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The bouba-kiki effect in a production task

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Abstract

Research on sound symbolism has shown that speakers of different languages associate specific consonants and vowels with round and pointy shapes, a phenomenon commonly dubbed the *bouba-kiki* effect. Most of this work rely on forced-choice tasks in which participants assign previously crafted pseudowords (like *kiki* or *bouba*) to visual stimuli. Here we investigate this phenomenon with a production written task. Participants had to create a new word they thought would be a good name for round and spiky images. In this less constrained task, spiky images received names with more high/front vowels and voiceless stops, while round shapes were named with more back/rounded vowels and lateral and nasal consonants. In great part these results replicate previous findings, showing that participants recourse to sound symbolism even when the task at hand gives them more freedom to create names to abstract shapes.

Keywords: iconicity; sound symbolism; bouba-kiki; psycholinguistics

Introduction

Over the past decades, experimental and corpora research have showed that iconicity plays an important role on language processing and acquisition. It is now known that the lexicon of natural languages shows form-meaning correspondences (Winter & Perlman 2021; Winter 2016; Blasi et al. 2016; Haynie et al. 2014), that iconicity enhances novel word learning in first and second language acquisition (Imai et al., 2008; Lockwood, Dingemanse & Hagoort, 2016), that children learn and use more iconic words earlier during their development (Perry et al., 2018), and that iconicity may have played a role on the origins of spoken language (Perlman, Dale & Lupyan, 2015; Perlman & Lupyan, 2018) and its evolution (Vinson et al., 2021).

Most experimental research on iconicity has used non-words to assess the extent to which speakers of different languages associate certain sounds to perceptual categories such as shape, color, speed or touch (see Lockwood & Dingemanse (2015) for a review). This type of cross-modal association is often called sound symbolism, and perhaps the most known example is the *bouba-kiki* effect (Ramachandran & Hubbard 2001, initially reported by Köhler (1929/1947) as the *maluma-takete* effect). According to a series of studies, there seems to be a cross-linguistic tendency to associate spikiness with high vowels and voiceless and/or obstruent consonants, and roundness with rounded back vowels and sonorant/voiced consonants (Fort, Martin & Peperkamp, 2014; D'Onofrio, 2014, Nielsen & Rendall 2011, but see Styles & Gawne 2017). Although there is some debate as to whether this effect is driven by the resemblance between rounded or spiky letters in the Roman alphabet (〈m, b, o〉 and 〈t, k, i〉) and round/angular shapes, these finding also holds for pre-literate children (Maurer et al. 2006) and populations that do not use writing systems (Bremner et al. 2013). More recently, there is also evidence that the *bouba-kiki* effect is robust across 25 different languages, regardless of the writing system participants use (Ćwiek et al. 2022, see also Cuskley, Simner & Kirby (2017) for a review on the phonological and orthographic influences in the *bouba-kiki* effect).

These findings come mostly from experiments that employ two-alternative forced choice tasks, which consist of presenting the participants with a pair of stimuli and asking them to make a decision. For example, one could present a round and a spiky image and ask participants to choose which one of them would be called *kiki* and which one would be called *bouba*. This paradigm has been successfully used to report not only the *bouba-kiki* effect, but also other sound-symbolic associations (e.g., Sapir 1929).

However, some task effects may hide a more nuanced picture of the phenomenon. Previous research has shown that the number of pseudowords presented to participants influences their response. When there are four stimuli, the rates of sound symbolic associations fall significantly compared to scenarios with only two stimuli (Aveyard, 2012). This indicates that two-alternative forced choice tasks, the most common paradigm used in the literature, may overestimate the effects of sound symbolism in some contexts. Other studies employed different paradigms and techniques (e.g., Kovic et al., 2010, McCormick et al., 2015, Westbury et al. 2018), but still relied on linguistic stimuli previously crafted by the researchers. Most of them use /t, k, i, e/ to create spiky pseudowords, and /b, m, l, o, u/ for round ones (Styles & Gawne, 2017).

In general, all these vowels and consonants show a strong association with spiky/round shapes in experiments conducted with speakers of different languages, and any researcher interested in studying phenomena associated with the *bouba-kiki* effect would be safe using them to create their stimuli. However, other studies also use /g, n, v, z, ʒ/ in pseudowords created to evoke roundness, and /r, p/ in stimuli created to evoke spikiness (Occelli et al., 2013; Peiffer-Smadja, 2010; Drijvers, Zaadnoordijk & Dingemanse, 2015). The phoneme /r/ goes as far as being used in pseudowords crafted to refer to spiky images in a study that targeted children/adolescents with autism spectrum disorders (Occelli et al., 2013), but round shapes in a study on the processing of sound symbolism by dyslexic adults (Drijvers et al., 2015). Similarly, the obstruent /g/ was used in pseudowords created to evoke both roundness (Nielsen & Rendall, 2011) and spiky images (Drijvers et al., 2015). This is not to say that the effect of each one of these phonemes was tested in isolation in these studies, but that the pool of consonants that supposedly evoke the idea of roundness or spikiness include them. Moreover, these examples show that the criteria to decide which sounds are spiky and which ones are round are not clear.

Some studies find that multiple phonetic dimensions like voicing, manner and place of articulation may cumulatively contribute to cross-modal associations regarding shape (D'Onofrio, 2014). However, there is also a lack of consensus on what parameters are associated with round/spiky images. Regarding just the use of consonants, round shapes are said to be associated with sonorants, voiced stops and labial consonants (Drijvers et al., 2015; D'Onofrio, 2014). Spiky shapes are believed to be related to voiceless stops (McCormick et al. 2015, Fort et al., 2014), voiced obstruents (Drijvers et al., 2015), unvoiced obstruents (Nielsen & Rendall, 2011) or velar/alveolar consonants (D'Onofrio, 2014).

In the present study, we propose a free elicitation written task to assess which sound parameters are mostly used (if any) to signal a difference between spiky and round shapes. This method was already used to investigate sound symbolism associated with size (Kawahara & Kumagai, 2019; Godoy et al. 2020), and it has the advantage of not constraining the strategies participants may use to name the visual stimuli.

Compared to forced-choice experiments, this methodology can answer two additional questions. The first is whether people actively employ sound-symbolic associations when they are not explicitly required to do so. Vinson et al. (2021), who also ran a production task on the *bouba-kiki* effect, reported that the names created for round and spiky shapes were comprised of syllables that evoked roundness and spikiness according to a previously developed index of shape iconicity. Based on their result, we believe we will also find evidence of sound symbolic associations in our data. However, the analysis in our dataset will be different: we will not judge the iconicity of the names created by the participants, but we will map whether there are preferences on the use of specific sound parameters to name spiky and round shapes.

This will allow us to answer a second question: what sound parameters (if any) people freely use to signal differences in shape? Given what we know from previous research, we will test whether the name of round and spiky shapes differ in their voicing (voiced/voiceless consonants) and manner (sonorants/obstruents). More recently, Erben Johansson, Carr & Kirby (2021) ran an iterated learning task that mimics language evolution. Participants were presented with a seed word and asked to repeat it. Their recording was then presented to another participant, who was also asked to repeat it. This process was repeated for 15 generations in 20 independent transmission chains. When the linguistic stimuli were presented with a spiky image, the final word uttered by the fifteenth participant in a transmission chain had increased the number of acute segments compared to the original seed word. Therefore, here we also checked if consonant position (acute/grave[1]) is employed to evoke roundness or spikiness.

Methods

We designed a free elicitation written task to investigate whether the *bouba-kiki* effect reported in forced-choice tasks could also be found in a production experiment which gives participants the freedom to create whatever name they want to spiky and round shapes. The target of this experiment were speakers of Brazilian Portuguese (BP), a language for which the *bouba-kiki* effect has already been reported in an implicit association task and a cross-modal matching experiment (Silva & Bellini-Leite, 2019), as well as in a classic two-alternative forced-choice task (Godoy et al., 2018). This latter study replicates the finding of Nielsen & Rendall (2011, Exp 1), showing that BP speakers associate some voiceless stops and unrounded vowels with spikiness, and some sonorants, voiced obstruents, and rounded vowels with roundness. Therefore, we were confident that BP speakers make these associations in other experimental contexts.

The main caveat to this methodology is the fact that participants provide their response in written form. Consequently, it is not completely accurate to say that the we have a clear case of cross-modal association in our results, as we have no sound-to-image mapping in this task. However, the target language used here has a high spelling-to-sound transparency, especially regarding its grapheme-phoneme mapping for consonants (Borgwaldt et al., 2005). This orthographic transparency of BP allows us to guess the intended pronunciation most of the time.

Stimuli and task

Six pairs of round-pointy shapes were used as experimental stimuli (cf. Figure 1). Pairs A to E were adapted from images used by Köhler (1929/1947) and Maurer et al. (2006) in their experiments (cf. Nielsen and Rendall, 2011), and Pair F was created by the authors in order to increase the number of observations per participant. We limited the stimuli to six pairs to avoid fatigue. Due to restrictions imposed by the COVID-19 pandemic, the task was administered online using the Google Forms platform. It took participants ten to fifteen minutes to complete the task.

Participants were 75 BP speakers who agreed to participate voluntarily after reading the consent form. They were told that in each screen there would be a pair of images, and that they should write down for each image a new name.

[1] According to Erben Johansson et al. (2021, p. 4), "(g)rave sounds include consonants produced by using soft tissue secondary articulators, notably the lips and the area from the soft palate and back, while acute sounds include consonants produced using the hard palate as a secondary articulator".

Participants were informed that they could not use an existing word or blends of words in Portuguese or other languages. They were also asked to create names that should sound like a word in Portuguese. These instructions were given in order to prompt names that did not violate Portuguese phonotaxis, so the grapheme-to-phoneme mapping would be easier to analyze. Participants were not explicitly told to pay attention to the images' shape or to any specific differences within each pair.

After completing the experiment, all participants answered a questionnaire that asked if they knew what sound symbolism was and if they had already taken part in previous experiments that investigated this phenomenon.

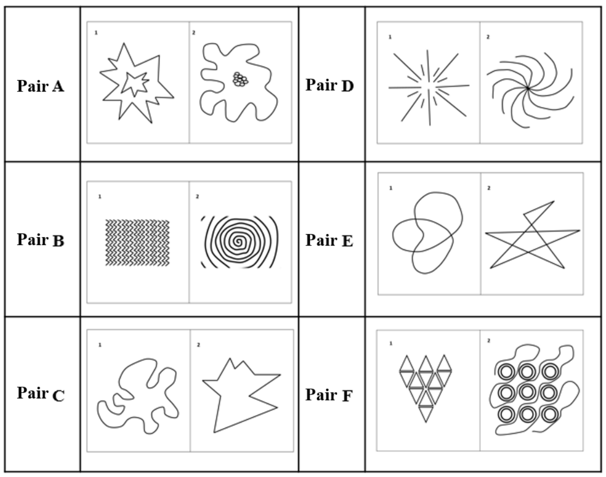

Figure 1: Experimental Stimuli

Data annotation and preparation

We excluded all data from 6 participants because they reported they had already taken part in other research on sound symbolism and were aware of this phenomenon. Five participants were excluded because they repeated the same names across experimental stimuli. Data from the remaining 64 participants were analyzed in order to exclude observations that did not conform to the instructions. We also excluded all data from 4 participants that did not abide to the instructions in more than 50% of the experimental items. These criteria led to the exclusion of 17.5% of our raw data. We believe this large number is due to participants not reading the instructions in detail in remote experiments.

The remaining dataset with 633 observations (314 names of pointy figures and 319 names of round ones) was transcribed with *silac* (Oushiro, 2018), an automatic transcription tool that convert text to phonological notation in Brazilian Portuguese with a high level of accuracy. These transcriptions were used in our analysis.

BP has 7 different vowels (/a, e, ɛ, i, o, ɔ, u/), but due to the nature of our task (participants had to write a name, rather than speaking it) and the orthographic conventions of BP, both /e/-/ɛ/ and /o/-/ɔ/ were respectively conflated in the phonemes /e/ and /o/. In our statistical analyses, each one of the five vowels were assessed separately in order to check if they were more recurrent in the names of pointy or round images.

Consonants were grouped based on six binary categories following the sound parameters used by Erben Johansson et al. (2021): *voiced* and *voiceless*, *sonorant* and *obstruent*, *acute* and *grave* (cf. Table 1). Rhotics in coda position (represented in *silac* by the letter R) were not included in the analysis because, in BP, the same grapheme in this position (the letter 'r') represent phones with different sound parameters in regional dialects - e.g., it can be either pronounced as a voiced or voiceless velar (Seara et al., 2015). We also excluded glides \j\ and \w\ because their status as a consonant or vowel in BP is still a matter of debate (Cristófaro Silva, 1998).

Table 1: Sound parameters for consonants used by Erben Johansson et al. (2021) and adapted to Brazilian Portuguese

Sound Parameter	Sound group	Segments
Voicing	Voiceless	p, t, k, f, s, ʃ, h
	Voiced	b, d, g, v, z, ʒ, m, n, ŋ, l, ʎ, ɾ
Manner	Sonorant	m, n, ŋ, l, ʎ, ɾ
	Obstruent	p, t, k, b, d, g, f, s, ʃ, v, z, ʒ, h
Position	Acute	n, t, d, s, z, ʃ, ʒ, l, ʎ, ɾ
	Grave	m, ŋ, p, k, b, g, f, v, h

Results

Dataset and code for all the analysis described here are available online[2]. A script automatically counted how many vowels or consonants for each sound parameter each name had. For example, the name 'daledo' had 3 voiced and 0 voiceless consonants, 1 sonorant and 2 obstruents, and 0 graves and 3 acutes. Regarding its vowels, it had 1 /a/, 1 /e/, 0 /i/, 1 /o/ and 0 /u/.

We initially checked whether there was any difference in length between the names created for round and pointy figures. This was done considering all segments produced, including rhotics in coda position and glides. Two generalized linear mixed models were fit with shape as the predictor and participants and pairs as random variables. Response variables were the number of syllables and number of segments, modeled with a zero-truncated poisson distribution. Results showed that there was no difference in length regarding the number of syllables ($b = 0.02$, $SE = 0.05$, $p = 0.58$) or segments ($b = -0.009$, $SE = 0.03$, $p = 0.76$). Therefore, we chose to proceed our analysis investigating whether the number of specific segments (voiceless, acute,

[2] Dataset and codes for all analyses in this paper are available at <https://github.com/mahayanag/GodoyAnanias2022CogSci>.

sonorant etc.) in a name would differ for pointy and round shapes.

A series of generalized linear mixed models were fit with the number of segments of interest as the response variable (modeled with a poisson distribution) and shape as the predictor (dummy coded, reference level: pointy). Models also included random intercepts by participants (due to convergence issues, we were able to include random intercepts by pairs just for the acute and grave analyses). All p-values were adjusted with the false discovery rate method (Benjamini & Hochberg, 1995). In this first round of analysis, our main goal was to check whether people make sound symbolic associations with vowels or consonants when creating names for pointy and round shapes.

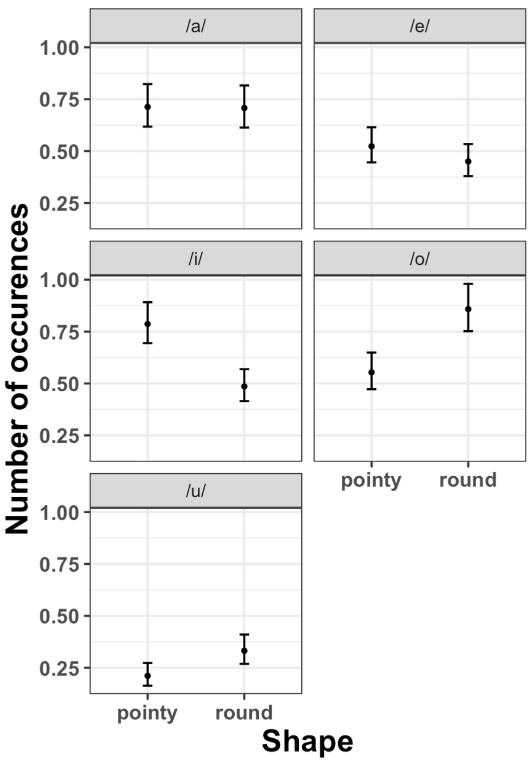

Figure 2: Estimated number of occurrences for each vowel in the names of round and pointy images.

Vowels

The high, front, unrounded vowel /i/ was preferably used to name spiky images (b = -0.48, SE = 0.1, p < 0.0001). On the other hand, back rounded vowels /o/ and /u/ were significantly more common in the names of rounded shapes (b = 0.43, SE = 0.09, p < 0.0001; b = 0.45, SE = 0.15, p = 0.007, respectively). Vowels /a/ (b = -0.007, SE = 0.09, p = 0.93) and /e/ (b = -0.15, SE = 0.11, p = 0.22) were equally used to name both shapes. Figure 2 depicts estimated means and 95% confidence intervals for each model.

Consonants

Regarding manner of articulation, obstruents were more common in the names of pointy figures (b = -0.21, SE = 0.05, p = 0.0004), and sonorants were used at the same rate to name round and spiky images (b = 0.16, SE = 0.07, p = 0.06). Unvoiced consonants were more common in the names of spiky figures (b = -0.31, SE = 0.06, p < 0.0001), but voiced ones were not associated to any particular shape (b = 0.09, SE = 0.06, p = 0.18). Acute consonants were more common in the name of spiky shapes (b = -0.15, SE = 0.05, p = 0.01), but there was no difference between the names of pointy and round figures regarding the use of grave segments (b = 0.02, SE = 0.07, p = 0.81). Figure 3 graphically displays estimated means and 95% confidence intervals for each model.

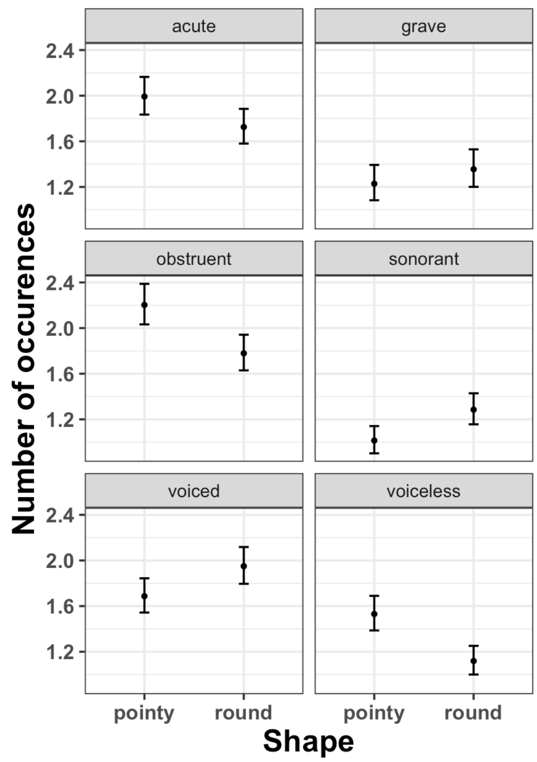

Figure 3: Estimated number of occurrences for consonant parameters in the names of round and pointy images.

Post-hoc analyses for consonants Our main analysis found that some vowels and consonants are preferably used to name spiky or round shapes. We further analyzed the consonant categories to have a more fine-grained description of which sounds are most used in sound-symbolic associations. Because obstruents are too broad a category, these consonants were divided in four different categories regarding their voicing and manner of articulation: voiceless and voiced stops, voiceless and voiced fricatives (see Table 2). This would allow us to understand how voiceless and obstruents consonants correlate with spiky images.

Following the previous analyses, we fit four generalized linear mixed models with the number of voiced and voiceless obstruents and fricatives as the response variable modeled with a poisson distribution. All models included shape as the predictor (dummy coded, reference level: pointy), and three of them also had random intercepts by participants and pairs, the only exception being the analysis of voiceless fricatives. Results showed that spiky shapes received names with more voiced stops in comparison to round images (b = -0.36, SE = 0.08, p = 0.0001). Fricatives, both voiced (b = -0.24, SE = 0.15, p = 0.13) and unvoiced (b = -0.21, SE = 0.11, p = 0.07), and voiced stops (b = 0.14, SE = 0.12, p = 0.26) were used at similar rates for round and pointy shapes.

Table 2: Sound parameters considered in the *post-hoc* analyses

	Sound group	**segments**
Obstruents	Voiced stops	b, d, g
	Voiceless stops	p, t, k
	Voiced fricatives	z, ʒ, v
	Voiceless fricatives	s, ʃ, f, h
Sonorants	Nasal	m, n, ŋ
	Lateral	l, ʎ
	Vibrant	ɾ

Sonorants were also analyzed in three categories regarding their manner of articulation: nasal, lateral and vibrant consonants (Table 2). This was done to check whether there is a small cluster of sonorants that correlate with round images, as this association is often reported in the literature. Results show that nasal (b = 0.42, SE = 0.14, p = 0.009) and lateral consonants (b = 0.34, SE = 0.13, p = 0.02) were indeed more common in the names created for round images. The vibrant /ɾ/, on the other hand, were used at greater rates to name spiky images, but this tendency did not reach statistical significance when p-values were adjusted for multiple comparisons (b = -0.3, SE = 0.14, p = 0.054).

Discussion

Results from the free elicitation task show an association between /i/ and spiky images and /o, u/ and round shapes. These associations were already attested in previous forced-choice experiments, but, as far as we know, our results are the first to document them in a production task. Regarding their sound parameter, /i/ is a high, front, unrounded vowel, while /u/ and /o/ are both back, rounded vowels. Therefore, it is not possible to tease apart effects of position (front/back) and roundedness as the main factor driving these associations. As for /o/ and /u/, it has been assumed that their rounded nature would act as a proprioceptive cue that maps their sound to round shapes (Ramachandran & Hubbard 2001), but it may also be the case that a combination of features may cumulatively influence cross-modal associations related to shapes (D'Onofrio 2014).

The main difference between our results and some assumptions from previous studies was the lack of association between /e/ and spiky images. As far as we know, this correspondence is not backed up by any specific study, but previous experimental work has used /e/ to create pseudowords supposedly related to spikiness (Drijvers et al., 2015; Fort et al., 2014). A possible explanation for our results is that participants privilege /i/ as the best way to signal spikiness. Maybe the association between /e/ and angular shapes reported in other studies is triggered by the contrast with back, rounded vowels used in the pseudo-words created for forced-choice tasks. It could also result from consonantal contrasts within the stimuli (e.g., zeze *vs* nunu, in Drijvers et al., 2015). If this is the case, then this association would be better described as a task effect.

Regarding the use of consonants, our results show no preference in the use of sonorants, grave or voiced consonants to signal differences in shape. On the other hand, they show an association between spiky shapes and acute, unvoiced and obstruent consonants. These associations were already attested in previous studies, but here we show that participants employ this sound symbolic association even when they are free to choose other sound parameters to create new names.

The association between acute consonants and spiky shapes were reported by Erben Johansson et al. (2021). The authors documented that names designating spike images change in an iterated learning task that mimics language evolution, and these changes tend to result in words with more acute sounds. As far as we know, this was the first study to distinguish acute and grave sounds in a task designed to study the *bouba-kiki* effect (amongst other types of cross-modal correspondences). The fact that we found the same association between acute sounds and spiky images in a free elicitation task reinforces such effect. However, it is not clear yet how acoustic or articulatory features of acute consonant are related to spiky images.

The obstruent/spiky association we found in our data was already attested in previous forced-choice experiments (e.g., Nielsen & Rendall, 2011). However, given the broad array of consonants under the label of "obstruents", these results merit a closer inspection that also takes into account the role of voicing and manner of articulation in establishing sound symbolic associations.

This is particularly relevant for our analysis because, as our results show, voiceless consonants were also preferably used to name spiky images. There are at least two possible explanations for this result. First, we should consider that the set of voiceless consonants is comprised by a subset of obstruents. In other words, all voiceless consonants are also obstruents. Hence, one might imagine that the voiceless/spiky association may be just a side-effect of the association between obstruents and spikiness: obstruents correlate with spiky shapes, and all voiceless consonants are obstruents, therefore, voiceless consonants correlate with spikiness just because they are a subset of obstruents. According to this explanation, voicing *per se* would show no association with shape.

However, as Ćwiek et al. (2022) point out, there might be a cross-modal correspondence between spikiness in the visual domain and the spectral changes from silent closure to high spectral frequencies caused by voiceless stops. According to them, this pattern contrasts with a more continuous fundamental frequency in words with voiced or sonorant consonants, such as *bouba* or *maluma*, whose amplitude envelope modulations are less abrupt. This is in line with our *post-hoc* analysis, which showed that it is indeed the subset of obstruents comprised by voiceless stops that are preferably used to name spiky images.

Regarding the use of sonorants, our dataset show that nasal and lateral consonants were more common in the names of round images, but we found no association between shapes and the vibrant /ɾ/. Therefore, our data suggests that participants in a production task preferably recourse to lateral and nasal consonants to signal roundedness. This is in line with the findings from forced-choice tasks that usually show an association between these consonants and round shapes. In fact, nasal and lateral consonants are the ones typically used in the pseudowords of studies that report an association between round images and sonorants (e.g., Occelli et al., 2013; Fort et al., 2014).

These results are relevant because they can inform future research on iconicity that uses pseudowords as linguistic stimuli to investigate sound symbolism. Our data suggest that using voiceless stops and lateral/nasal consonants may be the best way to create pseudowords that have a greater chance to be associated with spiky and round shapes. These patterns are in line with previous research that speculates about how the acoustic signal of consonants may relate to the *bouba-kiki* effect. As noted by Nielsen & Rendall (2011), attack differences and spectral density in consonants such as /k/ and /m/ make the former feel "harsh", and the latter feel mellifluous. In the study reported in this paper, this harsh/smooth distinction seems to influence the behavior of participants in a production task.

It is nonetheless curious that round images did not correlate with voiced stops in our experiment, as the most used stimuli for this cross-modal association, *bouba*, features the voiced stop /b/ twice. At this point, we must emphasize the limits of comparing our results with those of previous studies. First of all, our analyses do not allow for conclusions about specific consonants. We focused on the analyses of sound parameters regarding voicing, manner and position. As a consequence, although we can claim that the use of voiced stops does not correlate to any particular shape, we cannot claim whether /b/ (or /d/, or /g/ *etc.*) does. Additionally, the results of forced-choice tasks depend on the contrast of the pseudowords crafted by researchers. Therefore, even if /b/ or other voiced stops do not correlate with round shapes in a free elicitation experiment, they may do so in a forced-choice task, because the other pseudoword within a pair may contain voiceless stops or vowels that are preferably associated with spiky images.

Finally, we should address some limitations of our work. Following previous studies, the images in our experimental stimuli were presented in pairs. Shape perception is not as relative as size, and one can certainly point out that a shape is round or spiky without the need to compare it to any other image. However, the fact that the pictures were presented in pairs adds a contrastive element to the task that may have influenced our results. In other words, if images were presented in isolation, maybe their roundedness or spikiness would not have been be so evident, and the associations we reported in this paper could have been weaker. This is not a major issue here because our goal was mapping associations when shape differences were evident, but an interesting follow-up study would be investigating whether the use of spiky/round-related sounds also increases when these shapes are presented without a contrastive pair.

The fact that the experimental task involved written rather than oral production is another caveat. Some differences in vowel height are lost in the orthographic to phonological transcription, as well as minor dialectal differences in BP (e.g., the use of fricatives or affricates in some contexts). We do not know of any study that contrasts the use of these cross-modal associations in written and oral production tasks, so we cannot be sure the results we describe here would hold in a more spontaneous oral production experiment.

Lastly, our participants were BP speakers, and we did not target speakers of any other languages. We expect that the results reported here replicate in other languages, as it was the case for the results of the *bouba-kiki* effect in forced-choice tasks. However, only future research can test this prediction.

Conclusions

Work on the *bouba-kiki* effect have benefited mostly from forced-choice tasks in which participants had to decide which pseudoword best represented images of pointy and round shapes. These studies have found that speakers of different languages make associations between shape and sounds. However, forced-choice tasks use previously crafted pseudowords as linguistic stimuli, therefore limiting other associations that could be available to the participants.

In this paper, we presented a free elicitation task in which participants were asked to create the name they wanted (following BP phonotaxis) to name round and spiky shapes. We found that even in this less constrained experimental task participants still recourse to sound symbolism to signal differences in shapes. More specifically, our analysis was able to detect that spiky images receive more names with voiceless stops and the high vowel /i/, while round shapes are named preferably with lateral and nasal consonants and back round vowels.

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