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Klassikmusik 8:

[redacted]

[redacted] http://youtube.com/watch?v=DRBLKN2ZQDE

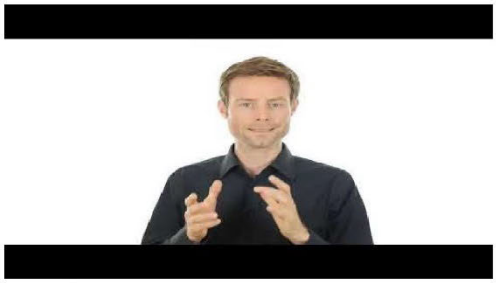
8. Klassikmusik 8: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Umfrage Landingpage-Video: Lautstärke der Hintergrundmusik Teil 2 (Pop)

Pop 1:



http://youtube.com/watch?v=eucajM4wrE0

9. Pop 1: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 2:

[redacted]

[redacted] http://youtube.com/watch?v=FohI1rdyN14

10. Pop 2: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 3:

[redacted]

[redacted] http://youtube.com/watch?v=4Sp6s3AZb8g

11. Pop 3: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 4:

[redacted]

[redacted] http://youtube.com/watch?v=w0vaotqXQWQ

12. Pop 4: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 5:

[redacted]

[redacted] http://youtube.com/watch?v=k2lMklPZPeo

13. Pop 5: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 6:

[redacted]

[redacted] http://youtube.com/watch?v=BnbdwD5Ui8o

14. Pop 6: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 7:

[redacted]

[redacted] http://youtube.com/watch?v=KrXbMcyS-UI

15. Pop 7: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

Pop 8:

[redacted]

[redacted] http://youtube.com /watch?v=n20ptijQvUA

16. Pop 8: Wie empfindest du die Hintergrundmusik? *

Markieren Sie nur ein Oval.

- (zu) leise
- normal / angenehm
- (zu) laut

3.2 Results of the survey regarding loudness:

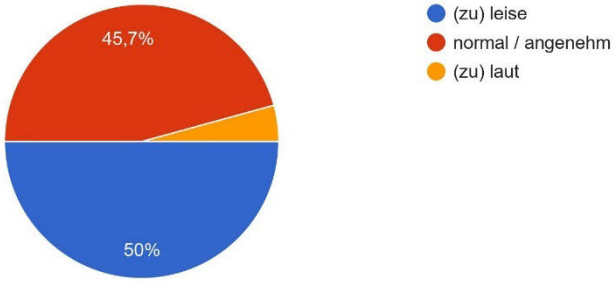
Umfrage Landingpage-Video: Lautstärke der Hintergrundmusik

94 Antworten

Analytics veröffentlichen

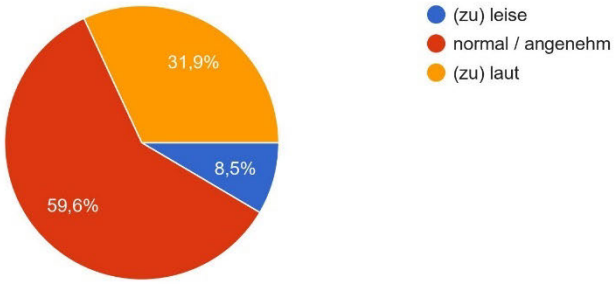
Klassikmusik 1: Wie empfindest du die Hintergrundmusik?

94 Antworten



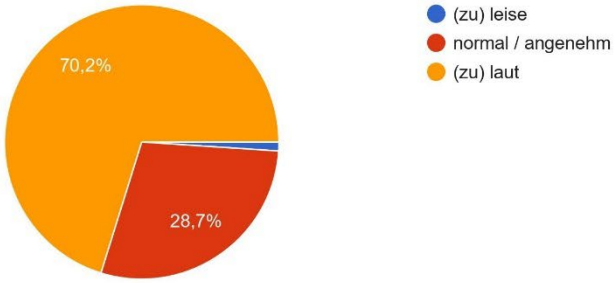
Klassikmusik 2: Wie empfindest du die Hintergrundmusik?

