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Stacey M Baxter, Jasmina Ilicic, Alicia Kulczynski, Tina Lowrey,

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# Communicating product size using sound and shape symbolism

Stacey M. Baxter

Newcastle Business School, University of Newcastle, Callaghan, Australia

Jasmina Ilicic

Monash University, Melbourne, Australia

Alicia Kulczynski

Newcastle Business School, University of Newcastle, Callaghan, Australia, and

Tina Lowrey

Department of Marketing, HEC Paris, Paris, France

## Abstract

**Purpose** – The purpose of this paper is to investigate children's perception of a product's physical attribute (size) when presented with brand elements (brand name and brand logo) manipulated using sound and shape symbolism principles (brand name sounds and brand logo shape), across children of different developmental ages.

**Design/methodology/approach** – The relationship between sounds and shapes was examined in a pilot study. A 2 × 2 experiment was then undertaken to examine the effect of brand name characteristics (front vowel sound versus back vowel sound) and brand logo design (angular versus curved) on children's (from 5 to 12 years) product-related judgments.

**Findings** – Older children use non-semantic brand stimuli as a means to infer physical product attributes. Specifically, only older children are able to perceive a product to be smaller (larger) when the product is paired with a brand name containing a front (back) vowel sound or an angular (curved) brand logo (single symbolic cue). We illustrate that brand logo-related shape symbolism effects are weaker and appear later in age when compared with brand name-related sound symbolism effects. Further, younger children are able to infer product attribute meaning when exposed to two symbolic cues (that is, brand name and brand logo).

**Practical implications** – When selecting an inventive brand element, consideration should be given to the relationship between the vowel sounds contained in a brand's name and product attributes, and also the shape of the brand's logo and product attributes.

**Originality/value** – This is the first experiment undertaken to examine the combination of brand name- and brand logo-related symbolism effects in the context of children. We demonstrate that age-based bounds may be overcome through the provision of multiple symbolic cues.

**Keywords** Brand name, Children, Brand meaning

**Paper type** Research paper

**An executive summary for managers and executive readers can be found at the end of this issue.**

## Introduction

For the past ten years, marketing scholars have continued to research the application and bounds of phonetic symbolism effects (Baxter and Lowrey, 2014, 2011; Baxter *et al.*, 2014a, 2014b; Kuehnl and Mantau, 2013; Shrum *et al.*, 2012; Lowrey and Shrum, 2007). Phonetic symbolism theory, which is founded on the notion that sounds (phonemes) convey meaning (Sapir, 1929), has been applied to understand consumer's response to brand stimuli. Specifically, academic researchers have demonstrated that phonemes contained in a

brand's name can act as a cue for product and brand attributes (Baxter and Lowrey, 2014; Baxter *et al.*, 2014a, 2014b; Coulter and Coulter, 2010; Klink, 2000; Lowrey and Shrum, 2007; Yorkston and Menon, 2004). Specifically, Klink (2000) found that brand names containing front vowel sounds (e.g. [e] as in *Renep*, as in *Gidan* and [a] as in *Fazz*) were perceived as smaller, lighter, softer, thinner, colder, more feminine, friendlier and prettier when compared with those back vowel sounds (e.g. [ä] as in *Runder*, [u] as in *Lupush* and [ü] as in *Golud*).

Principles of phonetic symbolism have also been associated with sound-shape judgments, termed the "bouba-kiki effect" (Ramachandran and Hubbard, 2001). The bouba-kiki effect rests on the notion that rounded images are associated with words containing back vowel sounds (e.g. bouba), whereas angular (or jagged) images are associated with words containing front vowel sounds (e.g. kiki) (Kohler, 1947; Tarte, 1982). The bouba-kiki effect is based on the articulatory hypothesis, which posits shapes mimic the articulatory movements made when pronouncing words (Ramachandran and Hubbard, 2001). However, despite the apparent link between phonetic symbolism principles and image design reported in the psycholinguistic literature (Ramachandran and Hubbard, 2001; Tarte, 1982), less

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attention has been given to brand logo-based judgments in the marketing domain, (Klink, 2003; Klink and Athaide, 2014).

Marketing scholars have recognized that brand logo design is an important consideration in the creation and delivery of meaning to consumers (Henderson and Cote, 1998), with the sound and shape symbolism theory providing a framework for understanding cross-modal correspondence effects in the meaning consumers draw from visual brand elements, such as, a brand name (sound symbolism) and brand logo (form or shape symbolism) (Klink, 2003). Cross-modal correspondence refers to the tendency for a feature, or attribute, in one sensory modality to be associated with a sensory feature, or attribute, in another sensory modality (Parise and Spence, 2012). For example, research finds that bitter, carbonated, sour and crunchy/crispy attributes are associated with more angular shapes on packaging, whereas sweet, smooth, rich and creamy attributes are associated with more rounded forms (Deroy and Valentin, 2011; Ngo *et al.*, 2011; Spence and Gallace, 2011). In addition, larger objects (no matter whether seen or felt) are associated with lower-pitched sounds and smaller objects with higher-pitched sounds (Parise and Spence, 2012).

