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Published in:
Psychology and Marketing

DOI:
[10.1002/mar.21346](https://doi.org/10.1002/mar.21346)

Publication date:
2020

Document Version
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

Citation for published version (APA):
Pathak, A., Calvert, G. A., & Lim, L. (2020). Harsh voices, sound branding: How voiced consonants in a brand's name can alter its perceived attributes. *Psychology and Marketing*, 37(6), 837-847.
<https://doi.org/10.1002/mar.21346>

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Harsh voices, sound branding: How voiced consonants in a brand's name can alter its
perceived attributes

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perceived attributes

Abstract

This paper examines the sound symbolic link between voiced obstruents (speech sounds created by obstructing the airflow) present in a brand name and the perceived product/brand attributes. In three studies (two using self-reported measures and one using an implicit reaction time paradigm), we tested the effect of voiced (b, d, g, z, v) vs. voiceless obstruents (p, t, k, s, f) across twenty-five hypothetical brand names, on the perceived product attributes of harshness (vs. softness). Brand names with voiced (vs. voiceless) obstruents are perceived as harsh (vs. soft/mild). Results are described across two different product categories (e.g., toilet cleaner and skin conditioner), and also within the same product category (e.g., strong vs. light beer and strong vs. mild toilet cleaner). Since sound symbolism is culturally agnostic, brands expanding into international and linguistically different markets can use these insights to create brand names that will have international appeal, and can match the product and/or brand attributes that brands wish to convey to consumers.

Introduction

With the globalization of markets, consumers are constantly being introduced to new brands, many with unusual and foreign sounding names (e.g., Xiaomi, Hyundai, TsingTao, Ayurveda etc.). A large body of research has now shown that the phonemes (or sounds) present within a brand name can create product expectations in a consumers' minds (a phenomenon referred to as sound symbolism) (see Lockwood & Dingemanse, 2015 and Spence, 2012 for a review). Research also shows that even if brand names are unfamiliar, certain speech sounds implicitly convey semantic information (Fenko, Lotterman, & Galetzka, 2016; Roche, Shrum, & Lowrey, 2015). Furthermore, these acoustic signifiers relate to specific psycholinguistic features such as syllabic length, quality of the vowels (back or front), type of consonants etc. (Klink, 2000; Pathak et al., 2019; Roche, Shrum, & Lowrey, 2015; Spence, 2012; Yorkston & Menon, 2004). In fact, the generation of product expectations based purely on the sound of a brand name, is particularly salient in the case of unfamiliar brands (Fenko, Lotterman, & Galetzka, 2016). It is well established that all languages contain speech sounds which are perceived as harsh to the human ear (Aryani, Conrad, Schmidtke, & Jacobs, 2018). In the current paper, we intend to demonstrate that the inclusion of harsh (vs. soft) sounds in a brand name can imbue them with connotations that are appropriate for certain products, and which consumers automatically associate with product harshness vs. softness (e.g., an abrasive domestic cleaning product vs. a moisturizing skin cream). By leveraging this psycholinguistic knowledge in the generation of novel brand names, companies can launch new products and services into unfamiliar markets with greater confidence that the distinctive features will be implicitly understood by consumers (Carnevale, Luna, & Lerman, 2017; Luna, Carnevale, & Lerman, 2013).

Employment of this neuro-informed brand naming strategy, is likely to give brands a competitive advantage in linguistically diverse international markets [e.g., many successful brands have an over-representation of certain letters (e.g., s, l, m, ee) in their names, which is said to give them an edge over their competitors (Pogacar, Plant, Rosulek, & Kouril, 2015). Several high profile examples of brands that have enjoyed such international success include Abba, Absolut Vodka, Volvo and IKEA which researchers have demonstrated is due in part to their sound symbolically well-balanced names (Abelin, 2015).

Theoretical background

All languages are comprised of two key building blocks: consonants and vowels (Ladefoged, 1993), that can be discriminated on the basis of their articulatory requirements. The pronunciation of vowels requires only movement of air within the oral cavity and little obstruction of the vocal tracts (Reetz & Jongman, 2011). In contrast, articulation of consonants requires substantial movement of the articulatory muscles including obstruction, friction and constriction of the vocal tract (Ladefoged, 1993). Though the production of consonants in themselves always involves inherent friction (or constriction), we propose to describe voicing (vs. non-voicing) in obstruents - speech sounds created by obstructing airflow in the oral cavity - as a psycholinguistic mechanism to make brand names convey the product harshness or abrasiveness.

Voicing refers to the vibration of the vocal cords during the pronunciation of some speech sounds. This can be subjectively experienced by placing fingers on Adam's apple while saying /b/ (voiced) vs /p/ (unvoiced)] (Delahunty & Garvey, 2010; Slepian & Galinsky, 2016). Voiced (vs. voiceless) obstruents refer to the sounds produced when the airflow in the oral cavity is obstructed, along with an associated voicing (Ladefoged, 1993; Reetz & Jongman, 2011).

VOICING AND BRAND ATTRIBUTES

There are three typical types of obstruents: stops (voiced & voiceless; k & g; p & b; t & d), fricatives (voiced & voiceless; s & z; ʃ & ʒ; θ & ð; f & v) and affricates (tʃ & dʒ). Importantly, the accompanying voicing and modulation of the vibrating vocal cords, is thought to make the voiced obstruents sound harsher than the unmodulated sound of the voiceless obstruents) (Slepian & Galinsky, 2016).

Numerous studies have highlighted the fact that people spontaneously associate certain speech sounds in a brand name with certain product attributes (e.g., fast vs. slow, sweet vs. bitter, luxury vs. basic, round vs. spiky, masculine vs. feminine, big vs. small, light vs. heavy (just to name a few) and that speech sounds can affect the perception of the associated product (or brand) attributes (see Spence, 2012 for a review). Here, we extend these findings to show that the harsh sounds present within a brand name can map on to the perceived harshness (or softness) of the associated brand (or product). By harshness, we mean for example, that a toilet cleaning product will be perceived as more astringent or effective at removing dirt if the brand name contains voiced obstruents whereas a skin moisturizing lotion would be perceived as softer on the skin if the brand name does not contain voiced obstruents.

But why should the voiced obstruents in particular be considered harsh by consumers? We propose two mechanisms behind this phenomenon: 1) the frequency code hypothesis (FCH) and, 2) aerodynamic difficulties in pronouncing voiced obstruents. In this paper, we link these to the research conducted in the field of sound symbolism and brand naming.

Frequency Code Hypothesis (FCH)

Voiced obstruents are believed to be articulated at a lower frequency than the voiceless ones (Kingston & Diehl, 1995; Kingston, Diehl, Kirk, & Castleman, 2008). In the animal kingdom, low frequency sounds have been shown to be associated with danger and threat, and

high frequency sounds with pleasure and appeasement. Many animals use low frequency sounds to express hostility but switch to a higher frequency sound to convey friendliness (Morton, 1977) showing a plausible link between sounds and their hostile (vs. friendly) nature. Similarly, the normal male voice lowers in frequency during puberty, which typically helps the male of a species appear more aggressive to other males in mating competitions (Ohala, 1994). The evolutionary link between harsh (vs. smooth) sounds for stressful (vs. pleasant) situations is also believed to be one of the reasons why voiced obstruents are found far more often in swear (or cuss) words and threatening words (Nielsen & Rendall, 2011; Nielsen & Rendall, 2013; Van Lancker & Cummings, 1999). Consumers too have been shown to link low (vs. high) frequency sounds with aggressiveness (vs. submissiveness) (Krishna, 2012; Pogacar et al., 2018). FCH proposes that since lower frequency sounds often emanate from larger, resonant oral cavities of the bigger (or threatening) animals (vs. higher frequencies emanated from smaller oral cavities of smaller animals), across species, listeners automatically associate low (vs. high) frequency sounds with danger (vs. harmlessness) (Fitch, 1997; Morton, 1977; Ohala, 1994).

Aerodynamic difficulties in pronouncing voiced obstruents

Pronunciation of voiced obstruents require extreme aerodynamic difficulties and control over the articulatory muscles (see Ohala, 1983 for a review). These difficulties are believed to be a reason behind the associated link between words with voiced obstruents and negativity (i.e., negative images, meanings or perceptions) (e.g., dirtiness, sneakiness) (Hamano, 1998; Hinton, Nichols, & Ohala, 1994; Kawahara, Shinohara, & Uchimoto, 2008; Kubozono, 1999; Ohala, 1983). These are also believed to be one of the reasons why voiced obstruents are rare in most world languages, and missing altogether in many (e.g., Cantonese, Hawaiian, Zuni, Ainu, Korean, Mandarin do not have any voiced obstruents) (Major & Faudree, 1996; Ohala, 2011;

Żygis, Fuchs, & Koenig, 2012). Research also suggests that words with voiced obstruents are associated with heaviness (i.e. magnitude and size, similar to a large or dangerous animal as proposed by the FCH) (Kubozono, 1999; Saji, Akita, Imai, Kantartzis, & Kita, 2013) and when such sounds are used in names (e.g., brands, people, characters of a story), people associate such named objects (or persons) as dangerous, threatening and bigger (e.g., studies done with Pokémon names show that, both in English and Japanese speakers, the story characters who have voiced obstruents in their names are perceived as larger, heavier and stronger creatures (Kawahara & Moore, 2018; Shih, Ackerman, Hermalin, Inkelas, & Kavitskaya, 2018). Voicing in voiced obstruents is also believed to increase the sound energy of these utterances (Aryani et al., 2018), which in turn further enhances the perception of large size and threatening nature associated with such names (vs. voiceless obstruents which are considered smaller, softer and more pleasing). Similarly, the acoustic harshness that accompanies voicing has been shown to convey harshness (vs. smoothness) in tactile perception (Sakamoto & Watanabe, 2018), and masculinity (vs. femininity) in names (Slepian & Galinsky, 2016).

Since voiced (vs unvoiced) obstruents are linked with harshness (vs softness) and negative (or threatening) perceptions, in the current paper we explore this in the context of branding and explore two questions, 1), whether the presence of voiced obstruents in a brands' name can affect its perceived attributes and, 2) whether consumers will associate such brand

¹Toilet cleaner and skin conditioner were chosen as harsh and soft product categories respectively; the logic being that toilet cleaner is generally considered harsh and skin conditioner as soft product categories (see Lowrey & Shrum, 2007 for a similar approach, where they have used these product categories for alienating the attributes of harshness and softness; also, Yorkston & Menon, 2004 for a similar approach for the product attributes of creaminess and smoothness for ice-creams).

names differently in terms of its perceived associations. To test these hypotheses, we created hypothetical brand names (HBNs) and assessed their association with products typically considered “harsh” vs. “soft” as defined above (e.g., toilet leaner vs. skin conditioner)¹ in three studies. We believe that since voiced obstruents have been shown to evoke negative images, are harsher and used more often in cuss words, sound symbolically participants will perceive the HBNs created using voiced (vs. unvoiced) obstruents as more appropriate for a harsh (vs soft) product¹. Perception of voiced obstruents (or even voiced consonants) in the context of brand-naming is an under-researched area (see Table 1 for an overview of the studies linking voiced (vs. voiceless) consonants with brands or product attributes), and with the current research we aim to understand more about the ways in which consumers associate brand names with product attributes.

Insert Table 1 about here

Method and overview of studies

Twenty-five HBN pairs (see Appendix 1) were produced using voiced (/b/, /d/, /g/, /z/, and /v/) vs. unvoiced (/p/, /t/, /k/, /s/ and /f/) obstruents. HBNs were tri-syllabic, with a CV-CV-CV (consonant-vowel) structure and all five vowels were used at the three vowel positions equally. Studies were designed using the Inquisit 5 software and the participant pool was hired from the USA using the Amazon’s Mechanical Turk (M Turk) (Mason & Suri, 2012). The web-links of studies were posted on the M Turk; participants were invited to take part in the studies and were paid for their time. Each participant was allowed to participate in only one of the studies and was barred from participating again. HBNs were tested for any similarity with existing words and or known brands (52 respondents between 23 to 81 years of age; $M_{age} =$

41.73, $SD = 12.37$, $Males = 36$, $Females = 16$; HBN_{voiced} : $Item\ Mean = 2.28$, $SD = 1.72$, $\alpha = 0.985$; $HBN_{voiceless}$: $Item\ Mean = 2.42$, $SD = 1.86$, $\alpha = 0.986$). We aim to test the association of brand names containing voiced (vs. voiceless) obstruents with the attributes of harshness (vs. softness) across three studies. Study 1 aimed to demonstrate this association with products which are generally considered to be harsh (e.g., a toilet cleaner) and soft (e.g., skin moisturizer). Study 2 aimed to rule out the effect of the product category itself (e.g., it is likely that consumers naturally associate some phonemic sounds with a few categories, for example, names with the vowel endings are generally considered to be female names; Barry & Harper, 2000; Moorthy, Pogacar, Khan, & Xu, 2018). In Study 2, we aimed to show the extent of this association within the same product category and intend to demonstrate that even within the same product category, brand names having voiced (vs. voiceless) obstruents are felt as more suited for the stronger vs. milder versions of the product [strong (vs. mild) toilet cleaner (Study 2a) and strong (vs. light) beer (Study 2b)]. Studies 1 and 2 used a self-reported measure to test the association, in Study 3 we aim to demonstrate the same using an indirect measure (e.g., semantic priming task). The aim of Study 3 is to test the extent and strength of the association of voiced (vs. voiceless) obstruents with the attributes of harshness (vs softness) at a non-conscious and automatic level (e.g., phonetic symbolism).

Study 1

Participants

A total of 59 respondents completed the study ($Min_{age} = 20$ yrs., $Max_{age} = 66$ yrs., $Mean_{age} = 38.58$ yrs., $SD = 10.66$, $Males = 40$, $Females = 19$). All participants were English speakers (two participants also knew Turkish).

Procedure and design

Participants were informed that a company was preparing to launch two new products into a new international market- a skin conditioner and a toilet cleaner - and was looking for suitable names for both its products. They were then shown two HBNs at the bottom of the computer screen, one with voiced obstruents and the other with unvoiced obstruents. Participants had to ‘drag and drop’ the HBNs to one of the two product categories (i.e., skin conditioner or toilet cleaner, shown at top of the screen), which they felt would be appropriate for that particular HBN (position mapping of the HBNs and product categories was counterbalanced, within-subjects and between-subjects respectively). Once participants were satisfied with their selection, they moved on to the next trial to rate all the 25 HBN pairs. Prior to the experiment, participants were trained on the ‘drag and drop’ procedure in practice trials, using real brands (e.g., Clorox, Nivea, Dove, Lysol).

Results

Participants rated HBNs with voiced (vs. voiceless) obstruents as more fitting to a toilet cleaning product (“congruent response” based on our hypotheses) than a skin conditioner (“incongruent”), $Z = 29.61, p < 0.0001, r = 0.14$. Paired t-tests² revealed significant differences between congruent and incongruent responses ($M_{congruent} = 57.08, SD = 18.67; M_{incongruent} = 42.92, SD = 18.67, t(58) = 2.91, p = 0.005, d = 0.38$). Results of Study 1 supports our hypothesis and provide evidence for a link between brand names, voiced (vs. voiceless) obstruents and perceived product attributes (i.e., harshness vs. softness).