94 Antworten



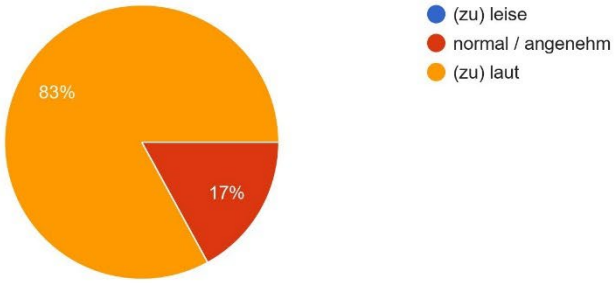
Klassikmusik 3: Wie empfindest du die Hintergrundmusik?

94 Antworten



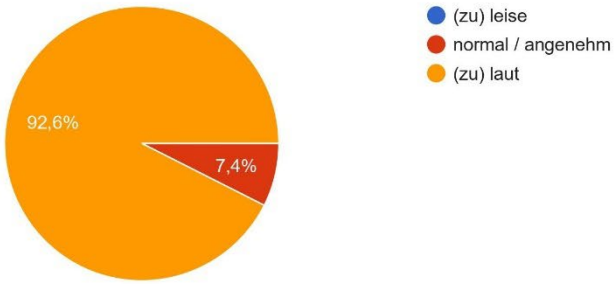
Klassikmusik 4: Wie empfindest du die Hintergrundmusik?

94 Antworten



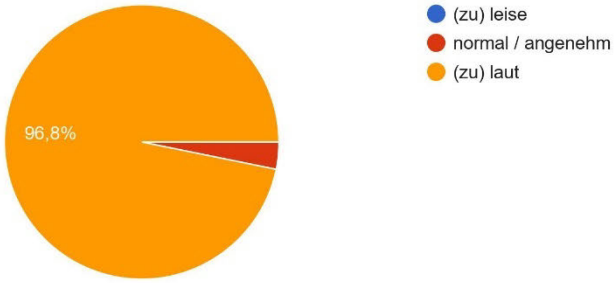
Klassikmusik 5: Wie empfindest du die Hintergrundmusik?

94 Antworten



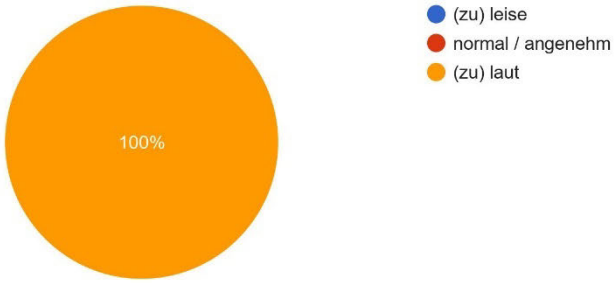
Klassikmusik 6: Wie empfindest du die Hintergrundmusik?

94 Antworten



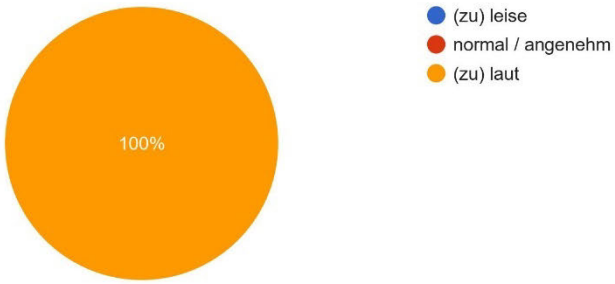
Klassikmusik 7: Wie empfindest du die Hintergrundmusik?

94 Antworten



Klassikmusik 8: Wie empfindest du die Hintergrundmusik?

