
Music and Consumers

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Music touches the lives of consumers at many junctures (Kellaris & Kent, 1993; Rentfrow & Gosling, 2003). It is frequently used by sellers as a weapon of influence (Kellaris & Cox, 1989). A common feature of radio, television, and Internet advertisements, and a ubiquitous feature of retail environments, music is encountered by consumers as they attend to media, shop, wait for service, board flights, are placed on hold on the telephone, and in many other contexts (Blair & Kellaris, 1993). Music is also an object of consumption itself (Lacher & Mizerski, 1994), consumed both directly in the form of CDs, concerts, MP3 files, satellite radio, etc., and indirectly as a feature of other products (films, video games, sporting events, ceremonial occasions, religious services, etc).

Moreover, music provides a rich context for the study of basic, theoretical topics in consumer psychology, such as auditory perception, memory and recall, information processing, attitude formation, affect and emotion, behavioral conditioning, etc. Thus it is not surprising to find many studies investigating music's various influences on consumers. There are, however, some vexing challenges involved in compiling a review of this music-related work. First, much of the best music research in consumer psychology is not "about" music per se, but involves the use of musical stimuli in experimental investigations of ad processing, time perception, etc. Indeed the word "music" seldom appears in the title of non-applied studies that report music-related findings (e.g., Anand & Sternthal, 1990; Espinoza, Neto, & D'Angelo, 2004; Gorn, Goldberg, Chattopadhyay, & Litvack, 1991, 1993; Grewal Baker, Levy, & Voss 2003; Groenland & Schoormans, 1994; Mantel & Kellaris 2003; Miniard, Bhatla, & Sirdeshmukh, 1992; Muehling & Bozman, 1990; Olsen, 1997; Olsen & Pracejus, 2004; Roehm & Sternthal, 2001; and much of the work of Morris Holbrook). Thus there is a challenge of identifying relevant work that might be classified as "music research" in consumer psychology.

Second, much of the relevant research was conducted in other disciplines/contexts and applied to consumer psychology by analogy. The influence of music on human emotions, for example, is a central issue in the field of music therapy. Educational psychologists study how music influences the acquisition of information from educational television programs, instructional videos, and computer aided learning. Thus there is a challenge concerning where and how one draws boundaries around this vast topic. Are studies of background music's effects on vigilance performance in a radar screen monitoring task (e.g., Alikonis Warm, Matthews, Dember, Hitchcock, & Kellaris, 2002) sufficiently analogous to background music in commercials influencing consumers' attention to television advertisements to warrant inclusion in this review? Are studies of the therapeutic potential of music listening as a nursing intervention (Biley, 2000) sufficiently analogous to the use of environmental music to reduce shopper stress (Aylott & Mitchell, 1999)? Similar questions

could be asked regarding studies in film communication that examine how music shapes the perception of information presented in the visual modality (Boltz, 2004). Scholars in many domains have examined how music influences the perception and remembering of other, concurrently or sequentially presented visual or auditory information.

Third, in consumer research studies, music is generally treated as an independent variable or stimulus. Research, however, tends to be organized by outcomes of interest, such as attention, perception, etc. Music influences a wide variety of cognitive, affective, and behavioral outcomes. Thus the literature on music and consumers crosses many theoretic boundaries and tends to reside in disparate areas identified with outcomes of interest.

A final challenge, and perhaps the greatest, stems from the fundamental question *what is music?* It is not my intent to open Pandora's box here. The practical problem is that the term *music* has been used broadly in consumer research to apply to background and foreground music, instrumental and vocal music, brashly commercial and sublimely artistic music, works of short duration (e.g., audio logos, ring tones, sonic branding) and long duration (e.g., a Mahler symphony), in diverse styles including commercial pop, classical masterpieces, jazz, and non-Western music. To add to the confusion, many effects attributed to "music" may actually stem from the verbal content of vocal music lyrics or song titles, or even the mere remembrance of such upon hearing an instrumental version of a piece strongly associated with textual material (e.g., Roehm, 2001). Additionally, music is frequently characterized in terms of subjective properties that are not constituent properties of music at all, but rather reactions resident within listeners (e.g., "pleasant music"). In summation, "music and consumers" is an important, exceedingly vast, yet poorly defined topic.

These challenges demand that some rather arbitrary limits be set on the scope of this chapter. With advance apologies for purposeful exclusions and unintentional sins of omission, this selective review will include a brief, historic overview of music research and critical summary of prior reviews by Bruner (1990) and Hargreaves and North (1997). The remainder of the review selectively examines empirical research in consumer psychology, marketing, and closely allied fields, pertaining to the influences of music on consumers, with special attention to music, time perception, and the "earworm" phenomenon. Related topics, such as the influences of music on employees and the consumption of musical products are not given full treatment in this review. The review offers directions for future research throughout. (The recent work of Charles Areni (2001, 2003a, 2003b, 2003c) on managers' implicit beliefs about music also provides an excellent source of ideas for future research, as some of the lay theories identified in this work have not been addressed in the literature.)

HISTORIC BACKGROUND ON MUSIC RESEARCH

Music figured prominently in the ancient world and was closely associated with philosophy, cosmology, mathematics, metaphysics, and healing (Sachs, 1943). The modern, scientific investigation of music traces its origins to Wundt (1874) and Helmholtz (1863), both of whom investigated objective properties of sound in relation to listeners' reactions. Helmholtz claimed that minor keys tend to induce feelings of sadness because the slight dissonance of the lowered third degree of the scale (which does not occur in the natural overtone series) provokes a peculiar nervous disturbance in listeners.

