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Research Note

# Calibrating 30 Years of Experimental Research: A Meta-Analysis of the Atmospheric Effects of Music, Scent, and Color

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**Abstract**

Atmospheric in-store stimuli have been the subject of considerable empirical investigation for over 30 years. This research presents a meta-analysis of 66 studies and 135 effects ($N = 15{,}621$) calibrating the atmospheric effects of music, scent, and color on shopping outcomes. At an aggregate level, the results reveal that environments in which music or scent are present yield higher pleasure, satisfaction, and behavioral intention ratings when compared with environments in which such conditions are absent. Warm colors produce higher levels of arousal than cool colors, while cool colors produce higher levels of satisfaction than warm colors. The estimated average strength of these relationships ranged from small to medium. Effect sizes exhibited significant between-study variance, which can be partly explained by the moderators investigated. For instance, larger effect sizes were observed for the relationship between scent and pleasure in those samples with a higher (vs. lower) proportion of females. Data also indicated a tendency toward stronger music and scent effects in service settings as compared to retail settings. The results of this analysis, based on data aggregated across the research stream, offer retailers a guide to enhance customers' shopping experience through judicious use of in-store atmospheric stimuli.


*Keywords:* Music; Scent; Color; Meta-analysis; In-store atmospherics; Retail customer behavior

One of the key success factors for any retailer or service provider is presenting customers with a pleasurable consumption environment (Pan and Zinkhan 2006). A well-designed store environment may positively stimulate customers' senses, enhance their shopping experience, and ultimately translate into larger sales revenues (Doucé and Janssens 2013; Sullivan 2002). The subtlety of atmospheric effects often results in customers being unaware of their exposure to them, even though their behavior is affected (Morrin and Ratneshwar 2000). Academic researchers have explored how environmental stimuli affect customers' shopping behavior for more than 30 years (Bellizzi, Crowley, and Hasty 1983; Ludvigson and Rottman 1989; Milliman 1982). In particular, scholars have investigated how music, scent, and color influence shopping outcomes, affecting emotional reactions, satisfaction and purchase intention, and have produced a voluminous literature with substantial variation in sample composition, industry context, and study design (Bellizzi and Hite 1992; Mattila and Wirtz 2001; Sayin et al. 2015).

This body of work has produced mixed results, including significant and non-significant findings, as well as effects in opposing directions, even for the same relationship (Andersson et al. 2012; Cyr, Head, and Larios 2010; Michon, Chebat, and Turley 2005; Morrin and Ratneshwar 2000; Yalch and Spangenberg 1988). Furthermore, estimates of the strength of the relationships have ranged from small to large (Jacob, Stefan, and Guéguen 2014; Morrison et al. 2011), rendering conclusions about the elasticity of atmospheric effects, an important question for retail executives, uncertain. Generalizable estimates of effect sizes are therefore badly needed. Previous reviews of atmospheric effects have, however, been limited to narrative or vote-counting methods (Bone and Ellen 1999; Turley and Milliman 2000), and generalized estimates among the

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relationships here investigated have been reported only for the effect of music on pleasure (Garlin and Owen 2006). In addition to the lack of aggregated effect size estimates, these early summaries date back more than 10 years.

The first contribution of this study is therefore to present a meta-analysis attempting to calibrate the size of atmospheric effects on shopping outcomes. The second contribution is an attempt to account for between-study variance in effect sizes and to investigate a number of moderators that reflect study design choices made by the researchers. The moderators include sampling frame (students versus customers), gender split (low versus high proportion of females in a sample), industry setting (retail versus service versus online settings), and experimental design (fictitious versus actual environments). Through these means, we aim to present retailers with a reliable guide to the effects of atmospheric stimuli on shopping outcomes based on an analysis of data aggregated across the research stream.

## Theoretical Background

The framework for this meta-analysis is depicted in Fig. 1 together with the investigated variables. It follows the extant literature in using the so-called stimulus-organism-response paradigm (Mattila and Wirtz 2001; Mehrabian and Russell 1974).