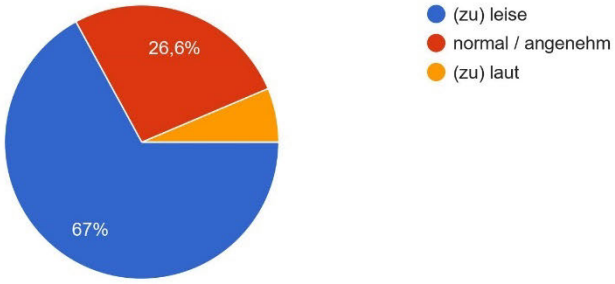
94 Antworten



Umfrage Landingpage-Video: Lautstärke der Hintergrundmusik Teil 2 (Pop)

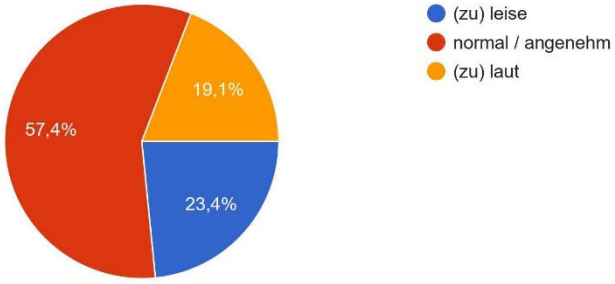
Pop 1: Wie empfindest du die Hintergrundmusik?

94 Antworten



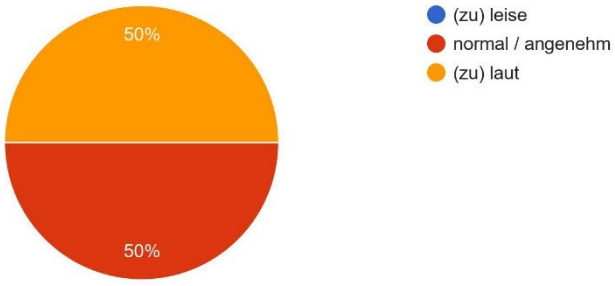
Pop 2: Wie empfindest du die Hintergrundmusik?

94 Antworten



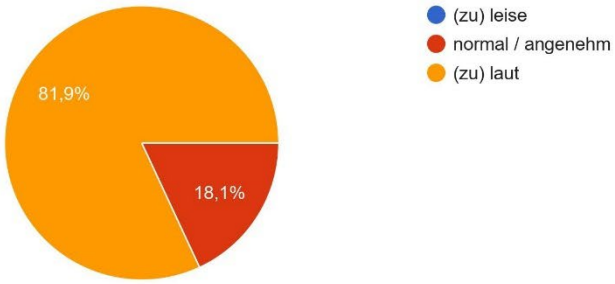
Pop 3: Wie empfindest du die Hintergrundmusik?

94 Antworten



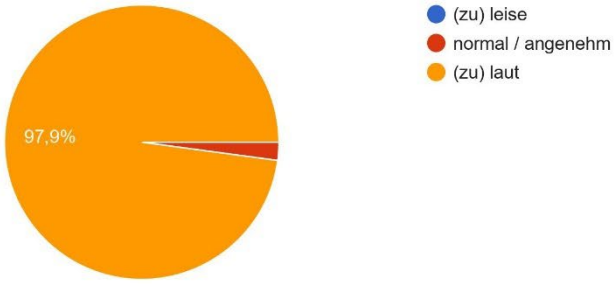
Pop 4: Wie empfindest du die Hintergrundmusik?

94 Antworten



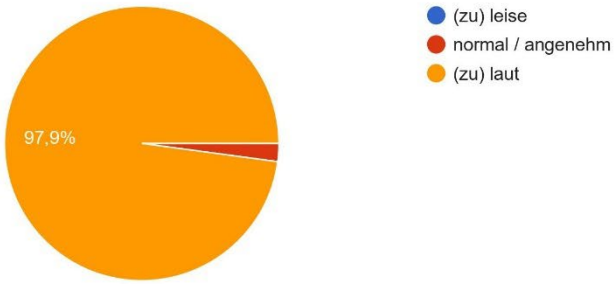
Pop 5: Wie empfindest du die Hintergrundmusik?

94 Antworten



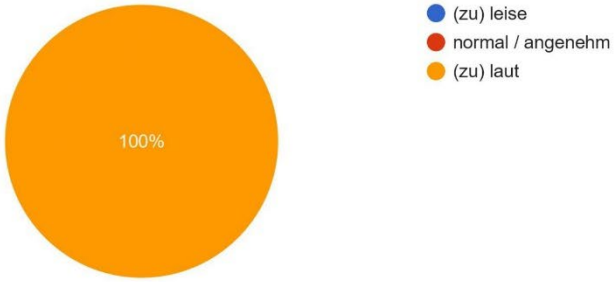
Pop 6: Wie empfindest du die Hintergrundmusik?

94 Antworten



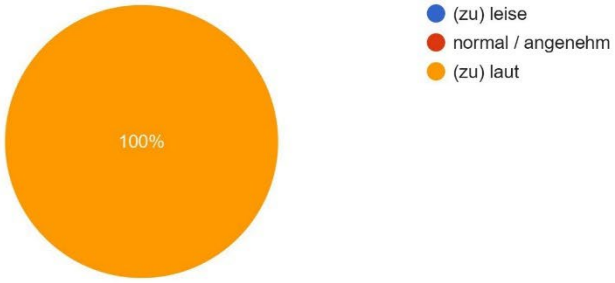
Pop 7: Wie empfindest du die Hintergrundmusik?

94 Antworten



Pop 8: Wie empfindest du die Hintergrundmusik?

94 Antworten



Appendix 4: Analysis of tempo used in previous studies

4.1 Sources:

No.	Study	Design	Context	Definition
01	Brooker, G., & Wheatley, J. J. (1994)	Laboratory Experiment	Radio Ad (for ice cream)	Slow: 76 BPM Fast: 142 BPM
02	Caldwell, C., & Hibbert, S. A. (2002)	Field Experiment	Restaurant	Slow: 72 (or less) Fast: 94 (or more)
03	Cheng, G. D., Chien-Hung, L. (2012)	Laboratory Experiment	Online Shopping	Slow: 72 (or less) Fast: 94 (or more)
04	Hahn, M., & Hwang, I. (1999)	Laboratory Experiment	Fictitious TV Ad	Slow: 80 Fast: 115
05	Kellaris, J. J., & Kent, R. J. (1993)	Laboratory Experiment	Lab experiment about music	Slow: 60 Fast: 180
06	Kellaris, J. J., & Rice, R. C. (1993)	Laboratory Experiment	Lab experiment about music	Slow: 60 Fast: 120
07	Oakes, S. (1999)	Laboratory Experiment	Radio Ad	Slow: 90 Fast: 170
08	Oakes, S., & North, A. (2006)	Laboratory Experiment	Radio Ad	Slow: 90 Fast: 170
09	Sevgin A. Eroglu, Karen A. Machleit, Jean-Charles Chebat (2005)	Field Experiment	Shopping environment, suburban mall	Slow: 60 Fast: 96
10	Oakes, S. (2003)	Field Experiment	undergraduate registration queue context	Slow: 104–129 BPM (average 114.2 BPM) Fast: 130–179 BPM (average 145.4 BPM)
11	North, A.C., Hargreaves, D.J., & Heath, S. (1998)	Field Experiment	a university gymnasium	Slow: 80 Fast: 120
12	Mailov, Levon (2011)	Laboratory Experiment	Fictional Video Ad	Slow: 60 Fast: 127
13	Wakshlag, J. J., Reitz, R., &	Laboratory Experiment	Education Programm for	Slow: from 36 to

	Zillmann, D. (1982)		First- and Second-Grade Children	60 Fast: from 100 to 170
14	Milliman, R. E. (1986)	Field Experiment	Restaurant	Slow: 72 or slower Fast: 92 or more
15	Milliman, R. E. (1982)	Field Experiment	Supermarket	Slow: 72 or slower Fast: 92 or more
16	Roballey et al. (1985)	Field Experiment	University Cafeteria	Slow: 56 Fast: 122
17	McElrea, H.,& Standing, F. (1992)	Laboratory Experiment	Drink soda in a group	Slow: 54 Fast: 132
18	Herrington, J. D. (1996)	Field Experiment	Supermarket	Slow: 60-65 or fewer Fast: 90 or more
19	Day et al. (2009)	Laboratory Experiment	performance of multi-attribute decision-making	The faster background music is made by speeding up the original piece by 25%, while the slower background music is made by slowing down the original piece by 25%.
20	Sweeney, J. C., and Wyber, F. (2002)	Laboratory Experiment	Apparel speciality store	Slow: Below 70 Fast: 126

4.2 Calculation:

Study No.		Slow	Fast
01		76	142
02		72	94
03		72	94
04		80	115
05		60	180
06		60	120
07		90	170
08		90	170
09		60	96
10	average:	114,2	145,4
11		80	120
12		60	127
13	average:	48	135
14		72	92
15		72	92
16		56	122
17		54	132
18		60	90
19		-	-
20		70	126
	Average:	**70,85**	**124,33**

4.3 Results:

Tempo	Lowest/Highest (BPM)	Average (BPM)
Slow	Lowest level: 36 (outlier); otherwise: 54 Highest level: 129 (outlier); otherwise: 90	70.85
Medium	Mean of Slow and Fast: 97,59	97,59
Fast	Lowest level: 90 Highest level: 180	124.33

Appendix 5: Presentation of raw data

5.1 Experiment 1:

id	session_id	session_duration	video	converted	converted_free	converted_paid	gender	birthdate	created_at
1	211	314	Default	0	0	0		2021-08-09	2021-05-10 20:36:04
2	244	0	Classical	0	0	0		2021-08-09	2021-05-10 20:37:20
3	248	0	Classical	0	0	0		2021-08-09	2021-05-10 20:37:39
4	254	0	Pop	0	0	0		2021-08-09	2021-05-10 20:38:02
5	260	0	Default	0	0	0		2021-08-09	2021-05-10 20:38:25
6	261	346	Default	0	0	0		2021-08-09	2021-05-10 20:38:27
7	265	95	Classical	0	0	0		2021-08-09	2021-05-10 20:38:41
8	272	0	Pop	0	0	0		2021-08-09	2021-05-10 20:38:55
9	274	1662	Classical	0	0	0		2021-08-09	2021-05-10 20:38:59
10	275	0	Classical	0	0	0		2021-08-09	2021-05-10 20:39:01
11	289	130	Classical	0	0	0		2021-08-09	2021-05-10 20:39:18
12	300	0	Pop	0	0	0		2021-08-09	2021-05-10 20:39:47
13	304	458	Classical	0	0	0		2021-08-09	2021-05-10 20:39:58
14	317	164	Default	0	0	0		2021-08-09	2021-05-10 20:40:25
15	322	0	Classical	0	0	0		2021-08-09	2021-05-10 20:41:01
16	328	101	Pop	0	0	0		2021-08-09	2021-05-10 20:41:27
17	329	583	Default	0	0	0		2021-08-09	2021-05-10 20:41:30
18	333	0	Pop	0	0	0		2021-08-09	2021-05-10 20:41:39
19	334	0	Classical	0	0	0		2021-08-09	2021-05-10 20:41:41
20	342	0	Classical	0	0	0		2021-08-09	2021-05-10 20:41:59
21	349	765	Classical	1	0	1	M	2005-02-03	2021-05-10 20:42:28
22	351	0	Classical	0	0	0		2021-08-09	2021-05-10 20:42:31
23	356	138	Pop	0	0	0		2021-08-09	2021-05-10 20:42:54
24	358	96	Default	0	0	0		2021-08-09	2021-05-10 20:42:58
25	361	481	Pop	0	0	0		2021-08-09	2021-05-10 20:43:02
26	372	0	Default	0	0	0		2021-08-09	2021-05-10 20:43:21
27	375	0	Classical	0	0	0		2021-08-09	2021-05-10 20:43:29
28	416	60	Default	0	0	0		2021-08-09	2021-05-10 20:45:20
29	417	198	Default	0	0	0		2021-08-09	2021-05-10 20:45:27
30	424	447	Default	0	0	0		2021-08-09	2021-05-10 20:46:10
31	425	94	Pop	0	0	0		2021-08-09	2021-05-10 20:46:15
32	431	0	Default	0	0	0		2021-08-09	2021-05-10 20:46:30
33	433	433	Classical	0	0	0		2021-08-09	2021-05-10 20:46:37
34	434	0	Classical	0	0	0		2021-08-09	2021-05-10 20:46:48
35	443	89	Classical	0	0	0		2021-08-09	2021-05-10 20:47:07
36	445	83	Default	0	0	0		2021-08-09	2021-05-10 20:47:10
37	462	0	Default	0	0	0		2021-08-09	2021-05-10 20:47:55
38	488	0	Pop	0	0	0		2021-08-09	2021-05-10 20:49:12
39	491	434	Default	1	1	0	M	1999-10-24	2021-05-10 20:49:21
40	422	230	Classical	0	0	0		2021-08-09	2021-05-10 20:49:23

5.2 Experiment 2:

id	session_id	session_duration	video	converted	converted_free	converted_paid	gender	birthdate	created_at
401	3521663	386	Default	0	0	0	NULL	2021-10-13	2021-08-18 10:10:50
402	3521788	1146	classic-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:11:18
403	3521793	657	classic-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:11:22
404	3521799	0	Default	0	0	0	NULL	2021-10-13	2021-08-18 10:11:24
405	3521820	40	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:12:02
406	3521827	0	classic-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:12:07
407	3521834	284	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:12:21
408	3521839	0	classic-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:12:26
409	3521846	2099	classic-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:12:38
410	3521854	0	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:12:55
411	3521857	0	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:13:00
412	3521705	269	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:13:06
413	3521870	0	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:13:19
414	3521897	0	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:14:09
415	3521914	1248	pop-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:14:36
416	3521928	0	pop-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:14:51
417	3521932	0	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:14:55
418	3521952	0	classic-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:15:27
419	3521967	66	pop-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:15:50
420	3521968	1038	pop-normal	1	0	1	F	2003-03-04	2021-08-18 10:15:51
421	3521971	66	classic-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:15:58
422	3521976	1880	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:16:06
423	3521982	0	pop-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:16:21
424	3522029	85	Default	0	0	0	NULL	2021-10-13	2021-08-18 10:17:45
425	3522049	34	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:18:24
426	3522062	0	pop-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:18:42
427	3522064	0	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:18:45
428	3522084	63	classic-loud	0	0	0	NULL	2021-10-13	2021-08-18 10:19:18
429	3522095	109	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:19:35
430	3522096	0	pop-soft	0	0	0	NULL	2021-10-13	2021-08-18 10:19:36
431	3522097	58	classic-normal	0	0	0	NULL	2021-10-13	2021-08-18 10:19:38

