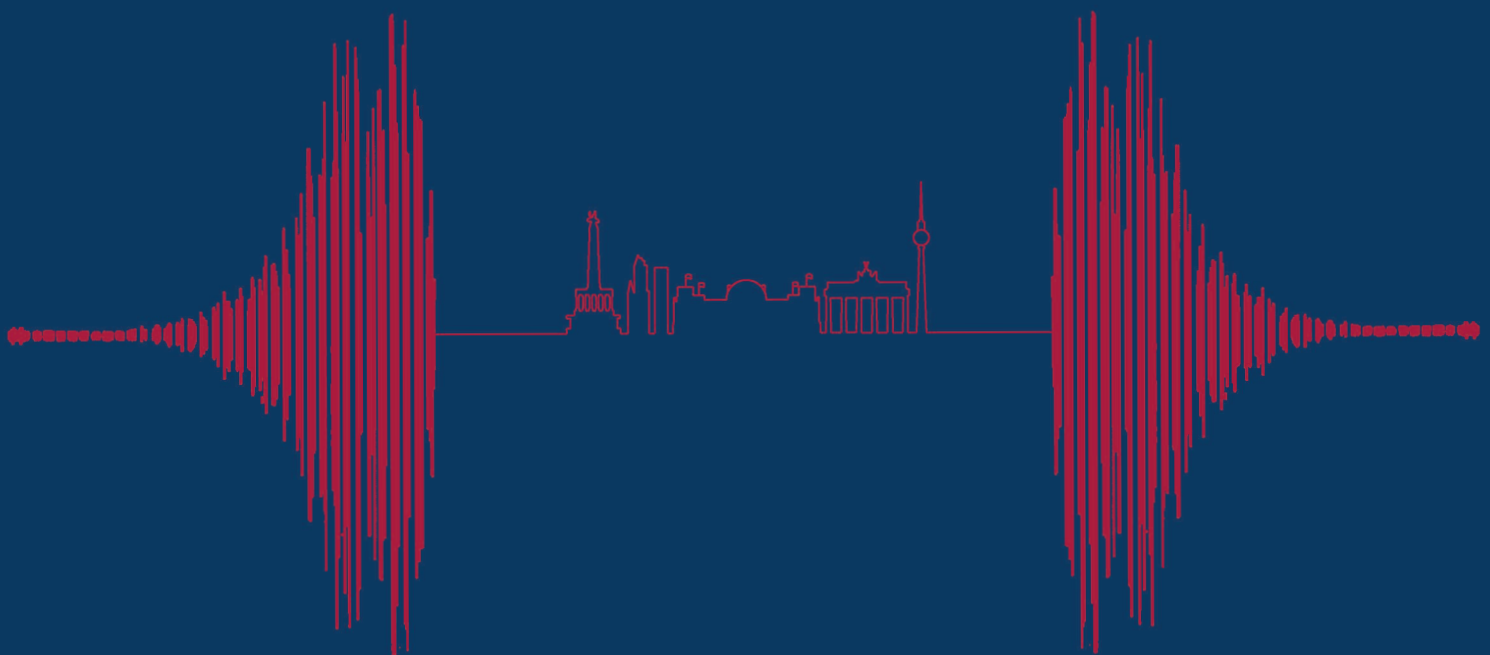


P&P i3

Proceedings of the Conference on
Phonetics & Phonology
in German-speaking countries



Leibniz-Zentrum
Allgemeine Sprachwissenschaft

HUMBOLDT-UNIVERSITÄT ZU BERLIN



Preface & Acknowledgements

It was a great pleasure for us, hosting P&P13 in Berlin in the fall of 2017 and we thank all 137 attendees for their coming and input. We listened to 2 keynote lectures and 21 talks and had the opportunity to discuss 59 posters over the span of this two day conference.

We are now ready to publish the proceedings of this conference and are very happy that P&P13 yet again provided a forum for young and seasoned scientists from phonetics, phonology and various interrelated disciplines to present their research in progress and to benefit from the ideas and input of colleagues. While the conference is gaining more and more international visibility, the visionary idea of P&P is to provide a forum for phoneticians and phonologists of all persuasions to discuss their work in progress and share ideas, tools and methods while maintaining the highest standards of scientific research and conduct.

Paper submission for this open access publication hosted by the edoc publication server of the Humboldt-Universität zu Berlin is not mandatory. Therefore, we are very happy that so many authors submitted their paper for inclusion of these proceedings. All papers benefitted from comments received during the presentation of the work during the meeting and from comments provided by the editorial team: all papers that were received were read by the editors to ensure adherence to the publication guidelines and scientific standards.

Again, we would like to take the opportunity to thank our sponsors: the Deutsche Forschungsgemeinschaft (DFG) supported us through a conference grant while the Institut für deutsche Sprache und Linguistik at the Humboldt-Universität zu Berlin provided the location and potent liquids during the conference reception. The Leibniz-Centre General Linguistics (ZAS) generously supported the technical assistance and all catering during this conference. The publisher Frank & Timme generously supported P&P13 with conference binders and pens. We also thank the HU Computer and Media Service for their support in making these proceedings accessible.

We are very lucky to have colleagues, staff, a very supportive administration and diligent student assistants that went out of their way to make P&P13 possible and a pleasurable experience. The cover of the proceedings was designed by Egor Savin and Maxim Welsch while Gediminas Schüppenauer designed the conference logo and took the conference pictures.

We are now very much looking forward to P&P14 in 2018 which will be hosted by the University of Vienna! See you there!

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Berlin, January 2018

Cognitive Associations Between Vowel Length and Object Size: A New Feature Contributing to a Bouba/Kiki Effect

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Abstract

Previous studies on sound symbolism have found evidence for the existence of an association between certain speech sounds and physical properties like shape or size: a phenomenon usually called bouba/kiki effect. Additionally, more and more experiments have attempted to find out exactly which phonetic features contribute to this effect. The present paper reports two experiments on a previously uninvestigated feature. The experiments show that short vowels are associated with small/short objects and long vowels with large/long objects for speakers of a language exhibiting a vowel length contrast (German). While the association between vowel length and object length seems to be very strong, the association between vowel length and object size seems to be weaker.

Introduction

A large body of evidence suggests that there exists a cognitive association between sounds and visual cues. This phenomenon is generally known as the bouba/kiki effect. Tasks showing such associations typically include a set of non-words, like *bouba* and *kiki*, and shapes that are depicted as either round or spiky. The findings of such studies are that non-words with rounded vowels and voiced consonants (*bouba*) are usually considered to correspond to round objects, while non-words without rounded vowels and with voiceless consonants (*kiki*) correspond to spiky objects (e.g., Köhler 1929; Fox 1935; Ramachandran & Hubbard 2001, 2005; Maurer, Pathman & Mondloch 2006). It was not until recently that researchers tried to figure out exactly which phonetic features contribute to this effect. For example, D'Onofrio (2014) found that vowel backness plays a role in the sound symbolic effect (see also McCormick et al. 2015). The goal of the present study was to extend these insights to vowel length. To be more precise, the goal was to test the hypothesis that long/big objects are associated with long vowels, and short/small

objects with short vowels. Although it is known that vowel quality is associated with object size (e.g. /o/ with bigness and /i/ with smallness) (e.g., Thompson & Estes 2011), the claim that vowel quantity could play a similar role, has, to the best of my knowledge, not been made and tested.

Sapir (1929) was perhaps the first to show that back vowels, for example /u/, are usually judged to refer to big objects and front vowels, for example /i/, are judged to relate to small objects. Similar correspondences, namely that some speech sounds, such as /a, u, o, m, l, v, b, d, g/, are associated with large objects and other speech sounds, such as /i, e, t, k/, are associated with small objects, were also found in later studies (e.g., Newman 1933; Taylor & Taylor 1962; Vetter & Tennant 1967; Koriat & Levy 1977; Mauer, Pathman & Mondloch 2006; Thompson & Estes 2011).¹ Interestingly, it has been argued that the association between object size and speech sounds does not stem from the articulatory properties of these sounds, but from their acoustic properties. Ohtake & Haryu (2013) found that participants were faster in categorizing the size of an object when hearing a congruent vowel (e.g., hearing an /i/ when presented with a small object), however this effect disappeared when they held objects in their mouths that led to a mouth position similar to the oral cavity shape when producing vowels. This can be interpreted as evidence in favor of the idea that the effect is not caused by mouth position itself.

The present paper reports two experiments. In Experiment 1, the claim that vowel length is associated with object length is tested. Experiment 2 is concerned with the presumed association between vowel length and object size. The results suggest that vowel length is

¹A related idea, namely that the length of an expression is reflecting larger quantity, was famously put forward by Jakobson (1965) who tried to show that plural morphology iconically represents quantity.

strongly associated with physical elongation, and also with physical size, however, the former has been observed to have a stronger correspondence.

Experiment 1

The goal of Experiment 1 was to determine whether an association between vowel length and object length exists. For this purpose, 35 native speakers of German, a language exhibiting a contrast in vowel length, were recruited (note that German does not have a pure vowel length contrast, but there is also a tense-lax contrast: long vowels are produced with higher muscular tension and short vowels with lower muscular tension). None of them reported any language disorders and all participated voluntarily. All were students at the University of Stuttgart, 28 were female, and their mean age was 21.19 years ($SD = 5.30$).

Six pairs of pseudo-words were created. Each pair consisted of one word containing a long vowel and one word containing a short vowel (see Table 1). All words were carefully crafted as to have the same number of syllables and phonemes, and, as the words were presented visually, the same number of letters and graphemes (five letters and four graphemes in each pseudo-word). Additionally, the words were size-matched. For this purpose, a monospaced Courier font was used to ensure that each character occupied the same amount of space.

Table 1. The written stimuli used in experiments 1 and 2; the German writing system allows different markings of vowel length; short vowels in open syllables are marked by doubling the following consonantal letter; long vowels in open syllables either remain unmarked or receive a length marking (e.g., <ah> represents a long /a:/)

Pseudo-word (long vowel)	Pseudo-word (short vowel)
<dehla>	<della>
<mahko>	<makko>
<mutoh>	<mutto>
<petoh>	<petto>
<rohta>	<rotta>
<tehko>	<tekko>

In addition to the pseudo-words, twelve picture pairs were created, each consisting of a long and a short version of the same object

(e.g., a key, a coat hanger, or a hairpin). Figure 1 shows sample material.

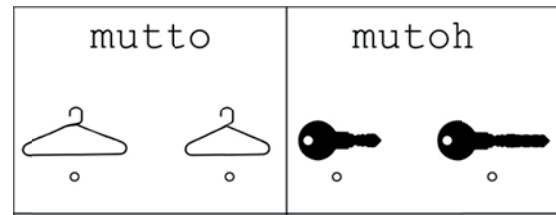


Figure 1. Two samples from Experiment 1

In the actual experiment, participants were randomly presented with one pseudo-word at a time. With each word, participants saw one pair of objects at random (whether the long or short object was presented on the left or on the right was also randomized). Participants were told that there exists an alien culture that is very similar to our culture except for the fact that objects in the alien world exist in two versions, namely a long and short version. Their task was to choose which of the two objects would fit the presented alien word better. It was expected that participants would choose significantly more long objects when the pseudo-word contained a long vowel and *vice versa*.

The results indicate that there was indeed a strong preference for participants to choose the long object when a pseudo-word contained a long vowel (81% of the cases) and the short object when the word contained a short vowel (85% of the cases). This is summarized in Figure 2. A two-tailed McNemar's test was calculated and revealed a statistically highly significant p -value < 0.0001 ($X^2(1) = 115.185$). See also Table 2. Thus, the present experiment can be regarded as evidence for the hypothesis that there is a cognitive association between vowel and object length.

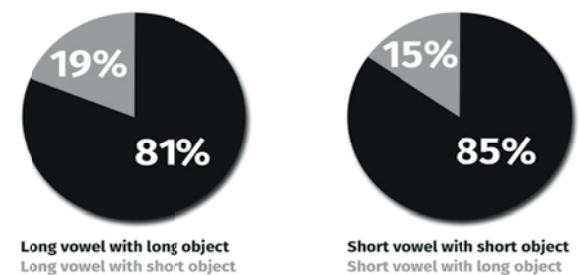


Figure 2. Results from Experiment 1

Table 2. Review of the results of Experiment 1

	Long objects	Short objects	Total
Long vowels	175	41	216
Short vowels	33	183	216
Total	208	224	432

Experiment 2

The objective of experiment 2 was to figure out if an association between vowel length and object size exists. For this purpose, 35 native speakers of German that did not participate in Experiment 1 were recruited. None of them reported any language disorders and all participated voluntarily. All were students at the University of Stuttgart, 24 were female, and their mean age was 20.51 years ($SD = 3.31$).

The present experiment consisted of the same forced-choice task as in Experiment 1. The same list of pseudo-words was used. Again, twelve picture pairs were created, each consisting of a large and a small version of the same object (e.g., an ambulance, a chili pepper, or a microscope). Figure 3 shows sample material. Participants received the same instructions as the participants in Experiment 1 except that they were told that there was an alien culture in which each object exists in a large and a small version. It was expected that participants would choose significantly more big objects when the pseudo-word contained a long vowel and *vice versa*.



Figure 3. Two samples from Experiment 2

Again, a McNemar’s test was calculated, also yielding a significant result ($X^2(1) = 20.119, p < 0.0001$). See also Table 3. However, as the pie charts in Figure 4 show, the association found in the present experiment is weaker than the one found in Experiment 1. Particularly short vowels seem not to evoke a relation to small objects. Taken together, the predicted effect was found, but was (given the results of the first experiment) unexpectedly weak.

Table 3. Review of the results of Experiment 2

	Long objects	Short objects	Total
Long vowels	138	72	210
Short vowels	100	110	210
Total	238	182	420

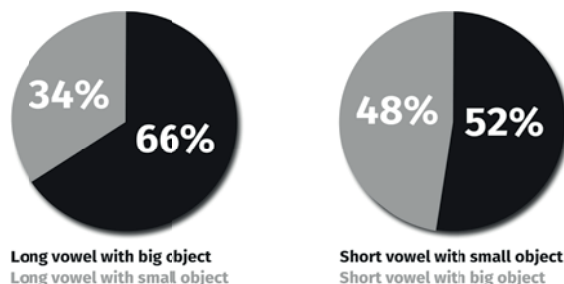


Figure 4. Results from Experiment 1

Conclusions

The results of the presented experiments suggest that there is a strong cognitive association between vowel length and object length, but a surprisingly small association between vowel length and object size. This was unexpected given the fact that bigger objects are also longer, compared to smaller objects. However, as there was a rather large difference between the results of the two experiments, this can be interpreted as evidence that there is a categorical difference between the mental conceptualization of object length and object size.

What remains unclear, however, is whether the same cross-modal correspondences can be found for auditorily presented stimuli (which seems likely as sound-symbolic effects are known to be consistent regardless of whether stimuli are presented visually or auditorily; see Nielsen & Rendall 2011) and whether or not it can be replicated for speakers of languages not exhibiting a contrast in vowel length.

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