We argue that shape symbolism in brand logo design represents a greater level of abstraction when compared with the application of phonetic symbolism for brand name selection (as sounds, or phonemes, are not present to connote product attributes). Shape symbolism is a phenomenon that explains the connections made between abstract referents and forms such as straight and curved lines (Liu, 1997; Marks, 1996). Drawing on research that finds subjects match an image of a circle with soft, light, warm, fast and deep attributes and an image of a square with hard, dark, cold, slow and shallow attributes (Liu and Kennedy, 1997), we propose that brand logo shape will also influence perceptions of product attributes.

Although prior research has tested the relationship between vowel sound (phoneme) and product characteristics (Lowrey and Shrum, 2007), and vowel sound (phoneme) and image shape cross-modal correspondences (Klink, 2003; Klink and Athaide, 2014), limited research has examined the next level of abstraction, that is, the image shape to product characteristic relationship (Klink, 2003). With brand elements playing a particularly important role for low-literacy consumers (such as children, Jae *et al.*, 2008), this research seeks to examine the effect of brand name characteristics (inclusion of a front versus back vowel sound) and brand logo design (angular versus curved) on product attribute judgments. Specifically, we investigate children's perception of a product's physical attributes (size) when presented with brand elements. We expect that shape-based judgments will become stronger as children age when shape symbolism principles are applied to brand logo shape. We also expect that shape-based brand logo symbolism effects will be weaker than brand name sound symbolism-related effects, because of the heightened level of abstraction required for children to decipher symbolism between image shape and product attributes.

## Sound and shape symbolism

### Sound symbolism in brand names: the moderating role of age

Studies in psycholinguistics have demonstrated that sounds in words represent an important form of communication (Nuckolls, 1999). To date, researchers have focused on the

symbolic value of vowels, finding consistent sound-stimuli relationships between vowel sounds and attributes. For example, the vowel sound [ü] (such as in *boot*) has been associated with large objects and the vowel sound (such as in *bit*) associated with small objects (Tarte and Barritt, 1971). The meaning generated by vowel sounds has been shown to follow a consistent pattern, forming a roughly ordered sound-symbolic list from [e] (such as in *bee*) through to [ü] (such as in *bloom*) (Sapir, 1929). The creation of this ordered list is founded on the notion of the front versus back vowel distinction, which suggests that as vowel sound creation shifts from the front of the mouth to the back, perception of size increases (Sapir, 1929).

Phonetic symbolism theory has been used in marketing to understand how consumers draw meaning from sounds in brand names (Baxter *et al.*, 2014a, 2014b; Baxter and Lowrey, 2014, 2011; Klink, 2000; Klink and Athaide, 2012; Kuehnl and Mantau, 2013; Lowrey and Shrum, 2007; Shrum *et al.*, 2012; Yorkston and Menon 2004), spokesperson names (Baxter *et al.*, 2014a, 2014b; Ilicic *et al.*, 2015), brand logos (Klink, 2003; Klink and Athaide, 2014) and prices (Coulter and Coulter, 2010). In each instance, effects consistent with phonetic symbolism theory were observed. For example, Lowrey and Shrum (2007) demonstrated that consumers prefer brand names with front vowel sounds for products that are perceived as small, fast and light (e.g. sports car) and brands with back vowel sounds for large, slow and heavy products (e.g. SUV).

In recent years, researchers have suggested that developmental factors impact the presence of phonetic symbolism effects (Baxter and Lowrey, 2011, 2014; Baxter *et al.*, 2014a, 2014b). Phonetic symbolism effects manifest as children age and develop the necessary language-based skills and knowledge (for example, phonological awareness; Fowler, 1991) (Baxter *et al.*, 2014a, 2014b). Specifically, research finds children under the age of nine do not demonstrate sound-stimuli relationships consistent with phonetic symbolism theory (Baxter and Lowrey, 2014; Baxter *et al.*, 2014a, 2014b), demonstrating an age-based boundary condition of the phenomenon. Further, cognitive constraints have been shown to impede the influence of phonetic symbolism in children. Research has found that, under conditions of cognitive load, phonetic symbolism effects do not manifest in a child sample (6–13 years) (Baxter *et al.*, 2014a, 2014b). These results are consistent with psycholinguistic research that provides evidence that children begin to learn letters and their association at approximately six to seven years of age, that is, Stage 1 - Initial Reading (Chall, 1983). It is at this time that children begin to process words phonetically, focusing on the sounds in words and their meaning (Ehri and Wilce, 1985). Therefore, we hypothesize that brand name sound, or phonetic symbolism effects will increase as children age:

*H1.* Brand name-based sound symbolism effects will increase linearly with age: older children will perceive the product as smaller (larger) when paired with a brand name containing a front (back) vowel sound, than younger children.

### Shape symbolism in brand logos: the moderating role of age

Shape symbolism refers to the cross-modal mapping that exists between abstract shapes and other sensory attributes (Spence, 2012). Shape symbolism research in multisensory perception has become increasingly researched (Spence, 2012); however, little research has been undertaken on brand logos, specifically with most of the research predominately focusing on packaging. For example, research finds sharp, pointy shapes on product packaging are associated with bitterness or carbonation in foods and beverages (Spence and Gallace, 2011), cheese as tasting 7 per cent sharper when viewed with angular as opposed to rounded shapes (Gal *et al.*, 2007), and angular (as opposed to rounded) packaging increasing perceptions of the intensity of flavor for a yogurt (Becker *et al.*, 2011). Furthering Klink (2003), we argue that shape symbolism in brand logo design represents a greater level of abstraction than sound symbolism, especially for children. Specifically, we suggest that the symbolism embedded within brand logo design is more abstract because of the absence of sounds, or phonology, within an image, which children learn to decipher at a younger age.

Cognitive development theory posits that children within the pre-operational thought stage (1.5-2 to 6-7 years of age) are only just beginning to think symbolically (Roedder-John, 1999). It is at this stage that children are able to draw meaning from phonology in words (Ehri and Wilce, 1985), evidenced by the manifestation of phonetic symbolism effects (Baxter *et al.*, 2014a, 2014b). As children age, however, moving into the concrete operations stage of cognitive development (6-7 to 11-12 years of age), they are able to consider the meanings within the abstract symbolic stimuli (Roedder-John, 1999). Despite Klink (2003) providing initial evidence that adults can use the shape of a brand logo to infer product attributes, we argue that younger children will be unable to make product-related meaning judgments at this high level of abstraction because of their inability to understand the symbolic meaning.

Because of the fact that younger children have a limited vocabulary when compared with older children and are still going through an earlier stage of language learning, we propose that children will find it more difficult to extract the symbolic meaning in brand logos (unlike sound symbolism in brand names) until later years (approximately 11-12 years of age). As a result, we hypothesize:

- H2. Brand logo-based shape symbolism effects will have a delayed effect that increases linearly with age: older children will perceive the product as smaller (larger) when paired with an angular (curved) brand logo, than younger children.

### Symbolism in brand names and brand logos: the moderating role of age

Studies in developmental science posit that the English language may contain naturally biased sound-shape correspondences that have influenced the evolution of language (Ramachandran and Hubbard, 2001; Maurer *et al.*, 2006). It is because of these pre-existing sound-shape patterns, that words with rounded vowels (e.g. “o”) characterized by a round sound, or a curved letter shape, are associated with round objects; and words with angular vowels (e.g. “i”), with angular sounds and letter shape, are associated with pointed or angular objects (Maurer *et al.*, 2006). This phenomenon is known as the bouba-kiki effect.

Initial evidence of the “bouba-kiki effect” was obtained by Gestalt psychologist Wolfgang Köhler, who observed sound-symbolic relationships between nonsense words and simple line images. Specifically, Köhler (1947) found that participants matched jagged images with the word “takete”, and rounded images with the word “balubla”. Similarly, Ramachandran and Hubbard (2001) found that 95 per cent of participants indicated that an angular image belonged with the word “kiki” and a rounded image belonged with the word “bouba”, with this effect demonstrated across two languages (English and Tamil). Interestingly, children have been shown to display similar sound-stimuli relationships. Specifically, children, from 8 to 14 years of age, were found to match angular images with the word “takete” and rounded images with the word “uloomu” (Davis, 1961).

The bouba-kiki effect is founded on the mechanical act of articulation (Ramachandran and Hubbard, 2001), that is, the articulation of “kiki” involves sharp inflections of the tongue which relates to the sharpness of the jagged image, whereas the rounding of the lips and oral cavity during the articulation of “bouba” is associated with the roundedness of images. We suggest that the bouba-kiki effect can be aligned with phonetic symbolism theory. Specifically, words such as “bouba” and “uloomu” contain back vowel sounds, whereas words such as “kiki” and “takete” contain front vowel sounds. This assertion is evidenced by the findings obtained by Tarte (1982), who observed that words containing back vowel sounds (e.g. [o]) are associated with rounded images, and words containing front vowel sounds (e.g. [i]) are associated with angular images.

Despite the apparent link between sound symbolism principles and word image reported in psychological and psycholinguistic literature (Köhler (1947); Ramachandran and Hubbard, 2001; Tarte, 1982), less attention has been given to the combined role of sound symbolism in brand names and shape symbolism in brand logo design in the marketing domain. Consistent with prior psycholinguistic research, Klink (2003) demonstrated that brand names containing front vowel sounds were associated with angular brand marks, while brand names containing back vowel sounds were associated with rounded brand marks in an adult sample. Moving beyond the sound-symbolic cross-modal correspondence relationships identified in psychological and psycholinguistic literature (that is, name to shape judgments), Klink (2003) also demonstrated sound-shape relationships where consumers prefer brand names and brand marks that are congruent with physical product attributes. For example, consumers preferred the brand name “Dotil” (back vowel sound) as opposed to “Detil” (front vowel sound) for a brand of “strong tasting” dark beer when the brand mark was rounded (Klink, 2003). Klink’s (2003) findings are inconsistent, with results finding no significant name-shape relationship for the product attributes heaviness and darkness. We further investigate and extend the work of Klink (2003), examining the interaction between brand name vowel sound

and brand logo shape on children's perceptions of product attributes.

Cognitive development theory suggests that children within the pre-operational thought stage (from 1.5-2 to 6-7 years of age) are developing their ability to think symbolically. It also suggests that children at this stage are characterized by a focus on a single dimension of stimuli (Roedder-John, 1999). Children in the concrete operations stage of cognitive development (6-7 to 11-12 years of age), however, are able to understand symbolic stimuli and are also able to consider and relate several dimensions of symbolic stimuli (Roedder-John, 1999). Despite Klink (2003) providing initial evidence that adults can use the brand name in combination with brand logo shape to infer some product attributes, we argue that younger children will be unable to infer product-related meaning because of their inability to symbolically relate several dimensions of stimuli (i.e. both sound and shape symbolism).

A three-way interaction between brand name, brand logo shape and age is also expected. When exposed to a front (back) vowel brand name paired with an angular (round) brand logo, older children should be able to abstract the meaning from the brand name and brand logo to infer product characteristics in line with sound and shape symbolism; that is, they should perceive the product to be small (large). We propose, however, that younger children will be unable to infer product characteristics, irrespective of whether they are exposed to a combination of brand name and brand logo-based symbolism. As such, the following is proposed:

*H3.* Brand name sound symbolism paired with brand logo shape symbolism effects will increase linearly with age: older children will perceive the product as smaller (larger) when paired with a brand name containing a front (back) vowel sound with an angular (curved) brand logo, than younger children.

## Method

### Pilot study

A pilot study was first undertaken to initially examine sound-symbolic relationship effects in children, that is, the bouba-kiki effect. A total of 37 children (6-10 years,  $M_{\text{age}} = 7.33$  years, 17 males, 20 females) for whom English was their first language participated in the pilot study. Consent was sought from the parent and assent gained from the child participant prior to participation. Participants received eight, two-syllable nonsense test words; four containing a front vowel sound (Illy Vipiz, Gerps and Bilad; Klink, 2003) and four containing a back vowel sound (Ully, Vopiz, Gorps and Bolad; Klink, 2003). Participants indicated their preference for either an ellipse (oval) or a rectangle (height and width

remained constant) for each test word by circling their preference on the page. Pilot materials were administered individually and all materials were read out loud to participants to ensure phonemes were presented as intended. Simple demographic information including age and gender was obtained.

### Results

As front vowel sounds are typically associated with angular images, we expected that when presented with a word that contained a front vowel sound, participants would select the angular image, and when presented with a word that contains a back vowel sound, participants would select the curved, oval ellipse image. To test our proposition, continuous dependent variables were created that represented the proportion of angular and curved images selected for words containing a back and front vowel sound. Paired *t*-tests were then conducted to determine whether there were significant differences between preferences for angular and curved images for words containing front or back vowel sounds. Consistent with psycholinguistic theory and the bouba-kiki effect, curved images were preferred for words containing back vowel sounds (64 versus 36 per cent,  $p = 0.006$ ) and angular images were preferred for words containing front vowel sounds (55 versus 45 per cent,  $p > 0.05$ ). These results provide further evidence of sound-symbolic relationships consistent with the bouba-kiki effect (consistent with Davis, 1961).

### Main experiment

Using the sound and shape symbolism theory, the main experiment aimed to demonstrate the effect of a brand's name and logo on children's product attribute judgments. In addition, we sought to examine the moderating role of age on symbolic inferences.

#### Participants and procedures

A total of 126 children aged 5 to 12 years of age ( $M_{\text{age}} = 8.13$  years, 64 males, 62 females) participated in the experiment. The sample exceeded that required to achieve statistical power of 0.80, with an a priori alpha level of 0.05 and estimated the medium effect size ( $F = 0.25$ ) (that is,  $n > 124$ ; as recommended by Button *et al.*, 2013). A 2 (brand name sound: front vs. back vowel)  $\times$  2 (brand logo shape: angular vs. curved) between-subjects design was used, with participants randomly allocated to one of the four experimental conditions (Table I provides a summary of participant characteristics by experimental condition). Consent was sought from the parent/guardian and assent was obtained from the child prior to participation. Participants were presented with an image of a child-oriented product (toy, consistent across conditions) accompanied with brand

Table I Participant summary across experimental conditions

Condition	Minimum	Age		Gender (%)	
		Maximum	Mean	Male	Female
Front vowel brand name/angular brand logo	5	12	8.58	14	15
Front vowel brand name/curved brand logo	5	11	7.85	17	17
Back vowel brand name/angular brand logo	5	12	8.00	15	14
Back vowel brand name/curved brand logo	5	12	8.32	18	16

information (name and logo, manipulated across conditions). The brand's name (*Illy* or *Ully*) was presented inside its logo, either a triangle (angular condition) or an ellipse (curved condition). Participants in each condition were asked to rate the size of the product utilizing a four-point scale (*very small, small, big and very big*) and reported their age and gender.

## Results

We argue that older children (as opposed to younger children), who are able to understand and relate several dimensions of symbolic stimuli (Roedder-John, 1999) including sound and shape stimuli, would infer product attributes consistent with sound and shape symbolism theory. To examine the moderating role of age on the effect of the interaction (independent variables: brand name [where, 0 = front vowel brand name, and 1 = back vowel brand name]  $\times$  brand logo [where, 0 = angular brand logo, and 1 = curved brand logo]) on the dependent variable of judgment of product size (three-way interaction), the Preacher *et al.*'s (2007) PROCESS macro bootstrapping procedure ( $n = 10,000$ , Model 3) was used. Results demonstrate that brand name ( $\beta = -2.41, p = 0.003$ ), brand logo ( $\beta = -1.85, p = 0.017$ ), as well as the two-way interactions, brand name  $\times$  brand logo ( $\beta = 2.80, p = 0.008$ ), brand name  $\times$  age ( $\beta = 0.339, p < 0.001$ ), and brand logo  $\times$  age ( $\beta = 0.237, p = 0.012$ ) were significant predictors of size judgments. Results of the simple effects analysis revealed younger children do not display effects consistent with sound, or phonetic symbolism theory (Point 1,  $\text{Age}_{(\bar{x}-1\sigma)} = 6.04$  years); however, phonetic symbolism effects are observed for older children (Point 2,  $\text{Age}_{(\bar{x})} = 8.12$  years, Point 3,  $\text{Age}_{(\bar{x}+1\sigma)} = 10.20$  years refer to Table II), supporting the *H1*. Using the Johnson-Neyman technique, we determined that the effect of brand name vowel sound on product attribute judgments transitions to significance at 7.04 years of age (Table III).

When considering the interaction brand logo  $\times$  age, simple effects analysis revealed that younger children do not display effects consistent with shape symbolism theory (Point 1,  $\text{Age}_{(\bar{x}-1\sigma)} = 6.04$  years, Point 2,  $\text{Age}_{(\bar{x})} = 8.12$  years), with effects consistent with shape symbolism not observed until children are older (Point 3,  $\text{Age}_{(\bar{x}+1\sigma)} = 10.20$  years, refer to Table IV). Results demonstrated that the effect of brand logo shape on product attribute judgments transitions to significance at 8.3 years of age (Johnson-Neyman technique), an older age than evident in the results of brand-name sound symbolism effects. As a result, *H2* is also supported.

A significant three-way interaction was also observed between brand name, brand logo and age ( $\beta = -0.317, p = 0.039, R^2\Delta = 0.014$ ). Although results of simple effect analysis indicated that the interaction (brand name  $\times$  brand logo) did not have a significant effect on product perceptions when participants were older (Point 2 and Point 3), and did

have a significant effect when children were younger (Points 1, Tables V and VI), the means for each condition at each age point performed in the expected pattern, consistent with the bouba-kiki effect. That is, at each age point the brand name with the front vowel sound, in combination with the angular brand logo, elicited smaller perceptions of product size ( $M_{\text{size (point 1)}} = 2.06, M_{\text{size (point 2)}} = 1.94, M_{\text{size (point 3)}} = 1.41$ ) than the brand name with the back vowel sound presented with the curved brand logo ( $M_{\text{size (point 1)}} = 2.58, M_{\text{size (point 2)}} = 2.59, M_{\text{size (point 3)}} = 2.59$ ). The current results indicate that the effect of the interaction (brand name sound  $\times$  brand logo shape) on product attribute judgments transitions to non-significance at 7.05 years of age (Johnson-Neyman technique, Table VII). Because of the non-significant results obtained for the older participants, coupled with the significant results observed for younger participants, *H3* cannot be supported.

The results of the experiment demonstrate that children can use brand stimuli (brand name and brand logo) as a means to infer symbolism regarding physical product attributes. Interestingly, however, these relationships have a developmental grounding, whereby younger children do not display effects consistent with sound and shape symbolism principles unless provided with multiple symbolism cues (brand name sounds and brand logo shapes).

## Discussion

The results of this research demonstrate that when considering brand names, children display effects consistent with the sound symbolism theory at approximately seven years of age, with the effect strengthening as children age. These results reinforce the findings of prior research, which demonstrates that phonetic symbolism effects have a developmental grounding (Baxter and Lowrey, 2011, 2014; Baxter *et al.*, 2014a, 2014b). However, of particular interest in this research was the effect of brand logo shape design on children's product size judgments, with research to date undertaken to examine the effect in adults (Klink, 2003; Klink and Athaide, 2014). This research demonstrates that brand logo-related shape symbolism effects are weaker, and occur later in age when compared with brand name-related sound symbolism effects. Specifically, results indicate that children do not draw meaning from brand logos until they are approximately 8.5 years of age (concrete operations stage of cognitive development). Inconsistent results exist in previous studies examining the sound-shape correspondences in young children (Maurer *et al.*, 2006). Although Ramachandran and Hubbard (2001) suggest a natural bias in the English language to contain sound-shape correspondences (for example "huge" and "enormous" contain back vowel sounds and mean large, and "tiny" and "little" contain front vowel sounds and mean small), language-learning is an important first step to observing the "bouba-kiki effect" which is said to develop after language learning (Maurer *et al.*, 2006). Therefore, a heightened level of

Table II Conditional effect of age on brand name-based product attribute judgments (size: small–big)

Moderator: age	Effect (95% CI)	t	p	Front vowel brand name	Back vowel brand name
Point 1 ( $\text{Age}_{(\bar{x}-1\sigma)} = 6.04$ years)	0.07 (–0.29, 0.44)	0.40	0.687	2.26	2.34
Point 2 ( $\text{Age}_{(\bar{x})} = 8.12$ years)	0.52 (0.26, 0.77)	4.01	<0.001	1.90	2.42
Point 3 ( $\text{Age}_{(\bar{x}+1\sigma)} = 10.20$ years)	0.96 (0.60, 1.32)	5.26	<0.001	1.55	2.51

**Table III** Johnson-Neyman technique – conditional effect of brand name and brand logo on product attribute judgments (size: small-big) at values of moderator (age)

Moderator: age	Brand name vowel sound			Brand logo shape		
	Effect (95% CI)	t	p	Effect (95% CI)	t	p
5.00	-0.15 (-0.61, 0.32)	-0.63	0.531	-0.22 (-0.72, 27)	-0.87	0.386
5.35	-0.07 (-0.50, 35)	-0.33	0.740	-0.17 (-0.63, 0.29)	-0.71	0.477
5.70	0.00 (-0.39, 40)	0.01	0.989	-0.11 (0.54, 0.31)	-0.52	0.599
6.05	0.08 (-0.28, 0.44)	0.42	0.672	-0.06 (-0.45, 0.33)	-0.31	0.761
6.40	0.15 (-0.18, 0.48)	0.91	0.367	-0.01 (-0.37, 35)	0.27	0.968
6.75	0.23 (-0.08, 0.53)	1.46	0.146	0.05 (-0.29, 38)	0.27	0.786
7.04	0.29 (0.00, 0.58)	1.98	0.050			
7.10	0.30 (0.02, 0.59)	2.09	0.039	0.10 (-0.21, 41)	0.63	0.528
7.45	0.38 (0.11, 0.64)	2.76	0.007	0.15 (-0.14, 0.44)	1.03	0.305
7.80	0.45 (0.19, 0.71)	3.44	<0.001	0.20 (-0.08, 0.48)	1.44	0.151
8.15	0.52 (0.27, 0.78)	4.05	<0.001	0.26 (-0.02, 0.53)	1.84	0.068
8.28				0.28 (0.00, 0.55)	1.98	0.050
8.50	0.60 (0.34, 0.86)	4.56	<0.001	0.31 (0.03, 0.59)	2.46	0.031
8.85	0.67 (0.40, 0.94)	4.91	<0.001	0.36 (0.07, 0.65)	2.46	0.015
9.20	0.75 (0.46, 1.04)	5.13	<0.001	0.42 (0.10, 0.73)	2.65	0.009
9.55	0.82 (0.51, 1.13)	5.24	<0.001	0.47 (0.13, 0.80)	2.77	0.006
9.90	0.90 (0.56, 1.23)	5.27	<0.001	0.52 (0.16, 0.88)	2.85	0.005
10.25	0.97 (0.61, 1.34)	5.25	<0.001	0.57 (0.18, 0.97)	2.88	0.005
10.60	1.05 (0.65, 1.44)	5.20	<0.001	0.63 (0.20, 1.05)	2.90	0.005
10.95	1.12 (0.69, 1.55)	5.13	<0.001	0.68 (0.21, 1.14)	2.90	0.005
11.30	1.20 (0.77, 1.7)	4.99	<0.001	0.73 (0.23, 1.23)	2.89	0.005
11.65	1.27 (0.77, 1.77)	4.99	<0.001	0.78 (0.24, 1.32)	2.89	0.005
12.00	1.34 (0.80, 1.89)	4.91	<0.001	0.84 (0.26, 1.42)	2.85	0.005

**Table IV** Conditional effect of age on brand logo-based product attribute judgments (size: small-big)

Moderator: age	Effect (95% CI)	t	p	Angular brand logo	Curved brand logo
Point 1 (Age <sub>(x̄ - 1σ)</sub> = 6.04 years)	-0.06 (-0.45, 0.33)	-0.32	0.751	2.34	2.28
Point 2 (Age <sub>(x̄)</sub> = 8.12 years)	0.25 (-0.02, 0.53)	1.81	0.073	2.07	2.33
Point 3 (Age <sub>(x̄ + 1σ)</sub> = 10.20 years)	0.57 (0.18, 0.96)	2.88	0.005	1.80	2.37

**Table V** Conditional effect of interaction (brand name × brand logo) on product attribute judgments (size: small-big) at values of age

Moderator: age	Effect (95% CI)	t	p
Point 1 (Age <sub>(x̄ - 1σ)</sub> = 6.04 years)	0.89 (0.30, 2.13)	2.62	0.010
Point 2 (Age <sub>(x̄)</sub> = 8.12 years)	0.23 (-0.28, 0.74)	0.875	0.384
Point 3 (Age <sub>(x̄ + 1σ)</sub> = 10.20 years)	-0.44 (-1.19, 0.31)	-1.16	0.250

abstraction is required to extract the symbolic meaning from a logo's shape. That is, it is not until children are within the bounds of concrete operations stage of cognitive development that they can infer symbolic meaning in brand logo shape.

Interestingly, results examining the combination of brand name sound and brand logo shape symbolism on product attribute judgments are neither consistent with our hypothesis nor prior research, which has demonstrated an age-based bound of the phenomenon (Baxter and Lowrey, 2014; Baxter et al., 2014a, 2014b). Results of our study provide evidence that younger children are able to infer product attribute meaning consistent with the bouba-kiki

effect. Specifically, younger children judge a toy product as small (large) when exposed to a brand name with a front (back) vowel sound coupled with a brand logo that is angular (curved) in shape. These results suggest that phonetic symbolism effects can be observed in younger children when both the brand name and shape of the logo are combined. This notion provides a unique contribution to marketing literature, which is yet to demonstrate a situation in which phonetic symbolism effects are observed in young children. We propose that the presentation of two symbolic cues (that is, brand name and brand logo) boost phonetic symbolism effects for younger children. Older children, however, are able to infer meaning from a single cue (that is, either the brand's name or logo), with phonetic symbolism effects not further enhanced by the introduction of a second cue (ceiling effect). However, we suggest that future research should be undertaken to replicate this effect before further conclusions are drawn.

This research provides a valuable contribution to marketing theory and practice. Results support the effects of sound and shape symbolism in children, who demonstrated sound-stimuli, shape-stimuli and sound-shape-stimuli

**Table VI** Three-way interaction (brand name × brand logo × age) on product attribute judgments (size: small-big)

Moderator: age	Brand logo	
	Angular	Curved
<b>Three-way interaction</b>		
<b>Age (6.03 years)</b>		
Brand name: front vowel	2.06	2.11
Brand name: back vowel	2.47	2.58
<b>Age (8.12 years)</b>		
Brand name: front vowel	1.94	2.02
Brand name: back vowel	2.29	2.59
<b>Age (10.21 years)</b>		
Brand name: front vowel	1.41	1.98
Brand name: back vowel	2.46	2.59

**Table VII** Johnson-Neyman technique – conditional effect of brand name × brand logo interaction on product attribute judgments (size: small-big) at values of moderator (age)

Moderator: age	Effect (95% CI)	t	p
5.00	1.22 (0.30, 2.13)	2.62	0.010
5.35	1.10 (0.26, 1.95)	2.59	0.011
5.70	0.99 (0.22, 1.77)	2.53	0.013
6.05	0.88 (1.7, 1.60)	2.45	0.016
6.40	0.77 (0.12, 1.42)	2.34	0.021
6.75	0.66 (0.06, 1.26)	2.17	0.032
7.04	0.57 (0.00, 1.13)	1.98	0.050
7.10	0.55 (−0.01, 1.11)	1.94	0.055
7.45	0.44 (−0.09, 0.97)	1.64	0.104
7.80	0.33 (−0.19, 0.84)	1.26	0.209
8.15	0.22 (−0.29, 0.73)	0.84	0.403
8.50	0.11 (−0.42, 0.63)	0.40	0.691
8.85	−0.01 (−0.56, 0.54)	−0.02	0.983
9.20	−0.12 (−0.71, 0.47)	−0.39	0.695
9.55	−0.23 (−0.87, 0.41)	−0.71	0.481
9.90	−0.34 (−1.03, 0.36)	−0.97	0.336
10.25	−0.45 (1.21, 0.31)	−1.18	0.242
10.60	−0.56 (−1.39, 0.26)	−1.35	0.180
10.95	−0.67 (1.57, 0.22)	−1.49	0.140
11.30	−0.78 (−1.75, 0.19)	−1.60	0.112
11.65	−0.89 (−1.94, 0.15)	−1.69	0.093
12.00	−1.01 (−2.13, 0.12)	−1.77	0.079