5.3 Experiment 3:

id	session_id	session_duration	video	converted	converted_free	converted_paid	gender	birthdate	created_at
1	5495545	415	pop loudness low tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:01:38
2	5495547	25	pop loudness high tempo high	0	0	0	NULL	2022-01-17	2021-10-18 09:01:46
3	5495554	76	pop loudness medium tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:01:53
4	5495561	0	classic loudness medium tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:02:10
5	5495580	0	pop loudness low tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:02:43
6	5495581	34	pop loudness medium tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:02:48
7	5495584	0	pop loudness medium tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:02:57
8	5495587	30	classic loudness medium tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:03:05
9	5495589	0	classic loudness medium tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:03:07
10	5495591	1010	pop loudness high tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:03:18
11	5495606	2059	classic loudness medium tempo slow	0	0	0	NULL	2022-01-17	2021-10-18 09:03:57
12	5495612	0	pop loudness high tempo high	0	0	0	NULL	2022-01-17	2021-10-18 09:04:05
13	5495619	48	classic loudness low tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:04:26
14	5495656	200	classic loudness high tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:05:43
15	5495674	0	classic loudness medium tempo slow	0	0	0	NULL	2022-01-17	2021-10-18 09:06:13
16	5495677	0	classic loudness high tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:06:15
17	5495681	230	pop loudness low tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:06:26
18	5495690	242	classic loudness medium tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:06:44
19	5495699	0	classic loudness low tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:07:16
20	5495256	1540	classic loudness low tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:07:58
21	5495734	0	classic loudness low tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:08:49
22	5495740	0	classic loudness low tempo slow	0	0	0	NULL	2022-01-17	2021-10-18 09:09:05
23	5495752	351	classic loudness high tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:09:28

24	5495754	0	pop loudness low tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:09:33
25	5495755	1097	classic loudness low tempo fast	0	0	0	NULL	2022-01-17	2021-10-18 09:09:34
26	5495781	70	pop loudness medium tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:10:33
27	5495784	0	pop loudness low tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:10:39
28	5495785	22	pop loudness high tempo low	0	0	0	NULL	2022-01-17	2021-10-18 09:10:41
29	5495786	1448	pop loudness low tempo normal	0	0	0	NULL	2022-01-17	2021-10-18 09:10:42
30	5495791	23	classic loudness high tempo slow	0	0	0	NULL	2022-01-17	2021-10-18 09:10:53
31	5495550	651	classic loudness high tempo fast	1	1	0	F	1990-12-18	2021-10-18 09:10:53

Appendix 6: Authorization letter

PRIMEROS
Der gute Erste Hilfe Kurs

PRIMEROS Qualification GmbH | Meyfartstr. 16| 99084 Erfurt

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Vom Schreibtisch von
Christian Groschopp
christian.groschopp@primeros.de

Authorisation of data collection

28.02.2023

To whom it may concern,

I confirm that I provided my approval to Mr. Jan Lehr for data collection of website visitors for his doctoral studies in the year 2021/2022.

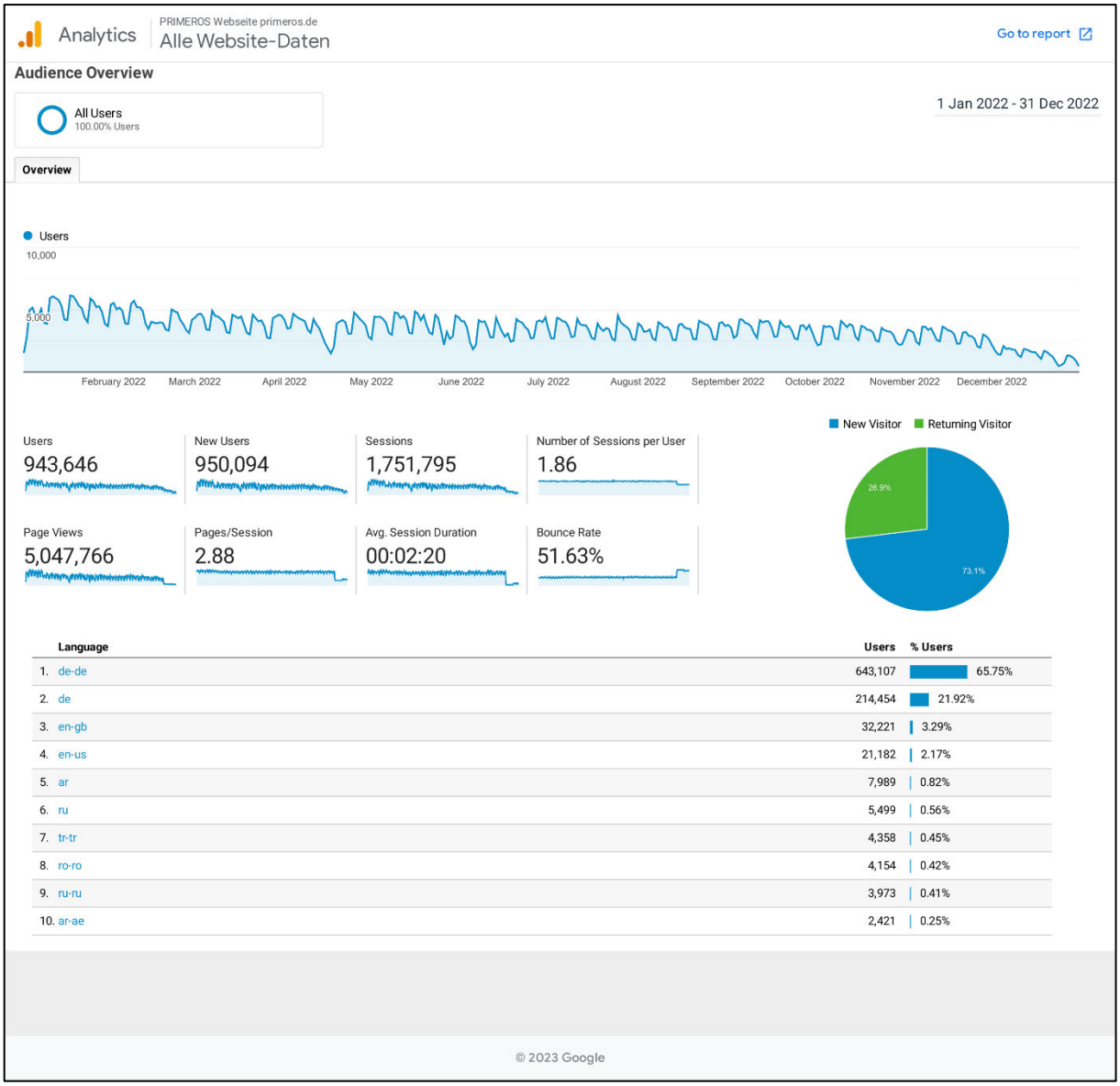
We agreed that the data collection would be completed ethically according to the European GDPR laws. In accordance with the GDPR laws, respondents remained completely anonymous with no identifying information provided.

Kind regards,

[redacted]

Christian Groschopp
CEO
PRIMEROS Qualification GmbH

Appendix 7:


Analytics
PRIMEROS Webseite primeros.de
Alle Website-Daten
Go to report
Audience Overview
All Users
100.00% Users
1 Jan 2022 - 31 Dec 2022
Overview
Users
10,000
5,000
February 2022
March 2022
April 2022
May 2022
June 2022
July 2022
August 2022
September 2022
October 2022
November 2022
December 2022
Users
943,646
New Users
950,094
Sessions
1,751,795
Number of Sessions per User
1.86
Page Views
5,047,766
Pages/Session
2.88
Avg. Session Duration
00:02:20
Bounce Rate
51.63%
New Visitor
Returning Visitor
26.9%
73.1%
Language
Users
% Users
1. de-de 643,107 65.75%
2. de 214,454 21.92%
3. en-gb 32,221 3.29%
4. en-us 21,182 2.17%
5. ar 7,989 0.82%
6. ru 5,499 0.56%
7. tr-tr 4,358 0.45%
8. ro-ro 4,154 0.42%
9. ru-ru 3,973 0.41%
10. ar-ae 2,421 0.25%
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