In the tradition of Helmholtz, Heinlein (1928), Gundlach (1932, 1935), Hevner (1935, 1936, 1937), and Rigg (1940) each conducted programs of experimentation to investigate how objective properties of music such as tempo and pitch influence subjective reactions, such as listeners' adjectival characterizations of music. They established a direct link between music's temporal and

tonal attributes, and listeners' characterizations of musical mood. Henkin (1955, 1957) examined the interplay of multiple attributes of music in a series of factorial studies. This stimulus-response approach was more recently echoed in the work of Holbrook and Anand (1990), who examined the non-monotonic effects of tempo on listeners' responses to music, that of Kellaris and Kent (1991, 1993), who used digital technology to produce factorial manipulations, and that of Schubert (2004), which examined the emotional impact of multiple factors as they unfolded dynamically over time. From this research we may conclude that music can be characterized in terms of objective attributes stemming from the physical properties of sound, and that these properties (and their interactions) are partly responsible for listeners' reactions.

Cattell and Saunders (1954) developed the idea that musical preferences can reveal insights into personality. Recent work by Rentfrow and Gosling (2003, 2006) lends credence to this idea by documenting personality correlates of music listening preferences, and by showing that people use musical preferences to convey information about themselves and form accurate impressions of others. This may have implications for the emerging field of sonic branding—a point to which the review will return in a later section.

Early investigations of music effects also examined the potential of music to raise worker productivity. In 1915 Thomas Edison conducted experiments to ascertain the impact of recorded music on factory workers' productivity; however, he observed no effects, probably because the sound reproduction equipment was primitive and of low quality (Lundin, 1985). Wyatt and Langdon (1937) investigated the use of music to reduce fatigue and boredom among British factory workers. They found that playing phonograph records intermittently during the middle of a shift increased productivity among workers engaged in a monotonous, repetitive task. Interestingly, commercial services to distribute music to workplaces predate scientific verification of music's effectiveness in raising worker productivity – suggesting an implicit belief in beneficial effects of music. Whereas beneficial effects of music on employees may extend to their delivery of service to consumers, this could be an area for future research in the domain of consumer psychology.

Interest in musical influence on consumers increased during the second half of the 20th century with the proliferation in commercial applications, the advent of new media, and changes in popular culture (e.g., M-TV generation). This interest is reflected in work such as Smith and Curnow's (1966) study of the effects of music on purchasing behavior, Galizio and Hendrick's (1972) study on the effect of musical accompaniment on attitude, and Fried and Berkowitz (1979) study of music's role in enhancing compliance.

KEY LITERATURE REVIEWS

There have been two important literature reviews in recent history, including Bruner's (1990) seminal "Music, mood, & marketing" article in the *Journal of Marketing*, and Hargreaves and North's (1997) book *The Social Psychology of Music*, which contains a chapter on "music and consumer behaviour." Also worthy of mention is Turley and Milliman's (2000) review of experimental studies investigating atmospheric effects on shoppers, which includes those of environmental background music. The existence of prior reviews makes the current task much easier, as the present review is essentially an extension of Bruner (1990) and update of Hargreaves and North (1997).

Bruner

Bruner (1990) provides a useful overview of empirical studies of music's influences on listeners, with particular attention to effects on consumers' emotional and behavioral responses in commercial

contexts. Perhaps the most important contribution of Bruner's review is that it reaffirmed that music is not a "unitary sonic mass," but rather a confluence of multiple stimulus properties. Bruner identified three primary dimensions underlying musical stimuli: time, pitch, and texture. The temporal dimension comprises variables such as speed ("tempo"), rhythm, and groupings ("meter" or time signature). The pitch dimension includes variables such as melody, harmony, and key. The textural dimension includes variables such as tone quality ("timbre"—the property that allows listeners to distinguish between, say, a violin and a trumpet playing the same pitch) and volume (loudness). Bruner proposes that listeners' reactions to music stem in part from the stimulus properties of sound.

The first part of Bruner's review is organized around the three dimensions of musical sound (time, pitch, texture). It establishes that the constituent properties of music can evoke predictable main and interactive effects. For example, music pitched in minor keys tends to be perceived as sad; music played at a fast tempo tends to be perceived as arousing. The second part of the review examines empirical findings in commercial contexts, documenting a number of behavioral and non-behavioral findings pertaining to music in ads and in stores. (No summary of these finds is offered here. Interested readers are referred to the source.) The review concludes with an inventory of research propositions and a discussion of methodological recommendations.

Significantly, Bruner's article raised the bar on the psychological sophistication of music-related studies that followed. Studies of the mere presence versus absence of music and studies of sung versus spoken messages virtually disappeared, because Bruner's review firmly established that music is not a "unitary sonic mass," and that its influences depend largely upon the constituent properties that evoke meanings and feelings.

With due respect for the welcome contribution this work represents, hindsight suggests several points of criticism. First, there is more to music than creating "moods." Certainly music is the par excellence nonverbal "language of emotion" and has profound potential to evoke feelings in listeners, so Bruner's emphasis on affect is both understandable and warranted. However, music can also affect cognitive outcomes, both directly (as auditory information that shapes perceptions and attitudes) and indirectly (by attracting attention, distracting, influencing cognitive load or resource availability). Second, by focusing on the properties of musical stimuli, Bruner's review ignores potentially important music by person interactions. On the basis of field theory (Lewin, 1951), one might argue that musical properties provide only half the picture. One man's Mozart is another man's Michael Jackson. Reactions to music should depend upon the joint interplay of the traits of the music and those of the individual listener. Third, although Bruner correctly points out that music is not literally a "unitary sonic mass," it may nonetheless convey a Gestalt impression and thus be perceived as such by listeners. As Scott (1990) argues, research has tended to treat music as a non-semantic, affective stimulus working independently of rhetorical meaning or context. Such an approach overlooks intended meanings consumers infer from the verbal and visual context within which music is heard. These criticisms notwithstanding, the Bruner article remains an important landmark in the history of music research in the fields of marketing and consumer behavior, succinctly summarizing the most important findings to date and defining a new state-of-the-art for future research.

Hargreaves and North

Hargreaves and North (1997) provide a useful review of studies documenting various influences of music on consumers. The review is organized by listening context and includes influences of music

heard in advertisements, in retail shops, and consumed as entertainment. In advertising, music may serve as an unconditioned stimulus in a conditioning paradigm (Gorn, 1982; Blair & Shimp, 1992), such that audiences learn to associate feelings elicited by music with an advertised product. However, it appears that such conditioning occurs unreliably (Kellaris & Cox, 1989) and only under a limited set of circumstances (e.g., low involvement). The review also notes that when meanings conveyed by music are consistent with those conveyed by a brand message, music can be influential under conditions of high involvement (MacInnis & Park, 1991).

In retail settings, the loudness (Smith & Curnow, 1966) and speed (Milliman, 1982, 1986) of music can influence the pace of store traffic and duration of visit. The “fit” of music to products may influence purchasing directly (Areni & Kim 1993); the pleasure and arousal evoked by background music may influence approach behaviors such as the desire to affiliate (Dubé, Chebat, & Morin, 1995). Music has also been shown to influence perceptions of time in both laboratory (e.g., the work of Kellaris and colleagues) and field (e.g., the work of Chebat and colleagues) research.

Although the Hargreaves and North (1997) review identifies influential studies involving music and is faithful in reporting their findings, it is largely uncritical of these studies. For example, it does not recognize the possibility that some effects attributed to “music” may actually stem from the verbal content of musical lyrics. Additionally, the review ignores alternative explanations for findings and other possible roles of music in ads and stores, including audience-sorting and targeting, reinforcing brand images, attracting and maintaining attention, distraction, etc. Finally, as in any review (including the present one), there are some omissions. Hargreaves and North (1997) omit Anand and Sternthal (1990) and other studies that used musical stimuli, but which were not positioned as being “about” music (e.g., Holbrook & Huber, 1979; Holbrook & Gardner, 1993, 2000). Nevertheless, it provides a useful update to Bruner (1990).

Turley and Milliman

Turley and Milliman (2000) provide a review of experimental studies of atmospheric effects on shoppers, which includes effects of environmental music on shoppers. (Rieunier (1998) provides a similar review in French.) Most of the music studies cited were reviewed by Hargreaves and North (1997), with the notable exceptions of Andrus (1986), Brooker & Wheatley (1994); Gulas and Schewe (1994), Herrington and Capella (1996), and Hui, Dubé, and Chebat (1997). (To this list of exceptions I would also add a number of studies published in French, the most important of which are reviewed in Gallopel (2000) and in Ben Dahmane Mouelhi and Touzani (2003).) The authors call for theory development to move the state of research on atmospherics beyond the mere identification of effects, but they do not offer specific directions for doing so.

Theory development in the area of atmospheric music is constrained by the tendency of researchers to conduct field studies. It is difficult, impractical, often impossible, to measure intervening psychological processes in the field. This is a peculiar advantage of laboratory studies. Theory development is also constrained by the tendency to examine outcomes that are easily observed in stores, such as sales or time spent shopping. To understand the potential influences of music, researchers must get inside shoppers’ heads and examine how music influences cognitive processes that shape evaluations, preferences, and choices. Research on music atmospherics should also benefit from thinking by analogy about music findings from other contexts. For example, studies of music in ads show that music can distract and thereby reduce cognitive resource availability (Anand & Sternthal, 1990). Might music heard in retail contexts shape time perceptions and decrease shoppers’ sales resistance by a similar mechanism? If so, this could provide theoretic accounts for both shopping duration and sales effects.

WORK SINCE 1990

Music and Affect

Music is widely recognized as the par excellence language of human emotions and its role in shaping affective states of consumers in commercial contexts is well established (Alpert & Alpert, 1990; Bruner, 1990). It has been used as a mood induction in experimental research (e.g., Groenland & Schoormans, 1994; Miniard et al., 1992; Olsen & Pracejus, 2004; Roehm & Sternthal, 2001). Moreover, research has begun to identify specific attributes of music (“structural profiles”) that are responsible for evoking particular affective reactions (Kellaris & Kent, 1993; Alpert, Alpert, & Maltz, 2005).

