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EDUARDO RECH

Sounds of consumption: the influence of nonmusical sounds on services and retail settings

Cristiane Pizzutti dos Santos, PhD
Supervisor

Porto Alegre, 2017

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ABSTRACT

Previous literature shows that sensory stimulation, such as pictures and scents, can affect consumers' choices in a retail setting. Visual stimulation (i.e., pictures of fruit), for example, make people choose more healthy foods, especially when they are hungry (Forwood, Ahern, Hollands, Ng, & Marteau, 2015). Following the same logic, sound might also trigger consumers' choices and perceptions, meaning that specific products are expected to be chosen more frequently when congruent sounds are played. However, the extant literature has paid little attention to this role of sound. This work therefore focuses on auxiliary sounds (nonmusical) in the shopping environment, especially those intentionally set using audio systems to improve and compose the experiential shopping environment. More specifically, this research investigates whether auxiliary sounds influence people's choice, decisions, and perceptions through the semantic properties (meanings) of sounds. Five studies were conducted to investigate these effects of auxiliary sounds; the first is a field experiment and the other four are lab studies. The field study showed exploratory results on the effect of auxiliary sounds on people's choice behavior. The first lab study (Study 1) considered a service context choice, where sounds were set in the "soundscape" of a fictitious travel agency. When city sounds were played as the background sound in the environment, the city destination was chosen more than the beach destination. Study 2 showed that congruence between sounds and options increase the choice of those options, even when more options are available. Study 3 found that when sound is strongly associated with product appeal or positioning, and this association is perceived by the consumer, it increases people's intention to buy the product. The last study showed that, for an experiential positioning, congruent sounds can improve people's intentions to visit the store by improving people's attitudes toward the store. These results shed light on the study of auxiliary sounds in retail and services environments, bringing to surface some effects that serve as an initial parameter on the study of this phenomenon. It also has managerial contributions as sounds can be strategically used by marketers in order to promote a richer consumption experience.

RESUMO

Estímulos sensoriais como imagens e aromas, podem afetar a escolha dos consumidores no varejo. Pistas visuais (ex.: imagens de frutas), por exemplo, fazem com que as pessoas escolham mais comidas saudáveis, especialmente quando estão com fome (Forwood et al., 2015). Seguindo esta lógica, o som também pode ativar escolhas e percepções dos consumidores. No entanto, a literatura existente tem dado pouca atenção ao papel do som. O presente trabalho trata dos sons auxiliares (não musicais) no ambiente de compra, especificamente aqueles colocados intencionalmente no ambiente de compra. Mais especificamente, o trabalho busca investigar se os sons auxiliares influenciam as escolhas, decisões e percepções das pessoas por meio das propriedades semânticas (significados) dos sons. Cinco estudos foram realizados no sentido de investigar estes efeitos dos sons auxiliares, onde o primeiro estudo foi um experimento de campo, enquanto que os demais foram estudos de laboratório. O estudo de campo, com caráter mais exploratório, demonstrou que os sons auxiliares podem ter um efeito sobre o comportamento de escolha dos clientes. O primeiro estudo de laboratório (Study 1) considerou o processo de escolha no contexto de serviços de agência de viagem, onde os sons influenciaram a escolha dos consumidores (ex.: sons de cidade fizeram com que os destinos turísticos de cidade fossem mais escolhidos, comparado com os destinos de praia). O estudo 2 (Study 2) verificou a influência dos sons auxiliares em um ambiente com mais opções disponíveis para escolha. O estudo evidenciou que a congruência entre os sons e as opções disponíveis podem influenciar a escolha dos consumidores, mesmo com uma maior gama de opções. No estudo 3 (Study 3) a associação feita pelo consumidor entre som e o apelo/posicionamento do produto aumenta a intenção de compra dos consumidores em relação ao produto. O último estudo (Study 4) demonstrou que o uso dos sons auxiliares congruentes com o posicionamento de uma loja, fazem com que o consumidor tenha atitudes mais positivas em relação à loja, e consequentemente aumenta a intenção de visitar a loja. No entanto, este resultado foi significativo apenas para lojas com posicionamento experiencial. Estes resultados são um primeiro passo no estudo dos sons auxiliares nos ambientes de varejo e serviço, trazendo à tona alguns efeitos que servem como um parâmetro inicial no do estudo deste fenômeno. Isto reflete também em aplicações estratégicas dos sons musicais no ambiente de compra de modo a enriquecer a experiência de compra do cliente.

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1 Introduction

Sensory cues, such as odors and music, influence perceptions, behaviors, learning, and memory processes in decision-making contexts (Krishna, 2012). As a consequence, a growing number of studies are considering these influences on decision-making and consumer judgment (Krishna & Schwarz, 2014).

Previous literature has shown that sensory stimulation, such as pictures and scents, can affect consumers' choices in a retail setting. For example, Forwood et al. (2015) found that visual stimulation (i.e., pictures of fruit) makes people choose more healthy foods, especially when they are hungry, and Gaillet-Torrent, Sulmont-Rossé, Issanchou, Chabanet, and Chambaron (2014) reported that a pear odor influenced people to choose more fruity desserts over non-fruity ones. This influence on choice can be explained by the association process (Gaillet-Torrent et al., 2014), which occurs if a semantic congruence exists between a cue and an option (e.g., barking sound drawing attention to a picture of a dog); (Hagtevedt & Brasel, 2016; Krishna, Elder, & Caldara, 2010).

Following the same logic, sound might also trigger consumers' choices and perceptions; that is, consumers might choose specific products more frequently when congruent sounds are played. For example, in a retail environment, a product with a healthy appeal might be chosen more frequently than other products when a subtle sound of nature (e.g., birds or water) is played. However, the extant literature on sensory marketing has paid little attention to this role of sound. One exception is the field study of North, Hargreaves, and McKendrick (1999), which found that French (German) music led to French (German) wines outselling German (French) wines, thus indicating the influence of congruent sound cues on choice in the shopping environment.

According to Özcan and Van Egmond (2008), even though people seek silence for some products (particularly computer fans and dishwashers), sound plays an important role in creating the complete experience of other products or in other situations (e.g. amusement parks). As sound is considered a property of any object or activity, retail spaces and services also have their particular sounds. Additionally, investigations into the effect of music on advertising and retail environments have indicated that auditory cues can influence consumers' perceptions, attitudes, and behaviors (Meyers-Levy, Bublitz, & Peracchio, 2010).

Service and retail spaces are considered to be controlled environments in terms of sound, especially by using music as a distractor to noises (Yorkston, 2010). However, Yorkston (2010) pointed out that nonmusical sounds can have unexpected effects on the environment. The author suggests that ancillary and ambient sounds can be applied intentionally in order to improve peoples' shopping experience (Yorkston, 2010). According to Soars (2009) "there is no need to restrict transmitted sound to music" (p. 293). However, even though strategies related to sound have been applied in the buying and consumption context, and many studies have examined the use of music in the retail environment (Bruner, 1990; Hul, Dube & Chebat, 1997; Jain & Bagdare, 2011; Kellaris & Kent, 1992; Milliman, 1982, 1986; Morin, Dubé & Chebat, 2007), the use and importance of nonverbal and nonmusical auditory elements in this environment have been neglected.

Soundscapes have background and foreground sounds: background sounds are typically continuous sounds that can be easily ignored (e.g., ambient noise from an airport lounge), while foreground sounds are louder, intrusive, and situational (e.g., airport announcements) (Treasure, 2011). Treasure (2011) explained that these sounds must be carefully considered because, even though people tend to focus on foreground sounds, background sounds, despite being less evident, can still influence their behavior. For example, according to Sayin et al. (2015), adding some foreground ambient sounds (e.g., birds singing) in car parks and metro stations increases the perception of safety and satisfaction with the public area, and thus raises consumers' willingness to purchase.

Although sound is a difficult variable to control in the marketplace (Krishna & Schwarz, 2014), sound technology innovations, such as ultra-directional sound systems, allow marketers to control and manipulate sounds independently or to supplement traditional visual elements (e.g., visual displays) (Pompei, 2009). To the best of our knowledge, the work of Mehta, Zhu, and Cheema (2012) is one of the few to explore nonverbal and nonmusical sounds. The authors analyzed the influence of noise (i.e. roadside traffic, multi-talker noise, etc.) on consumer creativity and found that noise can increase a consumer's willingness to buy innovative products (Mehta et al., 2012). However, noise is not classified as an auxiliary sound, which is the type of sound that the present work aims to investigate.

Auxiliary sounds are nonmusical sounds that are attached to the product and/or service that might play a valuable role for companies and consumers (Yorkston, 2010). These sounds are subdivided in two distinct categories: ancillary and ambient sounds. Ancillary sounds are associated with some product attribute, while ambient sounds are specific to the consumption experience (Yorkston, 2010), and both types of sound can promote a richer consumption experience. From a consumer experience perspective, the sound of the space or the environment are critical for making people spend more time in the services or shopping environment (Beckerman, 2014).

Yorkston (2010) claimed that, although the auxiliary role of sound on consumers' decision-making has been neglected, it could exert an important role for companies and consumers. Therefore, this dissertation asks the following research question: How do auxiliary (ambient intentional) sounds influence consumers' intentions and choices in the shopping environment?

This work focuses on auxiliary sounds in the shopping environment, particularly those intentionally set using audio systems to compose and improve the experiential shopping environment. More specifically, this study aims to investigate whether auxiliary sounds influence people's choice, decisions, and perceptions through the semantic properties (meanings) of sounds. This influence is expected to occur because of the congruence between the sound and the appeal of the service or product (e.g., beach sound and beach destination/farm sound and product with farm appeal). The congruence perspective refers to the association between two atmospheric cues, which influence a person's responses to an environment (Cheng, Wu, & Yen, 2009).

The present work aims to further analyze whether environmental sounds (auxiliary sounds) influence consumers' perceptions and behaviors. Since many sounds, especially nonmusical sounds, are out of the control of the marketer (e.g. roadside traffic sounds) and intentionally put by them (e.g. birds chirping sound), it is reasonable to explore their effects. The investigation might inform managerial decisions about the soundscape of retail and service environments that are usually concerned solely with musical sounds, even though many other sounds occur in the same place. From a scientific perspective, the exploration of such effects will bring answers about a neglected but very present sound cue.

The term "appeal of the offer" was chosen because of its comprehensive meaning, which can relate to communicating the meaning of both the product and service. For example, Liao, Shen, and Chu (2009) used the term "appeal" to convey meanings of products (e.g., their hedonic or utilitarian appeal), and Schuhwerk and Lefkoff-Hagius (1995) used "appeal" when referring to the categorization of products (e.g., green and non-green product appeal), where these appeals emphasized more or less green attributes for each product. The "appeal of the offer" in the present work thus refers to the implicit appeal of a product (e.g., a salad has a healthy appeal) and the explicit appeal of a product or service (e.g., positioning messages in a restaurant ad, with a more functional or hedonic appeal).

The remainder of this dissertation is organized as follows. Chapter 2 provides the theoretical background to this study, and discusses sound, the processing of sounds, sound and consumption, and the effect of sound on consumers' evaluation, perceptions, and behaviors. This chapter also presents the hypotheses for the research.

Chapter 3 describes the studies: one field experiment and four lab-experiments. The field experiment explores the effects of the auxiliary/nonmusical sounds in the actual consumption environment. The first two lab experiments examine how choice as the outcome variable is affected by sound treatments. Study 1 investigates the effect of the auxiliary sounds on people's choice of travel destinations (service) in a travel agency context, and Study 2 verifies the influence of auxiliary sounds on people's choices of food (products) in a bar context. Study 2 differs from Study 1 by giving the participants more options and adding music as a sound treatment. The last two studies investigate the mechanisms that explain the effect of sound on an individuals' buying behavior. Study 3 verifies how sound associations made by consumers explain their buying intention of goods, considering the association between three different versions of a product (appeals) and two different sounds, and Study 4 examines how the match between sound and positioning (appeal) affects individuals' evaluation of the store, thus affecting their intention to visit the store.

Chapter 4 discusses the results, limitations, directions, and implications for future research.

2 Theoretical Background

This chapter presents the theoretical basis of this dissertation. The first section (2.1) describes the fundamental aspects of sound and its classifications, and the next section (2.2) sheds light on the cognitive processing of sounds, dealing with modes of listening, and individual peculiarities concerning sound processing. Section 2.2 also contemplates crossmodal effects, which are the interactions between different sensory modalities. With the plethora of sound that is present in many types of environments, this section also addresses the topic of sensory overload. The last section (2.3) discusses sound and its effects on consumer behavior.

2.1 Sound

Listening makes the invisible be present, the
same way that vision is to silence
(Ihde, 2012).

Sound is a ubiquitous element in our lives. Considering that we live in a rich context, where information is available in multiple formats, sound is just one of those formats, which most of the time, we hear independently of our will. Although the terms *hearing* and *listening* are often used interchangeably, they are differentiated by the degree of intention (Roost, 2011). Hearing involves little or no intention from the individual to process a sound, while listening involves the acknowledgement and intention to be influenced by the source of the sound (Roost, 2011).

People are in constant interaction with sounds. We are immersed in a sound environment where soundscapes change and have significant impacts on our lives, both negative and positive. Noise pollution, caused by an excess of noise present in the environment, is an example of a negative soundscape. However, a sound structure that could promote a soundscape capable of preserving, stimulating, and multiplying desirable sounds can create a positive soundscape change (Schafer, 1994).

In many situations, sound seems to be only a supporting resource. However, when sound is processed below the consciousness level, it might be responsible for carrying much of the meaning about what is happening. For example, when seeing a hand stabbed by a needle without sound, it seems artificial, but with sound, it becomes a more realistic situation (Chion, 1994).

There are two regions, vision and audition, that have borders and limited horizons. The region of vision contains stable (x) and mobile (-y-) entities; the last entities are generally followed by sound, and the vision becomes limited to the invisibility horizon. The end of the sound presence region is surrounded by the silence horizon, and the sounds are followed by movements (-y-) and sounds without visual presence (-z-). The crossover between these regions, as presented in Figure 1, is where some entities involving sound and movement overlap (Ihde, 2007, 2012).

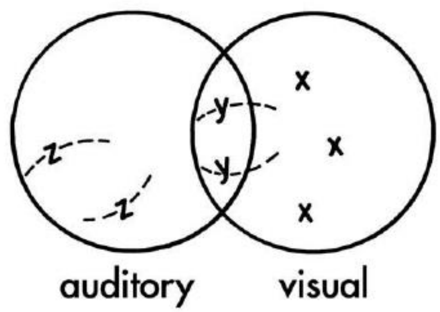

Figure 1. Audio-visual Overlap
Note: Adapted from Ihde (2007, 2012)

In this audio-visual interplay, one of the modalities typically dominates the other. Although this domination is context dependent, there is a tendency to bias toward the visual modality, because of the Colavita effect (Hecht & Reiner, 2009). The Colavita effect occurs when a visual sign (light) is matched with a sound (tone) based on their subjective intensity, and a visual dominance remains, even if the sound intensity is doubled (Colavita, 1974).

Even with this visual dominance over an auditory stimulus, sound is always present and plays an important role in our lives. Therefore, sounds such as the motors of cars, music played on the radio, people talking to each other, or the sound of a knife falling on the floor could be objects of research considering that they can influence behavior. Children also exemplify the usefulness of sound by imitating the sounds of movements or actions with their voices while playing with their toys (Chion, 1994).

The instrumental use of sound is central to film production, which employs many methods and techniques to produce effective sounds. For example, the perfect punch sound is obtained by hitting a frozen chicken, dry pasta, fruit, or other unusual objects (Steinberg, 2014). Similarly, in the video game context, the sounds determine moments of tension, agony, and other sensations that the game aims to deliver (Collins, 2008). Collins (2008) highlighted that a sound composer for games needs to use a wide variety of compositions because the player will spend a considerable time playing and listening to the sounds, and they might become annoyed and tired of repetitive sounds. As an informational cue, sound promotes a better understanding about some situations. For example, cooking sounds are informative when using different cooking techniques because each technique has a particular sound (Hevrdejs, 2014).

An important aspect to consider when talking about sound and the environment is Chion's (1994) superfield. In the film context, the superfield is the room used for creating ambient sounds, noise, music, and many others buzzes that surround the visual space, which can be generated by speakers outside the bounds of the big screen (Chion, 1994). In the video game setting, the sounds reflect the actions of the player (Collins, 2008). Going forward, Chion's (1994) superfield perspective could be used to strategically analyze and build interactive spaces, such as spaces of consumption.

These different nuances of sound demand some systematization to organize the knowledge of the object. Several classifications delimit the scope of the comprehension of sounds.

In terms of action and dynamism, sounds can be classified as diegetic and non-diegetic sounds. Diegetic sounds need individual interaction with the present context; the actions performed by individuals will result in sounds corresponding to the situation (e.g., gun sounds in a shooting video game). Non-diegetic sounds are linear and non-dynamic sounds; that is, sounds that are independent of the action of the player (e.g., ambient music) (Collins, 2008).

Sounds can also be classified as musical and nonmusical. However, this classification becomes unclear because a musical sound is not necessarily music, but is rather a regular musical note characterized by a wave pattern that repeats and vibrates between 20 and 20,000 times (Powell, 2010).

Furthermore, it is important to distinguish between verbal and nonverbal sounds. Verbal sounds refer to words and explanations of concepts, while nonverbal sounds are sensory cues that can activate concepts, in this case, with the help of verbal cues (Crisell, 1994; Edmiston & Lupyan, 2013). Within the nonverbal sounds, it is possible to establish two types of sounds: sound effects and sound shots. Sounds effect represent objects or environments, while sound shots are changes in the intensity of the sound, characterizing a spatial dimension in relation with the situation that it occurs (Rodero, 2010). These definitions are applied mainly to the sound production for radio. However, sound effects can also be used effectively in advertisements. For example, using a synthesizer, Suzanne Ciani added sounds to images in an ad piece and used congruent sounds based on the movements of light signals on a dishwasher (e.g., lights on = ping), thus giving the machine a kind of personality (Taylor, 2012). Although this is only an example without any scientific results, it is an important example of how sound can be applied to market objects.

Treasure (2011) suggested a classification of sounds based mainly on their source. The first type of sound is the human voice, which, like our fingerprints, is unique. The author considers that people can master their voices by being conscious of their accent, inflection, overtones, and other physical conditioners to develop an ideal voice. He also claimed that effective use of the voice can reach an advantage in negotiations (Treasure, 2011).

Music is another category of sound that is entwined with every aspect of human activity. Although it is already known that music has substantial effects on human behavior, a clear understanding of its specific effects is lacking. Interactions between melody, harmony, timbres, voice, tempo, rhythm, style, and associations happen simultaneously, making it a complex phenomenon to investigate (Treasure, 2011).

Natural sounds are another type of ambient sound that is stochastic. Treasure (2011) divided natural sounds into three categories: wind, water, and birdsong (WWB), which form the soundscape of any location.

Treasure (2011) also considered noise a category of sound; in this case, the source of the sound is less important because noise can be a circumstantial classification. Noise can be divided into two categories: signals and noise. A signal serves as a cue to information that we want, while noise is residual or unwanted information (Treasure, 2011). The distinction between noise and signals depends on the individual perspective. For example, while the Sex Pistols music might be noise incarnate for a devoted classical music buff, Beethoven can be noise to a hard-core punk fan (Kosko, 2006). Table 1 summarizes the classification of sounds.

Table 1. *Classifications of Sounds*

Type of Sound	Definitions	Example
Collins (2008) a) **Diegetic** b) **Non-diegetic**	a) Resulting sound of an action in a specific situation. b) Sound overlapping some situation.	a) Sound of kicking a ball during a football match. b) Narration of the match.
Powell (2010) a) **Musical** b) **Nonmusical**	a) Regular sound with standard and repetitive waves. b) Irregular sounds without wave pattern.	a) Musical notes. b) Sound of breaking glass.
Crisell (1994) **Edmiston & Lupyan (2013)** a) **Verbal** b) **Nonverbal** a. **Sound effects** b. **Sound shots**	a) Speech and concept explanations and meanings. b) It can carry but does not explain concepts or meanings: a. Representation of objects or environments (what the sound is). b. Spatial dimensions related to the situation where the sound occurs (where the sound is).	a) Conversation between two people. b) Nonverbal examples: a. Car sound. b. The sound of a car that is 500 m away is less intense than the sound of a car in front of me.
Treasure (2011) a) **The human voice** b) **Music** c) **Natural sounds** d) **Noise** a. **Signal** b. **Noise**	a) Language (verbal) or metalanguage (nonverbal sounds). b) Melody, harmony, timbres, and instrumentations, voice and words, tempo and rhythm, style and associations. c) Wind, water, and birdsong (WWB) sounds that are stochastic (as opposed to stressful urban sounds). d) Signal is the information that people want, while noise is the unwanted sound/information.	a) Speech, conversation. b) Rock 'n' Roll song. c) Wind in leaves, rainfall, and birdsong. d) Signal: cell phone ring for the user. Noise: sound of a truck passing by while sleeping.

Note: adapted from Collins (2008), Crisell (1994), Edmiston & Lupyan (2013), Powell (2010), Treasure (2011).

Many small sounds act as sonic triggers that can turn a forgettable experience into something memorable and meaningful. These small sounds can also trigger memory and reactions, such as the case of new moms and dads who have heightened reactions when hearing the sound of a baby crying (Beckerman, 2014). The relation between sound and meaning known as sound symbolism (Hinton, Nichols, & Ohala, 2006), which is widely studied in the language context, gives us a greater capacity to understand some phenomena involving sound and their possible influences on human behavior.

According to Spence (2012), sound symbolism is the association made by people between specific sounds and attributes of a stimulus (e.g., words having "i" associate with tiny things). Thus, it is important to understand the symbolism concept from the following four categories (Hinton et al., 2006; Klink, 2000):

- *Corporeal sound symbolism* relates to the sounds issued by the speaker that express their inner emotional and physical state. Some involuntary manifestations such as coughs and sobs are examples of these sounds.

- *Imitative sound symbolism* refers to the meaning of sounds that imitate sounds of the environment but that are difficult to express graphically because they are outside of the spoken language patterns.

- *Synesthetic sound symbolism* is defined by the process in which vowels, consonants, and suprasegmentals are chosen to represent visual, tactile, or proprioceptive proprieties of objects, such as their size and shape.

- *Conventional sound symbolism* is the analogical association of phonemes and clusters with certain meanings; they are considered strictly language-specific.

These several characteristics and definitions about sound as individual inherent elements and their interactions with people and things make it relevant to consider sound inside the consumption phenomena, as well its influential role on consumer behavior.

With these characteristics and classifications, sound may influence people's perceptions and behaviors. Thus, the mechanisms involved in the processing of sounds have a critical role in consumption and buying situations.

2.2 Processing of Sounds

As verbal and nonverbal elements struggle for the limited cognitive resources during the moment of message exposure, they could interfere in the learning process of a printed verbal ad, inhibit the elaboration ability of consumers, and affect product judgment (Tavassoli & Lee, 2003).

A differentiation between hearing and listening is vital when processing sounds. Hearing involves the relationship between the sound and its perceiver; the sound is processed involuntarily, since the sound waves "hit" us, configuring a physical/electrochemical process. However, listening is about our relationship with the sound, which is an active choice and a skill involving the perception and interpretation of sounds (Treasure, 2011).

Initially, it is necessary to consider sound from its two forms. One is the sound as a physical aspect, as air vibrations coming from a sound source, and the other is the sound as something perceived, as the perception of those air vibrations (Plomp, 2002). Perceptions have more than just a processing level. The perception processing starts from the analysis of the physical or sensory attributes of a stimulus, which precedes the internal search for pattern recognition and meanings of the stimulus (Craik & Lockhart, 1972).

The cognitive processing of sounds happens sequentially after receiving the sensorial stimulus. Some processing can happen below awareness and influence an individual's attitudes and behaviors by triggering automatic processes. In our daily interaction with objects, we listen to auditory cues that carry useful information about these objects, and we assimilate these cues, even when we are unaware of them (Zampini & Spence, 2005).

When we consider perceptions related to sensory stimulus, it becomes possible to develop mental images (MacInnis & Price, 1987), which can be visual, sound, tactile, olfactory, and gustatory (Bourne, Dominowski, & Loftus, 1979). According to Childers and Huston (1983), the impact of mental imagery on information processing has important implications related to marketing communication.

Several studies deal with the mental imagery process inside the consumption context of sensory stimulus (Krishna, Morrin, & Sayin, 2014; Peck, Barger, & Webb, 2013). However, mental imagery might refer to a specific sense and be evoked from different senses from those imagined. For example, if I listen to a sound effect in a radio ad, I might imagine a picture based on that sound (Rodero, 2010) and build a visual image based on the sound stimulus.

Miller and Marks (1992) researched the mental imagery activation by sound effects in radio advertisement and its positive influence on listeners' feelings. The authors found that listeners had more favorable attitudes toward advertisements with sound effects and showed an improvement in the learning process of brand information (Miller & Marks, 1992).

According to Plomp (2002), the cognitive aspects regarding research on sound are not investigated with the same intensity as the psychophysical aspects of sound perception. Plomp (2002) highlighted that perception not only produces sensations but also unconsciously produces interpretations based on past experiences. Following Martindale, Moore, and West's (1988) work about typicality and semantic categories being predictors of preference, North, Hargreaves, and McKendrick (1999) discussed knowledge activation by music, triggering associations semantically related with the musical piece in question. The cultural differences influencing sound and vision information processing is an example of semantically driven associations based on peoples' cultural backgrounds (Meyers-Levy et al., 2010). In line with these semantic associations and meanings related to sound cues, Meyers-Levy et al. (2010) posited that "a broad spectrum of language related variables can affect the persuasiveness of global communications" (p. 145).

The study of sound processing is important to apply to a context and is essential in scientific studies concerning cognition. Several studies have contributed to the knowledge about noise affecting the cognitive control[1] of individuals using complex methods involving fMRI (Hommel, Fischer, Colzato, van den Wildenberg, & Cellini, 2012). However, the results of these previous studies have shown that the noise generated by the fMRI equipment can amplify or overestimate the results when using this kind of equipment, thus making the tasks performed by the participants more challenging (Hommel et al., 2012).

Sound processing can happen at high and low levels. A stimulus is processed initially at a low level as an unconscious process and is then consciously processed at a high level of representations, which has to do with visual or verbal representations created by imagery processes (Kouider & Dehaene, 2007). However, Kouider and Dehaene (2007) emphasized that there is no clear limit between the two levels of processing, and an individual can turn their attention at any time to one of many levels of representations caused by the stimulus, making it conscious. These unconscious processes are not independent of the attention or strategies used by participants in the studies, and whichever is the task and the attention set consciously prepared, it can guide and amplify the subliminal or unconscious stimulus processing (Badgaiyan, 2012; Dehaene, Changeux, Naccache, Sackur, & Sergent, 2006; Kouider & Dehaene, 2007).

2.2.1 Modes of Listening

According to Chion (1994), people have three modes of listening: causal, semantic, and reduced listening. Causal listening is concerned with determining the source of a sound (e.g., the barking sound must come from a dog); semantic listening refers to a code or language to interpret a message; and reduced listening is limited to the sound processing per se, where there is no attention to the sound source and meaning but to the physical aspects of the sound.

However, Tuuri et al. (2007) proposed a new hierarchy based on Chion (1994), where each level of listening mode refers to the level of cognitive abstraction from low to high.

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[1] "*Cognitive control* refers to processes that flexibly and adaptively allocate mental resources to permit the dynamic selection of thoughts and actions in response to context-specific goals and intentions" (Fan, 2014, p. 1).

The listening modes are grouped into four groups of modes: pre-conscious, source-oriented, context-oriented, and quality-oriented modes. The pre-conscious group comprises the *reflexive mode*, which is the trigger for attention, and the *connotative mode*, which refers to immediate associations triggered by sound. The group of source-oriented modes contains the *causal mode*, which identifies the object and the source, and the *empathetic mode,* which is the meaning of the sound based on someone's state of mind. The context-oriented group comprises the *functional-oriented mode*, which reflects the utility and need for that sound; the *semantic mode*, which searches for the meaning of the sound; and the *critical mode*, which involves questioning the adequacy of a sound in a given situation. Finally, the quality-oriented group is only composed of the *reduced listening mode*, which is a thorough technical analysis of the sound (Tuuri et al., 2007).

These levels or hierarchies of the listening modes define how each person perceives and talks about any sound to which they have listened (Chion, 1994); this can disclose individual differences in processing and paying attention to sounds.

From another perspective, Treasure (2011) presented the qualities of listening, but not hearing, which are classified into four dimensions: *active-passive, critical-empathetic*, *reductive-expansive*, and *not listening*.

Active listening involves the intention, focus, reflection, and summarizing that the listener performs to understand the speaker; whereas, *passive listening* is conscious but does not involve any effort on the part of the listener to interpret the sound (Treasure, 2011).

Critical listening involves filtering the sound heard to dismiss anything that does not meet our criteria. Conversely, *empathetic listening* considers that the listener is prone to accept and agree with everything to which he listens and demonstrate agreement (Treasure, 2011).

Reductive listening is characterized by getting "straight to the point"; this type of listening discards anything that does not move toward the goal. By contrast, *expansive listening* focuses on the details (Treasure, 2011). In a conversation, the author relates this classification to gender, where reductive listening is more representative of male listeners, and expansive is more closely associated with female listeners.

The *not listening* dimension describes when, despite hearing the sound, the listener chooses not to listen to it. People can do this when the sound is an insignificant noise instead of an important signal. This type of listening is also caused by illnesses such as auditory processing disorders, or even depression. These dimensions presented by Treasure (2011) are above the threshold of awareness, especially considering the conscious processing of sounds.

2.2.2 Individual Sensory Characteristics

As sound processing is the core mechanism behind the phenomenon examined by this study, some individual characteristics relating to the sensory stimulus processing must be considered. Based on two dimensions, Dunn (1997, 2008) proposed a model of sensory processing, where self-regulation and neurological thresholds determine the individual's behavior toward a sensory stimulation.

Table 2. *Dunn's Model of Sensory Processing*

Neurological Thresholds	Self-Regulation	
	Passive	**Active**
High Threshold	Bystander	Seeker
Low Threshold	Sensor	Avoider

Note: Adapted from Dunn (1997, 2008)

According to this classification, seekers create excitement and change all around them, bystanders are easy-going and can focus even in busy places, avoiders create routines to keep life peaceful and manageable, and sensors notice what is going on and have ideas about how to handle situations (Dunn, 2008). These various reactions and behaviors toward sensory stimulation are observed in children playing with toy blocks. While some children will be amused by the sound of these blocks falling on the floor (e.g. seekers), others will cover their ears because the noise is disruptive (e.g. avoiders) (Dunn, 1997). Additionally, seekers are able to choose clothing by the sound of the fabrics while they move; for example, "if a person seeks sound, then swishy fabrics, jewelry that clacks together, shoes with noisy soles or corduroy will do the trick" (Dunn, 2008, p. 151).

In their study about playful buying experiences, Holbrook et al. (1984) highlighted that some individual preferences can influence emotional responses and performance in visual vs. verbal games. This influence occurs because some people prefer visual processing (visualizers) while others prefer verbal processing (verbalizers). Argo, Popa, and Smith (2010), who investigated sound repetition in the phonetic structure of brands, considered the individual ability to perceive repetition patterns in a sound context as a moderation variable.

Furthermore, two individual characteristics concern auditory processing tasks: noise sensitivity (Zimmer & Ellermeier, 1999) and noise annoyance (Vastfjall, 2002).

Noise sensitivity is considered a stable personality trait, which refers to attitudes toward a wide range of ambient sounds (Zimmer & Ellermeier, 1999). Many studies have examined its relation with stress with the environment and other interactional approaches, and there are ways to measure that, and also good arguments about using one or another measure (Zimmer & Ellermeier, 1999).

Noise annoyance might also reflect personality aspects involving sensitivity and attitudes toward noise. The mood of the individual can directly influence judgments of noise annoyance and determine their sound preferences (Vastfjall, 2002). Researchers have previously examined noise annoyance situations involving physical attributes of sound, attitude toward sound source, and personal characteristics of respondents (Zimmer & Ellermeier, 1999).

Besides noise sensitivity, there is an individual trait involving a sound deviation susceptibility called the irrelevant-sound effect. This trait is found in people are who more susceptible to sounds that break their capability of performing a short-term recall task, in a way that causes changes in their memory extension (Elliott & Cowan, 2005). These personal characteristics for processing sound corroborate Fraedrich and King's (1998) approach, which states that sound can evoke a wide range of (un)pleasant feelings depending on the life experiences of the individuals.

Additionally, some neurophysiological aspects are important in sound processing. For example, non-linguistic sound stimuli are processed and perceived in a different way when processed by the different hemispheres of the brain (left ear/right hemisphere; right ear/left hemisphere); where the left ear has a greater specificity when processing sounds compared to the right ear (González & McLennan, 2009). Although sound processing can be exclusively explained using the physiologic approach, some authors believe that sound sensitivity is not a reflection of a sensorial and physiological predisposition, but rather a reflection of attitudinal and evaluative components considering sound (Zimmer & Ellermeier, 1999).

However, while individual differences in sound processing and perception are associated with physiological and demographic aspects, sensory perception can be affected by chemical components of human organisms and genetic components (Fraedrich & King, 1998; Frenzel et al., 2012).

2.2.3 Crossmodal Effects

As sound is associated with sensory processing, a match between two senses creating a crossmodal effect seems reasonable. Several studies have investigated crossmodal effects using sound and visual input (Stutts & Torres, 2012; Vroomen & de Gelder, 2000). Crossmodal effects are directly related to interactions between attributes or dimensions of a stimulus in different sensory modalities. Such correspondences refer to semantic or synesthetic congruency. Semantic congruency refers to associations (match/mismatch) considering identity and meaning, while synesthetic congruency deals with correspondences of basic stimulus characteristics that reflect in different modalities (Spence, 2011).

According to Spence (2011), crossmodal effects are classified as statistical, structural, and semantic. Statistical crossmodal correspondences happen when pairs of stimulus dimensions are related naturally (‘big’ size object and ‘low’ frequency resonance), structural crossmodal correspondences occur because of innate neural connections, and semantic crossmodal correspondences occur when the words that people use to describe the stimulus overlap its dimension (i.e., ‘high’ in terms of sound tone and elevation of a visual stimulus).

Crossmodal correspondences do not share the same kind of automaticity present in synesthesia; however, because they can have a rapid effect on behavior, they do not entirely fit into the four criteria (goal-independence, non-conscious, load-insensitivity, and speed) seem that classify automatic processing (Spence & Deroy, 2013). Additionally, the crossmodal effect of a sensory stimulus includes the effect of sound on the taste and flavor of food and drink (e.g. sour, sweet, bitter, etc.), which is different from the effect of sound on the hedonic aspects of taste/flavor perceptions (e.g. tasty/disgusting, big/small) (Spence, 2014)

Sound can affect visual processing in that, when not synchronous (i.e., before or after) with a visual cue, the sound tends to influence the latency period and the attention given to the target object (Keetels & Vroomen, 2011). This finding complements those of another study that manipulated the synchrony between tone change in a continuous sequence of sounds and the presentation of an image (Vroomen & de Gelder, 2000). Semantic associations might happen when visual and auditory cues are paired. Albertazzi, Canal, and Micciolo (2015) found that some multisensory features (e.g., quick/slow, agitated/calm, strong/weak), which served as characteristics of both visual and auditory stimuli, were congruent with the participants' choice of paintings when listening to a specific music (i.e., fast tempo music made people choose paintings classified as "quick").

These semantic effects are explained by the semantic analyzers, which claim that some stimuli are hypothetically perceived and some nodes are activated. These nodes code basic-level concepts, general concepts, and superordinate categories, making it possible to relate the sound vertically (vertical connection) and exert differentiation between these nodes (lateral inhibition) (Martindale et al., 1988). For example, it is possible to relate a barking dog sound with a dog, or even a wolf (vertical connection), but not a bird (lateral inhibition).

In an applied context, Spence (2012) examined crossmodal aspects related to the sound symbolism of a brand, considering the phonetic traits of the brand name and the shape attributes. Spence (2012) found a relation between oral sensations such as taste and flavor, and phonetic aspects, tones, musical instruments, musical parameters, shapes, and colors (see Table 1 in Spence, 2012). From the same perspective, Stutts and Torres (2012) matched sound and images with the influence of product flavor and found that, when flavor (e.g., chocolate) is incongruent with the last shape presented in the stimulus (e.g., spiked shape image), it can influence the correspondence between the congruent sounds and images (e.g., rounded vowels and curvy images). The symbolic influence of sounds in people's perceptions is also affected by the pronunciation of words; that is, words with more plosives (non-plosives) consonants tend to describe rectilinear (curvilinear) objects better.

The interaction between sound and image shows an important relation with an individual's perception, wherein the sound can help to communicate the meaning of an image that would be more difficult to portray visually (Chion, 1994). Because we use information from all of the senses to build our perception of the food we eat (Crisinel & Spence, 2009), sound properties can also affect taste. Using an association task, Crisinel and Spence (2009) found strong associations between low and high-pitched sounds with bitter and sour tastes, respectively.

Considering a miscellany of subjects and applications related to sound, it is evident that sound exerts important influences on human behavior. Thus, sound permits a wide range of research in many contexts, specifically in the consumer behavior setting.

2.2.4 Sensory Overload

Although sensory stimulations are considered crucial for a better consumer experience, few attempts have been made to question the amount of sensory stimulation that might be effective or harmful. From a sensory perspective, a threshold of acceptance might exist based on consumer profiles and types of business.

At a more fundamental level, there can be no doubt that most people need (or seek out) an optimal level of sensory stimulation. What is more, significant individual differences exist in the level of stimulation that the consumer wants or needs. Spence (2002) highlighted the example of those workplaces where "the sick building syndrome" increases the cost to businesses by millions each year. This condition might, in part, be attributable to inappropriate types or levels of sensory stimulation in the environment, causing mild forms of sensory deprivation, such as a lack of light and touch hunger (see Field, 2001).

By including the appropriate multisensory cues at the point-of-purchase (PoP) (Middleton, 2002; Spence, 2002), it is possible to enhance the affective response while potentially increasing the amount of time consumers spend inside the store, their touching time, and their purchases (Hultén, 2012). In one in-store study, Hultén (2012) found that adding olfactory (vanilla scent) and visual cues (brown and red mats and decanters) to the wine glasses section of an IKEA store led to a significant increase in the consumers' desire to touch the products. The relation between visual and olfactory cues and the desire to touch indicates a significant increase in the probability of making a purchase (Hultén, 2012). By recruiting more senses with which to analyze the products, consumers demonstrate the need for a multisensory context when buying certain goods.

However, store managers need to be aware of how exactly a store appeals to the human senses by identifying the most significant impacts (Hultén, 2012). As Schmitt (1998) noted, "Too much stimulation, too much of the same colour in an environment, too much repetition of the same tune can be annoying" (p. 11). Hence, more sensory stimulation is not always a good thing.

Sensory cues are known to influence our behavior and sometimes do so unconsciously (Zomerdijk & Voss, 2009). These sensory cues can have a direct influence on consumers' emotions

(Roberts, 2004), but they are mediated by the individual's level of pleasure and arousal (Baker, Levy, & Grewal, 1992), the servicescape[2], and the provider's attitude (Morin et al., 2007).

An important aspect related to the servicescape is the store image. Store image is based on the saliency of the various attributes that are evaluated and weighted against each other (e.g., O'Cass & Grace, 2008) and should be defined as the complex aggregate of a customer's perception of a store based on salient attributes (Houston & Nevin, 1981). Attribute saliency would appear to be related to the amplification of some attributes such as the type of music and its level in the shopping environment. However, would this saliency exacerbate the consumer's threshold of acceptance?

Situations containing an excess of symbolic and physical stimuli can provoke overstimulation, or overload (Lipowski, 1975), which is when the rate and amount of stimuli exceed people's capacity to cope with them (Milgram, 1970). The discussion about the amount of stimuli present in the shopping environment relates to stimulus load theory, which encompasses the affective, behavioral, and cognitive domains either in a positive (enhancing) or negative (irritant) way (Eroglu & Machleit, 2008). Eroglu and Machleit (2008) emphasized that the load theory is based on an inverted-U-shaped function, considering the stimuli and their effects on the three domains cited earlier (affective, behavioral and cognitive).

One of the mechanisms that explain this inverted-U-shaped function is information overload (e.g., Eroglu & Machleit, 2008). Sensory input, which consists of physical stimuli, differs from information input, which is based on symbolic stimuli. However, as overload refers to the excess of both symbolic and physical stimuli (Lipowski, 1975), and as physical stimuli should be related to meaningful aspects, information and sensory overload can be used interchangeably (Malhotra, 1986).

According to Lindenmuth, Breu, and Malooley (1980), "sensory overload is a marked increase in the intensity of stimuli over the normal level. This disrupts the cerebral processing of information and decreases the meaningfulness of the environment" (p. 1456). Additionally, Malhotra (1986) pointed out that information and sensory overload can be addressed from the perspective of a decision-making or non-decision-making focus. When dealing with decision making, the consensus of many decision-making approaches is that "if an attempt is made to

[2] The term servicescape is the conceptual definition of the totality of the service or retail environment "including lighting, decor, temperature, and noise level" cueing the customers in to what the store wants to communicate (Bitner, 1992; Booms & Bitner, 1982, p. 39).

process ‘too much’ information (…), overload occurs leading to dysfunctional consequences” (Malhotra, 1986, p. 11).

Sensory overload can be a unisensory phenomenon because a loud noise can prevent the ability to smell or taste (Crocker, 1950). This is presumably what happens when restaurant reviewers complain about places that are so loud many diners simply cannot hear themselves think, let alone converse with their dining companions (e.g., see Spence, 2014, for a review).

In his discussion using senses in the shopping environment, Middleton (2002) quoted Millner, who stated that the PoP display is a form of disturbance of the habitual shopping behavior by engaging emotions through senses, which suggests that the PoP is able to move consumers away from their usual way of shopping. However, this appeal can result in a sensory overload, since any stimulus can be exacerbated in terms of intensity and quantity; for example, a store might inconsequently turn up the volume of music or places many different colors in the same section. As Spence (2014) warned, some retail outlets that bombard consumers with visual cues (e.g., sale signs and multiple colors) are likely to do so with other senses such as scent (Middleton, 2002).

Some ambient characteristics, which are classified as irritating when exacerbating the levels of acceptance, fit the aforementioned definition of sensory overload (e.g., temperature inside store that is too hot; music that is too loud) (d’Astous, 2000). Therefore, one might ask how sensory overload in one modality influences the load on another sense. The example of loud music in a restaurant is directly associated with the audition overload (Spence, 2014). When audition is overloaded by an increasing noise level, it dampens the gustatory cue intensity, diminishing the saltiness and sweetness perception of food (Woods et al., 2011). Following the ongoing complaints regarding airline food, Yan and Dando (2015) examined the impact of airplane sound on taste and found that, even for different concentrations of a sweet solution, the sweetness of the same solution was rated differently across manipulations (airplane sound/no sound).

2.3 Sound and Consumption

The sounds of products, shopping environments, brands, and advertisements (Krishna, 2012) have different configurations and characteristics in each place or object, thus reflecting the significant effects of sound on psychological and behavioral aspects of consumption. This sections considers some of these types of sound. Chion (1994) described how sound adds value to an image that is synchronous and naturally amplifies the experience with the phenomena or image in question in a way that the sound assumes only a supporting role when communicating meanings. Spectator analysis can be performed by isolating each contributing element and determining the meaning and entire information about that moment from only the image. However, the simultaneous processing of sound and image by an individual must occur unconsciously because the individual is unaware of the role of sound in communicating meaning, even if the sound is sometimes a dispensable element (Chion, 1994).

According to Peck and Childers (2008) "our judgments about a store (and) its products, […] are driven in part by the smells we encounter (our olfactory system), the things we hear (our auditory system), the objects we come into physical contact with (our tactile system), our taste experiences (the gustatory system), and what we see (the visual system)" (p. 193). Additionally, the sound of brands, as an omnipresent element in the market context, is an important subject to consider. Brands can be represented and identified by sound signs (e.g., Intel, MGM) (Krishna, 2012; Kiley, 2007), or by their phonetic structure, which relates to the pronunciation of the brand name (Argo et al., 2010; Yorkston & Menon, 2004). Many companies put considerable effort into the sound cues of their products. The sound cue might be desirable (e.g., 'pop' sound when unscrewing a Snapple bottle) or unwanted (e.g., textured plastic wrapper of Tampax) (Byron, 2012).

The phonetics of brands have been well investigated. Even though the contact with the brand name is only visual in many situations, the brand name requires auditory processing such as word-of-mouth information and radio advertisements (Carnevale, Lerman, & Luna, 2010). Argo et al. (2010) addressed the pronunciation of brands from two different perspectives—the figurative language and the sound symbolism perspective—to investigate the repetition of sounds when audibly exposed to a brand name (e.g., Coca-Cola, Kit Kat, and Tostitos). From the perspective of sound symbolism, Klink (2000) investigated the sound of brand names and its ability to inform consumers about size, speed, and weight. Yorkston and Menon (2004) also showed that, in addition to listing some product characteristics, consumers can evaluate the brand from its phonetic structure. Some influences of language also occur because prices are perceived differently when pronounced in English and Chinese (Coulter & Coulter, 2010).

Therefore, a sound permeates the mood of the environment, service, or object (Yorkston, 2010) and tends to affect some dimensions of the experiential value. In particular, music is capable of influencing behavioral aspects, such as time spent shopping, and emotional aspects, such as pleasure and mood (Bruner, 1990). Music is also present in the consumer context and is considered a powerful stimulus in building the buying experience. Music is a key factor that engages, entertains, energizes, invigorates, involves, and creates a memorable pleasure experience for the consumer (Jain & Bagdare, 2011).

Milliman (1982, 1986) researched background music effects in two different environments: supermarkets and restaurants. His studies examined music tempo (fast or slow) to identify the effects of different tempos on buying behavior, and he found that music with a slower tempo makes the client spend more time at the restaurant and spend more money naturally (Milliman, 1982, 1986). Familiarity with the music can also influence the difference between the perceived and the real time spent by customers while shopping (Yalch & Spangenberg, 2000).

In the services environment, music is integrated with other elements such as signs, actions, symbols, and artifacts that shape holistic perceptions of the consumer about the servicescape (Morin et al., 2007). In this sense, Morin et al. (2007) verified that music valence[3] affects consumers' responses, in physical and online environments, through holistic perceptions. Kellaris and Kent (1992) manipulated music modality and found that the time duration perception was perceived as bigger when music had major intervals (positive valence) compared to atonal music (negative valence).

Under a symbolic perspective, Spangenberg, Grohmann, and Sprott (2005) compared the effects of matching Christmas music and scent, and found that the store evaluations were better when a match was present between the music and the scent, both with a Christmas association.

People build cognitive schemas on their previous experiences (Kraus & Slater, 2016) with a product or service based on product and services cues (e.g., thick and glossy paper for magazines and large windows in fast food restaurants). These schemas contribute to people's inferences about quality (Roest & Rindfleisch, 2010). Roest and Rindfleisch (2010) considered only visual cues and a categorization process; however, sound can be considered from the same perspective when inferring quality perceptions (e.g., tapping the car dash, see Montignies et al., 2010).

Nevertheless, the sounds in the retail environment need not be restricted to music; some businesses experience different soundscapes (see Schafer, 1994) such as the sounds of water and birds (Soars, 2009). In the online context, many websites have background music, institutional

[3] The definition of valence by Gibson (2015), who cited Kurt Lewin's approach to valence, is that it is based on vectors represented by "arrows" pushing the observer toward (positive valence) or away (negative valence) from the object.

sounds, and interactive sounds. However, these elements demand more research with respect to their influence on consumer behavior (Wang, Minor, & Wei, 2011). Despite the larger amount of marketing studies considering sound from a musical perspective (Lageat, Czellar, & Laurent, 2003), nonmusical sounds can also affect some aspects of the consumption phenomenon, such as attention, association, and memory (Fraedrich & King, 1998).

According to Yorkston (2010), besides music, the consumption environment comprises auxiliary sounds that are nonmusical sounds. These sounds are subdivided into ancillary sounds and ambient sounds. Ancillary sounds relate directly to a product or service and can be used as cues for expected performances (e.g., the slam of a car door). Ambient sounds do not relate to the product or service, but to the surrounding environment (e.g., cars passing by). These sounds, when considered in the services context, especially entertainment spaces (e.g., ESPN Zone), might promote a richer or more playful experience to customers and can sometimes get closer to "reality" (Kozinets et al., 2004).

Some ancillary sounds related to the product serve as alternative evaluation cues. For example, the slam of a Rolls Royce car door sounds more elegant than that of a Volkswagen Beetle door (Lageat et al., 2003). However, while the act of tapping the car dash to make a sound might not have absolute influence on the evaluation of a car or its dash, this sound cue can perhaps influence the consumer's judgment (Montignies et al., 2010).

The relation between sound and brand should be considered when talking about nonmusical sounds. Harley-Davidson is a good example of this relation because the company attempted to trademark the roar of the V-Twin engine, which is known to be "as recognizable to motorcycle enthusiasts as 'The Star Spangled Banner'" (Roberts, 2004, p. 28).

In the virtual context, the use of sound icons (e.g., sound of a cash register or a greeting sound) can potentially influence consumers' affective and cognitive states and their approaching or retracting behavior in virtual stores (Eroglu, Machleit, & Davis, 2001). Additionally, inserting 3D sounds related to spatial dimensional aspects of a website makes the user find information faster (Gunther, Kazman, & MacGregor, 2004).

Another important classification of sound in the consumption phenomena is based on the origin of the sound when considering products. Özcan and Van Egmond (2008) separated product sounds into *consequential* and *intentional* sounds. Consequential sounds result from the functioning of the product and depend on the type of source in action (e.g., engine and rotating gears), and intentional sounds are designed to convey messages. Both classifications can be linked when examining intentional sounds in the service and retail environments. Ancillary and ambient sounds, defined by Yorkston (2010), could both be manipulated and made intentional if we apply Özcan and Van Egmond's (2008) approach to the service environment.

Following Holbrook and Hirschman's (1982) work on the experiential aspects of consumption through its hedonic, esthetic, and symbolic nature, several researchers have considered the hedonic side of consumption, which is associated with sensory and experiential attributes and the utilitarian aspect of consumption (Park, Lim, & Kim, 2013). In general, atmospheric variables can affect consumers' perceptions toward the shopping environment, and thus influence their approach or avoidance, time spent in the environment, and sales (Turley & Milliman, 2000).

This experiential route might result in more hedonic outcomes (Kunz, Schmitt, & Meyer, 2011). Thus, characteristic or ancillary sounds from a specific type of service (e.g., people talking and dishes clanking) can be more utilitarian-related, and conceptual ambient sounds (e.g., nature sounds—waterfall, rain) more hedonic-related. This classification of the intentional ambient sound as hedonic is based on the hedonic valence of symbolic ambient sounds (e.g., nature sounds), which could turn the consumption experience into an affective and sensory experience of fantasy, pleasure, and fun (Dhar & Wertenbroch, 2000; Holbrook & Hirschman, 1982).

Notably, nonverbal sounds assume a negative valence when classified as noise, which by definition are undesirable sounds (Mehta et al., 2012). Many psychology studies treat nonverbal sounds as noise (e.g., Azrin, 1958; S. Cohen & Spacapan, 1984; Hommel, Fischer, Colzato, van den Wildenberg, & Cellini, 2012; Lotto & Holt, 2011; Weinstein, 1978). However, when played at a moderated level, noise might enhance performance in creative tasks and promote consumers' buying intention of innovative products (Mehta et al., 2012), which opens an important avenue for research on nonverbal and nonmusical sounds.

Sound composes the experiential dimension of the shopping environment with other cues and has some effect on consumer perceptions and decisions. As this chapter shows, sound can influence consumers' routines in the shopping or consumption environment. However, the effect of auxiliary sounds needs to be investigated further because few studies have examined this type of sound.

Fraedrich and King (1998) claimed that nonmusical sound is different from music because the judgment of music pleasantness relates to past experiences, such as the moment that the music was listened to before. However, the suavity of a nonmusical sound relates to the sound per se instead of the experiences related to it. Thus, the same music can have different meanings for different people, while nonmusical sounds tend to have less variability among individuals. While a sound can attract a spectator's attention to an ad, it also can confound and distract if its features go beyond the viewer's perception threshold to become an annoying noise (Fraedrich & King, 1998).

Table 3 presents some studies that investigated sound as their main variable. The classification of studies was made based on three types of sounds: (a) music, (b) phonetics, and (c) auxiliary (nonmusical) sounds.

Table 3. *Studies About Sound (Music, Phonetics, and Auxiliary Sounds)*

Type of Sound	Reference	Objective	Independent Variable	Outcome Variables	Findings
Music	Gorn (1982)	The impact of the background features of a commercial on product preferences.	Music (liked vs. disliked)	(1) Choice	Many people (74 out of 94) chose the pen associated with the liked music, while few people chose the pen associated with the disliked music (30 out of 101). However, when there is a decision-making task, the music has less impact. The author advocates that liked music is more evident in a non-decision-making condition.
	Milliman (1986)	The influence of background music on the behavior of restaurant patrons.	Music tempo	(1) Consumption time, (2) waiting time, (3) money spent.	People exposed to slow tempo music took significantly more time to finish their dinner than those exposed to fast tempo music. The waiting time for a table was significantly higher when slow tempo music was played compared to when the fast tempo music was played. People spent significantly more on alcoholic drinks when slow tempo music was played compared to when fast tempo music was played.
	Kellaris & Kent (1992)	The influence of music valence on consumers' temporal perceptions.	Music valence (major key vs. atonal)	(1) Perceived duration	Perceived duration was longest for subjects exposed to positively valenced music (major key), and shortest for negatively valenced music (atonal).
	Kellaris & Mantel (1996)	The effect of music congruence and arousal on estimates of ad duration.	Music congruence (low vs. high) and music arousal (exciting vs. calm)	(1) Perceived duration of the ad	Arousal was found to moderate the influence of stimulus congruity on perceived time. For the low arousal condition, there was a significant difference on perceived duration of the ad between low and high congruence condition. Time duration of the ad was perceived higher for the high congruence and low arousal condition than the low congruence low arousal condition.

Hui, Dube, & Chebat (1997)	The effect of music on consumers' reactions to waiting for services.	Music valence (pleasant vs. unpleasant)	(1) Perception of wait duration, (2) emotional response to wait, (3) approach to the service organization.	The judgement/valence of music ameliorates the emotional evaluation of the service environment, which in turn positively affects approach behavior toward to the organization. Compared to negatively valenced (unpleasant) music, positively (pleasant) valenced music results in a more positive emotional response to the wait and a stronger approach to the organization. Positively valenced music increases people's perception of the wait duration, but it had no significant effect on consumers' behavioral response to the service organization.
North, Hargreaves, & McKendrick (1997/1999)	The influence of in-store music on wine selections.	Music style	(1) Choice	French wine outsold German wine, when French music was played in the store; German wine outsold French wine, when German music was played.
Yalch & Spangenberg (2000)	The effect of familiar music on duration perception, emotional states, and merchandise evaluations.	Music familiarity	(1) Duration perception, (2) arousal.	Participants self-reported as shopping longer while exposed to familiar music, but the actual shopping duration was longer when exposed to unfamiliar music. Increased arousal explains the shorter actual shopping duration.
Baker, Parasuraman, Grewal, & Voss (2002)	The influence of environmental cues on consumers' store decision criteria.	Music style (classical/high level store vs. top 40/low level store)	(1) Merchandise value perceptions, (2) store patronage intentions.	Music has a positive indirect effect on merchandise value perceptions and store patronage intentions.
Oaks (2003)	The influence of musical tempo on waiting perceptions	Music tempo	(1) Duration perception, (2) satisfaction, (3) positive disconfirmation of expectation, (4) relaxation.	Slow-tempo music made people perceive a shorter wait compared to the actual waiting time. When the actual waiting time exceeded 15 minutes, the effect eroded. Positive affective responses (satisfaction, positive disconfirmation of expectations, and relaxation) were significantly enhanced by slow rather than faster-tempo music.
Tavassoli & Lee (2003)	The effect of auditory and visual elements on learning of and cognitive responding of English vs. Chinese ad copies.	Nonverbal music and nonverbal images	(1) Information processing, (2) recall.	Nonverbal auditory (visual) stimuli interfered more with alphabetic English (logographic Chinese) processing. Auditory (visual) memory cues facilitated the recall of English (Chinese) advertisements.

Spangenberg, Grohmann, & Sprot (2005)	The joint effects of ambient scent and music on consumers' evaluations of a store, its environment, and offered merchandise.	Music style	(1) Store attitudes, (2) intention to visit the store, (3) pleasure, (4) arousal, (5) dominance, (6) evaluation of the environment.	Consumers' evaluations are more favorable when the Christmas scent is in the presence of Christmas music (congruence). However, the presence of Christmas scent with non-Christmas music lowers evaluations.
Morin, Dubé, & Chebat (2007)	The influence of background music on service evaluation and purchase intention.	Music pleasure intensity	(1) Servicescape attitude, (2) purchase intention, (3) provider attitude.	High pleasant music had a positive direct effect on servicescape attitude, a positive indirect effect on purchase intention, and a provider attitude through servicescape attitude.
Hagtvedt & Brasel (2016)	The influence of sound frequency and color lightness on visual attention guidance.	Music frequency (low vs. high)	(1) Attention, (2) choice, (3) automaticity.	High frequency sounds and music (vs. low frequency) drives attention to light (vs. dark) color shelves and influences people's purchase behavior by making more people buy bananas from a white (black) shelf. The visual attention shift is automatic because participants' attention is driven by sound, even when they are oriented to the sound incongruent visual cue.
Wang, Baker, Wakefield, & Wakefield (2017)	Influence of background congruent music in the website on consumers' responses.	Music congruence	(1) Arousal, (2) pleasantness, (3) perceived usefulness, (4) perceived enjoyment, (5) intention to use website.	Congruent background music on a website's homepage generates positive affective responses (arousal and pleasure) and enhances perceived usefulness and perceived enjoyment. The affective responses differed by gender, where the arousal generated by the music was not a significant driver of behavioral intentions for females. Website music produces significant affective and cognitive responses in high web skill/low web challenge users and explains more of website enjoyment.
Knoeferle, Paus, & Vossen (2017)	The moderation of in-store music on the effect of social density on customer spending.	Social density & music tempo (fast vs. low)	(1) Customer spending	Fast music strongly increased spending under high-density conditions. The increase in shopping basket value was driven by customers buying more items rather than buying items that were more expensive. Fast music alleviates negative effects of social density.

Phonetics	Klink (2000)	Sound symbolism in brand names delivering information and meanings.	Phonetic properties	(1) Perception of product attributes and characteristics	Phonetic properties (front/back vowels sound, stop vs. fricatives, voiced vs. voiceless stops) of the brand names can affect people's perceptions of products.
	Yorkston & Menon (2007)	The effect of sound symbolism in brand names on consumers' judgements.	Sound symbolism (different vowels)	(1) Product attribute perception, (2) brand evaluation.	Brands with phonetic [ä] sound are evaluated heavily (product attributes and brand evaluation) compared with brands with phonetic [i] sound. When brand was described as true, the "Frosh" brand was evaluated (both DV's) higher than the "Frish" Brand. When the true/false information was presented simultaneously with the brand, the result remained the same. When people had normal cognitive capacity, there was a significant sound symbolism effect only when the brand was considered true. For people with cognitive impairment, sound symbolism had a significant effect on brand evaluations regardless of whether the brand was "true or false."
	Argo, Popa, & Smith (2010)	The effect of linguistic characteristics of brand names on product evaluations.	Sound repetition (phonetic structure)	(1) Affect, (2) brand evaluations, (3) reaction to cross selling, (4) choice.	A brand name that has sound repetition in its phonetic structure and is spoken aloud produces positive affect, that positively affects brand evaluations, reaction to cross-selling, and product choice. Some moderators were significant (sensitivity to repetition, opportunity to experience emotions, degree to which the brand name's phonetic sound repetition deviates from linguistic expectations).
Auxiliary sounds (nonmusical)	Miller & Marks (1992)	Effect of the sound effects used in radio commercials on mental imagery of products.	Ancillary sound of products	(1) Mental imagery, (2) emotions, (3) attitude, (4) brand learning.	The use of sound effects compared with only messages (text) in radio commercials of a lawn mower improved metal imagery, increased warmth emotions, created stronger attitudes, and improved learning for brand information (aided and unaided recall, and recognition). Sound effects in the lawn mower commercial had positive emotions and attitudes as a consequence of the improved mental imagery.

Montignies, Nosulenko, & Parizet (2010)	Influence of the sound of tapping the dashboard in a car on consumers' perceptions about the car.	Ancillary sound of products	Quality judgement	By tapping the dashboard of two different cars, people judged the quality of matter of vehicle 1 poorer than that of vehicle 2. For vehicle 1, the judgement of participants who tapped the dashboard was far more severe than of those who merely observed.
Mehta, Zhu, & Cheema (2012)	Effect of ambient noise on creativity.	Ambient noise	(1) Performance on creative tasks, (2) buying likelihood of creative products.	Moderate levels of noise (70 dB) enhances performance on creative tasks and increases buying likelihood of innovative products, when compared to low levels of noise (50 dB).
Sayin et al. (2015)	The effect of ambient sound on the perceived safety of public spaces.	Ambient sound (Auxiliary and Music)	(1) Social presence perception, (2) perceived safety, (3) satisfaction, (4) willingness to purchase.	Different types of ambient sound convey social presence to different degrees. Perceived safety was higher when human vocal sound was played compared to animal vocal sound, instrumental music, and no sound condition. Satisfaction with the service and social presence were higher when human and animal vocal sound were played (separately). There was also an indirect effect of the type of sound on people's willingness to purchase the service mediated by perceived safety.
Knoeferle, Knoeferle, Velasco, & Spence (2016)	Semantically related sound (spatially uninformative) facilitates consumers' visual search for a specific brand that is presented in another sensory modality.	Ancillary sound of products	(1) Visual search	Product-related sound reflexively attracts a participant's visual attention to the associated product or brand. Semantically congruent sound only affects the allocation of visual attention if a search goal has been activated. The effect of sound congruence on visual search has no difference between long term semantic associations and short-term multisensory learning.

The studies summarized in Table 3 show that few works consider auxiliary sounds, thus highlighting the importance of this research, especially considering the effects of auxiliary sounds on consumer behaviors in the shopping environment. Overall, previous studies have identified different types of sound in the buying context. Table 4 highlights these sounds and their effects on consumers based on the contents of this chapter. The next section hypothesizes the expected effects of auxiliary sounds on consumers' perceptions, choices, and behavioral intentions.

Table 4. *Types of Sound and Their Effects*

Type of sound	Example	Actual and Potential Effect
Music	(a) Music tempo (b) Country of origin (c) Positive/negative modality (d) Semantic association between music and environmental cues (e.g., Christmas music and scent).	(a) Time spent in store/consumption amount of some products (e.g., drinks) (b) Choice (c) Time duration perception (d) Store evaluation/perception
Brand phonetics	(a) Language of the brand (b) Sound symbolism (e.g., sound repetition: Kit-kat; Coca-cola. Tostitos)	(a) Perceived discount (b) Semantic associations (e.g., size, speed, weight).
Brand signs	(a) Brand tone (e.g., Intel, Coke)	(a) Recall/identification
Auxiliary (attached and/or ambient sounds)	(a) Attached product sound (e.g., Harley roaring sound, tapping the dashboard, slam of a car door) (b) Sound put on purpose on the ambient (e.g., ESPN Zone, Rainforest Cafe) (c) Sound icons (e.g., cash register sound in virtual stores)	(a) Association, perception, product evaluation (b) Playful experience perception (c) Approach/retracting behavior

2.4 The Effect of Auxiliary Sounds on Customer's Perceptions, Choices, and Behavioral Intentions

This work centers on the influence of auxiliary sounds on consumer responses by relating their semantic properties with the appeal of the offer (product or service). Considering the power that a sound has to communicate meanings, the association with other sensory cues such as images, products, or even texts must be paired or congruent to cause a more accurate recall of the given object and its respective concept (Fraedrich & King, 1998). The effects of auxiliary sound are expected in the present work to affect (1) choice and (2) avoidance/approach response (i.e., intention to visit the store and buying intention).

It is known that characteristic sounds of products can affect how rapidly people can find products while scanning supermarket shelves. For example, the association process enabled people to find the target product (e.g., champagne bottle) faster when there was a congruent sound (e.g., uncorking a champagne bottle) compared to an incongruent sound (Knoeferle, Knoeferle, Velasco, & Spence, 2014; Knöferle & Spence, 2012). According to Gaillet-Torrent et al. (2014), the association process also explains the influence of odor on choice, and Mitchell, Kahn, and Knasko (1995) found that people tend to spread their choices evenly over the whole choice set when the scent is congruent with the product class, compared to an incongruent scent.

Many authors have studied congruence between products and sensory cues in the marketplace (Baker, Parasuraman, Grewal, & Voss, 2002; Krishna, 2012; North et al., 1999; Spence, 2011). According to Baker et al. (2002), consumers attend to environmental cues to gather information about products and the store as a whole. Therefore, sound, as a ubiquitous cue, would carry information and meaning for customers, regardless of whether it is consequential or intentional.

The semantic association between environmental cues and offers can also be seen in the study of Sester et al. (2013), which found that people chose drinks based on video clips (i.e., a video clip of a desert made people choose more drinks with Latino-American names, and a clip of an iceberg prompted people to choose hot drinks such as coffee and hot chocolate). Berger and Fitzsimons (2008) found that conceptually related cues in the everyday environment make people choose certain products more frequently (i.e., people writing with an orange (green) pen, were more likely to choose orange (green) products). This induced choice relates to congruence between stimuli and the ambient sound (e.g., beach pictures and beach sounds).

These semantic associations might explain influences of auxiliary sound on choice in relation to the classical conditioning approach, where the association between a product and an environmental cue (e.g., auxiliary sound) triggers people's preferences and choices (Gorn, 1982). We expect that some products will be chosen more when auxiliary sounds are semantically congruent with them (e.g., nature sounds leading to choosing a healthy dish in a restaurant). We thus post the following hypothesis:

H1: A higher (vs. lower) congruence between the auxiliary sound and the service/product appeal increases the individual's choice of such a service or product.

Sound can also trigger some perceptions around services/retailing. Verhoef et al. (2009) determined that the retail atmosphere, which consists of design, scents, temperature and music, was one of the determinants of customer experience creation. The effect of the atmospherics on buying behavior aspects include patronage intentions, perceived value (Baker et al., 2002), attracting/avoidance behavior, evaluations, intentions in a broader sense (Puccinelli et al., 2009), and pleasure and arousal (Baker et al., 1992; Kaltcheva & Weitz, 2006).

Roest and Rindfleisch (2010) suggested that “cues signaling category typicality may (also) inform the consumer about the usual performance on quality attributes of prototypical members of that product category” (p. 10), especially with mature product categories. The match between sound and visual cues (or even verbal cues) explain associations made by consumers when interacting with these cues; thus, congruence between cues might improve consumers’ responses in the marketplace (Krishna, 2012).

Yorkston (2010) stated that auxiliary sounds are expected to have different associations and effects depending on the type of service. Specifically for the ambient sounds, when considering their intentional or consequential classification (i.e., Özcan & Van Egmond, 2008). Some intentional sounds might set the mood or the concept of the environment (e.g., intentional: skating sounds in the skaters’ clothing section). According to Krishna (2012), semantic associations between sensory cues might improve people’s approach and product evaluations. The congruence between sound and products is also known to facilitate a product search on a virtual shelf display (Knoeferle et al., 2016; Knöferle & Spence, 2012).

These associations and communication of meanings emanating from sensory cues might result in more positive evaluations of stores and behavioral intentions, such as buying intention, when auxiliary sounds are semantically related with the appeal of a service or product. We therefore hypothesize as follows:

H2: A higher (vs. lower) congruence between the auxiliary sound and the service or product appeal will increase individuals’ intentions to buy such a product.

Another important aspect of consumer behavior is the approach/avoidance response. In this sense, the Stimulus-Organism-Response (S-O-R) perspective (Mehrabian & Russell, 1974) can be used to explain the effects of auxiliary sounds on the approach/avoidance response. The S-O-R perspective posits that “the environment is a stimulus (S) containing cues that combine to affect people’s internal evaluations (O), which in tum create approach/avoidance/behavioral responses (R)” (Spangenberg, Crowley, & Henderson, 1996, p. 68).

According to Oh et al. (2008), the S-O-R perspective is the background of the expected effects of the present work, where the S (stimulus) is the sound manipulation; the O (organism) are the associations, perceptions, and affective outcomes (e.g., store image and attitude toward the store) triggered by the sound; and the R (response) is represented by people's behavioral intentions.

When considering auditory cues, music is known to influence the behavioral responses of consumers, such as their pace while shopping, the sales volume, and time spent in the shopping environment (Milliman, 1982; Milliman, 1986). According to Allan (2008), the Mehrabian and Russel model is frequently used to explain the effects of music effects on consumer behaviors in retail spaces.

According to Puccinelli et al. (2009), by understanding the consumer decision process under some theoretical domains related to each stage, we can shed light on the perception of the experiential value of retail settings. Such theoretical domains, which refer to the source of some consumer behaviors and perception, relate to the atmospherics applied in the retail context. According to the authors, "store atmosphere can interact with consumer perceptions to affect behavior" (Puccinelli et al., 2009, p. 24).

In a study considering visual cues, the use of a thematic (conceptually related) picture-based designed generated more positive store image evaluations and a higher expectation of merchandise quality among online consumers when compared to a non-thematic, text-based store design (Oh et al., 2008). Effects of the S-O-R perspective were also found in studies examining sensory cues present in traditional retail settings (e.g., Mattila & Wirtz, 2001; Michon, Chebat, & Turley, 2005) and online settings (e.g., Cheng, Wu, & Yen, 2009; Eroglu et al., 2001). The findings suggest that an approach (avoidance) response from the individual is expected when the ambient sound is congruent (incongruent) with the concept of the store, making people increase (decrease) their intentions to visit the store.

While auditory stimulation might influence people's behavior, the path between sound and behavior is not always straightforward; thus, some affective states might mediate this effect (Peck & Childers, 2008). A meta-analytic review of 150 studies on the effects of background music in retail settings found that the majority of studies were concerned with affective (41%) (e.g., arousal, mood) instead of behavioral (10%) (e.g., patronage frequency, store choice) outcomes (Garlin & Owen, 2006).

In terms of perception and intentions, the presence of ambient sounds can influence the perceived safety of public places (Sayin et al., 2015). For example, people in a hypothetical situation at the metro station were more willing to purchase a metro pass when non-threatening vocal sounds were played as an alternative to no sound or threatening vocal sounds (Sayin et al., 2015). Therefore, we propose the following hypothesis:

H3: A higher (vs. lower) congruence between the auxiliary sound and the store appeal will increase an individual's intentions to visit such a store mediated by (a) store image perception and (b) attitude toward the store. Figure 2 summarizes the expected effects of auxiliary sounds.

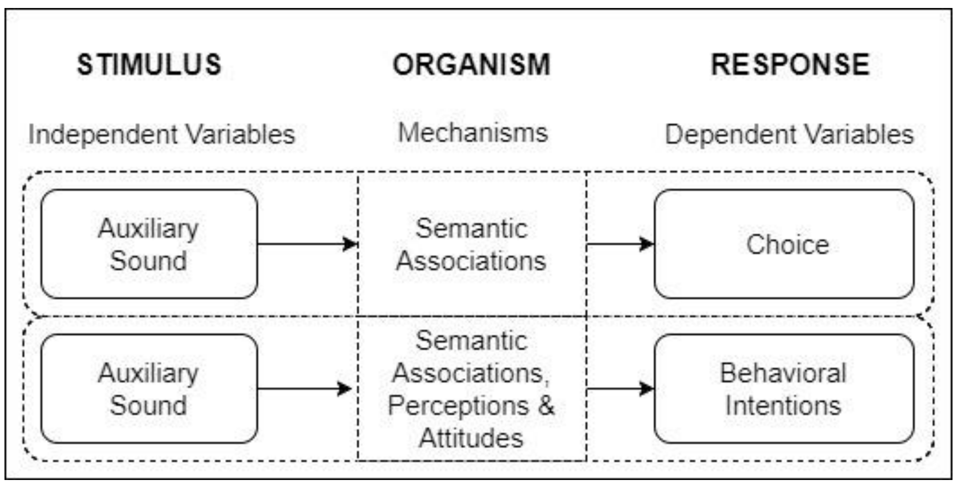

Figure 2. Expected Effects

3 Overview of the Studies

To investigate the effects of auxiliary sounds on consumer behavior, a series of studies was conducted to examine the interplay between the sound and the appeal of the service/product, and its effect on consumers’ responses, including choice, buying intention, and intention to visit the store. These studies comprise one field study and four lab experiments.

Each study considered congruence the main mechanism of influence on people’s perceptions and behaviors. This work considers auxiliary sound as an ambient factor; thus, the sound can be congruent or incongruent with any cue present in the environment. The majority of these studies (i.e., Field Study, Studies 1, 2, and 3) examined sound congruence with the actual product or service, and one study (Study 4) investigated the congruence between the sound and the positioning message of the store/restaurant.

The field study aimed to shed light on the use of auxiliary sounds on consumption spaces, and its influence on people’s buying behavior. This study used a single factor design, with four conditions of sound manipulations: Nature (forest), Nature (water), Music, and No sound.

Studies 1 and 2 verified the influence of auxiliary sounds on choice (H1). Study 1 used a single factor between-subjects procedure, and two auxiliary sounds were matched with the appeal of the offers: beach (city) sounds with beach (city) destination. This study examined the influence of auxiliary sound on services choices. For Study 2, a factorial between-subjects study was designed to check the influence of auxiliary sounds on choice of food. This study intended to create a more realistic setting by adding music, which is a usual sound cue in many retail environments, and by giving more options for the participants.

Study 3 aimed to establish whether perceived associations between auxiliary sounds with different versions of the product (i.e., milk) increase people’s intention to buy the product (H2). Therefore, the study examined how perceived congruence between sound and the appeal of the product affects people’s buying intention. The study used a factorial 2x3 mixed design study with two conditions of sound (farm and supermarket sounds) and three different appeals of the product (farm (bottle); farm (carton box) and standard).

Study 4 investigated the influence of congruence between the auxiliary sound and the store appeal and positioning on people’s intention to visit the store. This effect would be mediated by consumers’ attitudes toward the store and perceptions of the store image (H3). A 3x2 factorial study design was used, incorporating three types of sound (intentional, characteristic, and control/no sound) and two store positionings and appeals (experiential and feature). Intentional auxiliary (intentional condition) and consequential auxiliary (characteristic) sounds were incorporated in the experimental design to increase realism.

3.1 Field Study

This exploratory study investigates the influence of auxiliary sounds on the actual consumption environment. We assume that nature congruent sounds will increase people's buying of healthy (nature) associated choices (e.g., water and/or juice). This study took place in the beverages section of a supermarket in the state of Rio Grande do Sul.

Design and Stimuli

This study uses a single factor between-subjects design with four conditions: two ambient sounds[4], one musical sound condition, and a control condition (no sound).

The two ambient sounds were chosen based on their congruence with the actual type of product considered: (1) forest sound (e.g., wind, birds) and (2) water sound. A pretest involved asking people if they associated the sound with coconut water. The two options have the same appeal (nature) but different levels of association with coconut water: Forest (M = 3.03); Water (M = 4.27), t (36) 3.623, $p < .01$.

Four songs were chosen for the musical condition: Belief by John Mayer, Don't Cha Wanna Ride by Joss Stone, Mr. Jones by Counting Crows, and Valerie by Amy Winehouse. The songs were chosen based on their similar pleasantness level[5]. The songs were played randomly throughout the day.

All sounds were pretested to check their pleasantness level and their association with the products. Both nature sounds showed a significantly higher perceived pleasantness level than the music, which corroborates Gould van Praag et al.'s (2017) claim that exposure to natural soundscapes are perceived as more pleasant compared to artificial soundscapes.

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[4] All sounds are available at the following link: https://drive.google.com/drive/folders/1-f6K5CQFWvCCGiPwhZe1AqrmyyJJNy8k?usp=sharing; or you can scan the QR Code available in Appendix A.

[5] A significant difference was found between John Mayer (M = 5.47) and Joss Stone (M = 4.81), t (42) = -2.508, $p < .05$.

Sample and Procedure

The conditions were randomly assigned for each day of the week over 24 days. A sound system was intentionally set up for this study. Two speakers were mounted over a refrigerator in the beverage section of the supermarket but out of sight of consumers to control for possible demand artifacts. The sound was strategically positioned in the beverage section, close to the coconut water, mineral water, and juice categories, which were expected to be influenced by the sound manipulations.

All conditions were set at the same volume level to avoid bias or any possibility that the sound might be unnoticed or cause discomfort. The volume level concern arises since auxiliary sounds should be subtle and should not overlap other environmental cues.

Each sound had different durations; however, they were all played on a loop throughout the day. The sounds (and the no sound condition) were randomly played for 24 days, being one condition per day. Each condition was played on a loop for one whole day. Table 5 shows the number of times each sound was played on each day of the week:

Table 5. *Frequency of Sounds per Week*

Sound	Days						
	SUN	MON	TUE	WED	THU	FRI	SAT
Nature (Forest)		1	2		1		1
Nature (Water)			1	1	2	2	1
Music		1	1	2		1	
Control		2		1	1	1	2

Measures

To assess the influence of sound on people's buying behavior, sales data were obtained from the company's sales reports. The dependent variable in the present study was the number of units sold in each category. No distinction was made between packages or subcategories (e.g., sparkling vs. mineral water). The categories of beverage considered in this study were coconut water, mineral water, and juice. Since sales increase on weekends, the weekend was considered a covariate and was binary coded as weekdays = 0 and weekends = 1.

Results

To explore the effect of sounds on buying, we conducted an analysis of covariance with units sold as the dependent variable, ambient sound (nature sound—forest, nature sound—water, music, and no sound) as the independent variable, and weekend as a covariate (1 = weekend/0 = weekday). Table 6 shows the mean numbers of units sold during this study.

Table 6. *Means of Product Units Sold Across Conditions*

Conditions		
Sound Conditions	Products	
	Water	Juice
Nature (Forest)	55.8	40
Nature (Water)	54.1	37.4
Music	38.8	30.4
Control	39.9	32
Recoded Conditions		
Sound Conditions	Products	
	Water	Juice
Nature	54.8	38.5
Music	38.8	30.4
Control	39.9	32

Levene's test and normality checks were carried out, and the assumptions met for both categories (water and juice). No significant difference existed between the sounds in the mean units sold for water after controlling for the weekend, $F(3, 19) = 1.367$, $p = .28$. Contrast analysis showed that no significant difference existed between nature (forest) and control ($p = .14$), or between nature (water) and control (no sound) ($p = .13$). However, comparing the estimated marginal means showed that more water was sold in the nature (forest) and nature (water) conditions ($M = 55.8$, and $M = 54.1$, respectively) compared to the control (no sound) condition ($M = 39.9$).

The result pattern was similar for juice sales. No significant difference was found between the sounds in the mean units of juice sold after controlling for the weekend, $F(3, 18) = 1.471$, $p = .26$. Contrast analysis showed a marginally significant difference between nature (forest) and control ($p = .08$), and between nature (water) and control (no sound) ($p = .10$). Comparing the estimated marginal means showed that more water was sold in the nature (forest) and nature (water) conditions (M = 40, and M = 37.4, respectively) compared to the control (no sound) condition (M = 32). Figure 3 illustrates the results of this study.

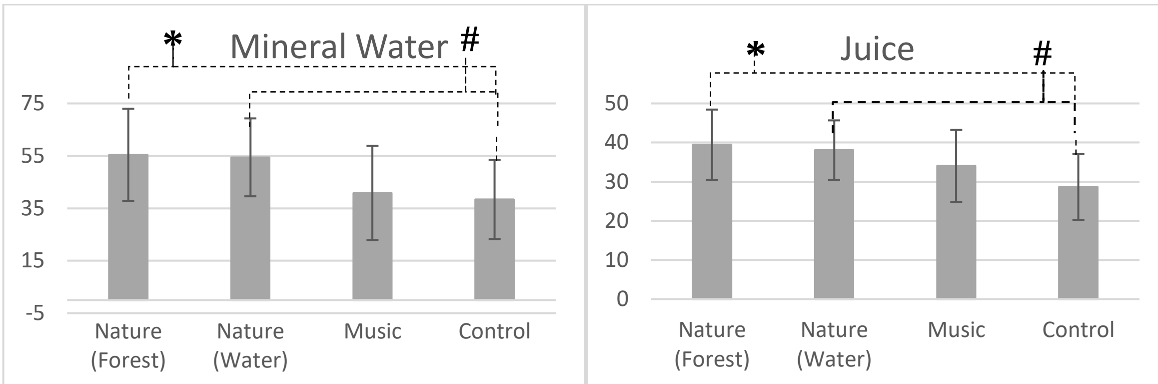

Figure 3. Estimated Marginal Means of Sales Across Conditions
Note. * = $p < .10$; # = $p = .10$; Estimated Marginal Means

The conditions were recoded for another analysis. Both nature sounds (forest and water sounds) were pooled into the same category, as they have the same appeal (nature congruent sound).

Levene's test and normality checks were carried out, and the assumptions were met for both categories (water and juice). A marginally significant difference was found between the sounds in the mean units of water sold after controlling for the weekend, F (2, 20) = 2.153, $p = .14$. Contrast analysis showed a marginally significant difference between nature and control ($p = .08$). Comparing the estimated marginal means showed that more water was sold in the nature condition (M = 54.8) compared to the control (no sound) condition (M = 39.9).

Levene's test and normality checks were carried out and the assumptions met. A marginally significant difference was evident between the sounds in the mean units of juice sold after controlling for the weekend, F (2, 19) = 2.289, $p = .13$. Contrast analysis showed that a significant difference existed between nature and control ($p = .05$). Comparing the estimated marginal means showed that more juice was sold in the nature condition (M = 38.5) compared to the control (no sound) condition (M = 32). Figure 4 shows results for the recoded conditions.

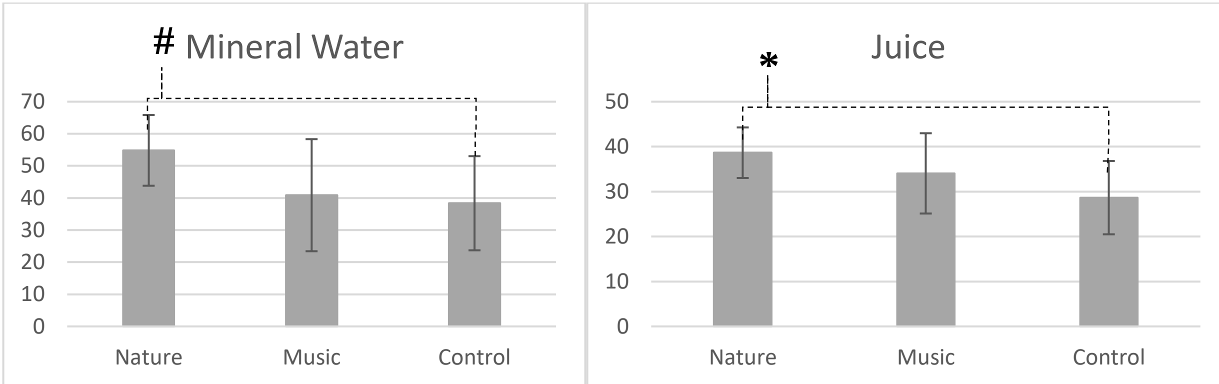

Figure 4. Estimated Marginal Means of Sales Across Conditions (Recoded)
Note. * = p = .05; # = p < .10; Estimated Marginal Means

Discussion

This field study explored the effects of intentional nonmusical sounds in consumption spaces on consumer behaviors and responses. In this case, the response was choice, which was measured by units sold.

Despite some marginally significant results, these preliminary results showed that nonmusical sounds can trigger choices of products that, in some sense, are semantically congruent with the sound (water and forest sounds). These preliminary results are considered reliable because the study examined an uncontrolled environment, thus justifying the subtle results found in the analysis. Despite the subtle influences in the consumption environment, the sensory influences are “powerful” because of the common unawareness among the consumers, which lowers the chance a possible resistance against a marketing stimulus (Hilton, 2015).

As the sound system was strategically positioned close to the categories considered in the study, there were other options of beverages in the section, which were not that far from the targeted categories (e.g., soft drinks, beer). Thus, it would be interesting to compare the sales between categories that are congruent and incongruent with the sounds present in the environment.

The next study (Study 1) investigates the influence of nonmusical sounds on buying behavior to understand whether nonmusical sounds influence people’s choices of services.

3.2 Study 1 – Sound Congruence and Choice of Services

As other studies (e.g., North et al., 1999) have shown, people tend to choose products that are congruent with the music being played in the store's sound system. North et al. (1999) showed that some wines were selected more when the in-store music was congruent with the country of the wine's origin (i.e., French (German) music led to a French (German) wine choice).

Additionally, characteristic sounds associated with products can facilitate visual processing and affect how rapidly people can find products while scanning supermarket shelves (Knoeferle et al., 2014; Knöferle & Spence, 2012). The association process as a mechanism of the influence of odor on choice (Gaillet-Torrent et al., 2014) might explain possible influences of sound on choice.

This study thus verifies the influence of congruence between sound and offer on people's choices (H1). We expect that, when the environmental sound cue is congruent with a certain offer, that offer will be chosen over another option.

Design and Stimuli

This study used a single factor between-subjects design with three conditions: two ambient sounds (beach and city sounds) and a control condition (no sound). The participants had to choose between two travel destinations, which could (or could not) be congruent with the sound to which one is assigned. As the data collection involved North American residents, destinations from other continents were used. The choice criteria were based on the TripAdvisor® destination rankings. A beach destination (Australian beach) and a city destination (London).

To illustrate the options, two images were used in the stimuli. The images were merely illustrative and were made the same size to control attractiveness. A brief description accompanied image to make it more realistic. The descriptions were based on offers of these destinations available from travel agency websites. Figure 5 presents the images and descriptions used in this study.

	Image	Description
Beach		A spectacular region spanning from Manly, Sydney's premier beach resort, to the northern coastal peninsula of Palm Beach. Indulge your senses as you experience Australia's golden sand and the refreshing ocean breeze. Adventure awaits, or simply relax, wine, and dine.
City		London is at once historic and contemporary. It's a city with its roots in the Roman Empire and a huge presence on the modern world stage, in every area from theater to finance. It is the capital city of both England and the United Kingdom. Visitors can find almost anything depending on which road they wander down.

Figure 5. Travel Destinations (Study 1)

The congruence of sound was determined by the main characteristics of the destination (e.g., city (beach) sounds and urban (beach) destination). The sounds were obtained from the soundsnap.com® website, which has a rich sound database. To control possible influences of the sound level (dB) and duration, the sounds were edited using the Audacity® software to match these variables.

Sample and Procedure

The initial sample of the study comprised 237 North American respondents from an online panel (MTurk). However, after checking for missing and wrong reports about the sound (e.g., people that were assigned to a sound condition, but failed to report listening to any sound), the final sample comprised 227 participants, with a mean age of 32 years old, of which 62% were men. The majority of the participants had a Bachelor's degree (45.4%).

The participants were instructed to remain in front of their computers or mobile phones, put on their earbuds or headphones, and stop any other source of sound in their rooms. The instructions page provided a short sound clip of drums to enable the respondents to set a comfortable volume level and ensure the sound was working.

The respondents were asked to imagine they were visiting a travel agency to choose a travel destination for their next vacation. They were asked to push play in the small player and click on “see the options,” and the sounds were randomly assigned across the participants. The two images (and descriptions) of the destinations were presented to the respondents, who were asked to click on their chosen destination.

Measures

The choice variable was measured by computing the participants’ choices as categorical variables. The analysis examined the proportion of congruent choices in each condition following the procedures used by Chartrand, Huber, Shiv, and Tanner (2008).

The control variables were measured using seven point scales, except noise sensitivity, which was measured using a five-item scale (Benfield et al., 2012; Zimmer & Ellermeier, 1999). Each participant was asked about their travel preferences (cities – beaches), the pleasantness of the sound (1=very unpleasant to 7=very pleasant), and if the sound could be used as a background sound in a store (1=totally disagree to 7=totally agree). The participants were also asked to indicate which sound they heard during the task.

Results

A significant difference was found in the perceived pleasantness of the sound between the city (M = 4.72) and beach (M = 5.75) conditions; t (148) = -4.714, p = 0.000. However, the perceived difference between the levels of pleasantness for the two conditions does not mean that the city condition was considered to have an unpleasant sound, because the mean was 4.72. The analysis considered the perception of sound pleasantness as a covariate, and its effect was not significant in the model (p = .07).

The mean for the preference of visiting cities or beaches was 4.46 of a scale ranging from 1 = cities and 7 = beaches, suggesting that participants have a slightly higher preference to visit beaches. When considering these three variables (I like visiting cities, I like visiting beaches, and I prefer visiting beaches/cities) as covariates in the model, the effect of the covariate related to the beach preference and the bipolar scale of “cities or beaches” was significant at $p < .01$. However, these significant results of the covariates did not change the pattern of the effects of sound manipulations on choice. Table 7 presents the results.

Table 7. *Number of Choices per Condition*

		Choice		
		City	Beach	**TOTAL**
Sound	City	**42**	33	**75**
	Beach	20	**55**	**75**
	Control	28	**49**	**77**
TOTAL		**90**	**137**	**227**

A logistic regression was performed to assess the impact of the ambient sound on people's choice of a travel destination. The full model was statistically significant, χ^2 (2, n = 227) = 14,066 (p = .001), indicating that the model could distinguish between respondents' choices across conditions. The model explained between 6.0% (Cox and Snell R square) and 8.1% (Nagelkerke R squared) of the people's choice and correctly classified 64.3% of cases.

Ambient sound made a statistically significant contribution to the explanation of people's choice in the service environment. It was found that when city sounds are used in the ambient condition, people tended to choose the city destination more, b = -0.80, Wald χ^2 (1) = 5.82, $p < .05$, recording an odds ratio of 0.45. This finding shows that people who listen to city sounds while in the environment were approximately 0.5 times less likely to choose a beach destination compared to those that did not listen to any sound, controlling for all other factors in the model.

Another analysis, which was performed to check the effect when city sounds are compared to beach sounds, showed that when city sounds are used, people choose a beach destination less often and choose a city destination more, b = 1.25, Wald χ^2 (1) = 12.833, $p < .001$, with an odds ratio of 0.27. This finding indicates that people tend to choose a beach destination approximately 0.3 times less than they choose a city destination. Table 8 presents the results of the logistic regression analysis for the effect of the sound type on people's destination choice.

Table 8. *Logistic Regression – Effect of Sound Type on Choice*

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	95% C.I. for EXP(B) Upper
Condition			13.537	2	.001			
Control x City Sound	-.801	.332	5.817	1	.016	.449	.234	.861
(City Sound x Control)	(.801)	(.332)	(5.817)	(1)	(.016)	(2.227)	(1.162)	(4.270)
Control x Beach Sound	.452	.353	1.643	1	.200	1.571	.787	3.136
(City Sound x Beach Sound)	(1.253)	(.350)	(12.833)	(1)	(.000)	(3.500)	(1.764)	(6.946)
Constant	.560	.237	5.580	1	.018	1.750		
(Constant)	(-.241)	(.233)	(1.075)	(1)	(.300)	(.786)		

	Bootstrap[a] B	Std. Error	Bias	Sig. (2-tailed)	95% Confidence Interval Lower	95% Confidence Interval Upper
Control x City Sound	-.801	.342	-.015	.016	-1.503	-.153
(City Sound x Control)	(.801)	(.358)	(.009)	(.015)	(.162)	(1.477)
Beach Sound x Control	.452	.367	.001	.208	-.265	1.182
(City Sound x Beach Sound)	(1.253)	(.358)	(.017)	(.000)	(.580)	(1.998)
Constant	.560	.245	.012	.018	.098	1.077
(Constant)	(-.241)	(.238)	(.000)	(.302)	(-.715)	(.229)

Note: The bootstrap results are based on 10,000 bootstrap samples. The information in parentheses is due to another model that was run considering city sound as the reference category for the contrast analysis (comparisons) between groups.

The results support H1, which postulates that a higher congruence between service appeal will increase choice of such a service.

Discussion

Study 1 shows that intentional ambient sounds can influence people's choices. For this study, a travel agency context was used to investigate a choice of a service, which is almost absent of tangible cues to evaluate the offers. In this case, sound may exert an important role on choice.

The influence of intentional ambient sounds on choice happened since there was a significant difference in the number of choices made between a beach and city destination when using congruent sounds. While the number of choices of the city destination was higher when city sound was played when compared to the no sound condition, the number of choices for the beach destination was not significantly higher when the beach sound was played (compared to no sound condition). Despite the lack of effect of the beach sound compared to the control group, $b = 0.45$, Wald χ^2 (1) = 1.64, $p > .05$, this sound-induced choice is explained by congruence, which influences and improves a person's responses to the environment (Cheng et al., 2009; Krishna, 2012).

The lack of significance of the influence on choice comparing the beach sound to the no sound condition might be due to a general tendency in choosing beach destinations (as shown by the results of the beach preference covariates). However, more importantly, this tendency was attenuated by the intentional use of city sounds in the shopping environment, which had a significant influence on people's choices, making people choose the beach destination less and the city destination more often.

In their field study on choice of wine, North et al. (1999) showed that congruence between sound cues and offers influence people's choice directly. The present study corroborates North et al's (1999) study by showing that nonmusical sounds also influence choice in a service context.

The limitations of this study include not asking if the respondents had visited those places before, which could have been tested as a covariate. Additionally, a simple choice task considering only two options lacks realism and complexity, which are important aspects to consider when dealing with choice and buying decisions.

The next study deals with a more complex choice task, offering more and different types of options. An environment with more intense sensory stimulation was used (a bar context), where people are usually overloaded with sensory stimulation, especially sound (in terms of quantity and level). The intention was to insert more realism into the investigation, using video resources to emulate people's experience in the service environment. To broaden the scope of the investigations, different from Study 1, where people had to choose an intangible offer (travel destination), Study 2 required people to choose a tangible offer (food from a menu).

3.3 Study 2 – Sound Congruence and Choice of Products

Conceptually related cues in the environment influence the choice frequency of products (Berger & Fitzsimons, 2008), which Study 1 showed in the context of travel destination choices. This second study investigates the influence of sensory stimulation on product choice in the shopping environment.

In terms of sensory stimulation, as a means of influencing people's choice of certain products, visual cues (i.e., pictures of fruits) make people choose more healthy foods, especially when hungry (Forwood et al., 2015). Pictures can stimulate food intake by increasing levels of ghrelin (i.e., the hunger hormone) (Schüssler et al., 2012). Scent cues can also influence people's choices, as shown by Gaillet-Torrent et al. (2014), who found that a fruity odor (pear odor) made people choose more fruity desserts than non-fruity ones. In terms of congruence, people tend to choose more options of the same category of product when the scent is congruent compared to an incongruent scent (Mitchell et al., 1995).

The present study verifies whether sounds trigger consumers' choices and perceptions in a more complex choice task (H1), incorporating more options in an environment with more sound stimulation (music added). Specific products are expected to be chosen more frequently when congruent ambient sounds are played. For example, a product with a healthy appeal may be chosen more frequently than other products when subtle sounds of nature (e.g., birds, water) are present.

Design and Stimuli

This study uses a 2 (auxiliary sounds: healthy congruent (nature sounds) x healthy incongruent (bar sound)) x3 (music: healthy congruent x healthy incongruent x no music) between-subjects factor design. The task presented three types of courses with four options each. The congruence or incongruence of the sounds was based on the offers in the courses (e.g., sounds of nature are congruent with healthy foods). The aim of the study is to investigate the effect of auxiliary sounds (nonmusical); however, we also contemplate music because it is a recurrent intentional sound in consumption spaces, and is neutral or incongruent with the offers.

The sounds (nonmusical and musical) were chosen based on a pretest conducted with undergrad students, which considered the pleasantness level of the sound and its association with health and nature. For the music condition, the students were asked about the probability of listening to that music in a bar. Based on these data, four sounds were used. One nature sound (healthy congruent) and one bar sound (healthy incongruent) were selected from 10 auxiliary sound options (five nature sounds and five bar sounds). The sound effects were obtained from the *soundsnap.com*® database. The (in)congruence in this case was intentionally set considering the available options of food (healthy and unhealthy options).

The choices of the auxiliary sound and the music were made based on the pretest with 43 undergraduate students by choosing the higher and lower means of their relatedness with healthiness (higher/lower means = higher/lower congruency). The sounds that were more or less associated with healthiness were sounds of nature and bar sounds (auxiliary sound) and Santeria by Sublime and Highway to Hell by ACDC (music). The perceived pleasantness of the sounds was considered to control its influence. Table 9 shows the means. All sounds were edited using the Audacity® sound editing software to match the level (dB) and duration.

Table 9. *Means of Pre-test of Sounds (Association with Healthiness & Sound Pleasantness)*

		Means of Association with Healthiness	Means of Pleasantness
Auxiliary sounds	Nature	5.67	5.05
	Bar	4.05	3.51
Music	Sublime	5.49	5.65
	ACDC	4.67	5.53

Paired samples T-tests were performed to check the differences between means of the pretested sounds. The means of association with healthiness were different for auxiliary sounds: nature (M=5.67, SD=1.72) and bar (M=4.05, SD=1.68); t (42) = 1.63, $p < .001$. The difference was also evident for the music conditions: Sublime (M=5.49, SD=1.56) and ACDC (M=4.67, SD=1.78); t (42) = 2.94, $p < .01$.

An analysis of the difference between the means of pleasantness of sound was also performed. The means for pleasantness between the conditions of the auxiliary sounds were different: nature (M=5.05, SD=1.81) and bar (M=3.51, SD=1.44); t (42) = 4.43, $p < .001$. For the music conditions, the difference between means was not statistically significant: Sublime (M=5.65, SD=1.46) and ACDC (M=5.53, SD=1.71); t (42) = .35, $p = .73$.

The bar context was determined for this study to avoid any dissonance for the participants who indicated that they go to this type of place “sometimes or often,” with a mean of 3.74 (on a seven-point scale). Table 10 shows the sound (auxiliary sounds and music) presented in each condition and the products offered on each menu.

Table 10. *Sounds, Products, and Environments*

Type of Sound (Independent Variables)					Products/Offers (Dependent Variable)
Auxiliary Sounds (2 conditions)		Music (3 conditions)			
Nat (Healthy Congruent)	**Bar** (Healthy Incongruent)	**Sub** (Healthy Congruent)	**ACDC** (Healthy Incongruent)	Control	
Sounds of nature - Sounds of forest - Birds, water, and wind	Sound of people chatting in the bar	Sublime – Santeria	ACDC – Highway to Hell	No Sound	3 courses - Appetizer - Appetizer - Entrée --------------------- 4 options each - 2 Healthy - 2 Unhealthy

The participants had to choose one product or offer from each menu among four options: two congruent with the auxiliary sound and two incongruent. Four options were offered to make the choice process more difficult and to balance the number of options with the same appeal. The types of products were chosen for the stimulus based on (1) frequent options available at that type of place, (2) the contrast between the options based on healthiness and visual appeal, and (3) the easiness to describe the product. The choice of items was made with help from a chef, who classified the healthy and unhealthy options. Appendix C presents pretest data for the healthiness perceptions of the menu options. Figure 6 shows an example of the stimulus used in this study.

Figure 6. Example of Stimulus in Study 2

Sample and Procedure

The sample consisted of 182 undergraduate students from Texas Christian University; the mean age was 21 years old, and 52.7% of the sample was women. In this computer-based task, each participant was invited to imagine going to a bar to grab some food, making choices for themselves.

A video approximately 15 seconds long was used as a stimulus for each scenario. The video was the same for every condition, despite the sound editing, and began by simulating the entrance to the bar. The video finished when the “consumer” was seated with the menu in their hands. The participant was asked to click on the menu to start making choices. The sound manipulation, which was randomly assigned, started with the video and finished when the participant clicked on the forward button to get to the next page of the study.

There were three courses, and the participant was asked to choose one of four options from each menu. After entering their choice for the first course, another menu popped up on the screen for the participant to choose the next course. This continued until they had made their last choice.

Measures

A dummy variable was set for the choice variable: 0 for unhealthy choices and 1 for healthy choices. For the analysis, the proportion of choices in each condition were considered.

The control variables were measured using seven point scales, except for noise sensitivity, which used a five-item scale (Benfield et al., 2012; Zimmer & Ellermeier, 1999). The participants were also asked about their concern about eating healthily and how often they go to the type of place used in the study. Control variables about the sound included the pleasantness of the sound heard (1=very bad to 7=very good), and the appropriateness of the sound for the place (1=totally disagree to 7=totally agree).

Results

The analyses of the control variables showed that the perceptions of sound pleasantness and appropriateness differed between some conditions. The analysis of variance (one-way between groups) was significant for both sound pleasantness, F = (5, 174) = 4.7, p = .000, and sound appropriateness, (F = 5, 174) = 17.13, p = .000. The post-hoc comparisons between groups showed differences for both variables. For sound pleasantness, the Bar sound[6] (M = 3.63; SD = 0.833) was

[6] Abbreviation of types of sounds:
- Auxiliary sounds: Bar = healthy incongruent; Nat = healthy congruent
- Music: ACDC = healthy incongruent; Sub = healthy congruent

less pleasant than BarSub[7] (M = 4.56; SD = 1.251), NatACDC (M = 4.81; SD = 1.415), and NatSub (M = 4.66; SD = 1.111). No significant difference was found among these last three conditions. For the sound appropriateness, Nat sound (M = 2.85; SD = 1.805) had lower means than every other condition of the study. This finding showed that the healthy congruent sound when presented in isolation was considered inappropriate for the type of place used in the study.

Regarding the control variables for eating healthily (M = 4.77; SD = 1.417) and the frequency of visiting similar places (M = 3.74; SD = 1.439), the mean for the frequency of visiting similar places was average on a seven-point scale, which suggests that people had some familiarity with the context used. The mean for eating healthily showed that the participants were concerned about eating healthily, which might have skewed some results. Notably, both covariates negatively correlate with each other: $r(178)$ -.20; p <.01. Noise sensitivity, as a covariate, showed no significant effects (p > .05) on choices across all three courses (Appetizers 1 and 2, and Entrée) and was not included in the final model. Table 11 shows the number of healthy and unhealthy choices on each menu.

Table 11. *Frequency of Healthy/Unhealthy Choices Across Three Courses*

	Menu		
	Appetizer 1	Appetizer 2	Entrée
Number of Healthy Choices	110	59	75
%	**60.4%**	32.4%	41.2%
Number of Unhealthy Choices	72	123	107
%	39.6%	**67.6%**	**58.8%**
Total	**182**	**182**	**182**
%	**100%**	**100%**	**100%**

Table 11 shows that, despite the experimental conditions, the proportion of healthy choices was higher for the Appetizer 1 menu (60.4%), while for the two other menus, the proportion of unhealthy choices was higher (Appetizer 2 = 67.6%; Entrée = 58.8%). Table 12 presents the proportion of choices across conditions.

[7] Combinations between auxiliary sounds and music: BarACDC, BarSub, NatACDC, and NatSub.

Table 12. *Proportions of Choices Across Conditions*

Appetizer 1 Menu								
		Type of Sound						
		Bar	BarACDC	BarSub	Nat	NatACDC	NatSub	**TOTAL**
Choice	Healthy	18	17	15	21	20	19	110
	Unhealthy	14	15	12	12	7	12	72
TOTAL		**32**	**32**	**27**	**33**	**27**	**31**	**182**
Appetizer 2 Menu								
		Type of Sound						
		Bar	BarACDC	BarSub	Nat	NatACDC	NatSub	**TOTAL**
Choice	Healthy	7	12	8	13	5	14	59
	Unhealthy	25	20	19	20	22	17	123
TOTAL		**32**	**32**	**27**	**33**	**27**	**31**	**182**
Entrée Menu								
		Type of Sound						
		Bar	BarACDC	BarSub	Nat	NatACDC	NatSub	**TOTAL**
Choice	Healthy	7	16	13	14	8	17	75
	Unhealthy	25	16	14	19	19	14	107
TOTAL		**32**	**32**	**27**	**33**	**27**	**31**	**182**

To check the interaction effect between auxiliary sound and music on people's choice across menus, an interaction analysis was performed using maximum likelihood logistic regressions (Hayes, 2013a). Three logistic regression models were used (one for each type of menu). Every model has two covariates that were strictly correlated with people's choices of food: (a) eating healthy concern and (b) frequency attending bars. The eating healthy covariate had significant effects in the three models: (Appetizer 1 choice: $p < .001$; Appetizer 2 choice: $p < .001$; and Entrée choice: $p < .001$). The frequency attending bars had a significant effect on people's choices on the Entrée menu model ($p < .01$).

Two conditions of sound were used to test the interaction effect between them and their effects on people's choices. The only model that had a statistical marginally significant effect ($p = .056$) was the Entrée choice model, which explained between 5.8% (Cox & Snell R square) and 7.8% (Nagelkerke R square) of the effect on people's choices.

An analysis of the main effects of the model variables showed that the main effect of nonmusical sound congruence (healthy congruent x healthy incongruent) on people's choice for the entrée menu was marginally significant ($p = .08$), with an odds ratio of 2.632. This finding means that the odds of choosing a healthy option is 2.63 higher for people that listened to a healthy congruent nonmusical sound compared with the healthy incongruent condition.

The interaction between no music/healthy incongruent music and healthy incongruent/congruent sound was also significant ($p < .05$; odds ratio = .546), indicating that the odds of choosing a healthy option of entrée decrease to a factor of .54 if a person listens to a healthy congruent nonmusical sound matched with a healthy incongruent music (Nature sound + ACDC music). It appears that when there is no congruence between the auxiliary sound and the music playing in the environment, the probability of choosing healthy foods decreases.

Even though the logistic regression was not significant for the Appetizer 2 choice, when analyzing the model, the effect of the healthy incongruent music condition was significant ($p < .05$; odds ratio: .910), showing that the odds of choosing a healthy choice decrease to a factor of .91 if a person listens to a healthy incongruent music. The interaction between healthy incongruent music and a healthy congruent nonmusical sound (p < .05; odds ratio: .392) also showed that the odds of someone choosing a healthy option decrease to a factor of .392, and this repeats the pattern observed in the entrée model.

The tests also showed a marginally significant effect of the interaction on choices for both Appetizer 2 and Entrée menu models. A likelihood-ratio test for interaction showed a marginally significant result for the Appetizer 2 model, ($\chi^2(2) = 5.96$, $p = .051$), and for the Entrée model, ($\chi^2(2) = 5.83$, $p = .054$). Figure 7 presents a visual representation of the interaction effect.

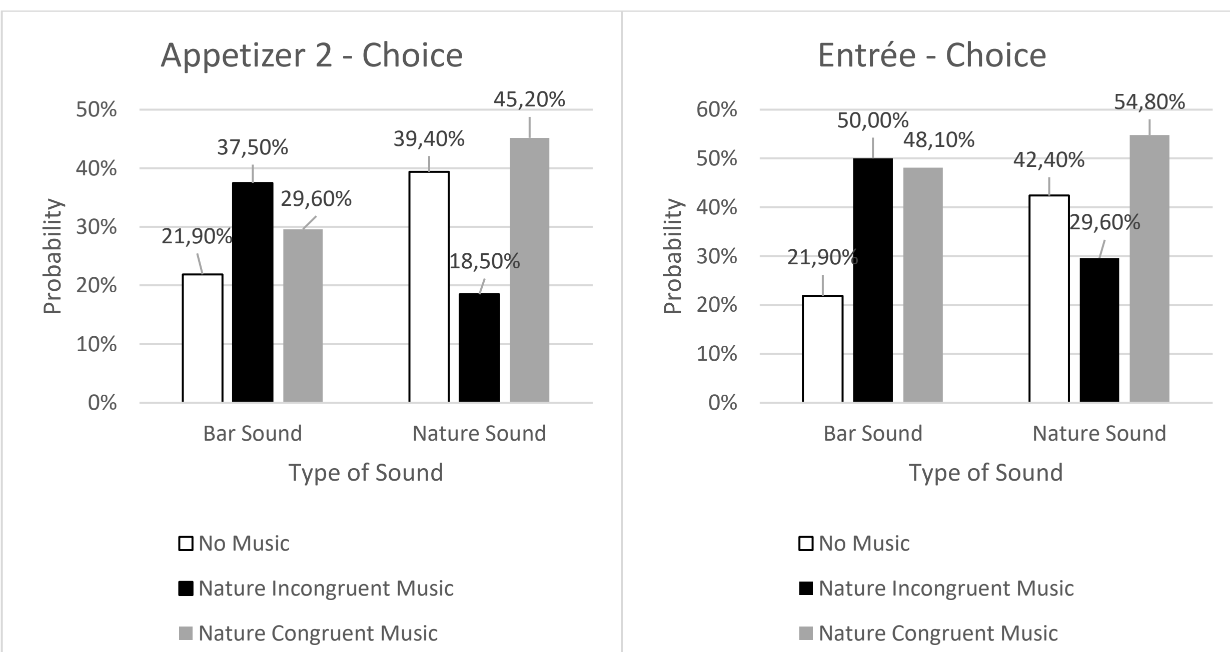

Figure 7. Probability of Healthy Choices Across Conditions (Nonmusical x Musical Sound)

The interaction shows that the probability of making healthy choices decrease when there is an incongruent match of sounds (nature congruent nonmusical sounds x nature incongruent music) for both courses (Appetizer 2 and Entrée).

The results for the conditional effects showed a marginally significant effect of the nonmusical sound on choice when there is no music for the entrée menu, ($\chi^2(2) = 5.83$; $p = .08$), indicating that the probability of making healthy choices is higher when people listen to healthy congruent nonmusical sounds (nature sounds), as can be seen in Figure 7. These results support H1, and thus complement the results of Study 1 by setting congruence between sounds and products instead of sounds and services.

Discussion

The study shows that the semantic properties of sounds might influence people's choices of products in the sense that congruence (incongruence) between sound and options might increase (decrease) the chance of a product being chosen. Among the many options provided between three menus, the influence was found in two of them. The healthy congruent auxiliary sounds (nonmusical) increased the probability of people choosing healthy options.

As the study also used music as an independent variable that interacts with auxiliary sounds in the consumption environment, some interesting effects were found. The incongruence between auxiliary sounds and music (i.e., healthy congruent auxiliary sounds x healthy incongruent music) decreased the chance of choosing healthy options. The effect of the incongruence between two types of sound (auxiliary and music) on the decrease of people's choice of healthy food might be because incongruence relates to negative behaviors (less coherent ensemble effects), and because "mismatched environmental stimuli would lower customer perceptions of the entire shopping experience" (Mattila & Wirtz, 2001, p. 277). This negativity can be related to the decrease in healthy choices because we usually relate choosing healthy food with positive behavior, especially as contemporary social norms (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010).

Limitations of this study include offering the choice of healthy food in the bar context in a lab experiment and the use of nature sounds as the healthy congruent auxiliary sound condition, which seemed strange to the participants. Even if the results are not directly influenced by this perception, it would be worth testing different sounds in different contexts to reduce the strangeness.

As Forwood et al. (2015) stated, although some environmental cues can motivate people to make more healthy eating choices, these effects depend on individual traits and states (e.g., hunger). These individual traits and states, especially the actual states of the consumer or participant, would thus be an interesting variable to examine.

Study 3 takes a different approach from the last two studies because, instead of considering people's choices, this study determines their intention to buy the product. The association mechanism that would explain the intentions was also measured.

3.4 Study 3 – Sound Congruence and Products' Perceptions and Intentions

From the relationship between observable cues and unobservable attributes of products and services, Roest and Rindfleisch (2010) suggested that "cues signaling category typicality may (also) inform the consumer about the usual performance on quality attributes of prototypical members of that product category" (p. 10). The authors examined the situation by separating mature and new categories, showing that mature categories have well established typical cues compared to the new categories (Roest and Rindfleisch, 2010). The differences between categories are created because sound can be an informational cue, enabling associations and perceptions toward products and/or services.

Congruence might play an important role when considering the possible influence of auxiliary sounds in the shopping environment behavior (Berger & Fitzsimons, 2008; Cheng et al., 2009). According to Yorkston (2010), "the consumption space may have ambient sounds that are specific to the consumption experience, and these sounds may interact with the physical properties […] of that space" (p. 165). For example, a store that sells only organic and natural food might have some congruent sounds of birds singing. Yorkston (2010) also called for forthcoming studies to investigate this complex interaction of ambient and ancillary sounds.

This third study aimed to test H2, which posits that the congruence between sound and the appeal of the product represented by visual cues leads to an increased buying intention of the "congruent" product.

Design and Stimuli

The present study is a 2x3 mixed design. Two variables were manipulated: sound (farm vs. supermarket sound), which was between subjects; and product (farm—bottle vs. farm—carton vs. standard), which was within subjects.

Sound conditions, e.g., (1) farm sounds (birds, cows, etc.) and (2) supermarket sounds (cash register, trolleys, scanners, etc.) were randomly presented across the participants. The sounds were set in the shopping environment, and the farm sounds were intended to trigger associations with a specific version of the product to create congruence between the product appeal and the sound cue.

The product chosen for this study was milk because it is possible to find many kinds of milk at a supermarket. Each version of the product was represented by a static image corresponding to its nature, as presented in Appendix D. The farm (bottle) was presented in a single glass bottle of milk without any brand or label; the farm (carton) version was a carton of milk with some farm/rural verbal cues on it (i.e., cow outline and a spotted cow skin with "straight from the farm" inscription); last, the standard version was represented by a plain white carton of milk with "whole milk" written on it. There was an intentional polarization of the farm (bottle) and standard appeals, where the former related more with the farm environment, and the latter associated more closely with a supermarket. The farm (carton) appeal stayed in the middle of the continuum between farm and supermarket sound associations.

The presentation order of the three versions was also randomized between participants. The images were matched in size and color and were edited using free vectors and images available on the Web. The choice of sounds depended the versions of the product to set congruence (or incongruence) between them, as Table 13 shows.

Table 13. *Expected Congruence Between Sound and Different Versions of Products*

		Sounds	
		Farm	**Supermarket**
Versions	**Farm (bottle)**	Congruent	Incongruent
	Farm (carton)	Congruent	Congruent
	Standard	Incongruent	Congruent

The sounds were set *a priori* by considering their congruence with the versions of the product, as done by Knoeferle et al. (2016) in their study of the influence of congruence on the visual search of products. Knoeferle et al. (2016) obtained the sounds from a royalty-free online sound database based on their semantic congruence or incongruence with the products used in the studies.

In our study, the sounds were obtained from an online sound database (*soundsnap.com*®). Sound level (dB) and duration were all made the same to avoid any other source of influence. Sounds were edited using the Audacity® open source sound editing software.

It was considered that the supermarket sound would be congruent with the farm (carton) and standard versions of the product because they use carton packages, which are common in supermarkets. The association measure tested the perceived congruence between the sound and appeal of the product in the study.

Sample and Procedure

The study comprised 175 North American participants, with a mean age of 33 years old, and 63% were men. Of the participants, 84.2% had a college or Masters' degree. Twenty-five participants were excluded from the sample because they reported (or omitted) a different or wrong sound than the one they were assigned, leaving 150 participants.

A computer-based task was administered to the participants, and data were collected via Amazon Mechanical Turk. The instructions of the study, presented on the first page, asked the participants to put on their headphones or earbuds. Before commencing the actual task, the participants were asked to set the sound volume to a comfortable level to the neutral sound of drums, which was available on the instructions page.

Every participant had contact with the three versions of the product, which means that the versions were presented within subjects. Participants were asked to rate the association between each version of the product and the sound assigned to them. Sound and products were presented together. First, participants had to push play to hear the sound and answer the association scales available for each version of the product, which was represented by a picture. They were then asked to indicate their intention to buy each version of the product on a scale. Last, participants answered control and demographic measures.

Measures

A Likert type seven-point single item scale was set to measure buying intention (I would buy this product). The association between stimuli and the product was also measured using a Likert type seven-point single item as the mediator variable (The sound is associated with this product).

The control variables used in this study were noise sensitivity and sound pleasantness. For the control variable noise sensitivity, a five-item seven-point scale was used (Benfield et al., 2012; Zimmer & Ellermeier, 1999), and sound pleasantness was measured using a single item seven-point scale. The control variable pleasantness of sound showed no difference between the farm sound (M = 4.0, SD = 1.56) and supermarket sound (M = 3.6, SD = 1.46) conditions, t (148) = 1.62, p = 0.11. However, the effect of sound pleasantness on the association variable and buying intention was significant for every version of the product, although it did not change the result patterns.

The effect of the noise sensitivity covariate was not significant for the association across the sound conditions, but it showed a significant effect on buying intention across the sound conditions. The effect was significant for the farm (bottle), (t (145) = -2.54, p = .01), farm (carton) (t (145) = -2.38, p = .02), and standard (carton) (t (145) = -1.97, p = .05) appeals of the product, showing that the higher the noise sensitivity, the smaller the buying intention.

After indicating whether they heard any sounds, the participant was asked to note the sound they heard to check the participant's awareness of the sound being played during the task.

Results

Table 14 presents the mean scores of the association and buying intention across conditions and versions of the product.

Table 14. *Association Means per Condition x Version of the Product*

Version	Measure	Type of Sound	Mean	Std. Deviation
Farm (bottle)	Association	Farm	4.49	1.968
		Supermarket	3.40	2.053
	Buying Intention	Farm	4.56	1.933
		Supermarket	4.23	2.109
Farm (carton)	Association	Farm	4.44	1.891
		Supermarket	4.14	1.948
	Buying Intention	Farm	4.64	1.843
		Supermarket	4.57	1.967
Standard (carton)	Association	Farm	4.40	1.924
		Supermarket	4.07	1.788
	Buying Intention	Farm	4.45	1.954
		Supermarket	4.64	1.950

A two-way mixed analysis of variance was conducted to assess the effect of the interaction between type of sound and appeal of the product on the association and buying intention measures.

A significant interaction was evident between the sound and appeal of the product on the association measure, Wilks' Lambda = .940, F (2, 296) = 8.53, *p* = .000, partial eta squared = .054. The contrast analysis for the interaction showed that the effect was significant when comparing farm (bottle) appeal with farm (carton), *F* (1, 148) = 12.51, *p* = .001, and standard, *F* (1, 148) = 11.25, *p* = .001, appeals. Figure 8 shows that sound associations were different between the farm (M = 4.5) and supermarket (M = 3.4) sounds for the farm (bottle) appeal, where this appeal was more closely associated with farm sounds than supermarket sounds. The following graphs show the means for each measure across treatments:

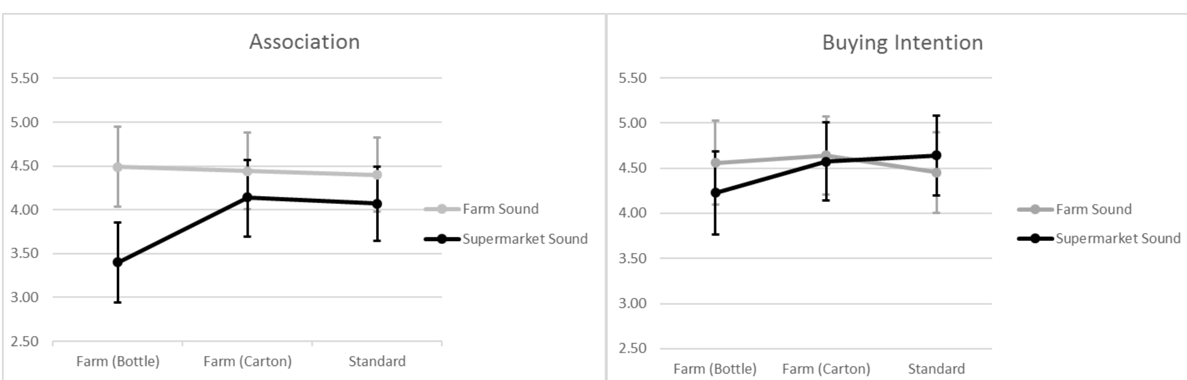

Figure 8. Interaction Between Version of the Product x Type of Sound (Association and Buying Intention Means)

However, the interaction between the appeal and sound was not significant when comparing association measures of farm (carton) and standard appeals of the product, F (1, 148) = .018, p = .89. This finding shows that the association scores for farm and supermarket sounds were similar for both appeals.

For the buying intention measure, there was no significant main effect of either the appeal of the product, F (2, 296) = 1.73, p = .18, or sound, F (1, 148) = .06, p = .81. However, a marginally significant effect was evident in the interaction between appeal and sound on buying intention, F (2, 296) = 2.41, p = .09. By running a contrast analysis, a significant effect of the interaction was found when analyzing the difference in the buying intention for the standard and farm (bottle) appeals of the product, F (1, 148) = 10.14, p = .028. Figure 4, showing the effects on buying intention, indicates that a slightly higher buying intention exists for the farm (bottle) version of the product when the farm sound was played (M = 4.6) compared to when the supermarket sound was played (M = 4.2). However, for the standard version, the scores of buying intention were the opposite: farm sounds (M = 4.45) and supermarket sounds (M = 4.64). Although the means are very close, a contrast analysis showed that farm sounds increase the buying intention for a farm (bottle) version of the product, and supermarket sounds increase the buying intention for the standard version.

When the participants perceived a congruence or association, setting a higher or lower association between sound and product, congruence had a significant effect on people's intentions to buy such a product, thus supporting H2. Table 15 shows the contrast analysis between groups considering the interaction between appeal and sound and its effect on association and buying intention.

Table 15. *Contrast Analysis Between Groups for the Interaction (Type of Sound x Version of the Product)*

Source			Type III Sum of Squares	df	Mean Square	F	Sig.
Product appeal	Association	Farm (carton) vs. Farm (bottle)	17.340	1	17.340	9.351	.003
		Standard vs. Farm (bottle)	12.327	1	12.327	6.401	.012
		Farm (carton) vs. Standard	.427	1	.427	.288	.593
	Buying intention	Farm (carton) vs. Farm (bottle)	6.827	1	6.827	2.614	.108
		Standard vs. Farm (bottle)	3.527	1	3.527	1.709	.193
		Farm (carton) vs. Standard	.540	1	.540	.330	.566
Product appeal * Sound	Association	Farm (carton) vs. Farm (bottle)	23.207	1	23.207	12.514	.001
		Standard vs. Farm (bottle)	21.660	1	21.660	11.247	.001
		Farm (carton) vs. Standard	.027	1	.027	.018	.894
	Buying intention	Farm (carton) vs. Farm (bottle)	2.667	1	2.667	1.021	.314
		Standard vs. Farm (bottle)	10.140	1	10.140	4.915	.028
		Farm (carton) vs. Standard	2.407	1	2.407	1.472	.227
Error(Appeal)	Association	Farm (carton) vs. Farm (bottle)	274.453	148	1.854		
		Standard vs. Farm (bottle)	285.013	148	1.926		
		Farm (carton) vs. Standard	219.547	148	1.483		
	Buying intention	Farm (carton) vs. Farm (bottle)	386.507	148	2.612		
		Standard vs. Farm (bottle)	305.333	148	2.063		
		Farm (carton) vs. Standard	242.053	148	1.635		

Discussion

The results of Study 3 show that the higher the association between sound and product, the higher the consumers' buying intention. These findings corroborate the classical conditioning approach that a simple association between product and sound can affect product preferences by measuring product choice (Gorn, 1982). A bottle of milk was found to be more closely associated with farm sounds than other versions of the product, most likely because it has visual characteristics that might remind the consumer of a farm origin product (e.g., no label or brand). This congruence increased the participants' intention to buy the product, especially when compared to a less congruent version. Similarly, farm (carton) and standard appeals of the product were associated with both farm and supermarket sounds, possibly because of the nature of the product (milk → farm association) for the farm sound associations, and because of the packaging for the supermarket sound associations. Consequently, no difference or influence was found between buying intention of farm (bottle) and standard appeals of the product, when comparing farm and supermarket sounds.

These findings show that products can be associated with ambient sounds that are intentionally set to direct people's intention toward buying sound congruent products. These associations between the sound and the versions of a product might thus underlie people's buying intention of the products. The results of the study corroborate the semantic congruency of the crossmodal correspondences, which deal with match or mismatch of identity and meaning (Spence, 2011). The correspondence of sound and image or product improves people's perceptions and help to communicate meanings. In the consumption environment, the present study could be applied by utilizing intentional ambient sounds at specific points (e.g., an aisle in a supermarket) to improve consumers' perceptions and buying intention concerning specific offers.

An important limitation of this study was the lack of polarization toward the association measure. As shown in the results, a small variation was evident in the association measure across the three versions of the product. However, as congruence between the sound and the offer is a prerequisite to influencing people's intention, it might have influenced the effects tested in this study.

To examine the use of auxiliary intentional sound in service and retail settings, Study 4 applies auxiliary sounds to a service environment scenario to investigate whether an intentional ambient sound could influence people's perceptions or attitudes toward the service and their intention to visit the store. The following study thus explores the indirect effects of sound on people's behavior and/or behavioral intentions (e.g., intention to visit the store). We hypothesize that perceptions are improved by the congruence between cues present in the environment, and thus generate more positive behavioral intentions.

3.5 Study 4 – Sound Congruence on Services Perceptions and Intentions

Study 4 examines the influence of auxiliary (intentional and characteristic) sounds on consumer perceptions of the products in retail and service settings. Patterns concerning the correspondence between different types of sound and different types of offer (i.e., products and services) are expected in this study. In their review of ancillary sounds of beverages, Spence and Wang (2015) highlighted the influences of product characteristics (e.g., taste) on our sensory expectations, as well as the hedonic expectations, which relate to the more entertaining side of the consumption.

Depending on their congruence, different auxiliary sounds might influence consumers' store evaluation, attitudes toward the store, and intention to visit the store. A brand and a store image must be consistent with their target market by setting their features in a congruent way with consumer's expectations and characteristics. Berger and Fitzsimons (2008) found that, if the surrounding environment contains more perceptually or conceptually related cues, products congruent with these cues are evaluated more favorably and chosen more frequently. Congruence is also a key factor in store evaluation, as shown by Spangenberg, Grohmann, and Sprott (2005), who found that the store is evaluated more favorably when the music and odor were congruent (e.g., Christmas song and Christmas scent).

We therefore expect that when congruence exists between the sound and appeal, participants will rate their store evaluation, attitude, and intention to visit the store more positively than when no congruence exists (H3).

Design and Stimuli

The present study is a 3x2 factorial between-subjects design. Two variables were manipulated: three auxiliary sounds (intentional sound x characteristic sound x control) and two market positioning[8] (feature positioning vs. experiential/symbolic positioning).

This study was based in a service environment (restaurant) because this environment permits many possibilities for manipulating ambient sounds, since these consumption spaces are usually strategically manipulated to convey meanings and create an ideal atmosphere for the consumer. However, there is a need to investigate other environments beyond retail settings because retail is the most widely investigated type of environment of the servicescape approach (Mari & Poggesi, 2013).

Two sounds related to the positioning messages. The intentional sound (beach sounds) related to the experiential positioning, and the characteristic sound (restaurant ambience sound) related to the feature positioning. The sounds and positioning messages were randomly presented.

[8] Positioning is considered a type of appeal. While Study 2 considered a more intrinsic appeal of the product (i.e., onion rings = unhealthy), Study 4 has an extrinsic appeal, e.g., an inputted or declared meaning (i.e., positioning message).

There was also a control condition that had no sound. Each participant had contact with only one manipulation of sound and positioning message. The sounds were obtained from an online sound database (*soundsnap.com®*), and the sound level (dB) and duration were set the same to avoid any other source of influence. Sounds were edited using the Audacity® open source sound editing software.

Each environment used in the study was represented by a static image followed by a brief message containing one of the two positioning approaches (feature vs. experiential/symbolic). The positioning types were chosen based on the positioning typology presented by Crawford (1985), and Fuchs and Diamantopoulos (2010). The feature condition communicates a functional positioning, appealing the utilitarian and technical characteristics of the company. While the experiential/symbolic approach called attention to the symbolic aspects when visiting or utilizing the service. The positioning messages were manipulated to deliver a more symbolic or functional market positioning, as done by Roggeveen, Grewal, Townsend, and Krishna (2015). Both conditions were set to purposely associate with their respective sounds.

Figure 9 presents an example of each market positioning message. A “close to the nature” approach was used for the experiential/symbolic condition, while more “functional” motivations were used for the feature condition (e.g., fresh ingredients, best service). The sound and message were presented together.

The positioning messages used in this study were pretested and showed a significant difference ($p < 0.05$) based on a comparison of means on a feature-oriented/experience-oriented semantic differential scale (single item). The feature positioning was seen as more “feature oriented” (M = 3.77), while the experiential positioning was rated as more “experience oriented” (M = 5.62). No significant difference was found between the messages ($p > .05$).

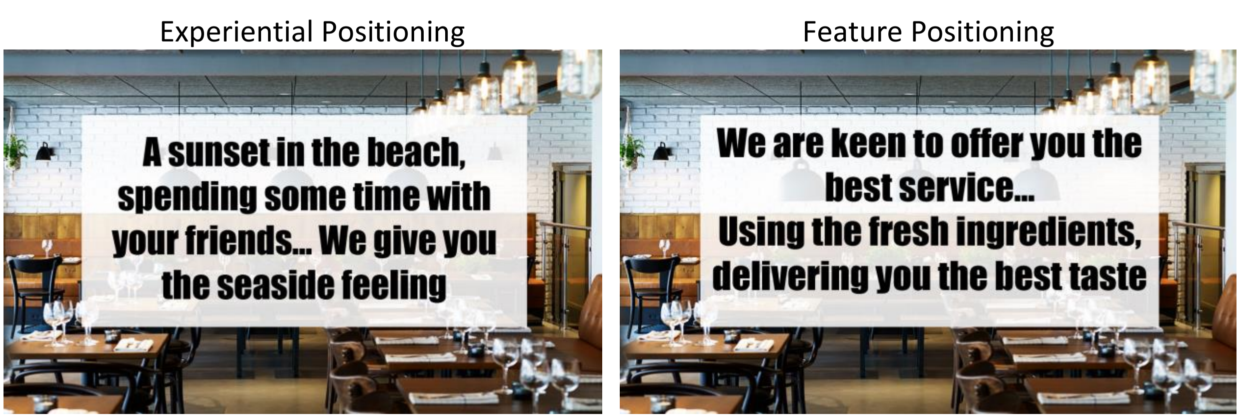

Figure 9. Example of Stimulus in Study 4

Sample and Procedure

A sample of 305 North American participants from Mechanical Turk participated in this study, of which 63.7% were men. The mean age of the participants was 32 years old, and 42.6% of the participants had a bachelor's degree. As 49 participants were excluded for failing to give accurate responses in the manipulation check (Q1: Did you listen to any sound? Q2 Which sound did you listen to?), the final sample contained 256 participants.

Each participant was asked to read all the instructions carefully to understand the nature of the study (personal perceptions about a specific place). The same screen instructed the participants to put their headphones or earbuds on and play a neutral sound (drums) to set the volume at a comfortable level.

When they finished reading the instructions, they were redirected to a page where they had to click on play to "start listening (or not)" to a sound. They were alerted by a message under the player about the possibility of listening to a sound or not. Sound manipulations and positioning messages were randomly presented across participants.

While the sound was playing, the participants saw an image of an unidentified restaurant with the positioning message centered in the picture. After reading this image, they were asked to respond to some statements on the same page. The sound was played constantly while the participant responded to the main question items of the study. The participants were then invited to answer the control variable and demographic measures.

Measures

Store evaluation was considered from two perspectives as dependent variables: (a) perception of store image and (b) attitude toward the store. Store image was measured using the store image scale presented by Baker, Grewal, and Parasuraman (1994), and the attitude toward the store was measured using the scale developed by Spangenberg et al. (1996).

Intention to visit the store was measured using a single item scale adapted from Spangenberg et al. (1996) (Assuming you were going to purchase this type of merchandise and had the money, how likely would you be to visit this restaurant/supermarket/store?). Noise sensitivity was used as a control variable based on a five-item seven-point scale (Benfield et al., 2012; Zimmer & Ellermeier, 1999).

After responding about whether they had listened to any sound, the participants were asked to indicate the sound they heard to check their awareness of the sounds played during the experiment. The participants also completed the demographic measures at the end of the survey.

Results

A two-way between-groups analysis of variance was conducted to explore the impact of the type of sound and positioning on store image perception, attitude toward the store, and intention to visit the store. There were three groups of sound: (1) ambient intentional sound, (2) characteristic sound, and (3) control. The interaction effect between the sound and positioning on store image perception was not statistically significant, F (2, 250) = 0.884, p = .348. There was a statistically significant main effect for sound, F (2, 250) = 6.554, p = .002, and the effect size was medium (partial eta squared = .05). The main effect for positioning, F (1, 250) = .979, p = .348, did not reach statistical significance.

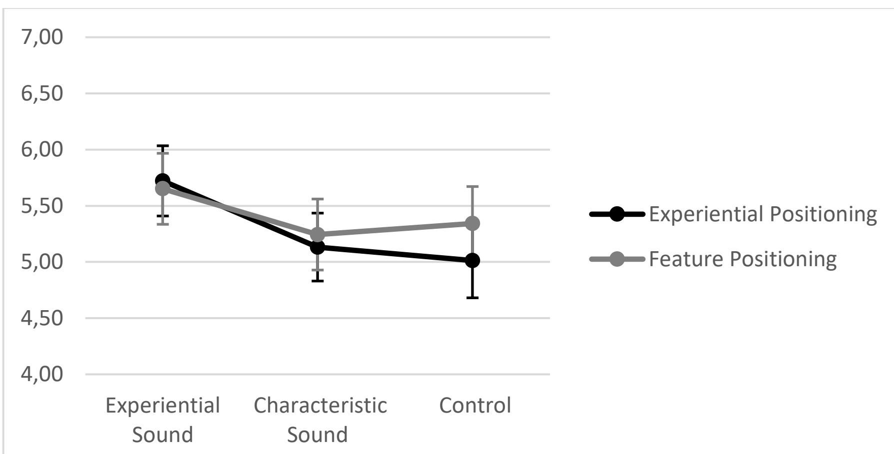

Figure 10. Interaction Effect of Sound and Positioning on Store Image Perception

Post-hoc comparisons using the Tukey honest significant difference (HSD) test indicated that the mean score of store image perception for the intentional sound group (M = 5.69, SD = 1.01) was significantly different from the characteristic sound condition (M = 5.19, SD = 1.07) (p = .005) and the control group (M = 5.18, SD = 1.07) (p = .006). No significant difference was evident between the characteristic sound group and the control group (p = .999).

The interaction effect between the sound and positioning was also not statistically significant, *F* (2, 250) = 2.052, *p* = .13, for attitude toward the store. A statistically significant main effect was evident for sound, *F* (2, 250) = 4.157, *p* = .017, but the effect size was small (partial eta squared = .03). The main effect for positioning was partially significant, *F* (1, 250) = 3.369, *p* = .068.

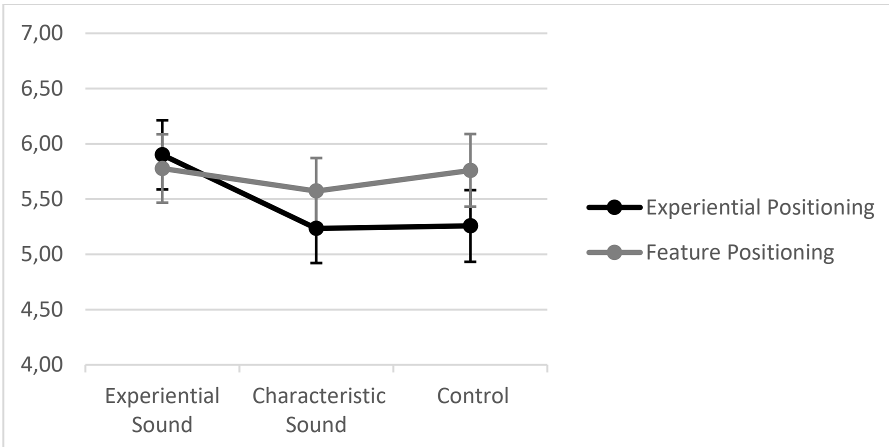

Figure 11. Interaction Effect of Sound and Positioning on Attitude Toward the Store

Post-hoc comparisons using the Tukey HSD test indicated that the mean score of attitude toward the store on the experiential sound group (*M* = 5.84, *SD* = .917) was significantly different from the characteristic sound condition (*M* = 5.40, *SD* = 1.202) (*p* = .01). However, it was not different from the control group (*M* = 5.51, *SD* = 1.001) (*p* = .11). No significant difference was found between the characteristics of the sound group and the control group (*p* = .75).

The interaction effect between sound and positioning was not statistically significant, *F* (2, 250) = 2.031, *p* = .13, for intention to visit the store. A statistically significant main effect was evident for sound, *F* (2, 250) = 3.424, *p* = .027, but the effect size was small (partial eta squared = .03). The main effect for positioning was not significant, *F* (1, 250) = .259, *p* = .61.

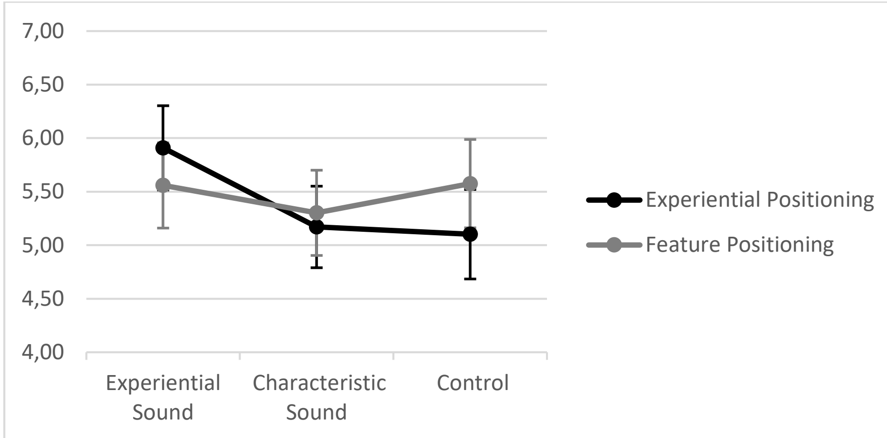

Figure 12. Interaction Effect of Sound and Positioning on Intention to Visit the Store

Post-hoc comparisons using the Tukey HSD test indicated that the mean score of intention to visit the store on the experiential sound group (*M* = 5.74, *SD* = 1.176) was significantly different from the characteristic sound condition (*M* = 5.23, *SD* = 1.514) (*p* = .03). However, it was not different from the control group (*M* = 5.34, *SD* = 1.260) (*p* = .14). No significant difference was evident between the characteristics of the sound group and the control group (*p* = .86).

The full model was tested considering the indirect effect of the type of sound on intention to visit the store, based on the store image perception and the attitude toward the store, and moderated by positioning (as an interaction). Figure 13 represents the model.

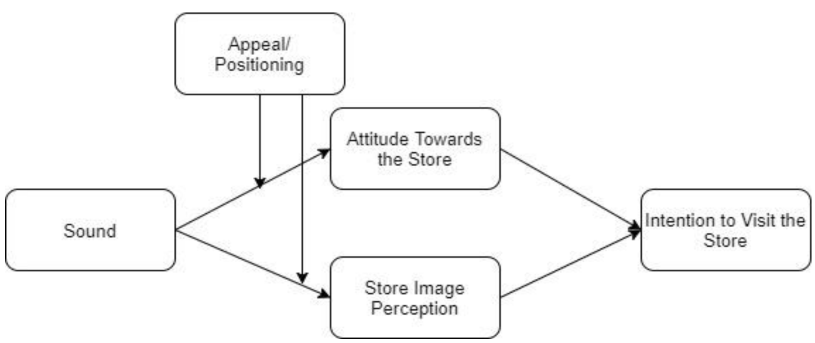

Figure 13. Moderated Mediation of Attitude Toward the Store and Store Image Perception on the Influence of Sound on Intention to Visit the Store

The results showed no significant direct effects of type of sound on intention to visit the store. The effect of the interaction between type of sound and positioning on intention to visit the store was also not significant. A marginally significant effect of the interaction (axb) on attitude toward the store (M_2) (b = 0.319; p = 0.051) was evident. Table 16 presents the results.

Table 16. *Analysis of the Effect of Sound on Intention to Visit the Store Though the Moderated Mediation*

	Consequent				
	M1 (Store Image Perception)				
Antecedent	Coef.	SE	*p*	LLCI	ULCI
Constant	5.631	0.565	0.000	4.519	6.744
Sound Condition	-0.046	0.259	0.860	-0.556	0.464
Positioning	-0.534	0.358	0.137	-1.239	0.171
Sound Condition x Positioning	0.203	0.164	0.217	-0.120	0.525
	R^2 = 0.046				
	F(3, 252) = 4.09, *p* < .01				
	M2 (Attitude Toward the Store)				
Antecedent	Coef.	SE	*p*	LLCI	ULCI
Constant	6.565	0.561	0.000	5.460	7.669
Sound Condition	-0.308	0.257	0.232	-0.814	0.198
Positioning	-0.885	0.355	0.013	-1.584	-0.185
Sound Condition x Positioning	0.319	0.163	0.051	-0.002	0.639
	R^2 = 0.043				
	F(3, 252) = 3.816, *p* = .01				
	Y (Intention to Visit the Store)				
Antecedent	Coef.	SE	*p*	LLCI	ULCI
Constant	0.363	0.608	0.551	-0.835	1.562
Store Image	0.503	0.080	0.000	0.345	0.661
Attitude	0.490	0.081	0.000	0.330	0.649
Sound Condition	-0.247	0.224	0.272	-0.689	0.195
Positioning	-0.222	0.312	0.479	-0.837	0.394
Sound Condition x Positioning	0.158	0.142	0.268	-0.122	0.438
	R^2 = 0.55				
	F(5, 250) = 61.077, *p* < .001				

A significant moderated mediation was found on the effect of the type of sound on intention to visit the store. The results show that the indirect effect of Sound on the Intention to Visit the Store through attitude toward the store (M_2) is moderated by store positioning (W). This effect was not found for the mediator store image perception (M_1).

When analyzing the indirect effects of sound on intention to visit the store through both store image perception (M_1) and attitude toward the store (M_2), considering the different levels of the moderator positioning, significant indirect effects were only evident on the experiential positioning level of the moderator (Bootstrap LCI – M_1 = 0.046 to 0.421; M_2 = 0.046 to 0.35). No statistically significant effects were evident for the feature positioning level of the moderator. Table 17 shows the results of the moderated mediation with the significant effects for the experiential positioning condition.

Table 17. *Analysis of the Moderated Mediation Across Different Levels of the Moderator*

	Indirect Effect of Sound Condition in Intention to Visit the Store			
	M1 (Store Image Perception)			
	Effect	Boot SE	BootLLCI	BootULCI
Feature positioning	0.079	0.056	-0.003	0.23
Experiential positioning	0.181	0.092	0.046	0.421
	M2 (Attitude Toward the Store)			
	Effect	Boot SE	BootLLCI	BootULCI
Feature positioning	0.005	0.055	-0.11	0.118
Experiential positioning	0.161	0.078	0.046	0.35
	Indirect Effect of X in Y through Moderated Mediation			
Mediator	Effect	SE (boot)	BootLLCI	BootULCI
Store image	0.102	0.093	-0.035	0.345
Attitude toward the store	0.156	0.098	0.018	0.409

The results partially support H3 because the mediation effect was moderated by store appeal or positioning being significant for only one positioning (experiential positioning) and for only one mediator (attitude toward the store).

Discussion

The study shows that when congruence exists between cues (in this case intentional ambient sound and positioning or slogan), people tend to evaluate a store better than when there is incongruence between cues. Difference on store evaluation was higher when comparing congruent sound and a place that is absent of sound (control condition). This result corroborates the findings of Spangenberg et al. (2005).

These effects occurred in the experiential positioning condition only. The experiential condition of sound increased the intention to visit the store through a higher attitude toward the store in the experiential positioning condition. According to Yorkston (2010), sound tends to affect dimensions of the experiential value, communicating meanings and associations with other cues (including texts), particularly when there is congruence between these cues (Fraedrich & King, 1998).

Intention to visit the store was higher when using congruent sound in the experiential condition, which assumes the approach/avoidance perspective (Turley & Milliman, 2000).

4 General Discussion

This dissertation shed light on the role of sounds in the retail setting and/or consumption spaces by investigating the influence of nonmusical sounds, more specifically auxiliary sounds, on consumer's perceptions, behavioral intentions, and choices of services and products.

Four studies were conducted to verify influences of auxiliary sounds on services and products' choice, repurchase intentions, and perceptions. The main mechanism of the effects analyzed in the studies was the congruence between the sound and the appeal of the offer. Congruence between the sensory stimuli and messages (i.e., type of product and positioning) would increase people's evaluations of places and products, and trigger specific choices by matching the meanings of sound with specific offers.

Study 1 examined the congruence of auxiliary sounds and travel destination options by investigating the influence of sound on service choice. The results showed that when auxiliary sound is congruent with the offer, people tend to choose that option more, i.e., city (beach) sounds made people choose more city (beach) destinations.

The next study (Study 2) found that, even with more options, sound exerted an influence from the congruence perspective. This study used a bar context, and in contrast to Study 1, people had to choose items from three different courses. The manipulations in this study were based on the healthy meaning, where healthy and unhealthy sounds and options (dishes) were intentionally set. People chose more healthy options when listening to auxiliary healthy sounds. Music was also incorporated in this study to bring more realism, since it is a common sound in this type of environment. However, music was found to have significant interplay with the auxiliary sounds because congruence between the music and auxiliary sound meanings influenced people's choices. When music was a healthy incongruent and auxiliary sound was a healthy congruent, people tended to choose less healthy options. If more choices for healthy options are wanted, the use of sound cues that convey healthy meanings might improve or trigger these choices. Nevertheless, if more sound cues are present in the ambient condition, setting them in "congruence" might have a positive influence on people's choices of healthy options.

The third study (Study 3) examined the perceived congruence between sound and appeal of the product (versions of the product) by measuring the perceived association between them. The perceived association between the auxiliary sound and appeal had a marginally significant effect on the buying intention of the products. The analysis also showed a significant result when comparing products that were very different from each other in terms of appeal and congruence with sound. The congruence (incongruence) with such sounds explained the increase (decrease) and difference of the buying intention of these products (farm (bottle) x standard (carton) versions).

Finally, Study 4 considered the underlying mechanisms that would explain the effect of the interaction (congruence) between sound and appeal of the service (market positioning) on individuals' intention to visit the store. This study showed that auxiliary sounds could exert a significant effect on people's intention to visit the store if the practitioner intends to communicate an experiential message through his positioning. As mentioned, sound influences experiential dimensions (Yorkston, 2010). Therefore, the result of Study 4 unveiled that, besides music, auxiliary sounds can improve the experiential value of the shopping environment and thus influence individuals' intentions to visit the store by affecting their attitude toward the store.

The present work brought elucidation to the sound studies by examining a type of sound that has been previously neglected in the marketing context. Auxiliary sounds have not been frequently used by companies to improve their shopping environment, possibly because of the uncertainty about their meanings and effects on consumers' behavior. However, as this study shows, auxiliary sounds can trigger people's perceptions of services and products. Stores could use congruent auxiliary sounds to improve the customers' store perceptions, delivering them a richer experience, and increasing their intentions to visit the store. Retailers can also use auxiliary sounds to help customers make choices, which is applicable for goods and/or products.

The results also have implications for public policies. Since auxiliary sounds can influence people's choices of products/food (Study 2), policymakers could consider using auxiliary sound clips in public spaces and schools to trigger people's and children's choices of healthy food. However, more studies must be done to investigate this type of choice.

In summary, the studies provided some answers about the influence of sound on consumption. However, other investigations around sound such as the match between different sounds in the environment might be considered for a richer elucidation of the topic.

4.1 Limitations and Recommendation for Future Research

This chapter discusses some limitations of the studies and makes recommendations for future research.

Study 2 included bar sounds (i.e., people chatting at the bar) as the healthy incongruent sound. Even though the pleasantness level was controlled, the healthy incongruent sound showed a significantly lower level of pleasantness compared to the nature sound (healthy congruent) according to the participants. Thus, to increase the external validity, two sounds with equal pleasantness levels could be used to avoid other sources of influence than the sound congruence.

Study 3 was a mixed design experiment, where the versions of the product (appeal) were presented within subjects. Even though the choice was not examined in this study, the within-subjects design was set for the versions of the product to promote a sense of multiple options for the participant. As sound is expected to influence people's buying intention, a comparison between buying intentions of different versions of a product by the same individual seems a reasonable way to test a stimulus influence. However, this design could have triggered different levels of buying intention per se, which could thus have interfered in the results in such a way that people might have demand artifacts (Sawyer, 1975). Future studies could therefore use a between-subjects factorial design to contribute a different perspective.

Forthcoming studies should consider the crossmodal correspondences. Investigating the crossmodal effects in consumption spaces is imperative because these spaces easily fit into the category of multisensory environments. It is known that "designers should always try to stimulate as many of a consumer's senses as possible […] they should try to ensure that all of the sensory cues in a given product or service go together (that is, that they are congruent)" (Spence & Piqueras-Fiszman, 2014, p.217). Therefore, some crossmodal correspondences should be expected.

Sester et al. (2013) showed that, after trying different beers, people chose Kriek beer more often when the ambience was cold (plastic furniture, blue video clip, and electro music) compared to warm (wood furniture, red video clip, and far west music). While it is known that ancillary and ambient sounds (e.g., bacon sizzling, chickens clucking, sea sound) can influence taste perception (Spence & Piqueras-Fiszman, 2014), little is known about how crossmodal correspondences work when present in services and retail spaces. Consumer's choice may be affected by this mechanism. Zampini and Spence (2004) examined nonmusical sound influencing taste and found that people had different perceptions of the crispiness of potato chips when listening to their own sounds. The authors found that the chips were perceived to be crisper and fresher, when the sound level and high frequency sounds were amplified (Zampini & Spence, 2004). The same effect was found for carbonated water, where people rated it more carbonated when amplifying the same elements of sound as done in the previous study (Zampini & Spence, 2005). Notably, the actual taste has to be considered rather than the hedonic aspects of taste because the crossmodal effect considers the effect of the sound we hear on the taste and flavor of the food and drink, which is different to its effect on the hedonic aspects of taste and flavor perceptions (Spence, 2014).

From this perspective, we believe that if any auxiliary sound is played into consumption spaces (e.g., restaurants, pubs, and cafes), people's perceptions of taste can be positively influenced. As loudness is an important variable in auditory cues, we consider that by amplifying and playing characteristic sounds of a specific product as a composition of the soundscape, it is possible to change people's taste of that product.

Moreover, more field studies in different segments are worth the research effort because they could effectively investigate the strength of the effects of the auxiliary sounds on the shopping and consumption environments.

In addition, sound can also confound and distract, putting its attractiveness and positive influences on the side by going beyond the perception thresholds and becoming an annoying noise (Fraedrich & King, 1998). However, when and where does this happen? Future studies might thus also examine the sensory overload subject because many consumption spaces deal with high levels of sound (e.g., gyms, metro stations, and bus stations). Studies concerning the amount of sound stimuli present in consumption contexts would also be worth investigating to determine in which circumstances some sounds should be avoided or controlled to prevent any negative influence on consumers' responses.

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APPENDIX A – Sound samples

Shared Link:

https://drive.google.com/drive/folders/1-f6K5CQFWvCCGiPwhZe1AqrmyyJJNy8k?usp=sharing

QR Code:

APPENDIX B – Measures used across studies

Table 18. *Measures*

Scale	Items	Study
Store image	- This store would be a pleasant place to shop. - The store has a pleasant atmosphere. - This store is clean. - The store is attractive.	Baker et al. (1994)
Attitude toward the store	- Bad/good - Unfavorable/favorable - Negative/positive - Outdated/modern - Dislike/Like (14 points)	Spangenberg et al. (1996)
Intention to visit the store	- Assuming you were going to purchase this type of merchandise and had the money, how likely would you be to visit this store?	Spangenberg et al. (1996)
Noise sensitivity	- I am sensitive to noise. - I find it hard to relax in a place that's noisy. - I get mad at people who make a noise that keeps me from falling asleep or getting work done. - I get annoyed when my neighbors are noisy. - I get used to most noises without much difficulty. (REVERSED)	Benfield et al. (2012)

APPENDIX C – Pre-test means for perceived healthiness for the three courses.

Table 19. *Means for all the menu options*

Appetizer 1

	Perceived Healthiness (Mean)	N	Std. Deviation
Steamed shrimp	6.50	42	1.419
Baked sweet potato chips	6.76	42	1.559
Onion rings	2.38	42	1.752
Beef with cheddar	2.45	42	1.728

Appetizer 2

	Perceived Healthiness (Mean)	N	Std. Deviation
Caprese salad	6.24	42	0.878
Mixed leaves with grape tomato and feta cheese	6.31	42	1.024
Jacket potato with sour cream and bacon	2.76	42	1.736
Buffalo wings	4.38	42	2.368

Entrée

	Perceived Healthiness (Mean)	N	Std. Deviation
Sea bass with steamed asparagus and thyme pesto	6.00	42	1.126
Leek risotto	6.17	42	2.186
Steak parmigiana with French fries	2.67	42	1.734
T-bone with caramelized onion and hash browns	3.60	42	2.430

Table 20. *T-tests for perceived healthiness between menu options*

Appetizer 1

	Paired Differences					t	Sig. (2-tailed)
	Mean Differences???	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Steamed shrimp x Onion rings	4.12	1.990	0.307	3.499	4.739	13.413	0.000
Steamed shrimp x Beef with cheddar	4.05	1.912	0.295	3.452	4.643	13.719	0.000
Steamed shrimp x Baked sweet potato chips	-0.26	1.432	0.221	-0.708	0.184	-1.185	0.243
Onion rings x Beef with cheddar	-0.07	1.091	0.168	-0.411	0.268	-0.424	0.674
Onion rings x *Baked sweet potato chips*	-4.38	2.163	0.334	-5.055	-3.707	-13.123	0.000
Beef with cheddar x *Baked sweet potato chips*	-4.31	2.066	0.319	-4.953	-3.666	-13.519	0.000

Appetizer 2

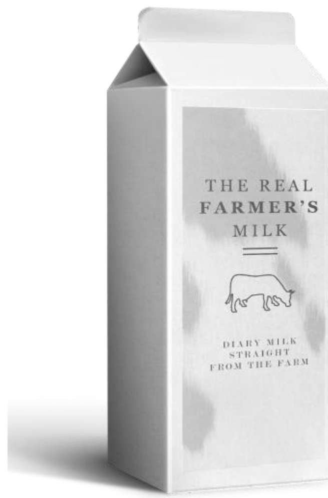
	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Jacket potato x Buffalo wings	-1.62	2.083	0.321	-2.268	-0.970	-5.037	0.000
Jacket potato x *Caprese salad*	-3.48	1.742	0.269	-4.019	-2.933	-12.929	0.000
Jacket potato x *Mixed leaves*	-3.55	1.811	0.279	-4.112	-2.983	-12.698	0.000
Buffalo wings x *Caprese salad*	-1.86	2.385	0.368	-2.600	-1.114	-5.047	0.000
Buffalo wings x *Mixed leaves*	-1.93	2.617	0.404	-2.744	-1.113	-4.776	0.000
Caprese salad x Mixed leaves	-0.07	0.894	0.138	-0.350	0.207	-0.518	0.607

Entrée

	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Sea bass x Steak parmigiana	3.33	2.126	0.328	2.671	3.996	10.161	0.000
Sea bass x T-bone	2.41	2.660	0.410	1.576	3.234	5.859	0.000
Sea bass x Leek risotto	-0.17	2.241	0.346	-0.865	0.532	-0.482	0.632
Steak parmigiana x T-bone	-0.93	1.943	0.300	-1.534	-0.323	-3.097	0.004
Steak parmigiana x *Leek risotto*	-3.50	2.392	0.369	-4.245	-2.755	-9.484	0.000
T-bone x *Leek risotto*	-2.57	3.255	0.502	-3.586	-1.557	-5.120	0.000

Note. Healthy options are presented in *italics.*

APPENDIX D – Versions of the product

a)  b) 

c) 

a) Farm (bottle)
b) Farm (carton)
c) Standard (carton)