### *Shopping Outcomes*

Frequently studied shopping outcomes at the organism level include customers' emotional reactions and judgments of satisfaction. Emotional reactions are conceptualized as a combination of arousal and pleasure. *Arousal* represents the activation dimension and can be defined as the perceived degree of stimulation, while *pleasure* represents the valence dimension and refers to the perceived degree of enjoyment (Donovan and Rossiter 1982). *Satisfaction* reflects an overall evaluative judgment about the shopping experience (Mattila and Wirtz 2001). Satisfaction is distinct from pleasure in that it relates to outward-looking judgments about external entities such as a store's atmosphere ("Shopping in this store is a positive experience", as adapted from Sayin et al. 2015, p. 5); while pleasure reflects a subjective, inward focus ("I'm experiencing pleasant feelings").

At the response level, the most commonly studied variables include purchase (Fiore, Yah, and Yoh 2000), visiting (Doucé and Janssens 2013), shopping (Broekemier, Marquardt, and Gentry 2008), or patronage intention (Grewal et al. 2003). Studies also capture actual expenditures (Sullivan 2002). Together, these variables reflect the underlying objective of customers to do business with an organization, and are here subsumed under *behavioral intentions*.

### *Atmospheric Stimuli*

The integration of prior findings into a common framework necessitates a concentration on the most frequently studied variables. Among the wide variety of investigated atmospheric stimuli, music, scent, and color have received the most research attention and are therefore the focus of this analysis (Bellizzi, Crowley, and Hasty 1983; Bone and Ellen 1999; Garlin and Owen 2006).

#### *Music*

As an atmospheric stimulus, music refers to human compositions functioning as an ambient element in the consumption environment (Garlin and Owen 2006). At the most basic level, *music* has been studied by comparing the effects of the presence and absence of music; that is customer emotions, satisfaction, and behavioral intentions are compared across conditions where music is present and where music is absent (e.g., Grewal et al. 2003).

Authors argue that music can be seen as a complementary product or service feature that is consumed during the purchase process and is therefore likely to influence shopping outcomes (Hui, Dubé, and Chebat 1997). Another explanation for the effect of music comes from optimal arousal theory, which posits that people seek to align their current level of arousal to a level they find personally optimal (Berlyne 1971). Customers who are in an "understimulated" state will be seeking heightened arousal, which they may realize through the presence of music in the shopping environment (Mattila and Wirtz 2001). Since arousal operates as an amplifier of positive in-store experiences (Oliver, Rust, and Varki 1997), downstream positive effects on pleasure, satisfaction, and behavioral intentions can be anticipated. Therefore, we hypothesize:

**H1.** The presence (versus absence) of music has a positive effect on (a) arousal, (b) pleasure, (c) satisfaction and (d) behavioral intentions.

#### *Scent*

Ambient scent refers to a scent present in the environment that does not emanate from a particular object (Bone and Ellen 1999). Scent has been employed as a naturally occurring stimulus (e.g., in bakeries) as well as an artificially induced stimulus to enhance store ambience (Spangenberg et al. 2006). Similar to music, *scent* effects are usually measured by comparing customers' shopping experiences in a scented environment with those in a scent-free one (e.g., Doucé and Janssens 2013).

Research suggests that, relative to other sensory cues, scent is processed in a more primitive portion of the brain (Herz and Engen 1996), and scent therefore requires little or no cognitive effort to enhance alertness, improve in-store experience, and promote positive shopping outcomes (Bone and Ellen 1999). Studies have also found a privileged neural link between the olfactory nerve and the area responsible for emotional memory (Herz 2004). This is understood as the physiological explanation for why smell evokes significantly stronger emotional memories compared to those triggered by auditory and visual stimuli (Herz 2004). Therefore, when evoked in-store, such memory associations may stimulate positive emotions and lead to a more enjoyable shopping experience (Bone and Ellen 1999). Hence, we propose: