Studia Anglica Posnaniensia 55 (2020): 21–48
doi: 10.2478/stap-2020-0002

CORRELATION BETWEEN CAR SIZE, WEIGHT, POWER, AND VOWEL QUALITY IN MODEL NAMES

ŁUKASZ STOLARSKI

ABSTRACT

This paper focuses on the practical application of the theory of sound symbolism in brand name development and examines which of the two phonetic dimensions of vowel articulation, the vertical articulatory scale or the horizontal one, is utilised to a higher degree in communicating the size of a vehicle to customers. The methodology used in previous studies on size-sound symbolism did not make it possible to separate the two aspects of vowel articulation. In the present paper, these dimensions were categorised by the use of quantitative methods. Each Received Pronunciation vowel was assigned a numerical value separately on both scales. Then, the correlations between the values obtained for horizontal and vertical articulation of the vowels present in the names of cars sold in Great Britain and the physical attributes of the respective vehicles such as size, weight, and power were calculated. The final results reveal that it is only the vertical scale of vowel articulation which is utilised to signal the physical characteristics of the vehicles examined in this project. Although these findings refer directly to British English, they may also have more universal implications for the theory of magnitude sound symbolism.

Keywords: Sound symbolism; phonetic symbolism; phonetic iconicity; phonological iconicity; language of advertising.

1. Background

1.1. Theory of sound symbolism

Sound symbolism is a term which covers a vast array of phenomena united by a "direct linkage between sound and meaning" (Ohala, Hinton & Nichols 1994: 1–2). Another possible definition suggests that it is "a general term for an iconic or indexical relationship between sound and meaning, and also between sound and sound" (Abelin 1999: 4). Marchand adds that "the principle of sound symbolism is based on man's imitative instinct which leads us to use characteristic speech sounds for name-giving" (1960: 13); as a result, some aspects of the phenomenon may be universal across languages. It must be stressed that sound symbolism does not deny the arbitrary nature of the linguistic sign, but it interprets this principle in a less restrictive way. While it remains a fact that in the majority of cases, the connection between the "signifier" and "signified", to use the Saussurean model, is arbitrary, there are also instances in which a natural connection between the two parts of the linguistic sign may be established.

The discussion of the subject started a long time ago and may even be found in antiquity (cf. the summaries in Klink 2000; Yorkston & Menon 2004: Lowrey & Shrum 2007). Nevertheless, most of the empirical research on sound symbolism was conducted in the 20th century and the issue continues to be discussed into the 21st century. As mentioned in Stolarski (2012), numerous studies have examined a possible connection between the structure of artificial or natural words in various languages and the semantic categories chosen (cf. Sapir 1929; Newman 1933; Brown, Black & Horowitz 1955; Maltzman, Morrisett & Brooks 1956; Brackbill & Little 1957; Wichmann, Holman & Brown 2010; Urban 2011). Other publications focus on clusters of segments, or phonesthemes, which tend to be associated with various meanings (cf. Householder 1946; Bolinger 1950, 1965; Markel & Hamp 1960; Jakobson & Waugh 1979; McCune 1985; Nordberg 1986; Rhodes 1994; Blust 2003; Bergen 2004; Wright 2012). One can also find numerous suggestions of a possible connection between individual linguistic sounds and different semantic fields (cf. Tolman 1906; Lucas 1955; Householder 1960; Hymes 1960; Murdy 1966; Nash 1980; Chapman 1982; Frazer 1982; Caltvedt 1999). Finally, it is also worth mentioning that attempts have been made to establish associations between selected phonetic or phonological features and various semantic categories (cf. Miron 1961; Taranovski 1965; Langdon 1971; Nichols 1971; Ultan 1978; Jones 1983; Ohala 1984; Hamano 1986, 1994; LaPolla 1994; Silverstein 1994).

Sound symbolism has been divided into various categories (cf. Marchand 1960; Ohala, Hinton & Nichols 1994; Matisoff 1994; Rhodes 1994; Abelin 1999). The subtype which is central to the present study is the so-called "size-sound symbolism", also referred to as "magnitude sound symbolism" (Nuckolls 1999). It concerns cases in which acoustic and/or articulatory aspects of speech are associated with differences in the size of the objects which are being referred to. The theory was initially tested by linguists such as Jespersen (1922) and Sapir (1929), and later developed by Newman (1933) and Bentley and Varon (1933). Among other things observed by the aforementioned authors, it was established that high and/or front vowels are more suitable to represent "small size" and that the other extreme of the articulatory space – the low, back region

– is naturally connected with “large size”. Sapir offered three possible explanations for this psycholinguistic phenomenon. The first concerns the “kinesthetic” factor. In the production of high vowels, the body of the tongue is placed close to the roof of the mouth and the resulting space between the active articulator and the passive one is narrow, which is appropriate to symbolise “small size”. In the production of low vowels, the space between the two articulators is greater, which makes such articulations suitable for symbolising large objects. Obviously, the speaker does not need to be aware of such associations, and the preferences observed in initial studies on size-sound symbolism are assumed to be subconscious. Another explanation provided by Sapir relates to the claim that “the inherent ‘volume’ of certain vowels is greater than that of others” (1929: 235). This “acoustic” aspect of vowel articulation was later developed by Ohala (1983, 1984, 1994), whose publications constitute a significant contribution to the theory of magnitude sound symbolism. He proposes that “small vocalisers” are naturally connected to high acoustic frequency, while “large vocalisers” are associated with low acoustic frequency. This phenomenon stems from the natural physical property of small objects to emit high pitched tones and, reversely, of large objects to emit low pitched tones. This property is used by animals to signal their size and frequently helps them avoid physical confrontation when an opponent is substantially larger than them. Moreover, similar mechanisms are present in numerous aspects of human communication. Ohala connects these observations with a set of related arguments and calls his theory the “frequency code”. For the purposes of the present study, it is important to mention his conclusion concerning individual phonemes: “In consonants, voiceless obstruents have higher frequency than voiced because of the higher velocity of the airflow, ejectives higher than plain stops (for the same reason) and dental, alveolar, palatal and front velars higher than labials and back velars. In the case of vowels, high front vowels have higher F2 and low back vowels the lowest F2” (1984: 9).

1.2. Sound symbolism in brand name development

In recent years, size-sound symbolism has been extensively tested in brand name development. For instance, Wu, Klink and Guo (2013) investigate a possible association between vowel backness, or, to use the terminology applied in the present work, the horizontal vowel articulatory scale, and gender brand personality. Their experiments confirm the assumption that: “brand names with front vowels better create a feminine brand personality, whereas brand names with back vowels better form a masculine brand personality” (Wu, Klink & Guo 2013: 319). These results are in accordance with other studies, which propose that close, front vowels are more frequent in female names than in male names

(Crystal 1995; Pitcher, Mesoudi & McEllingott 2013). It is also interesting to note that the established relationships may be indirectly connected to magnitude sound symbolism, because the "female - male" dichotomy is stereotypically associated with the contrasts "smallness – largeness" and similar pairs of opposing characteristics such as "light – heavy" or "domineering – submissive" (Gordon & Heath 1998).

Other studies focus on the possible interaction between selected phonetic characteristics in artificial names and shapes of objects. For example, it has been observed that nonsense words containing voiceless plosives (e.g., *takete, tiki*) are more appropriate to indicate angular shapes, and artificial forms which include nasals and laterals (e.g., *maluma, lula*) are typically associated with round shapes (Köhler 1929; Davis 1961; Holland & Wertheimer 1964; Tarte 1974; Ramachandran & Hubbard 2001; Ahlner & Zlatev 2010; Nielsen & Rendall 2011; Ngo & Spence 2011; Ngo, Misra & Spence 2011). Similar correspondences have been noted between rounded shapes and rounded vowels on the one hand, and between spiky shapes and unrounded vowels on the other (Maurer, Pathman & Mondloch 2006; Stutts & Torres 2012). Moreover, voicing of consonants has been examined in connection with the two shapes, and a preference for matching voiced consonants with round objects and voiceless consonants with angular objects has been established (Cuskley, Kirby & Simner 2010; D'Onofrio 2014). Consonant manner of articulation may also play a role in sound-shape correspondences. For instance, it has been proposed that different kinds of obstruents tend to be associated with angular shapes, whereas sonorants are matched with round shapes (Westbury 2005; Nielsen & Rendall 2012; Aveyard 2012).

Studies on sound symbolism in relation to marketing focus also on other sensory categories, such as taste (Gallace, Boschin & Spence 2011; Ngo, Misra & Spence 2011; Spence & Gallace 2011; Crisinel & Spence 2012; Knoeferle et al. 2015), but for the current paper, the most crucial aspect is the connection between sound and size. On the basis of assumptions about magnitude sound symbolism, various experiments testing the influence of vowel backness on the perception of size have been conducted. For example, Klink (2000, 2003) confirms that potential new brand names with front vowels are perceived as smaller than names with back vowels. Similar results may also be found in Park and Osera (2008). In some studies, phonetic characteristics of consonants are taken into account as well. For instance, Coulter (2009) indicates that, in addition to horizontal vowel articulation, fricatives are more appropriate to symbolise "smallness" in price perceptions. Reversely, stops are interpreted as larger and the number combinations which involve their articulation should be avoided in price advertisements.