Study 2

At this point, one may argue here the confounding role of the product category itself and it is possible (though highly unlikely) that voiced obstruents are somehow linked with some of the product categories (e.g., toilet cleaner and skin conditioner). This association may be due to the known and existing brands (which by chance, may have an abundance of a few psycholinguist features), or it may also be due to hitherto untested (or unknown) semantic associations. If our hypothesized relationship holds true, it should be demonstrable within the same product category also (i.e., within a product category itself, a harsher product will be perceived to be more appropriate for HBNs with voiced obstruents and vice-versa). To test this, in Study 2, we chose two products that have a varying degree of the perceived harshness, a toilet cleaner (Study 2a) and a beer (Study 2b) [note that beer has consistently been shown to be associated with harshness (Oladokun et al., 2016; Oladokun et al., 2017). Strong beers are generally of higher alcoholic content, and beverages with high alcohol content are considered aggressive (Rous, Snow, & Kunkee, 1983) and harsh by consumers (Klingshirn, Liu, & Gallander, 1987)]. The experimental procedure and instructions used in Study 2 were similar to those in Study 1.

Study 2a Results

A total of 59 participants completed the study (data of three participants who could guess the purpose of the experiment were excluded). Data from the remaining 56 participants (between 21 to 70 years, $M_{age} = 35.86$, $SD = 11.56$, $Males = 32$, $Females = 24$) were analyzed. All participants were English speakers and knew no other language. Results show that participants rated HBNs with voiced (vs. voiceless) obstruents as more appropriate for a strong (vs. mild) toilet cleaner, $Z = 69.53$, $r = 0.22$, $p < 0.0001$.

Paired t-tests² revealed significant differences between congruent and incongruent responses ($M_{congruent} = 61.14, SD = 19.94; M_{incongruent} = 38.86, SD = 19.94, t(55) = 4.18, p < 0.001, d = 0.56$).

Study 2b Results

A total of 60 participants completed the study (data of one participant who could guess the purpose of the experiment was excluded). Data from the remaining 59 participants (between 22 to 70 years, $M_{age} = 39.08, SD = 11.26, Males = 31, Females = 28$) were analyzed. All participants were English speakers and knew no foreign language. Results show that participants rated HBNs with voiced (vs. voiceless) obstruents as more appropriate for a strong (vs. light) beer, $Z = 172.90, p < 0.0001, r = 0.34$. Paired t-tests² revealed significant differences between congruent and incongruent responses ($M_{congruent} = 67.12, SD = 17.98; M_{incongruent} = 32.88, SD = 17.98, t(58) = 7.31, p < 0.0001, d = 0.95$). Participants were also asked about their beer consumption habit, and except for four participants, rest were regular beer drinkers. Results of Study 2a and 2b further supports the hypothesis and provide evidence that even within a product category, brand names with voiced (vs. unvoiced) obstruents are considered more appropriate for a harsher (vs. softer or milder) version of the product.

²Note that the data is normally distributed, Study 1 (*Shapiro-Wilk value* = 0.97, $p = 0.11$); Study 2a (*Shapiro-Wilk value* = 0.96, $p = 0.10$); Study 2b (*Shapiro-Wilk value* = 0.97, $p = 0.15$)

Study 3

In Study 3, we propose to use an indirect (e.g., reaction time task) (in contrast to Studies 1 and 2, which used a self-reported measure) to test the association of voiced obstruents with the product harshness. Research suggests that explicit responses (e.g., surveys) are a good measure of the deliberate behavior of the consumer, but the implicit responses can tap better into the impulsive and non-conscious behavior (Friese, Wänke, & Plessner, 2006). Many marketing scholars have used implicit methods to explore the non-conscious processing of brands (or products) and their associated attributes (e.g., Calvert et al, 2014; Pathak et al., 2019). Since phonetic symbolism too is believed to be automatic and non-conscious (Pogacar et al., 2018; Yorkston & Menon, 2004), we adopted this approach in Study 3.

Participants

A total of 62 participants completed the study; two participants having accuracy rates of less than 55% were excluded ($M_{Accuracy}$ of rest of the participants = 93.64%, $SD = 4.39$). Only the correct latencies between 200ms to 1500ms of the rest of the sixty participants (between 22 to 63 years, $M_{age} = 38.03$, $SD = 10.72$, $Males = 30$, $Females = 30$) were analyzed. All participants were English speakers (except one who also spoke Spanish).

Design and procedure

A semantic priming reaction time task was used (see Pathak, Calvert, and Velasco (2017) for a similar approach), where if two stimuli are semantically congruent (e.g., A and B) the response time taken to identify one (e.g., A) will be faster, if immediately preceded by the other (e.g., B), and vice-versa if stimuli are incongruent. Here, we used the HBNs as visual primes and the words (skin conditioner and toilet cleaner) as the target words (Figure 1). In each trial, a visual prime (HBN) and a target ('skin conditioner' and 'toilet cleaner') was shown on the

computer screen and participants responded by pressing keys (E or I) on the computer keyboard (mapping of the keys was counterbalanced between participants). Participants were instructed to be as fast and accurate as possible, and were familiarised with the experiment with a few practice trials. All 25 HBN pairs were used to create 100 trials per block and respondents participated in three blocks each. If the association of the prime and target is congruent, then we expect a stronger interaction between them [measured as response latencies in milliseconds (ms)].

Insert Figure 1 about here

Results

Responses were analyzed as a function of the HBN (voiced and voiceless) and the target word (skin conditioner and toilet cleaner). The mean response latencies (in ms) found were, $M_{voiced\ BN\ with\ toilet\ cleaner} = 523.91$, $SD = 77.69$, $M_{voiced\ BN\ with\ skin\ conditioner} = 532.56$, $SD = 77.77$, $M_{voiceless\ BN\ with\ skin\ conditioner} = 526.36$, $SD = 75.25$, $M_{voiceless\ BN\ with\ toilet\ cleaner} = 527.06$, $SD = 78.43$ (Figure 2). The interaction of the target word and the HBN was significant $F(1, 59) = 6.60$, $p = 0.01$, $\eta_p^2 = 0.10$ (Figure 2), but the main effects were not found to be different (for BN, $F(1, 59) < 1$, $p = 0.37$; for target word, $F(1, 59) = 2.79$, $p = 0.10$). Paired t-tests revealed significant differences between $M_{voiced\ BN\ with\ toilet\ cleaner}$ ($M = 523.91$, $SD = 77.69$) and $M_{voiced\ BN\ with\ skin\ conditioner}$ ($M = 532.56$, $SD = 77.77$), $t(59) = 3.03$, $p = 0.004$, $d = 0.39$ but not between $M_{voiceless\ BN\ with\ skin\ conditioner}$ ($M = 526.36$, $SD = 75.25$) and $M_{voiceless\ BN\ with\ toilet\ cleaner}$ ($M = 527.06$, $SD = 78.43$), $t(59) < 1$, $p = 0.82$. Results show that even at a non-conscious level, voiced (vs. voiceless) obstruents are perceived as more appropriate for a harsher (vs. softer) product. Results also suggest that the association of voiced obstruents with harshness is much stronger than the association of voiceless obstruents with the softer product category.

Insert Figure 2 about here

Discussion

Brand names play an important role in a products' acceptance (Charmasson, 1988) and the connection between the sound of the brand name (phonetic symbolism) and the brand (or product's) likability has been well established (Klink, 2001; Shrum et al., 2012). Previous research shows that consumers intuitively anticipate a relationship between brand elements (e.g., sound of the brand name, packaging etc.) and product features, and if their implicit and explicit product expectations are congruent with their subsequent experience of the product, such products are appreciated considerably more (Friese, Wänke, & Plessner, 2006; Shrum et al. 2012; Topolinski, 2017). Consumers have also been shown to be willing to pay more for products that maintain the expected congruency between sound symbolic aspects of their name and preferred product attributes (Pathak, Calvert, & Velasco, 2017; Pogacar et al., 2018). In addition, because sound symbolism can effectively be used to predict both implicit (automatic) and explicit (deliberative) consumer behavior (Pogacar et al., 2018), it is therefore an important element that practitioners need to heed as part of their brand naming conventions (e.g., these authors show that consumers implicitly and explicitly prefer certain sounds (/s/, /m/, /l/, and /e/) in brand names and are even willing to pay more for them).

To date, research on sound symbolism has shown sounds to be associated with various product attributes (e.g., slowness vs. fastness, thinness vs. heaviness, luxury vs. basic, roundedness vs angularity, masculinity vs femininity, aggressiveness vs submissiveness, hardness vs softness) (Abel & Glinert, 2008; Klink, 2000; Krishna, 2012; Parise & Spence, 2012; Pathak et al., 2017; Ramachandran & Hubbard, 2001; Slepian & Galinsky, 2016; Spence, 2012). However, much of this research has focused on the psycholinguistic properties of vowels and

respective product features (Guevremont & Grohmann, 2015). This is surprising because both consonants and vowels are the two basic building blocks of all languages (Ladefoged, 1993) and scholars propose a ‘division of labor’ between vowel and consonants. Vowels are said to be more useful for conveying grammatical cues, syntax and prosody (Bouchon, Floccia, Fux, Adda-Decker, & Nazzi, 2015; Nespor, Peña, & Mehler, 2003), while consonants are more useful for lexicon building, word learning and recognition (Nespor et al., 2003). Both are processed in different areas of the brain (Carreiras & Price, 2008); vowels convey stable, spectral sounds whereas consonants deliver a more rapid and changing acoustic information to the listener (Havy, Bertocini, & Nazzi, 2011); vowels are learnt first (Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992) whereas consonant learning occurs considerably later (Werker & Tees, 1984); vowels tend to be pronounced louder (which makes them more salient) and longer (in duration) than consonants (Repp, 1984). On a closer note, research in psychology too has shown stronger priming effects using consonants (compared to vowels) (New, Araújo, & Nazzi, 2008) and it is believed while learning to read, both adults and children rely more on consonants (compared to vowels, also referred to as the consonant bias) (New et al., 2008) [for e.g., if the consonants of a word are retained in their relevant order but the vowels are omitted (e.g., direction vs. drctn) the word has a good chance of being recognized. However, if the consonants are deleted but the vowels retained, word recognition becomes almost impossible (e.g., direction vs. ieio) (Nespor et al., 2003)].

Despite these aforementioned differences, the predominant focus on vowel-based sound symbolism (both in brand naming research and in general) is curious given that consonants dominate (i.e. substantially outnumber) vowels across all living languages (Swedish being the exception) (Maddieson & Disner, 1984; Nespor et al., 2003). Even if we believe that consonants

are equally important (if not more so) than vowels (Acha & Perea, 2010; Bouchon et al., 2015; Delle Luche et al., 2014), still the research on consonant sound symbolism is rare (Aveyard, 2012; Guevremont & Grohmann, 2015). Moreover, the research linking voiced consonants to product attributes (see Table 1) is even rarer. Addressing this potential gap, in the current paper, we explored the sound-symbolic relationship between voiced obstruents in brand names and the perception of harshness.

Across three studies, we show that consumers conceive of a product as harsh (vs. soft or mild) if the brand name has more voiced (vs. voiceless) obstruents. In Study 1, we provide evidence for this association across two different product categories (e.g., toilet cleaner vs. skin conditioner); in Study 2, we show that this association holds even within the same product category (e.g., strong vs. mild beer). In Study 3, we show that the effect is also maintained when evaluated using an implicit semantic priming paradigm, which suggests that this sound symbolic association occurs at an implicit or subconscious level (in other words, it occurs involuntarily and intuitively).

Our results differ from some recent findings on the perceived association of voiced (vs. voiceless) consonants with different shapes/objects (e.g., D'Onofrio, 2014 and McCormick et al., 2015). These authors found that voiced consonants are more readily associated with rounded objects (vs. unvoiced consonants with spiked ones). Normally, one would interpret this finding as evidence of an automatic association of voiced consonants with the trait of softness (i.e., equivalent of roundedness) and unvoiced consonants with harshness (i.e., equivalent of spiky). However, as D'Onofrio and colleagues argue in their paper that spikiness and roundedness may not be easily transferable (or equivalent) to traits present in real life objects (3D). Similarly, the way we perceive 2-dimensional objects (e.g., round vs spiky images) may not be comparable

with our perception of 3-dimensional objects (e.g. a knife may be round in shape, but still considered spiky). This raises questions about the way in which these associations map on to real life objects/products. In the case of brand names, interpretation of these mappings may be more complicated than the simple association of 'shapes with acoustic qualities' as brand names are considered a special category of stimuli altogether (Gontijo et al., 2002), being processed differently and considered more complex than simple word/text stimuli (Gontijo et al., 2002; Gontijo & Zhang, 2007).

Managerial implications

The brand name is often the first point of contact between consumers and a brand, and almost forty percent of a product's success is attributable to a well-chosen brand name (Alashban, Hayes, Zinkhan, & Balazs, 2002; Zaltman & Wallendorf, 1979). Especially in foreign markets, where consumers may not understand the original meaning of the brand name in its source language, the sounds present in the brand's name can still influence the perceived physical and functional attributes of the product (Roche, Shrum, & Lowrey, 2015). In fact, the connection between sound symbolism and psycholinguistic attributes is believed to be stronger in unknown brand names (Fenko, Lotterman, & Galetzka, 2016). The sounds present in a brand name have also been shown to create product expectations (e.g., harsh sounds in a brand name was associated with a more rugged hiking boot in one example) (Klink & Athaide, 2012) and resulted in a more favorable post-product evaluation (Coulter & Coulter, 2010; Lowrey & Shrum, 2007).

As companies expand globally into linguistically different cultures, their brand naming (and taglines and other textual elements) decisions have become increasingly complex (Schuiling

& Kapferer, 2004). Brand names often contain linguistic distinctions of the culture from which they originate (e.g., the brand names Nescafe, Band-Aid, Vaporub and Kleenex convey meanings to English speakers; He, 2003). In a similar way, many brands rely on conveying linguistic messages through their names (e.g., 7-Eleven, Post-it). However, these messages and meanings may easily be lost in another market due to linguistic differences (in other words, the original linguistic strengths of a brand name may not be transferred equally across the globe) (Usunier & Shaner, 2002). Similarly, when brand names are written (or pronounced) in linguistically ambiguous ways, the meaning understood by consumers may be entirely different from that which the company intends to convey (e.g., the perception of Honda's Precis model can range from "precise", "exact", "performer", "elegant" and "cheap" across different countries; Leclerc, Schmitt, & Dubé, 1994; Olavarrieta Soto et al., 2009).

There was a time when brand names (and tag lines) were considered sacrosanct and companies never dared to touch them, even during international expansions. However, that trend is now changing (e.g., Google doodle changes almost daily), and increasingly, successful brands are changing their names (or at least the literal translations of their names) due to linguistic compulsions when operating in international markets. For example, in China, Philip Morris changed the Chinese version of its name from "mo-li-see" (direct translation), which meant 'bad luck' in Chinese, to a more sensible name, "mor-ha-li-se", meaning "good luck" (Huang & Chan, 1997; Usunier & Shaner, 2002). When Coco-Cola entered the Chinese market in the early 1980's, the company used Chinese characters that, when pronounced, sounded like the brand's original name in English. However, although phonetically "ko-ka-ko-la" posed no pronunciation challenge in China, semantically it had a nonsensical meaning (literally, "wax-flattened mare"). The brand subsequently changed its name to "ke-kou-ke-le" which has a more suitable meaning

(e.g., “Can-Be-Tasty-Can-Be-Happy”, “Tasty fun”) (Bhasin, 2011; Fetscherin, Alon, Littrell, & Chan, 2012; Li & Shoostari, 2003).

In addition to brand names, companies invest years and millions of dollars on developing successful taglines (e.g., Nike’s “Just do it”) and have in the past been reluctant to change these taglines. However, this is no longer the case. For example, Toyota started using the new tagline “Akeed” in Arabic only for their Middle Eastern consumers. This approach contrasts with the previous common practice of using the same tagline globally (Kadirov, Bardakci, & Kantar, 2018)]. In today’s globalized markets, it makes more sense for brands to exploit the linguistic strengths of each market and adapt their brand names to suit local linguistic tastes [e.g., Wipro Unza, a Malaysian company that had a successful detergent brand “Maxkleen 9” in Malaysia, changed the brand name to “Way-Way” and “Vigor 33” when operating in Singapore and Hong Kong respectively (Harun, Wahid, Mohammad, & Ignatius, 2011)]. Similarly, Unilever often sells the same product across countries, but using different brand names [e.g., Vifin, Vissin, Jifin and Cifin are brands found in Switzerland, Germany, Britain, and France respectively, but are actually the same Unilever product (Palumbo & Herbig, 2000)].

Though managers acknowledge the importance of name branding, research suggests that the brand naming process is far from scientific (Pogacar, Plant, Rosulek, & Kouril, 2015), and companies often do not devote sufficient resources or rigor to the proper brand name selection (Kohli & LaBahn, 1997). One exception here is the pharmaceutical industry, which is known to spend millions of dollars into brand naming research because it is clinically important that drug names are sufficiently distinctive from each other and similarly for prescription purposes they should be memorable and distinguishable enough during the verbal medical instructions (Dutchen, 2009; Stepney, 2010). Research on drug naming suggests that the use of rare and

unique phonemes/sounds can make a name memorable, distinguishable and unique (Pathak, Calvert, & Velasco, 2017; Stepney, 2010). If the uniqueness and rarity of phonemes present in a brand name can enhance its memorability, similar effects can be found for other phonemic attributes (e.g., phonemic harshness can be associated with product harshness), which we attempted to demonstrate in this paper.

Here we should point out that any brand naming convention does not occur in a vacuum but is in fact strongly influenced by similar naming conventions popular in the contemporary cultural milieu (e.g., popular children names prevalent at the time) (Pathak, Velasco, & Spence, 2019). For example, recent research suggests that consumers are guided by even the sounds of their own names while they are making important decisions (e.g., Lisa may prefer to live in St. Louis and may like L'oreal) (Hodson & Olson, 2005; Pelham, Mirenberg, & Jones, 2002). To illustrate with another example, the use of the initial sound /ʒ/ (as in measure; /ʒ/ is considered to be phonemically harsh and rare) in popular names is on the rise (e.g., Jacques) in the USA (Johnson 2014; Time Magazine 2015), and yet none of the top brand names in the Fortune 500 list start with the sound /ʒ/. We predict that brand managers will soon catch up with this current naming practice and the trend of using the initial /ʒ/ sound may become popular amongst brand names too (Pathak, Velasco, & Spence, 2019).

Given this knowledge and trend, it is prudent that firms keep in mind the insights generated by this paper and others in the field of sound symbolism. Sound symbolic names can be especially invaluable in conveying messages that are often difficult to communicate (e.g., complex concepts such as environmental friendliness) (Joshi & Kronrod, 2019). Since brand managers and product designers are often looking for harmony amongst attributes, product

features and brand names (Roche et al., 2015), it makes more managerial sense to choose sound symbolic brand names which are congruent with the product features.

Limitations and future research

One limitation of the current paper is that we used only tri-syllabic names with CV-CV-CV structure. It is unlikely that the results will be different for varying brand name lengths (e.g., four or five syllabic) and with different linguist structures (e.g., hypothetical word ‘Zkaltee’ has a CCV-CCVV structure, and has two consonant clusters, ‘zk’ and ‘lt’) of the brand names, but it is yet to be tested. Another potential limitation is the use of an equal number of voiced (vs. voiceless) obstruents in HBNs. This raises the questions as to whether there might be an increase in the perceived harshness of a brand name if a varying number of obstruents are used (e.g., one vs. two vs. three voiced obstruents in an HBN). Further studies could use HBNs with one, two or three voiced obstruents to examine the effect of increasing voiced obstruents on perceived brand or product harshness. In the past scholars have associated multiple attributes with a single psycho-linguistic feature (e.g., the front vowels are associated with lightness, brightness and fastness) (Klink, 2000; Spence, 2012). Similarly, future research can extend the associations of voiced phonemes with multiple product attributes [e.g., very recent research suggests the sound symbolic associations of voiced consonants with taste; voiced (vs. voiceless) consonants with saltiness/sourness (vs. sweetness/sourness) (Motoki et al., 2020) and voiced (vs. voiceless) obstruents with sweetness (vs. bitterness) (Pathak & Calvert, submitted)].

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Appendix 1

HBNs used in the current paper.

HBN with voiceless obstruents	HBN with voiced obstruents
Satoke	Zadoge
Sokita	Zogida
Sipetu	Zibedu
Sukapi	Zugabi
Sekuto	Zegudo
Kaseti	Gazedi
Ketiso	Gedizo
Kipotu	Gibodu
Kopusa	Gobuza
Kutape	Gudabe
Tupasi	Dubazi
Tosepa	Dozeba
Tekopu	Degobu
Tisuko	Dizugo
Tapise	Dabize
Pokasi	Bogazi
Pesoka	Bezoga
Pituse	Biduze
Pukeso	Bugezo
Patisu	Badizu
Fakise	Vagize
Fetoki	Vedogi
Fipatu	Vibadu
Fokuta	Voguda

Source: Pathak & Calvert, submitted

Tables

Table 1. *Overview of studies on voiced (vs. voiceless) consonants and product attributes.*

Study	Focus of research	Main findings
<i>Main studies in the field</i>		
Klink, 2000*	Examining the link between sounds present in a brand name and product attributes (e.g., size, speed, strength, weight)	Voiced stops (p, t, and k), are perceived to be smaller, faster, lighter, sharper, and more feminine (no difference observed in the perceived softness); voiceless fricatives (f and s), are perceived as faster, softer, and more feminine.
D'Onofrio, 2014; McCormick et al., 2015; Bottini, Barilari, & Collignon, 2019; Cuskley, Simner, & Kirby, 2017	Examining sound-shape correspondences	Voiceless stop consonants are associated with sharper objects and shapes and voiced labial consonants are associated with round shapes and objects (from these findings indirect references can be mapped onto product attributes; e.g., roundedness = sweet/soft and angularity = bitter/harsh)
Abel & Glinert, 2008	Examining the sounds present in cancer medication and their perception	Voiceless consonants are preponderant in the cancer medication perhaps because of their association with lightness, smallness and fastness
<i>Other related studies</i>		
Doizaki, Shimizu, & Sakamoto, 2012	Developing an image evaluation system based on sound symbolic brand names	Ice creams and snacks have preponderance of voiced sounds
Baranov, 2018	Explore survival analysis in commercial names	Higher number of voiced consonants in a brand name conveys higher business success and higher quality
Joshi, Kronrod, & Lowrey, 2014	Exploring sound symbolism and metaphor cognition	Voiceless consonants in brand names convey trustworthiness, purity and environmental attributes

*Klink (2000) by far is the only study, which directly links voiced consonants with product attributes

Figures

Figure 1: A typical trial used in Study 3.

Figure 2: Response latencies in Study 3.

Author's final version

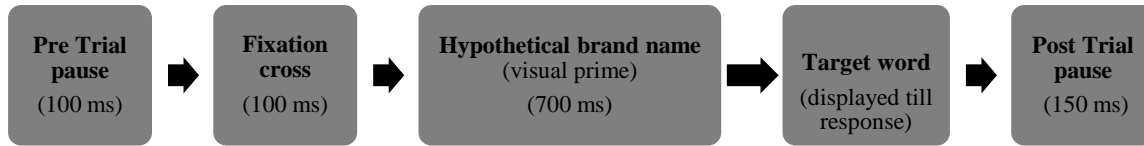


Figure 1. A typical trial used in Study 3.

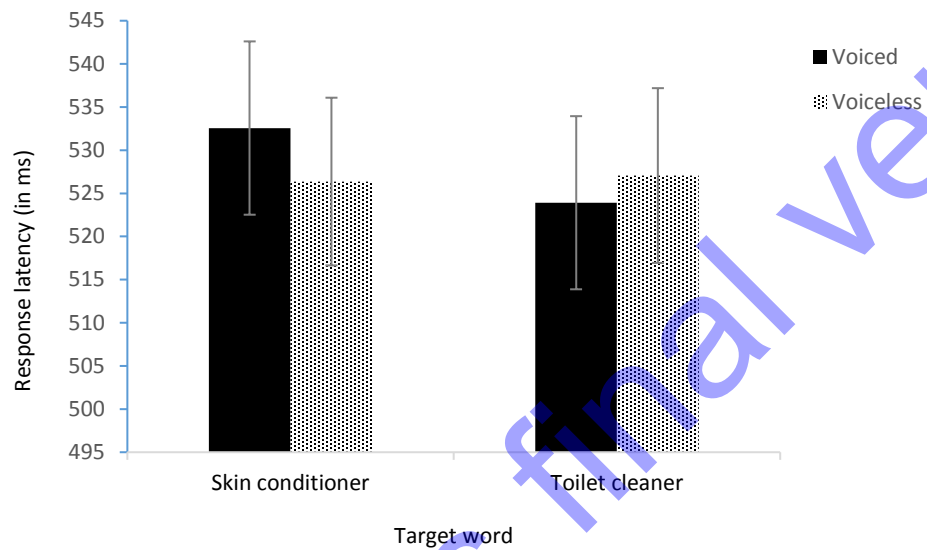


Figure 2. Response latencies in Study 3.

Error bars represent the SE of mean