relationships. This study is limited as it focuses only on product meaning derived from sound and shape symbolism. Future research, however, should also examine the effects of sound- and shape-based symbolism on other managerial outcomes such as purchase intentions and willingness to pay a premium price. In addition, although this research draws upon prior literature to develop experimental stimuli (that is, the selection of the brand name *Illy et al.*, 2007), a review of market brands find that *Illy* is a brand of Italian coffee (which pairs a front vowel sound with angular (square) brand logo). Although we do not anticipate that children would have a high level of familiarity with this non-child-oriented brand, the selection of this test brand forms a limitation of this study, as

we are unable to determine the effect of possible prior brand associations in our experiment. However, we anticipate that coffee, as a liquid beverage, would not maintain strong size-based associations (small-large). As such, any associations that knowledgeable children may have had are unlikely to be related to the dependent variable used in this study. We propose that future research should examine the effects of sound and shape symbolism using both fictitious and real brand names, taking into consideration prior brand associations.

As children are developmentally different to adults (Roedder-John, 1999), this research provides a unique contribution to this growing body of research. Findings also have implications for brand element or logo design. The relationships between brand name characteristics, logo design and product attribute-related meaning demonstrated in this research will be of interest to those looking to choose a congruent, inventive brand element. For example, those selecting an inventive brand name for a new brand of plush toys may look to incorporate a curved logo matched with a brand name containing a back vowel sound, whereas those launching a brand of action figures should consider the design of an angular logo matched with a brand name containing a front vowel sound.

Although this research examined only a limited number of fictitious brand elements within the context of a single product category, the results suggest that sound and shape symbolism can be important tools for marketers wishing to develop meaningful and creative brand elements – even when their target market is children. We trust the results reported will spur further research on the application of psycholinguistic and psychological theory in branding.

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## About the authors

**Stacey M. Baxter** is Senior Lecturer in Marketing for the Newcastle Business School at the University of Newcastle, Australia. She holds a PhD in Management (Marketing), from the University of Newcastle. Stacey has published in international academic journals, such as *the International Journal of Research in Marketing*, *European Journal of Marketing*, *Journal of Advertising*, *Journal of Brand Management*, *Marketing Letters*, *International Journal of Market Research* and *the Journal of Consumer Marketing*. She is a member of marketing professional bodies including the Australian and New Zealand Marketing Academy, the European Marketing Academy and the Society for Consumer Psychology. Stacey M. Baxter is the corresponding author and can be contacted at: [stacey.baxter@newcastle.edu.au](mailto:stacey.baxter@newcastle.edu.au)

**Jasmina Ilicic** is Senior Lecturer for the Monash Business School at Monash University, Australia. She holds Bachelor of Business with the First Class Honors from the University of Newcastle and a PhD in Marketing from Macquarie University. Prior to her academic career, Jasmina worked in the advertising industry with several internationally recognized brands including Pfizer and L'Oreal. Jasmina has published in international academic journals, such as *International Journal of Research in Marketing*, *European Journal of Marketing*, *Psychology & Marketing*, *the Journal of Business Research*, *Marketing Letters* and

*the Journal of Brand Management*. Jasmina is a member of several marketing professional bodies.

**Alicia Kulczynski** is Lecturer in Marketing for the Newcastle Business School at the University of Newcastle, Australia. She holds a PhD in Management (Marketing) and has a BA (Communications) from the University of Newcastle. Alicia has had research accepted for publication in international academic journals, such as *the European Journal of Marketing*, *International Journal of Research in Marketing*, *Journal of Advertising*, *Marketing Letters* and *Annals of Leisure Research*. Alicia is a member of the European Marketing Academy and the Australian and New Zealand Marketing Academy.

**Tina Lowrey** is Professor in Marketing at Hautes études commerciales (HEC) Paris. She holds a PhD in Communications and Master of Science (MS) in Advertising from the University of Illinois at Urbana-Champaign, and Bachelor of Business Administration (BBA) in Finance from the University of Houston. Her research has appeared in numerous international journals, including *the Journal of Consumer Research*, *Journal of Consumer Psychology* and *Journal of Advertising*, as well as numerous edited volumes. She has edited three scholarly books, including the 2007, *Psycholinguistic Phenomena in Marketing Communications* (Erlbaum). Professor Lowrey serves on the editorial boards of *the Journal of Consumer Psychology*, *Journal of Advertising*, and *Media Psychology*.

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