Clearly, music can elicit feelings of pleasure (Sweeney & Wyber, 2002) and convey intended emotions, such as anger, sadness, happiness, and fear (Juslin, 2000). It can mitigate stress and promote feelings of relaxation in a stressful waiting situation (Lee, Henderson, & Shum, 2004; Tansik & Routhieaux, 1999). Pleasant feelings induced by music can influence cognitive activity (Chebat Chebat, & Vaillant, 2001), product evaluations (Gorn, Goldberg, & Basu, 1993; Groenland & Schoormans, 1994) and encourage positive evaluations of overall experience in waiting situations (Cameron, Baker, Peterson, & Braunsberger, 2003), although reactions can vary significantly by gender (Kellaris & Rice, 1993) and may depend upon the “fit” of the music (MacInnis & Park, 1991; North MacKenzie, Law, & Hargreaves, 2004).

Brader (2005) used music in political ads to evoke emotions of enthusiasm or fear. Results of experimentation show that evoking feelings of enthusiasm during a positively framed message can motivate voter participation and activate party loyalties; evoking feelings of fear increased the persuasiveness of a negatively framed message. Hence using music that evokes message-congruent emotions appears to reinforce the message and effect desirable outcomes. Although many prior studies have shown that music can evoke positive or negative affect, this study demonstrates the ability of music to evoke very specific emotions. It also raises the chilling prospect that something as important as the democratic process can be manipulated via music in campaign ads.

Hughes and Lowis (2002) studied “spiritual-emotional responses” to Anglican hymn tunes as a function of their structural properties. The authors report that hymns in triple (vs. duple) meter evoked more positive scores. Because duple meters mimic natural biorhythms (such as heartbeats and respiration), music characterized by triple meters may have a “freeing” effect that facilitates religious sentiment.

There are many topics that could be explored vis-à-vis music and emotion. For example, when do people seek out music that is congruous with their current feelings versus seek out music to effect a favorable change in mood? Why do (some) people enjoy listening to sad music? How and when do negatively-valenced emotions convey positive utility? What are the personal and situational boundary conditions under which this happens? Might listening to sad music evoke a contrast effect, such that happy experiences seem by comparison happier? The ancient notion of *catharsis* has been used to explain the positive utility of exposure to negative stimulation, but consumer psychology potentially offers many alternative explanations that could be explored in future research with music (Matsumoto, 2002).

Another challenge for future research in this area is that there appears to be some confusion in the literature stemming from a failure to recognize the important distinction between consumers’ affective reactions to music (“the music made me feel happy”) and consumers’ judgments of music’s affective character (“the music sounds happy to me”). Exposure to music that is recognized as being happy in character does not necessarily instill feelings of happiness in the listener. Hence some

observed effects attributed to music-induced affect may, in some instances, actually stem from thoughts evoked by music or thought processes influenced by music.

Music and Cognition

Recent studies of music and cognition have reported links between music and recall (Roehm, 2001; Stewart, Farmer, & Stannard, 1990; Stewart & Punj, 1998; Tom, 1990; Yalch, 1991), including autobiographical memory (Baumgartner, 1992), message processing (Anand & Sternthal, 1990; Kellaris et al., 1993), evaluations (Dubé & Morin, 2001; Mattila & Wirtz, 2001), persuasion (Muehling & Bozman, 1990), willingness to spend and purchase intent (North & Hargreaves 1998; North et al., 2000).

On the basis of her studies of Appalachian ballads, Wallace (1991) proposed that sung (vs. spoken) messages may improve recall of advertisements under certain conditions. Indeed, several studies have shown recall effects of music. Tom (1990) found that ads with music scored especially for the ad were better remembered than ads using parody music or original versions of popular hit songs. This was explained in terms of stimulus congruity, the advantages of which are also demonstrated by Kellaris and Rice (1993).

The current trend in advertising, however, is to use popular music. There may be a recall advantage when instrumental (vs. vocal) versions of popular hits are used. Roehm (2001) speculated that instrumental versions of popular music may encourage audiences to generate lyrics—to “sing along” mentally. Generating lyrics rather than listening to them passively may increase message recall when the lyrics convey the ad message. Evidence from an experiment are consistent with this explanation, as only listeners familiar with the music recalled more when exposed to an ad containing an instrumental version of the music. Alternatively, however, the absence of verbal material in instrumental music may reduce cognitive load, freeing resources to process the spoken message without distraction.

When persuasion is the goal rather than recall, use of popular hits may increase message acceptance by drawing attention, reducing the capacity to counter-argue, and by encouraging a less critical mind-set. That is, ads featuring well-known popular music may seem more like entertainment than like an influence attempt. Hence, such ads may be processed less critically. This untested proposition poses a challenge for future research.

Although music has the potential to increase recall by drawing attention to an ad, it can also serve as a distraction that can reduce cognitive resources and thereby reduce recall. Olsen (1995) addressed this dilemma by examining continuous versus interrupted schedules of background music punctuated by silence. Recall increased when a radio ad cuts to silence just before presenting a crucial piece of information. Moreover, the effect depends upon the duration of the interstimulus interval and the resource demands of the (directed vs. incidental) listening task (Olsen, 1997).

In addition to influencing the acquisition and recollection of other (verbal, visual) information, music has been shown to influence message processing (Anand & Sternthal, 1990) and to convey meanings (Zhu & Meyers-Levy, 2005) that reinforce messages and shape perceptions and evaluations (Hung 2000, 2001; Zhu & Meyers-Levy, 2005). The work of Marilyn Boltz with film scores (e.g., Boltz 2001, 2004) demonstrates how music can shape viewers' perceptions and interpretations of visual information. Her findings should apply by analogy to background music in television and web advertisements. Muehling and Bozman, (1990) found music to interact with ad narratives, such that factual narratives were most persuasive in the presence of favorable (or no) music; evaluative narratives were most persuasive in the presence of neutral music.

Background music has also been found to influence willingness to spend and purchase intent (North & Hargreaves, 1998). For example, North et al. (2000) observed associations among the extent to which people like the style of music (e.g., classical, easy-listening, pop) played in a bar and in a bank, perceptions of the atmosphere, and willingness to spend. This study did not address the issue of the music's congruity with other elements of the environment or with listeners' expectations. (For an excellent treatment of these issues, see Baker, Parasuraman, Grewal, & Voss, 2002.) Dubé and Morin (2001) observed similar effects of music, with attitude toward the servicescape mediating the impact of pleasant background music on store evaluations.

In summary, the effect of music on cognitive responses depends largely on what is played and how it relates to other information (Baker et al., 2002). Many of the effects reported in the literature seem to stem from stimulus congruity and support the matching hypothesis. To the extent that the manner in which information is presented matches or is similar to the manner in which consumers prefer to represent information stored in memory, the presented information is easier to process and more influential on cognitive outcomes such as recall and evaluations. Support for the matching hypothesis has been found in persuasion research (Fabrigar & Petty, 1999; Petty & Wegener, 1998), memory research (transfer-appropriate processing theory; Roediger, 1990), and decision research (stimulus compatibility effects; Shafir, 1995).

Although the vast majority of the literature supports the matching hypothesis (Hahn & Hwang, 1999), support has also been found for a mismatching hypothesis in some circumstances (Millar & Millar, 1990). For example, when message arguments are weak, greater persuasion occurs when the presented information mismatches the functional basis of the attitude one is attempting to change (Petty & Wegener, 1998). A clearer understanding of the conditions under which matching versus mismatching is likely to occur and confer benefits could add much to the literature on the effects of music on cognitive outcomes.

The literature on music and cognition seems limited by its focus on a relatively small set of outcomes (recall, evaluation, willingness to spend, and buying intent). In practice, music is frequently used to draw and hold the attention of consumers; yet, studies of the influence of music on attention are rare (Hecker, 1984; Kellaris et al., 1993).

Music and Time Perception

One of the more fascinating findings involving music is the apparent ability of music to shrink or expand subjective time relative to objective, clock time. This has numerous applications in shaping the temporal experience of consumers while they shop, surf the web, wait for service, or wait in checkout lines and other queues.

Kellaris and colleagues have conducted a series of lab studies examining the influence of music on time perception (Kellaris & Altsech, 1992; Kellaris & Kent, 1992; Kellaris & Mantel, 1994a, 1994b, 1996, 2003; Kellaris et al., 1996; Mantel & Kellaris, 1993, 2003). Exposing participants to music varying in characteristics such as mode (major, minor, whole tone "keys"; Kellaris & Kent, 1992) and loudness (Kellaris et al., 1996) can influence the retrospective duration estimates of short intervals "filled" with music. Generally, time intervals seem longest when less arousing/distracting music is heard, subject to certain moderating conditions such as gender of listener (Kellaris & Altsech, 1992; Kellaris & Mantel, 1994; North et al., 1998), and the congruity of the music with other elements of a stimulus event (Kellaris & Mantel, 1996). The duration of past events seems longer in retrospect under conditions that permit reconstruction of the event from memory, such as when cognitive resource requirements "match" their availability (Mantel & Kellaris, 2003).

Chebat and colleagues have conducted numerous field studies examining influences of music on customers (e.g., Chebat et al., 2000, 2001; Chebat & Dubé, 2000), including perceptions of wait-

ing times (e.g., Chebat & Gelinias-Chebat, 1993) in banks (e.g., Chebat et al., 1993) and in stores (Hui, Dube, & Chebat, 1997). Positively-valenced music was found to increase perceived waiting times, but this did not influence approach behaviors negatively. Thus it appears that the duration of a wait does not matter so much if the time is spent pleasantly. Similarly, Cameron et al. (2003) found that playing likeable music influenced wait length evaluations in a low cost waiting situation; however, wait length evaluations did not influence overall evaluations of the experience; and, Yalch and Spangenberg (2000) found that exposure to less familiar music decreased perceived times, increased actual time, but did not influence evaluations in a shopping simulation experiment.

Ironically, few studies have examined the influence of music's temporal aspects (e.g., tempo, rhythm) on time perception. An important exception is a field study by Steve Oakes (2003), which found time perceptions (perceived time–actual time) of students waiting in a registration queue to be positively related to the speed of the music to which they were exposed during the wait. One interpretation of this finding is that exposure to more musical information (music played at faster speeds contains more information per unit of time) evokes a numerosity heuristic. Further work by Oakes and Kellaris (in progress) is examining perceptions of event durations as a function of exposure to amount of musical information in the form of melodic information (i.e., fewer/more notes).

Recent work by Bailey and Areni shows that the number of songs to which listeners are exposed can serve as a basis for estimating time passage under conditions that encourage heuristic processing. Consistent with a segmentation-change theory of time perception, a numerosity effect was observed when participants in a lab study were engaged in a word puzzle task during exposure to music. In one study, those exposed to 8 short songs estimated a 20-minute interval to be longer than those exposed to 4 long songs during a 20-minute interval, irrespective of the type of music played (Bailey & Areni, 2006a).

In another study by Bailey and Areni (2006b), a 12-minute time interval seemed shorter to participants exposed to familiar/liked music (vs. unfamiliar music), when sitting idle (vs. engaged in a cognitive task). This effect was replicated in a follow-up experiment; moreover, familiar/liked music produced longer time estimates among individuals engaged in a memory task. These results are consistent with an attentional model under the low cognitive load condition and consistent with a discrete event model under the high cognitive load condition. Thus the effect of background music on the recollection of a past time interval appears to depend upon the availability of resources to monitor time passage.

Several studies have examined influences of music in the context of waiting on hold while on the telephone (Kellaris et al., 1999; North et al., 1999; Ramos, 1993). Ramos examined the effect of music formats on telephone waiting persistence on a Protective Services hotline. The greatest proportion of disconnects were observed under “relaxation music” format; the greatest persistence under a jazz condition. These results were explained in terms of the “*iso matching principle*.” Callers presumably disconnected when music was incongruent with their current mood. (Given the nature of the hotline service, the author safely assumed callers to be distressed, agitated, in a state of high arousal.) Kellaris et al. (1999) proposed an alternative explanation for Ramos' findings, i.e., that relaxing music may have seemed boring, less distracting to distressed callers; ergo, the duration of the wait may have seemed longer. They tested this proposition in a simulation experiment. Participants were asked to imagine calling a technical service number and being placed on hold. They received 6-minute timed exposures to Alternative, Classical, Jazz, or Rock music. Retrospectively reported durations seemed longer than 6 minutes under all conditions, but were shortest, on average, under the Jazz music condition. This is consistent with the authors' speculation that time perceptions may have influenced subjects in Ramos' experiment. (A telephone persistence study by North et al. (1999) is reviewed in the section on music and behavior.)

Although shaping consumers' perceptions of waiting time is the par excellence application of music and time perception research, research in this area could be usefully extended to other contexts, such as web site visit duration (see Galan, 2002; Jacob & Guéguen, 2003). Streaming music that shrinks perceived time may encourage longer visits, which should increase opportunities for information acquisition, persuasion, and click-through. Another avenue for future research on music and time perception would be to explore different facets of subjective time, such as perceived duration (how long an event seemed to last) and perceived pace (how slowly/quickly an event seemed to have passed). Although Kellaris et al. (1996) introduced this distinction, it has not been fully explored. Finally, whereas several studies have found music that influences time perception does not influence evaluations, future research should investigate trade-offs and countervailing effects of music on different desirable outcomes. The effective use of music as a weapon of influence may best be approached as an optimization problem.

Music and Behavior

Although the theoretic accounts for observed effects vary widely, a number of studies report behavioral effects of music. For example, Kellaris (1992) reported a field study in which applause duration was found to be a quadratic (inverted U-shaped) function of the tempo of live Greek music (when controlling for other factors, such as the duration of each song performance). Applause behavior was interpreted as an indication of audience pleasure, which is maximized at an optimum stimulation level.

North and Hargreaves (1999) found people were willing to persist in waiting longer (for someone to return) when music was playing than under a no-music condition. The music might have disrupted participants' internal timers; or it may have reduced the stress of waiting. In a study of telephone callers placed on hold, callers exposed to liked music and music that was congruous with their expectations persisted longer on hold (North et al., 1999). These findings are consistent with the notion that pleasant stimuli encourage approach behaviors.

Caldwell and Hibbert (2002) found that exposure to preferred music increased the length of time spent in a restaurant. (Bailey & Areni, forthcoming b, may provide an alternative theoretic account for this field observation. That is, exposure to liked music may have diminished perceived time relative to clock time, such that patrons sat longer at table under the illusion that their stay was shorter.) Sullivan (2002) also found restaurant visits to be longer on average when patrons are exposed to music, and particularly when the music is popular and played at a low volume. Music played at soft volumes also had favorable effects on expenditures—an effect also observed by Lamers (2003).

The “wine shop study” of North et al. (1999) received international media attention as journalists interpreted the findings as evidence of “subliminal persuasion.” Sales of French versus German wine increased when French music was playing in the store and vice versa. Upon questioning, less than 14% of shoppers attributed their product choice to the music; however, it is not clear whether shoppers were unaware of the music's influence (the “subliminal” effect sensationalized in the media) or if they were simply unwilling to admit it (social desirability bias). This study echoes an earlier study by Areni and Kim (1993), which found that wine shoppers exposed to classical (vs. Top-40) music spent more. Exposure to classical music did not increase the amount of wine purchased; rather consumers tended to buy more expensive wine.

Exposure to fast music appears to provoke a faster pace of drinking (McElrea & Standing, 1992). Certain styles of music seem to encourage spending in a restaurant setting (Wilson, 2003), in a perfume and cosmetics shop (Ben Dahmane Mouelhi, & Touzani (2003), and in a supermarket

(Herrington, 1996). Theoretic accounts for these observations, however, are not fully developed. This represents an opportunity for future research.

Musical Preferences and Listening Behavior

Although it was not my intent to cover the consumption of music (Lacher & Mizerski, 1994) in this review, there are two streams of research that warrant mention by merit of their important implications for consumer psychology. The first is a series of studies by Rentfrow and Gosling (2003) exploring individual differences in musical preferences and the links between musical preferences and personality traits. The authors document the central role of music in the lives of consumers, provide evidence that people consider music to be important and that it is frequently consumed in a variety of contexts, identify the basic dimensions of music preferences, and show how preference structures relate to other aspects of personality, such as intelligence. In a follow-up study, the authors examined the role of music in interpersonal perception (Rentfrow & Gosling, 2006). They found that people use musical preferences to convey information about themselves and to form accurate impressions of others.

The second is work by Holbrook, Lacher, and LaTour (2006) on expert judgment versus popular appeal. They begin by noting the weak link between experts' judgments of aesthetic merit and those of non-expert consumers of "cultural products" (e.g., film, music, fine art, entertainment). In an empirical study involving listening to different recordings of the song "My Funny Valentine" performed by various artists in different styles, the impact of expert judgment on audience appeal was shown to be mediated by audience judgment, such that there are moderately positive associations between each link. This would seem to have major implications for understanding the phenomenon of "taste" (Holbrook & Schindler, 1989) and the role of critics in shaping the appeal and commercial success of cultural products.

The work of Rentfrow and Gosling and that of Holbrook and colleagues raises some intriguing questions regarding consumer tastes and preferences. How and to what extent are individual preferences—and by extension mass audience appeal—influenced by knowing what *should* be preferred (versus what *is* preferred)? Why do some consumers strive to develop "good taste" that is congruent with that of experts, while others are content to ignore the opinions of experts on matters of taste? What factors moderate the influence of experts' opinions on the formation and evolution of consumer preferences? The marketing concept suggests that customers' needs be served. Are needs better served by giving the customer what he thinks he wants or by teaching the customer to appreciate something that might confer more satisfaction? The issue of "should like" versus "do like" burns at the very heart of marketing and certainly warrants much more research.

Music and the "Earworm" Phenomenon

Igor Stravinsky is reputed to have said, "Too many pieces of music finish too long after the end." He may have been referring to what has come to be known as the "earworm" phenomenon. The term comes from the German *ohrwurm* and refers to a song, tune, or fragment of music that gets lodged in one's head, such that it seems to repeat itself involuntarily. This "song stuck in the head" phenomenon is also popularly called "repetunitis," "tune cooties," and by a variety of other names. It differs from *endomusia* (auditory hallucinations) in that the music is obsessively rehearsed mentally, but not actually heard as from an external source.

In reference to this phenomenon, Wanda Wallace wrote, "...consider how difficult it can be to get a jingle out of your head when you have heard it several times. Whether or not you like the jingle

is irrelevant; you just can't seem to stop humming it. One well worn example is the Oscar Meyer song. Just saying the brand name is usually enough to start part of the jingle playing through your mind" (Wallace, 1991, p. 239).

Kellaris (2001) was the first to examine this phenomenon empirically in the field of consumer psychology. In a presentation to the Society for Consumer Psychology he presented a preliminary overview of the phenomenon, which generated world-wide media attention (e.g., Rivenburg, 2001). This study documented the existence and pervasiveness of the phenomenon, including the frequency and duration of episodes, and laid the groundwork for building a theoretic account and possible remediation strategies. This initial study also examined properties of songs that people report as have gotten stuck in their heads, strategies that people use to un-stick a stuck song, and lay explanations for why the phenomenon occurs. Whereas Kellaris believed that musical properties might prove key to explaining how and why songs become earworms, he provisionally outlined a theory of "cognitive itch."

Just as certain bio-chemical agents (histamines) have physical properties that can cause the skin to itch, certain pieces of music may have properties that excite an abnormal reaction in the brain ("cognitive itch"). An itching sensation on the skin may motivate people to scratch to alleviate the discomfort. This, of course, only exacerbates the sensation, causing the familiar cycle of repeated itching and scratching.

By analogy... the only way to "scratch" a cognitive itch is to rehearse the responsible tune mentally. The process may start involuntarily, as the brain detects an incongruity or something "exceptional" in the musical stimulus. The ensuing mental repetition may exacerbate the "itch," such that the mental rehearsal becomes largely involuntary, and the individual feels trapped in a cycle or feedback loop. (Kellaris, 2001, p. 66)

In a follow-up study, Kellaris (2003) examined person traits and situations that might interact with musical properties to create an earworm experience. Surprisingly, there were no statistical associations between earworms (frequency, duration) and O-C scores. The frequency of earworm episodes were positively associated with neuroticism, with the "discomfort with ambiguity" dimension of need for cognitive closure, and with musical training and listening behaviors. Individuals characterized by low need for cognition are prone to longer earworm episodes. Findings regarding situational influences included primacy and recency effects, stress, and fatigue as contributory factors.

It appears that music characterized by simplicity, repetitiveness, and incongruous features such as odd meters or unexpected cadences is most likely to become an earworm. However, the earworm phenomenon cannot be explained by of the "stickiness" of musical properties alone. Person traits and situational factors also appear to play significant roles.

Work by Halpern and colleagues (e.g., Halpern, Zatorre, Bouffard, & Johnson 2004) has examined neural correlates of musical properties and found similar patterns of neural activation (fMRI evidence) for both perceived and imagined music. This may provide a clue to understanding the earworm phenomenon. It appears that the brain processes unheard (imagined) music similarly to heard (perceived) music. Moreover, a highly publicized study conducted by a team of researchers at Dartmouth (Kraemer, Macrae, Green, & Kelly, 2005) found that the brain tends to fill in missing information when a fragment of familiar music is interrupted. In fact, the tendency to do so is sufficiently strong that all subjects in the Dartmouth study reported subjectively hearing the (familiar) music during short gaps that were muted. Exposure to muted gaps in unfamiliar music did not produce this effect.

The theory of ironic processes of mental control (Wegner, 1994; Wenzlaff & Wegner, 2000) may provide a useful explanation for the fascinating earworm effect. According to the theory, mental control involves two processes: (1) an operating process that searches for mental contents consistent with one's goals (e.g., to not think of a particular tune), and (2) a monitoring process that searches for mental contents inconsistent with one's goals (e.g., how frequently one thinks about a tune about which one is trying not to think). The operating process requires greater cognitive effort and is more strongly influenced by cognitive load manipulations. Hence, under conditions of cognitive load, attempts to suppress an unwanted thought are ineffective. Furthermore, a post-suppression rebound effect is frequently observed. Thought suppression can be effective initially, but when one lets down one's guard and stops attempting to avoid thinking about an unwanted thought (tune), the unwanted thought occurs more frequently (compared to a no-suppression control condition).

Ironic processes theory has important implications for understanding substance abuse, PTSD, OCD, and offers counterintuitive implications for their treatment. People who suffer these challenges should abandon thought suppression in favor of other methods of mental control. Concentrating on attaining desirable goals rather than avoiding undesirable goals can be effective. Training on the use of more effective distracters can be effective. Paradoxically, even accepting and expressing unwanted thoughts can be effective under some circumstances. Wegner and Zanakos (1994) developed a self-report measure of the tendency to suppress thoughts, and this measure correlates positively with depression, obsession, dissociation, and anxiety. By analogy, earworm sufferers may be well advised to follow the prescriptions of ironic processes theory. As one research participant in a Kellaris study wrote, "never fight with an earworm—it will only make it angry!"

Music and Sonic Branding

Music is a nonverbal language that can convey abstract and concrete meanings (Zhu & Meyers-Levy, 2005) and cue memory (Stewart et al., 1990). As such, it may be particularly useful in cross-cultural communications when verbal languages impose a need for translation. The emerging field of "sonic branding" seeks to take advantage of music's ability to communicate nonverbally (Jackson, 2003).

The idea of sonic branding appears to have evolved from "audio logos," which have been in use for a long time. Older readers will recall examples such as the NBC television network's three note (*sol mi do*) chime motif and the ascending scale (*fa sol la ti do*) that accompanied the spelling of the word J-E-L-L-O. Yet, surprisingly, at the time of this writing, there are no academic studies of sonic branding known to the author. The work of Rentfrow and Gosling (2003, 2006), however, suggests the intriguing possibility of using music to convey brand personalities and to appeal to the idealized self of prospective consumers.

CONCLUSION

The question I am asked most frequently by business practitioners and journalists alike is "What is the best music to play in ___?" Fill in the blank with any context—an ad for shoe inserts, a store targeting adolescents, an upscale hotel lobby, a busy, downscale restaurant, a medical office waiting room, or a funeral home full of grieving relatives to be comforted and consoled. The answer is always the same and should be predictable to anyone in the field of consumer psychology: "It depends." It depends on the immediate and longer-term goals to be served, because music can elicit many different types of responses from consumers. A short list might include: evoke feelings, elevate or depress moods, calm or stimulate listeners, serve as an unconditioned stimulus in an

associative learning paradigm, draw and hold attention, distract, reduce cognitive resource availability, shape perceptions of visual stimuli, evoke imagery and meanings, enhance message learning or acceptance, cue memories, reinforce store or brand images, target particular segments of consumers through their musical tastes and preferences (Sivadas Grewal, & Kellaris, 1998), shrink or expand perceived time relative to clock time, convey information about a product or organization non-verbally, reinforce verbal messages, reduce fatigue, stress, and boredom, boost employee morale and thereby enhance the delivery of service to customers, etc. Clearly, music can serve multiple purposes (Dunbar, 1990; Morrison & Beverland, 2003). Moreover, sometimes these multiple purposes come in conflict with each other as music can have countervailing effects on different desirable outcomes (Chebat et al., 2001). Should a store play music that is preferred by customers or by employees? Should a restaurant play music that shrinks perceived waiting times or that augments perceived time at table, such that table turn-over is greater without making customers feel rushed? There are simply no simple answers.

So what can we conclude from this brief overview of research on music and consumers? Research has come a long way from the foundational, 19th century work of Wundt and Helmholtz to studies such as Zhu and Meyers-Levy (2005). The literature of this subfield is scattered, intriguing, rapidly growing in volume, and evolving in terms of psychological sophistication. This review provides an opportunity to reflect on the current state of the subfield and offers suggestions for future research on this fascinating topic.

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