Of particular interest to the current project are the results of the psycholinguistic experiment described in Lowrey and Shrum (2007). Namely, they investigated potential car names containing front and back vowels. Their results confirm the assumptions of size-sound symbolism, and the names with front vowels were found to be more suitable to represent smaller vehicles than names with back vowels. This tendency has also been examined in a similar experiment summarised in Baxter and Lowrey (2014), in which potential car names were presented to children from two different English-speaking countries. Again, a tendency for matching words containing front vowels with smaller vehicles has been observed. All this suggests that magnitude sound symbolism may be successfully utilised in developing the names of cars. Whether it has been used in practice is another matter and the current project aims to investigate this particular problem (see Section 1.4).

1.3. Previous analysis on size-sound symbolism in existing names of cars

The analysis presented in Stolarski (2012) aimed to test the major predictions of the theory of size-sound symbolism in relation to vowel articulation in the development of real brand names. The study used quantitative methods, and the sample chosen for the experiment consisted of data on 260 car models. The realization of the names of the vehicles in RP was analysed in terms of vowel articulation and compared with the volume of the respective cars. The statistical analysis conducted in the later part of the paper under discussion revealed that the distribution of the close front vowels /iː/, [i] and /ɪ/ supports the theory of size-sound symbolism. The frequency of these segments is the highest among the group of the smallest vehicles, and it gradually decreases as the cars increase in size. It must be emphasised that these results were statistically significant. In other cases, however, the conclusions were less clear. The distribution of /eɪ/ and /e/, the other two vowels which were expected to be more frequent in names of small vehicles, did not indicate any consistent patterns. Additionally, the distribution of vowels which were predicted to be more typical for names of larger cars (/ɔː/, /ʌ/, /ɒ/, /ɑː/) was irregular and no definitive conclusions could be reached. Ultimately, the results reported in Stolarski (2012) confirmed that magnitude sound symbolism is used in the process of assigning names to cars, but only to a limited extent.

1.4. Aims of the present paper

As will be discussed in Section 2.2, the methodology employed in Stolarski (2012) did not make it possible to determine which of the two articulatory dimensions – the vertical or the horizontal – plays a more crucial role in size-sound symbolism. It was established that there is an association between the frequency of /iː/, [i] and /ɪ/ and the sizes of the vehicles which were analysed, but it was impossible to say whether it was the position of the vowels on the vertical scale, the horizontal scale, or both, that was decisive. The major aim of the current publication is to answer the question as to which of the two articulatory dimensions plays a more prominent role in the process of car name development in the English language and, potentially, in size-sound symbolism in general.

In addition to the main goal, there are two secondary objectives. Firstly, the results of the earlier study are also significantly amended by improving the composition of the sample under analysis. As pointed out in Section 2.1, the materials used in this publication encompass the names of cars sold exclusively in Great Britain. This excludes any confounding role of different perception of vehicle size in different countries. Secondly, dimensions other than magnitude will also be investigated. In the literature on sound symbolism the dichotomy "small – big" is frequently claimed to have metaphorical extensions, such as "near – far" (Jespersen 1922, Nichols 1971, McGregor 1996), "pleasant – coarse" (Hamano 1986), "personal – impersonal" (Silverstein 1994), "happy - sad" (Jones 1983), etc. An additional task undertaken in this paper is to examine two such semantic opposites, namely "heavy – light" (Miron 1961; Nichols 1971; Cooper & Ross 1975; Tarte 1982; Hamano 1986) and "strong – weak" (Jespersen 1922; Miron 1961; Levickij 1971, 1973). Anything which is "big" is also naturally connected with the meaning "heavy" and potentially "strong". Conversely, anything which is "small" tends to be "light" and "weak". The correlation between vowel articulation in names of cars and the data on weight and strength of the respective vehicles (counted in kilograms and horsepower, respectively) will also be calculated. Such an additional analysis will certainly provide more evidence as to the way in which size-sound symbolism is utilised in the creation of brand names.

2. Methods

2.1. Test materials

The sample chosen in the current analysis (see the Appendix) is only partly based on the one used in Stolarski (2012) and many alterations were introduced in order to effectively address the goals of the current research. One such change results from the fact that the names are investigated in terms of one dialect of English – the so-called Received Pronunciation (RP), or BBC English, which may be described as "an accent which remains generally acceptable and intelligible within Britain" (Jones 2011: 12). Even though Baxter and Lowrey (2014) have demonstrated that the differences between various English accents do not eliminate the effects of phonetic symbolism, the choice to use RP requires that the car models under analysis actually be sold in Great Britain. The notion of size may be dissimilar in different countries and, for instance, a car which is perceived as large in Europe may actually be seen as average in the USA. Additionally, it is not infrequent to find dissimilar brand names for the same product in different countries. A good example is the great variety of names under which ice cream varieties produced by Unilever are sold. Internet sites such as Wikipedia mention around 30 different ways in which their products are named, including “Wall’s” in Great Britain and “Good Humor” in the United States. The same problem concerns various car names. For example, the model called “Chevrolet Lacetti” in Europe is distributed as “Chevrolet Optra” in Asia, South America, Canada, Mexico and South Africa, and as “Suzuki Reno” or “Suzuki Forenza” in the United States. There may be numerous reasons behind such differences, and sound symbolism could be one of them. Therefore, the scope of the current research is limited only to those car models which are sold in the United Kingdom. Adding this restriction does not exclude the possibility that size-sound symbolism may be applied more universally in the creation of car names. Nevertheless, the present study focuses solely on the British car market.

In order to satisfy the aforementioned constraint, the names used in Stolarski (2012) were searched in the British car auction sites “autotrader.co.uk”, “motors.co.uk” and “desperateseller.co.uk”. If a given name was not found on at least two of them, the car name was removed from the list. Overall, 105 names were deleted, which reduced the sample size from 260 to 155. Next, the same websites were searched for car models sold in Britain which were not included in the previous list. The time span taken into consideration was lengthened to 10 years, so it was 5 years longer than in the previous research project and included models produced between 2001 and 2011. In Stolarski (2012), the decision to limit the choice to a particular period was taken because of the problem of technological progress. It is likely that the idea of “a big car” was different in the past than it is in the present, and the same may be presumed for attributes such as “weight” or “strength”. Lengthening this period to 10 years in the present study allows additional examples to be found and, at the same time, the issue of technological progress should not affect the results to a significant degree. All these procedures resulted in adding 131 new car names, giving a final sample size of 286 car models.

It is important to mention that in the process of collecting the sample, other limits defined in the previous research project (Stolarski 2012: 174-175) were adhered to as well. For example, only those models were considered whose names could be pronounced as “normal” English words. This excluded abbreviations and acronyms, which potentially draw attention to consonants rather than vowels.

Next, in cases where a name involved two words, usually only the first was taken into consideration because the second one frequently expressed additional qualities found in numerous vehicles produced by a given manufacturer, such as “family”, “classic”, “automatic”, “diesel”, etc. The only exceptions are three names in which the first word does not seem to be more important than the second one (“Grand Vitara”, “Land Cruiser” and “Urban Cruiser”). For the same reasons, in names consisting of three words, the last word was also excluded from the analysis. For “Carisma Comfort Plus”, however, only the first word was analysed, because the other words describe additional qualities of the vehicle. Finally, for each model, only the smallest possible version was analysed phonetically. This decision helped to resolve the problem of many versions of a given model being named in the same way.

Data on the chosen physical attributes of the cars were gathered mostly on the basis of the summaries found on “carsplusplus.com”, but other websites were occasionally consulted as well. The size of the cars was measured as a product of their length, width, and height. In the current paper, the complete data, which involves details on all dimensions of the vehicles, are reduced only to the established volume of the models measured in cubic decimetres (see the Appendix). The weight of the cars was counted in kilograms and, finally, their “strength” was interpreted to be directly connected with the horsepower of their engines. Neither of the latter two attributes were analysed in Stolarski (2012), so they constitute another addition to the previously analysed data.

The pronunciation of the names of cars listed in the Appendix was established mostly on the basis of Wells (2008). In less obvious cases, predicted articulations were determined by consulting a number of internet forums where the problem of the pronunciation for a given car name was discussed. Nonetheless, even within Received Pronunciation, the words that are listed in the Appendix may have alternative articulations, so the presented transcription should not be treated as the only possibility.

2.2. Procedure

Although significant additions were made to the sample used in Stolarski (2012), the major modification introduced in the current study is the way in which the data are examined. As described in Section 1.3 above, in the former analysis, the size-sound symbolic potential of high front vowels was compared to the corresponding potential of low back vowels. Nevertheless, with the use of the methodology adopted in Stolarski (2012), it was impossible to analyse the vertical and horizontal articulatory scales separately. The final conclusions concerned phonemes, but not individual articulatory dimensions. The methods applied in the present publication aim to answer the question of which of the two scales is more consequential in the process of devising car names and, potentially, in size-sound symbolism in general.

In order to accomplish this major aim, the following strategy was used. Although individual phonemes are normally interpreted as categorical data in which the two articulatory scales are inseparable, it is possible to change such an interpretation to ordinal data. If the scales are divided into units, these units can be assigned numerical values. This makes it possible to analyse the two articulatory dimensions separately. The resulting solution, chosen for the current project, is presented in Figures 1 and 2 below:

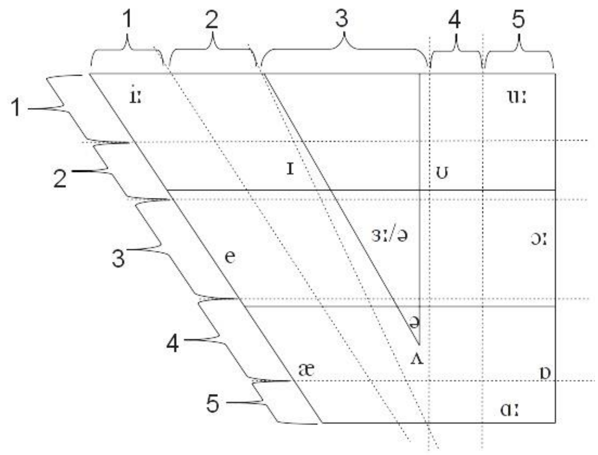

Figure 1.

Both of the scales were divided into five units. Numbers were assigned to the units in the manner predicted by the theory of size-sound symbolism. In the case of the horizontal dimension, the "smallest" /iː/, /e/ and /æ/ were assigned a value 1, a bit "bigger" /ɪ/ as 2, the "average" /ɜː/, /ə/ and /ʌ/ as 3, /ʊ/ as 4 and, finally, the "largest" /uː/, /ɔː/, /ɒ/ and /ɑː/ as 5. The same procedure was followed in the case of the vertical articulatory scale[1]. The resulting categorisation is summarised in Table 1.

1 In this study, the terms "vertical articulatory scale" and "horizontal articulatory scale" are equivalent to the ideas of vowel height and backness, respectively.

Table 1. Scoring for RP monophthongs on the horizontal and the vertical articulatory scales

The horizontal articulatory scale scoring for monophthongs		The vertical articulatory scale scoring for monophthongs	
/iː/ [i]	1	/iː/ [i]	1
/e/	1	/uː/	1
/æ/	1	/ɪ/	2
/ɪ/	2	/ʊ/	2
/ɜː/	3	/e/	3
/ə/	3	/ɜː/	3
/ʌ/	3	/ɔː/	3
/ʊ/	4	/ə/	3 (word medially), 4 (word finally)
/ɑː/	5	/æ/	4
/uː/	5	/ʌ/	4
/ɔː/	5	/ɒ/	4
/ɒ/	5	/ɑː/	5

Although the phonemic status of the high front [i] is usually denied and, functionally speaking, the linguistic sound is interpreted as an allophone of /ɪ/ (in many dictionaries it is, actually, transcribed as /ɪ/), its phonetic realisation frequently resembles /iː/ (Cruttenden 1994). It appears in English due to Prevocalic Tensing (as in 'notorious') and Stem-final Tensing (as in 'very') (Jensen 1993). Because the present paper focuses on phonetic characteristics rather than phonological relations, this vocalic articulation is treated as "maximally front" and "maximally high". Another problem involves different realisations of /ə/ in different word positions. According to Cruttenden, "it is a central vowel with neutral lip position, having in non-final positions a tongue-raising between open-mid and close-mid" (1994: 132). In final positions, however, "the vowel may be articulated in the open-mid central position" (1994: 132). Consequently, /ə/ is given either 3 or 4 points on the vertical articulatory scale depending on its position within the word.

The classification of diphthongs is more complicated because they involve a change in the position of the tongue from the starting point to the direction in which the shift is made. The solution was to take into account both of these elements and calculate the mean value from the two. For instance, the gliding vowel /eɪ/ involves a starting point around the quality of the vowel /e/, so its "horizontal" value is 1. The termination of the diphthong is around the vowel /ɪ/, which on the "horizontal" scale is classified as 2. In consequence, the final numeric value ascribed to /eɪ/ is the mean of the two digits: 1.5. The full classification of diphthongs on both the horizontal and vertical scales is provided in Table 2 below:

Table 2. Scoring for RP diphthongs on the horizontal and the vertical articulatory scales

The horizontal articulatory scale scoring for diphthongs	The vertical articulatory scale scoring for diphthongs
/eɪ/ 1 and 2 = 1.5 /eə/ 1 and 3 = 2 /ɪə/ 2 and 3 = 2.5 [iə] 1 and 3 = 2 /aɪ/ 3 and 2 = 2.5 /əʊ/ 3 and 4 = 3.5 /ʊə/ 4 and 3 = 3.5 /aʊ/ 3 and 4 = 3.5 /ɔɪ/ 5 and 2 = 3.5	/eɪ/ 3 and 2 = 2.5 /əʊ/ 3 and 2 = 2.5 /ɪə/ 2 and 3 = 2.5 (word medially), 2 and 4 = 3 (word finally) [iə] 1 and 3 = 2 (word medially), 1 and 4 = 2.5 (word finally) /ʊə/ 2 and 3 = 2.5 (word medially), 2 and 4 = 3 (word finally) /ɔɪ/ 4 and 2 = 3 /eə/ 3 and 3 = 3 (word medially), 3 and 4 = 3.5 (word finally) /aɪ/ 5 and 2 = 3.5 /aʊ/ 5 and 2 = 3.5

Following the strategy applied in classifying monophthongs, the first element in [iə] is treated as maximally close and maximally front, even though phonologically the articulation is treated as a variety of /ɪə/. Also, the different positions within a word of the centring diphthongs /ɪə/, [iə], /ʊə/ and /eə/ result in dissimilar scoring. When they are pronounced word-medially, their values on the vertical articulatory scale are half a point lower than when they are articulated at the end of names under analysis.

For reasons of space, the Appendix only provides the mean values of vowel articulation for both of the articulatory dimensions. An example of the way these results were obtained is provided in Table 3. Each vowel in a car name was assigned a numeric value for the vertical dimension according to the scoring outlined in Table 1. Then, the resulting numbers were added up and the sum was divided by the number of vowels. The same procedure was repeated for the horizontal dimension using the scoring provided in Table 2.

Once the mean value of vowel articulation on the horizontal and the vertical articulatory scales for each individual car name was established, it was possible to juxtapose these scores with the corresponding size, weight and power of a given vehicle. In the end, the applied methodology made it possible to quantitatively evaluate the degree to which individual dimensions of vowel articulation are applied in the process of naming cars.

Table 3. Scoring of vowel articulation in names of Suzuki models as an example of the way the mean values for vertical and horizontal articulations were calculated

Model	Predicted RP pronunciation	Vertical scoring for vowels					Horizontal scoring for vowels				Mean horizontal scoring for vowels
		1st vowel	2nd vowel	3rd vowel	4th vowel	Mean vertical scoring for vowels	1st vowel	2nd vowel	3rd vowel	4th vowel	
Alto 1.1 Classic 2011	/ˈæltəʊ/	4	2,5			3,25	1	3,5			2,25
Grand Vitara 1.6 2011	/ˈgrænd vɪˈtɑːrə/	4	2	5	4	3,75	1	2	5	3	2,75
Jimny 1.3 2011	/ˈdʒɪmni/	2	1			1,5	2	1			1,5
Kizashi Sport 2011	/kəˈzɑːʃi/	3	5	1		3	3	5	1		3
Splash 1.0 2011	/splæʃ/	4				4	1				1
Swift 1.2 DDiS 2011	/swɪft/	2				2	2				2
Ignis 1.3 DDiS Club 2008	/ˈɪgnɪs/	2	2			2	2	2			2
Liana 1.3 Club 2008	/liːˈɑːnə/	1	5	4		3,33	1	5	3		3

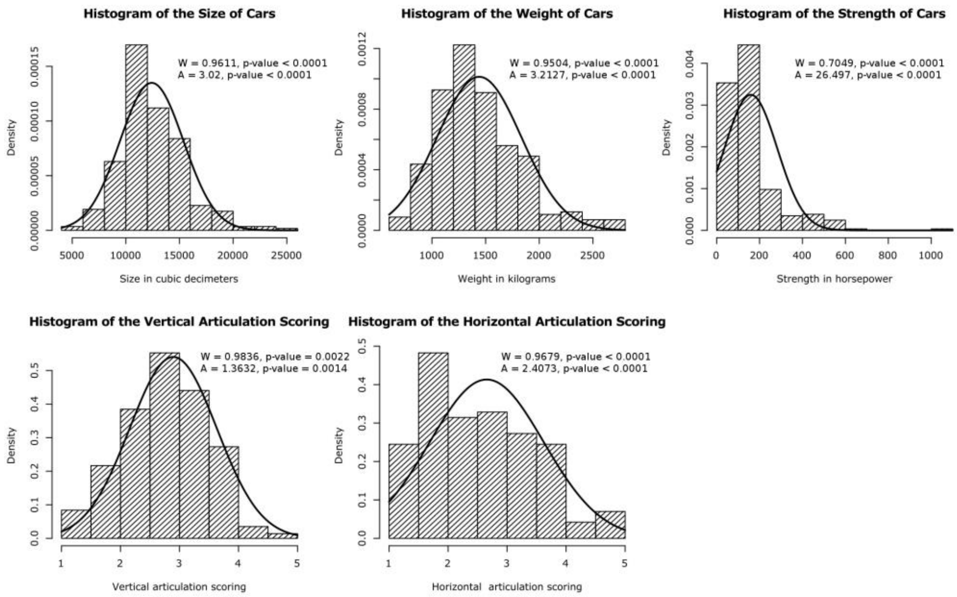

Figure 3. Histograms of the data sets used in the present study with normal distribution lines and the results of the Shapiro–Wilk and the Anderson–Darling tests of normality

It is worth adding that there is an alternative approach to assigning numerical values to vowel articulation. Namely, one may use the values of the first and second formant for each phoneme under analysis. There is a generally held view that F1 corresponds to vowel height (or the vertical articulatory scale, to use the terminology applied in the present work). Close vowels have low F1 and open vowels have high F1. Similarly, there is a correlation between vowel backness (or the horizontal articulatory scale) and F2. Front vowels have high F2, whereas back vowels have low F2. This "acoustic" approach is also potentially useful and could be applied in future research. Nevertheless, the method applied in the present paper is simpler and easier to interpret. Additionally, it omits problems with speaker normalization, which would have to be resolved in the other approach. Finally, the methodology used in this publication could be used in other studies on sound symbolism, allowing useful comparisons. For instance, the fact that scoring used on both articulatory scales is independent of speaker characteristics makes it possible to directly compare vowels in different languages. In this way, it would be possible to assess the degree to which dissimilar realisation of seemingly similar articulations in two languages may affect customer responses. Such differences frequently arise as a consequence of different phonetic realisations of a given spelling pattern in the languages which are compared.

Before discussing the results, it is important to emphasise that the correlations described in Section 3 are reported as Spearman's rank correlation coefficients. The measurements could not have been calculated with the use of Pearson product-moment correlation coefficients because the data sets used in the present study deviate from normal distribution. This is clearly visible in Figure 3, which presents histograms of the data sets with corresponding normal distribution lines. The shapes of the graphs are not symmetrical and, in most cases, substantially positively skewed. This indicates outliers with unusually high values. The results of the Shapiro–Wilk test, as well as the Anderson–Darling test, which are summarised beside each graph, support all these observations. The null hypothesis that the data are normally distributed is rejected even in the case of the histogram in the lower left-hand corner, which seems to follow the normal distribution line relatively closely. The resulting p-values are much below the alpha level of 0.05. Therefore, non-parametric alternatives are more appropriate for the current project and Spearman's rank correlation method is the preferred choice.

All statistical analyses were performed using R software version 3.2.1 (R Core Team 2015). The figures were also prepared in R.

3. Results

3.1. The vertical articulatory scale

The mean value of the articulation of the vowels on the vertical articulatory scale for each car name analysed in the current study has been juxtaposed with one of the corresponding attributes of a given vehicle. The first scatterplot in Figure 4 presents the correlation between these mean vowel articulation values and the individual sizes of the cars. The line in the middle of the scatterplot represents the calculated linear regression. It is easily observable that the linear relationship is rather weak. In fact, the Spearman correlation coefficient is only 0.1248; however, because of the large sample used in the analysis, this tendency may be regarded as statistically relevant ($p = 0.034$). It is also possible to determine the exact equation for the best fitting line, which in this particular case is "y = 11556 + x * 293". By entering the mean value of vertical vowel articulation of a given name (x), the size of the car the name represents may be predicted (y). Nevertheless, the correlation under discussion is weak and any such calculation would involve a margin of error too big for the predicted result to be informative. The model predicts only 0.2% of the actual variation in the response variable, and the basic requirement for such models, that the residuals are normally distributed, is not met (see Figure 5).

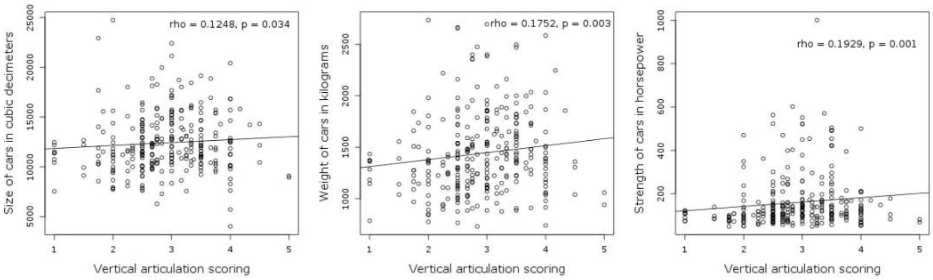

Figure 4. Scatterplots of the vertical articulation scoring for vowels and the size, weight and strength of the vehicles

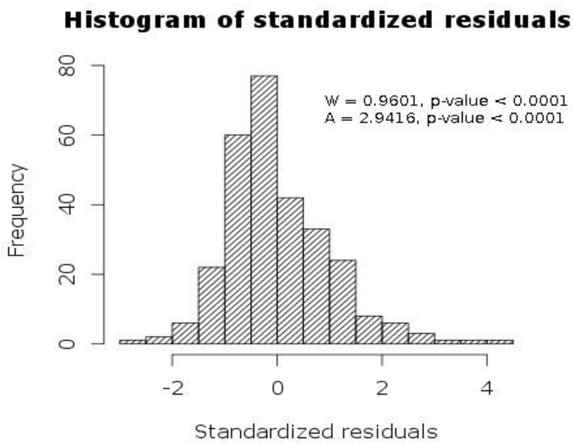

Figure 5. Histogram of the standardized residuals for the model predicting sizes of vehicles from vertical vowel articulation in corresponding names

A positive correlation between the weight of the vehicles and the value of the articulation of the vowels in their names on the vertical articulatory scale is also discernible (see the second scatterplot in Figure 4). The results observed in this part of the discussion are more convincing than the ones described above. The Spearman correlation coefficient is 0.1752 and it must be assumed to be statistically relevant ($p = 0.003$). The linear relationship between the two variables is still weak, but stronger than between the vertical articulation scoring for vowels and the size of the vehicles. It may indicate that phonetic symbolism is used to signal the weight of cars to a slightly higher degree than their size.

The Spearman correlation coefficient for the linear relationship visible in the last scatterplot in Figure 4, which depicts the data on the strength of the vehicles measured by the horsepower of their engines juxtaposed with the value of the articulation of the vowels in their names on the vertical articulatory scale, is similar to the one discussed in the previous paragraph. It amounts to 0.1929, and, again, it should be interpreted as statistically meaningful (p = 0.001).

To summarise, the reported results confirm that in the process of naming cars, the vertical dimension of vowel articulation is utilised according to the predictions of the theory of size-sound symbolism. However, the extent to which its potential is realised to symbolise the selected physical aspects of vehicles is limited.

3.2. The horizontal articulatory scale

The average values of vowel articulation on the horizontal scale were juxtaposed with the three car attributes in the same way as in Section 3.1. This time, the results do not reveal any statistically relevant correlations.

The first scatterplot in Figure 6 shows the sizes of individual cars paired with the average scores for the articulation of the vowels in their names. A closer look at the regression line in the middle of the picture suggests that there is no positive correlation between the two variables. In actuality, this may even exemplify a case of negative correlation with a correlation coefficient of - 0.0132. It must be stressed, however, that this tendency, which runs counter to that which was predicted, is statistically irrelevant (p = 0.8237). As a result, no correlation may be confirmed between the two variables under discussion.

The middle scatterplot in Figure 6, which depicts the juxtaposition of the weights of the vehicles with the average scores of the articulation of the vowels in their names, is almost identical to the one discussed previously. The dots symbolising the distribution of the data are not arranged in any consistent pattern, and the Spearman coefficient (rho = 0.0101, p = 0.864) confirms that there is no correlation between the two numerical sets of data.

The fact that the horizontal articulatory scale does not seem to play any role in the process of naming cars is additionally substantiated by the results in the last scatterplot in Figure 6. The “strength” of the vehicles does not correlate with the values of the articulation of vowels under analysis, either. The regression line visible at the centre of the graph appears to be almost perfectly horizontal, which is confirmed by the Spearman coefficient close to 0 (rho = - 0.0291). In addition, the p-value, which is 0.6235, strongly suggests a lack of any correlation of the variables.

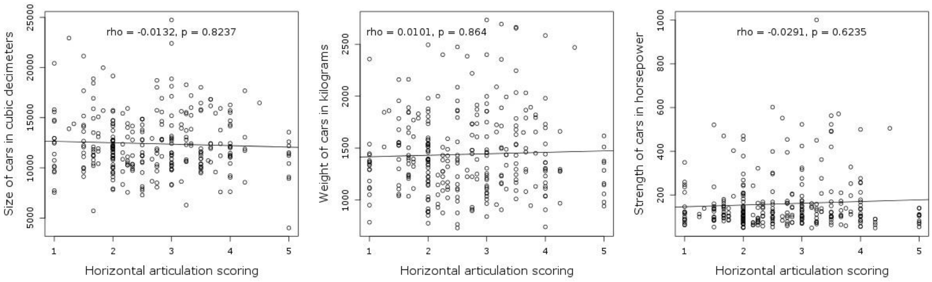

Figure 6. Scatterplots of horizontal articulation scoring for vowels and the size, weight and strength of the vehicles

4. Discussion and conclusions

The results of the analysis described in Section 3 suggest that only the vertical vowel articulatory scale is utilised in symbolising the differences in vehicle size in car names. It has been observed that the horizontal dimension does not play any role in this process. These conclusions allow a more appropriate interpretation of the results obtained in Stolarski (2012). While it is still true to say that open-back vowels are used more frequently in names of larger cars, and close-front vowels in names of smaller vehicles, the explanation for such a preference can be found in the vertical articulatory scale. The reason for mentioning the front - back distinction among the results of the previous research is the fact that the applied methodology did not allow separation of the two articulatory dimensions. The analysis of individual segments automatically involved both scales. The methods employed in the current study, however, made it possible to separate the simultaneous influence of the two articulatory dimensions.

It must be emphasised that the results described in this publication concern primarily the actual process of inventing car names. They do not disprove the claim that, generally speaking, the horizontal articulatory scale plays a role in size-sound symbolism. Still, one of the possible interpretations of the obtained results is that the potential of both articulatory scales to symbolize size is not equal. It is probable that the vertical scale is, in fact, more effective in symbolizing size than the horizontal one. The way the former phonetic category has been applied in developing the names of cars suggests intuitive preference on the part of creators of such names. This conclusion is supported by the fact that palatality of consonants has a particularly strong potential to symbolise small size (Nichols 1971; Ultan 1978; Jones 1983; Ohala 1984; Hamano 1986, 1994; Stolarski 2011) and consonant palatalisation involves movements mostly along the vertical dimension. The conclusion is also in accordance with the "kinesthetic" explanation of sound symbolism suggested by Sapir (1929) (see the discussion in Section 1.1). In order to investigate this issue, additional research should be conducted. For example, it would be interesting to explore the influence of the two articulatory dimensions on the perception of artificial words. With the use of the methodology applied in this paper, the degree to which each of the two scales influences respondents' perception of size could be estimated independently.

An additional goal achieved through the present study is the confirmation that the other dichotomies – "light – heavy" and "weak – strong" – are also correlated with the vertical scale of vowel articulation. Consequentially, the very assumption that the two dichotomies are extensions of the basic contrast "big – small" has been substantiated. Indeed, the results obtained for all three semantic oppositions are very similar. The correlation coefficients calculated in the analysis range from 0.12 to 0.19. Such differences are surprisingly small. Likewise, the other three results discussed in Section 3.2 also support the idea that the semantic contrasts under discussion are related to each other. The horizontal articulatory dimension is not correlated with any of the "big – small", "light - heavy" or "strong – weak" dichotomies.

Finally, consideration should be given to the major limitation of this study, which is the problem of a possible generalization of the results to countries other than the United Kingdom and languages other than English. As described in Section 2.1, the sample analysed in this study is based solely on vehicles sold in Great Britain and the major focus is on the English language. Consequentially, the conclusions may not be directly extended to the strategies applied to cars sold in other countries. Nevertheless, there are additional arguments which suggest that the trends observed in this paper may be, to a greater or lesser extent, more universal. For instance, for reasons of broad marketability, in many cases, English words or words coined in such a way as to be at least pronounceable in English are used when naming cars. Obviously, examples of the same car having dissimilar names in different parts of the world are not infrequent (see the discussion in Section 2.1), but cases in which the same English-sounding name for a vehicle functions in many countries where English is not spoken are also very common. A good example of this are models produced in countries such as Japan or Korea. Many of the vehicles manufactured there have English names, even if they are sold outside English-speaking countries. Consequently, analysis of the way in which such names are pronounced often has a more universal interpretation than just for the British car market.

Another argument which suggests that the results obtained in the current study may indicate more general tendencies concerns the very issue of the cross-linguistic universality of phonetic symbolism. There are accounts which disprove that the phenomenon is fully universal and provide examples from some languages which contradict the popularly accepted tendencies. For instance, Kim (1977) shows that in Korean, /i/ is interpreted as "larger" than /a/. A similar association is found in Bahnar, a Non-Khmer language used in Vietnam, by Diffloth (1994). Nevertheless, publications providing evidence against universality of phonetic symbolism are relatively rare and there is a large body of literature showing that various iconic tendencies are used similarly in many unrelated languages. General summaries of this kind may be found in Körtvélyessy (2011) and Schmidtke, Conrad and Jacobs (2014). Other publications discussing the universality of sound symbolism focus on specific aspects, such as sound – shape correspondences (Wichmann, Holman & Brown 2010), the frequency of selected phonemes in semantically-related words (Urban 2011), or iconicity in sign languages (Perniss, Thompson & Vigliocco 2010). A number of works also deal directly with the universal nature of size-sound symbolism (Ultan 1978; Nuckolls 1999; Shinohara & Kawahara 2016), and such summaries encourage the assumption that the tendencies observed in the present study may also be present in the names of cars which are not meant to sound English.

A possible future research project could investigate the effects of sound symbolism for vehicle names which are actual English words separately from lexical items which are made up. It is possible that the tendencies observed in the present study are weak because the former group may be affected by size-sound symbolic principles to a much smaller degree than the latter group. If the two types of names are analysed separately, a new pattern may be discovered. Furthermore, additional physical characteristics of cars, such as speed measured in miles per hour, could be investigated. The results based on such new data would expand our understanding of the way in which size-sound symbolism is used in the creation of brand names.

In conclusion, this study demonstrates that, among other possible factors, size-sound symbolism is, to a limited degree, involved in the process of naming cars. The results indicate weak but statistically relevant correlations between size, weight and strength of vehicles and the relative height of vowels in corresponding names. However, the same tendency has not been confirmed for the horizontal articulatory scale. This observation does not necessarily disprove the potential of this phonetic aspect to convey the information on the physical characteristics of cars, but it clearly shows that the differences in vowel articulation along the horizontal scale are not used by specialists inventing car names. Additionally, all these findings may suggest a more general pattern in magnitude sound symbolism. It is possible that the vertical scale of articulation is more important than the horizontal scale in signalling selected semantic qualities, but more research is needed to confirm such a conclusion.

REFERENCES

Ahlner, Felix & J. Zlatev. 2010. Cross-modal iconicity: A cognitive semiotic approach to sound symbolism. *Sign Systems Studies* 38. 298–48. DOI: 10.12697/SSS.2010.38.1-4.11t

Abelin, Åsa. 1999. *Studies in sound symbolism*. Department of Linguistics, Göteborg University .

Aveyard, Mark E. 2012. Some consonants sound curvy: Effects of sound symbolism on object recognition. *Memory and Cognition* 40. 83–92. DOI: 10.3758/s13421-011-0139-3

Baxter, Stacey & Tina Lowrey. 2014. Examining children's preference for phonetically manipulated brand names across two English accent groups. *International Journal of Research in Marketing* 31(1). 122–124. DOI: 10.1016/j.ijresmar.2013.10.005

Bentley, Madison & Edith J. Varon. 1933. An accessory study of "phonetic symbolism". *The American Journal of Psychology* 45. 76–86. DOI: 10.2307/1414187

Bergen, Benjamin K. 2004. The psychological reality of phonaesthemes. *Language* 80(2). 290–311.

Blust, Robert A. 2003. The phonestheme *ŋ*- in Austronesian languages. *Oceanic Linguistics* 42(1). 187–212. DOI: 10.1353/ol.2003.0001

Bolinger, Dwight L. 1950. Rime, assonance, and morpheme analysis. *Word* 6(2). 117–136. DOI: 10.1080/00437956.1950.11659374

Bolinger, Dwight L. 1965. *Forms of English: Accent, morpheme, order*. Hokuou Publishing Company.

Brackbill, Yvonne & Kenneth B. Little. 1957. Factors determining the guessing of meanings of foreign words. *The Journal of Abnormal and Social Psychology* 54(3). 312–318. DOI: 10.1037/h0042411

Brown, Roger W., Abraham H. Black & Arnold E. Horowitz. 1955. Phonetic symbolism in natural languages. *The Journal of Abnormal and Social Psychology* 50(3). 388–393. DOI: 10.1037/h0046820

Caltvedt, Les. 1999. The poetics of synaesthesia in Rilke and Handke. *Modern Austrian Literature* 32(1), 53–66.

Chapman, Raymond. 1982. *The language of English literature*. Edward Arnold.

Cooper, William E. and John R. Ross. 1975. World order. In Robin E. Grossman, L. James San & Timothy J. Vance (eds.), *Papers from the parasession on functionalism*. 63–111. Chicago Linguistic Society.

Coulter, Keith. 2009. The effects of phonetic symbolism on comparative price perceptions. *Advances in Consumer Research* 36. 986–987.

Crisinel, Anne-Sylvie & Charles Spence. 2012. The impact of pleasantness ratings on crossmodal associations between food samples and musical notes. *Food Quality and Preference* 24(1). 136–140. DOI: j.foodqual.2011.10.007

Cruttenden, Alan. 1994. *Gimson's pronunciation of English* (5th edn). Edward Arnold.

Crystal, David. 1995. *The Cambridge encyclopedia of language*. Cambridge University Press.

Cuskley, Christine, Simon Kirby & Julia Simner. 2010. Cross-modality: Reviving iconicity in the evolution of language. In Andrew D. M. Smith, Marieke Schouwstra, Bart de Boer & Kenny Smith (eds.), *The evolution of language: Proceedings of the 8th international conference (EVOLANG8) , Utrecht, Netherlands, 14–17 April 2010*, World Scientific. 389–390. DOI: 10.1142/9789814295222_0059

Davis, R. 1961. The fitness of names to drawings: A cross-cultural study in Tanganyika. *British Journal of Psychology* 52(3). 259–268. DOI: 10.1111/j.2044-8295.1961.tb00788.x

Diffloth, Gérard. 1994. i: big, a: small. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 107–114.

D'Onofrio, Annette. 2014. Phonetic detail and dimensionality in sound-shape correspondences: Refining the *bouba-kiki* paradigm. *Language and Speech* 57(3). 367–393. DOI: 10.1177%2F0023830913507694

Frazer, June M. 1982. The phonetic symbolism of Arnold's *Wragg is in custody*. *American Notes and Queries* 21. 13–14.

Gallace, Alberto, Erica Boschin & Charlse Spence. 2011. On the taste of 'bouba' and 'kiki': An exploration of word–food associations in neurologically normal participants. *Cognitive Neuroscience* 2(1), 34–46. DOI: 10.1080/17588928.2010.516820

Gordon, Matthew & Jeffrey Heath. 1998. Sex, sound symbolism, and sociolinguistics. *Current Anthropology* 39(4). 421–449. DOI: 10.1086/204758

Hamano, Shoko. 1986. *The sound-symbolic system of Japanese.* Ph.D. dissertation, University of Florida.

Hamano, Shoko. 1994. Palatalization in Japanese sound symbolism. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 148–158.

Holland, Morris K. & Michael Wertheimer. 1964. Some physiognomic aspects of naming, or, maluma and takete revisited. *Perceptual and Motor Skills* 19(1). 111–117. DOI: 10.2466%2Fpms.1964.19.1.111

Householder, Fred W. 1946. On the problem of sound and meaning: An English phonestheme. *Word* 2. 83–84.

Householder, Fred. W. 1960. Retrospects and prospects, from the viewpoint of linguistics: opening statement. In Thomas A. Sebeok (ed.), *Style in language.* The Technology Press of Massachusetts Institute of Technology & John Wiley & Sons. 339–349.

Hymes, Dell H. 1960. Phonological aspects of style: Some English sonnets. In Thomas A. Sebeok (ed.), *Style in language.* The Technology Press of Massachusetts Institute of Technology & John Wiley & Sons. 109–133.

Jakobson, Roman & Linda R. Waugh. 1979. *The sound shape of language.* De Gruyter.

Jensen, John T. 1993. *English phonology*. John Benjamins.

Jespersen, Otto. 1922. *Language: Its nature, development and origin.* Allen and Unwin.

Jones, Daniel. 2011 *Cambridge English pronouncing dictionary* (18th edn). Cambridge University Press.

Jones, Lawrence G. 1983. Distinctive features and sound tropes in Russian verse. In Thomas Eekman & Dean S. Worth (eds), *Russian poetics*, Slavica. 195–208.

Kim, Kong-On. 1977. Sound symbolism in Korean. *Journal of Linguistics* 13(1). 67–75.

Klink, Richard R. 2000. Creating brand names with meaning: The use of sound symbolism. *Marketing letters* 11. 5–20. DOI: 10.1023/A:1008184423824

Klink, Richard R. 2003. Creating meaningful brands: The relationship between brand name and brand mark. *Marketing Letters* 14. 143–157. DOI: 10.1023/A:1027476132607

Knoeferle, Klemens M., Andy Woods, Florian Käppler & Charles Spence. 2015. That sounds sweet: Using cross-modal correspondences to communicate gustatory attributes. *Psychology and Marketing* 32(1). 107–120. DOI: 10.1002/mar.20766

Köhler, Wolfgang. 1929. *Gestalt psychology*. Liveright.

Körtvélyessy, Lívia. 2011. Phonetic iconicity – lost in research. *Bulletin of the Transilvania University of Braşov* 4(53). 137–144.

Langdon, Margaret. 1971. Sound symbolism in Yuman languages. In Jesse Sawyer (ed.), *Studies in American Indian languages.* University of California Press. 149–173.
LaPolla, Randy J. 1994. An experimental investigation into phonetic symbolism as it relates to Mandarin Chinese. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 130–147.
Levickij, Viktor. V. 1971. Čy isnuje universalij zvukosymvolizm? [Does universal sound symbolism exist?] *Movoznavstvo* 1. 25–32.
Levickij, Viktor V. 1973. *Semantika i fonetika* [Semantics and phonetics]. Čenrovickij Gosudarstvennyj Universitet.
Lowrey, Tina M. & L. J. Shrum. 2007. Phonetic symbolism and brand name preference. *Journal of Consumer Research* 34(3). 406–414.
Lucas, F. L. 1955. *Style*. Cassell & Co Ltd.
Maltzman, Irving, Lloyd Morrisett & Lloyd O. Brooks. 1956. An investigation of phonetic symbolism. *Journal of Abnormal and Social Psychology* 53(2). 249–251. DOI: 10.1037/h0048406
Marchand, Hans. 1960. *The categories and types of present-day English word-formation.* Otto Harrassowitz.
Markel, Norman N. & Eric P. Hamp. 1960. Connotative meanings of certain phoneme sequences. *Studies in Linguistics* 15. 47–61.
Matisoff, James A. 1994. Tone, intonation, and sound symbolism in Lahu: Loading the syllable canon. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 115–129.
Maurer, Daphne, Thanujeni Pathman & Catherine J. Mondloch. 2006. The shape of boubas: Sound-shape correspondences in toddlers and adults. *Developmental Science* 9(3). 316–322. DOI: 10.1111/j.1467-7687.2006.00495.x
McCune, Keith M. 1985. *The internal structure of Indonesian roots.* Universitas Katolik Indonesia.
McGregor, William B. 1996. Sound symbolism in Gooniyandi, a language of Western Australia. *Word* 47(3). 339–364. DOI: 10.1080/00437956.1996.11432454
Murdy, Louise B. 1966. *Sound and sense in Dylan Thomas's poetry.* Mouton.
Miron, M. S. 1961. A cross-linguistic investigation of phonetic symbolism. *Journal of Abnormal and Social Psychology* 62(3). 623–630. DOI: 10.1037/h0045212
Nash, Walter. 1980. *Designs in prose: A study of compositional problems and methods.* Longman.
Newman, Stanley S. 1933. Further experiments in phonetic symbolism. *American Journal of Psychology* 45(1). 53–75. DOI: 10.2307/1414186
Ngo, Mary K. & Charles Spence. 2011. Assessing the shapes and speech sounds that consumers associate with different kinds of chocolate. *Journal of Sensory Studies* 26(6). 421–428. DOI: 10.1111/j.1745-459X.2011.00359.x
Ngo, Mary K., Reeva Misra & Charles Spence. 2011. Assessing the shapes and speech sounds that people associate with chocolate samples varying in cocoa content. *Food Quality and Preference* 22(6). 567–572. DOI: 10.1016/j.foodqual.2011.03.009
Nichols, Johanna. 1971. Diminutive consonant symbolism in Western North America. *Language* 47(4). 826–848. DOI: 10.2307/412159
Nielsen, Alan & Drew Rendall. 2011. The sound of round: Evaluating the sound-symbolic role of consonants in the classic Takete-Maluma phenomenon. *Canadian Journal of Experimental Psychology* 65(2). 115–124. DOI: 10.1037/a0022268

Nielsen, Alan & Drew Rendall. 2012. The source and magnitude of sound-symbolic biases in processing artificial word material and their implications for language learning and transmission. *Language and Cognition* 4(2). 115–125. DOI: 10.1515/langcog-2012-0007

Nordberg, Bengt. 1986. *The use of onomatopoeia in the conversational style of adolescents*. Institutionen for nordiska sprak vid Uppsala Universitet.

Nuckolls, Janis B. 1999. The case for sound symbolism. *Annual Review of Anthropology* 28. 225–252. DOI: 10.1146/annurev.anthro.28.1.225

Ohala, John J. 1983. Cross-language use of pitch: An ethological view. *Phonetica* 40(1). 1–18. DOI: 10.1159/000261678

Ohala, John J. 1984. An ethological perspective on common cross-language utilization of F_0 of voice. *Phonetica* 41(1). 1-16. DOI: 10.1159/000261706

Ohala, John J. 1994. The frequency code underlies the sound-symbolic use of voice pitch. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 325–347.

Ohala, John. J., Leanne Hinton & Johanna Nichols (eds). 1994. *Sound symbolism.* Cambridge University Press.

Park, Jae Woo & Shin Osera. 2008. The effect of brand sound on consumers' brand evaluation in Japan. *Latin American Advances in Consumer Research* 2, 188–189.

Perniss, Pamela, Robin L. Thompson & Gabriella Vigliocco. 2010. Iconicity as a general property of language: Evidence from spoken and signed languages. *Frontiers in Psychology* 1. 227. DOI: 10.3389/fpsyg.2010.00227

Pitcher, Benjamin J., Alex Mesoudi & Alan G. McElligott. 2013. Sex-biased sound symbolism in English-language first names. *PLoS ONE* 8(6). e64825. DOI: 10.1371/journal.pone.0064825

R Core Team. 2015. *R: A language and environment for statistical computing.* R Foundation for Statistical Computing.

Ramachandran, V. S. & E. M. Hubbard. 2001. Synaesthesia? A window into perception, thought and language. *Journal of Consciousness Studies* 8. 3–34.

Rhodes, Richard. 1994. Aural images. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 276–292.

Sapir, Edward. 1929. A study in phonetic symbolism. *Journal of Experimental Psychology* 12. 225–239.

Schmidtke, David S., Markus Conrad & Arthur M. Jacobs. 2014. Phonological iconicity. *Frontiers in Psychology* 5. 80. DOI: 10.3389/fpsyg.2014.00080

Shinohara, Kazuko & Shigeto Kawahara. 2016. A cross-linguistic study of sound symbolism: The images of size. In Nicholas Rolle, Jeremy Steffman & John Sylak-Glassman (eds.), *Proceedings of the Thirty-Sixth Annual Meeting of the Berkeley Linguistics Society*, Berkeley Linguistic Society. 396–410.

Silverstein, Michael. 1994. Relative motivation in denotational and indexical sound symbolism of Wasco-Wishram Chinookan. In John. J. Ohala, Leanne Hinton & Johanna Nichols (eds), *Sound symbolism*, Cambridge University Press. 40–60.

Spence, Charles & Alberto Gallace. 2011. Tasting shapes and words. *Food Quality and Preference* 22(3). 290–295. DOI: 10.1016/j.foodqual.2010.11.005

Stolarski, Łukasz. 2011. Palatality in size-sound symbolism on the basis of selected Polish examples. *Studia Neofilologiczne* 5. 39–56.

Stolarski, Łukasz. 2012. Size-sound symbolism in the names of cars. *Token: A Journal of English Linguistics* 1. 171–189.
Stutts, Cassie A. & Aurora Torres. 2012. Taste interacts with sound symbolism. *North American Journal of Psychology* 14(1). 175–184.
Taranovski, Kiril. 1965. The sound-texture of Russian verse in the light of phonemic distinctive features. *International Journal of Slavic Linguistics and Poetics* 9. 114–124.
Tarte, Robert D. 1974. Phonetic symbolism in adult native speakers of Czech. *Language and Speech* 17(1). 87–94. DOI: 10.1177%2F002383097401700109
Tarte, Robert D. 1982. The relationship between monosyllables and pure tones: An investigation of phonetic symbolism. *Journal of Verbal Learning and Verbal Behavior* 21(3). 352–360. DOI: 10.1016/S0022-5371(82)90670-3
Tolman, Albert H. 1906. The symbolic value of English sounds. In Albert H. Tolman (ed.), *The views about Hamlet (and other essays)*, Houghton, Mifflin & Company. 143–172.
Ultan, Russell. 1978. Size-sound symbolism. In Joseph H. Greenberg, Charles A. Ferguson & Edith A. Moravcsik (eds), *Universals of human language* (vol. 2), Stanford University Press. 527–568.
Urban, Matthias. 2011. Conventional sound symbolism in terms for organs of speech: A cross-linguistic study. *Folia Linguistica* 45(1). 199–213. DOI: 10.1515/flin.2011.007
Wells, John C. 2008. *Longman pronunciation dictionary.* Pearson Education.
Westbury, Chris. 2005. Implicit sound symbolism in lexical access: Evidence from an interference task. *Brain and Language* 93(1). 10–19. DOI: 10.1016/j.bandl.2004.07.006
Wichmann, Søren, Eric W. Holman & Cecil H. Brown. 2010. Sound symbolism in basic vocabulary. *Entropy* 12. 844–858. DOI: 10.3390/e12040844
Wright, David. 2012. Scrunch, growze, or chobble?: Investigating regional variation in sound symbolism in the Survey of English Dialects. *Leeds Working Papers in Linguistics and Phonetics* 17.
Wu, L., Richard R. Klink & J. Guo. 2013. Creating gender brand personality with brand names: The effects of phonetic symbolism. *Journal of Marketing Theory and Practice* 21(3). 319–330.
Yorkston, Eric & Geeta Menon. 2004. A sound idea: Phonetic effects of brand names on consumer judgements. *Journal of Consumer Research* 31(1). 43–51. DOI: 10.1086/383422

Appendix 1

Model	Predicted RP Pronunciation	Mean vertical scoring for vowels	Mean horizontal scoring for vowels	Overall size of the vehicle (dm^3)	Weight of the vehicle (kg)	Power of the car's engine (hp)
Alfa Romeo						
Giulietta 1.4 TB 2011	/dʒuːliˈetə/	2.25	2.5	11536.56	1355	119
MiTo 1.3 JTDM 2011	/ˈmiːtəʊ/	1.75	2.25	10280.01	1225	94
Spider 2.0 JTS 2011	/ˈspaɪdə/	3.75	2.75	10126.78	1480	163
Brera 2.2 JTS 16V 2009	/ˈbrerə/	3.5	2	10979.28	1545	182
Aston Martin						
Cygnet 2011	/ˈsɪgnət/	2.5	2.5	7756.56	988	97
DB9 Volante 2011	/vəˈlænti/	2.67	1.67	11269.47	1890	470
Rapide 2011	/rəˈpiːd/	2	2	14383.29	1980	470
Vantage V8 2011	/ˈvɑːntɪdʒ/	3.5	3.5	10343.72	1630	420
Virage Coupe 2011	/ˈvɪrɑːʒ/	3.5	3.5	11604.97	1785	490
Vanquish S V12 2009	/ˈvæŋkwɪʃ/	3	1.5	12077.55	1956	521
Bently						
Continental GT 2011	/kɒntɪˈnentl/	3	2.67	12929.28	2385	552
Mulsanne 2011	/mʊlˈsɑːn/	3.5	4.5	16477.18	2470	505
Azure 2009	/əˈzjʊə/	3	3.25	15528.3	2695	450
Arnage T 2009	/əˈnɑːʒ/	4	4	15706.31	2585	500
Brooklands 2009	/ˈbrʊkləndz/	2.5	3.5	15706.31	2655	523
Flying Spur Speed 2008)	/flaɪɪŋ spɜː/	2.83	2.5	14848.71	2475	602
Bugatti						
Veyron 16.4 Coupe 2011	/ˈveɪrɒn/	3.25	3.25	10817.4	1888	1001
Caddillac						
Escalade 2011	/eskəˈleɪd/	2.83	1.83	19978.4	1788	403
Seville STS 4.6 V8 2005	/səˈvɪl/	2.5	2.5	13585	1857	301
Chevrolet						
Aveo 1.2 2010	/ˈæviəʊ/	2.5	1.5	10028.97	1105	83
Camaro 2010	/kəˈmærəʊ/	3.17	2.5	12824.06	1110	296
Captiva 2.0 D 2011	/kæpˈtiːvə/	3	1.67	14930.59	1848	148
Corvette 2011	/kɔːˈvet/	3.5	3	10267.5	1928	424
Cruze 1.6 2011	/kruːz/	1	5	12186.32	1360	111
Spark 1.2 2010	/spɑːk/	5	5	8935.2	1058	81
Suburban 2011	/səˈbɜːbən/	3	3	22409.07	1105	316
Volt 2011	/vəʊlt/	2.5	3.5	11599.2	1715	150
Epica 2.0 2010	/ˈepɪkə/	3	2	12781.13	1535	142
Lumina SS 6.0 UTE 2010	/ˈluːmɪnə/	2.33	3.33	13854.28	1105	362
Kalos 1.2 2009	/ˈkælɒs/	4	3	9802.8	1035	71
Lacetti 1.4 SE 2010	/ləˈseti/	2.33	1.67	10786.55	1245	94
Matiz 0.8 S 2010	/məˈtiːz/	2	2	7927.5	775	51
Orlando 2.0 VCDi LTZ 2010	/ɔːˈlændəʊ/	3.17	3.17	13947.57	1655	161
Tacuma 1.6 SX 2008	/təˈkuːmə/	2.67	3.67	12062.12	1272	105
Trax LS 1.6 2013	/træks/	4	1	12558.29	1290	113
Chrysler						
Voyager 2.4 Family 2010	/ˈvɔɪɪdʒə/	3	2.83	16931.2	1915	145
PT Cruiser 1.6 Classic 2009	/ˈkruːzə/	2.5	4	12087.08	1441	114
Sebring LX 2.0 2010	/ˈsiːbrɪŋ/	1.5	1.5	12222	1555	139
Delta 1.4 M-Air 140 SE 5d 2011	/ˈdeltə/	3.5	2	12159.29	1395	140
Ypsilon 1.2 SE 2012	/ˈɪpsɪlɒn/	2.67	3	9787.57	965	69
Neon 2.0 LX 2008	/niːɒn/	2.5	3	11217.99	1305	130
Crossfire 3.2 Roadster V6 LTD Automatic	/ˈkrɒsfaɪə ˈrəʊdstə/	3.75	3.4	9485.78	2035	215
Citroen						
Berlingo 1.4i 2007	/bɜːˈlɪŋgəʊ/	2.5	2.83	12869.64	1200	74
Nemo 1.4 2011	/ˈniːməʊ/	1.75	2.25	14022.83	1275	72
Xsara 1.4 HDi SX Plus 2011	/ˈzærə/	4	2	10102.51	1186	67
Picasso 1.6i HDi Exclusive 2008	/pɪˈkæsəʊ/	2.83	2.17	12353.79	1240	108
Relay 30 L1 Diesel 2007	/ˈriːleɪ/	1.75	1.25	22932.53	1845	100
Dispatch 2007	/dɪˈspætʃ/	3	1.5	17682.83	1550	125
Xantia 2001	/ˈzæntiə/	3.25	1.5	11105.87	1300	89
Dacia						
Duster 1.6 2011	/ˈdʌstə/	4	3	12886.13	1236	104
Logan MCV 1.4 2011	/ˈləʊgən/	2.75	3.25	12800.2	1165	74
Sandero 1.2 Eco 2011	/sænˈdeərəʊ/	3.17	2.17	10860.85	1050	74
Daewoo						
Matiz 0.8 S 2010	/məˈtiːz/	2	2	7822.5	851	50
Nubira 1.6 SE 2010	/nʊˈbɪrə/	2.33	3	11313.34	1255	108
Daihatsu						
Copen 0.7 2011	/ˈkəʊpən/	2.75	3.25	6290	905	67
Materia 1.3 2010	/məˈtɪəriə/	2.67	2.5	10622.28	1026	90
Sirion 1.0 2010	/ˈsɪriən/	2	2	9404.77	890	69
Terios 1.3 2008	/ˈteriɒs/	2.67	2.33	10330.32	1125	104
Charade CX 2007	/ʃəˈrɑːd/	4	4	7620.67	740	55
Cuore 1.0 2010	/ˈkwəʊreɪ/	2.5	2.5	7931.62	765	69
Dodge						
Avenger 2011	/əˈvendʒə/	3.33	2.33	13579.86	1425	168
Caliber 1.8 L SXT 2009	/ˈkælɪbə/	3.33	2	11911.9	1385	148
Challenger 2009	/ˈtʃælɪndʒə/	3.33	2	14173.53	1878	247
Charger 2010	/ˈtʃɑːdʒə/	4.5	4	14313.08	1360	178
Journey 2.0 2011	/ˈdʒɜːni/	2	2	15628.44	1805	168
Nitro 2.8 CRD 2010	/ˈnaɪtrəʊ/	3	3	15196.57	1855	175
Ram 1500 2010	/ræm/	4	1	20418.16	1362	212
Caravan SXT 2006	/ˈkærəvæn/	3.67	1.67	16931.2	1842	180
Ferrari						
California 2011	/kæləˈfɔːniə/	3.13	2.75	11434.6	1625	454

Model	Predicted RP Pronunciation	Mean vertical scoring for vowels	Mean horizontal scoring for vowels	Overall size of the vehicle (dm^3)	Weight of the vehicle (kg)	Power of the car's engine (hp)
Fiat						
Bravo 1.4 2011	/ˈbrɑːvəʊ/	3.75	4.25	11718	1280	89
Doblo 1.2 Trofeo 2011	/ˈdɒbləʊ/	3.25	4.25	13053.77	1295	64
Panda 1.1 2011	/ˈpændə/	4	2	8779.2	915	53
Punto 1.2 2008	/ˈpʊntəʊ/	2.25	3.75	9579.96	945	59
Qubo 1.3 Multijet 2011	/ˈkjuːbəʊ/	1.75	4.25	11881.42	1275	74
Croma 1.8 2009	/ˈkrəʊmə/	3.2	3.25	13727.18	1505	138
Idea 1.2 Active 2009	/aɪˈdɪə/	3.25	2.5	11185.66	1150	80
Multipla 1.6 Active 2009	/ˈmʌltiplə/	3	2.33	12784	1375	102
Brava 2001	/ˈbrɑːvə/	4.5	4	10437	1040	82
Fiorino 1.4 2009	/fɪəˈriːnəʊ/	1.83	2.17	11515.57	1145	72
Scudo L1 Diesel	/ˈskuːdəʊ/	1.75	4.25	17682.83	1661	90
Sedici 1.6 2010	/səˈdɪtʃi/	2	2	11819.46	1265	106
Seicento 1.1 2005	/səˈtʃentəʊ/	2.83	2.5	7291.04	730	53
Stilo 1.4 2006	/ˈstiːləʊ/	1.75	2.25	11100.15	1090	94
Ulysse 2.0 JTD 2009	/juːlɪˈseɪ/	1.83	2.83	15567.38	1736	108
Barchetta 2004	/bɑːˈketə/	4	3	8279.04	1060	129
Ford						
Edge 2011	/edʒ/	3	1	15577.42	1334	259
Explorer 2010	/ɪkˈsplɔːrə/	3	3.33	17204.26	1334	207
Fiesta 1.25 2011	/fiˈestə/	2.67	1.67	10207.69	1036	81
Focus 1.4 2011	/ˈfəʊkəs/	2.75	3.25	12303.9	1229	79
Fusion 1.25 2011	/ˈfjuːʒn/	1	5	10431.9	1145	74
Galaxy 2.0 2011	/ˈgæləksi/	2.67	1.67	18883.37	1697	143
Ka 1.2 2011	/kɑː/	5	5	9098.96	940	68
Maverick 2.0i Highclass 2011	/ˈmævərɪk/	3	2	14397.71	1515	122
Mondeo 1.6 Ti-VCT 2010	/mɒnˈdeɪəʊ/	3	3.33	15232.88	1435	123
Mustang 2010	/ˈmʌstæŋ/	4	2	12644.32	1385	207
Ranger 2.3 2011	/ˈreɪndʒə/	2.75	2.25	14418.07	1385	142
Taurus 2011	/ˈtɔːrəs/	3	4	15516.12	1110	258
Transit Connect 2011	/ˈtrænzɪt/	3	1.5	11484.18	1529	136
Streetka 1.6 2009	/ˈstriːtkɑː/	3	3	8350.29	1136	94
Cougar 2001	/ˈkuːgə/	2.5	4	11087.81	1279	168
Kuga 2.0 TDCi 2009	/ˈkuːgə/	2.5	4	14159.9	1540	134
Puma 2005	/ˈpjuːmə/	2.5	4	9049.32	1035	100
Honda						
Accord 2.0 Sport 2011	/əˈkɔːd/	3	4	11985.56	1129	153
Civic 1.3 i-DSi VTEC Hybrid 2010	/ˈsɪvɪk/	2	2	11531.52	1368	94
Insight 1.3 2009	/ˈɪnsaɪt/	2.75	2.25	10696.4	1276	87
Jazz 1.2 i-VTEC 2011	/dʒæz/	4	1	10169.91	1119	89
Legend 3.5i V6 2011	/ˈledʒənd/	3	2	13077.79	1760	205
Odyssey EX 2011	/ˈɒdəsi/	2.67	3	18136.37	1484	248
Stream 1.7i ES 2009	/striːm/	1	1	12457.6	1434	123
Integra Type iS 2001	/ˈɪntɪgrə/	2.67	2.33	10373.57	1170	158
Prelude 2001	/ˈpreljuːd/	2	3	10524.1	840	195
Hyunday						
Accent 2011	/ˈæksənt/	3.5	2	10793.64	885	108
Equus Ultimate 2011	/ˈekwəs/	3	2	14734.5	885	378
Genesis Coupe 2.0T 2010	/ˈdʒenəsɪs/	2.67	2	12060.75	885	210
Getz 1.1 GL 2011	/gets/	3	1	9569.1	1110	62
Santa Fe 2.2 CRDi 2011	/sæntə ˈfeɪ/	3.17	1.83	15705.21	1830	194
Sonata 2.0 GLS 2011	/səˈnɑːtə/	4	3.67	12430.28	1498	129
Terracan 2.9 CRDi GL 2011	/ˈterəkæn/	3.33	1.67	15887.52	2162	161
Tucson 2.0 4WD GLS 2011	/ˈtuːsɒn/	2.5	5	13561.56	1617	139
Matrix 1.6 2010	/ˈmeɪtrɪks/	2.25	1.75	11652.2	1323	102
Elantra 1.6 GLS 2008	/iˈlæntrə/	3	1.67	11206.77	1206	104
Trajet 2.0 CRDi 2008	/ˈtrɑːʒeɪ/	3.75	3.25	15390.15	1713	111
Isuzu						
Rodeo S 4WD 2004	/rəʊˈdeɪəʊ/	2.5	2.83	14320.72	1874	205
Trooper 2005	/ˈtruːpə/	2.5	4	14693.5	1980	212
Jeep						
Cherokee 2001	/ˈtʃerəki/	2.33	1.67	12086.47	1430	121
Commander 3.7 2008	/kəˈmɑːndə/	4	3.67	16833.98	1866	210
Compass 2.0 CRD 2008	/ˈkʌmpəs/	3.5	3	13162.97	1610	138
Patriot 2.0 CRD 2008	/ˈpætriət/	3.25	1.75	13103.87	1610	139
Wrangler 2.5 2002	/ˈræŋglə/	4	2	11837.27	1395	122
Kia						
Carens 1.8 EX 2009	/ˈkærəns/	3.5	2	12757.5	1515	124
Ceed 1.6 CRDI 2008	/siːd/	1	1	11371.68	1368	89
Cerato 2.0 CRDi 2008	/səˈrɑːtəʊ/	3.5	3.83	11202.12	1450	111
Magentis 2.0 SE 2008	/məˈdʒentɪs/	2.67	2	12317.36	1478	134
Optima LX 2006	/ˈɒptɪmə/	3.33	3.33	12224.21	1488	138
Picanto 1.1 EX 2007	/pɪˈkæntəʊ/	2.83	2.17	8344	928	64
Rio 1.3 LS 2009	/ˈriːəʊ/	1.75	2.25	10270.98	1508	81
Sedona 2.9 CRDi 2008	/səˈdəʊnə/	3.17	3.17	15631.06	2090	142
Shuma 2005	/ˈʃuːmə/	2.5	3.5	11206.77	1090	100
Sorento 2.5 CRDi 2007	/səˈrentəʊ/	2.83	2.5	14869.87	2087	139
Soul 1.6 2010	/səʊl/	2.5	3.5	11918.18	1531	122
Sportage 2.0 2007	/ˈspɔːtɑːʒ/	4	5	12600.4	1511	140
Venga 1.4 CRDi 2010	/ˈvengə/	3.5	2	11598.28	1345	89

Model	Predicted RP Pronunciation	Mean vertical scoring for vowels	Mean horizontal scoring for vowels	Overall size of the vehicle (dm^3)	Weight of the vehicle (kg)	Power of the car's engine (hp)
Lamborghini						
Diablo Roadster 2005	/ˈdɪabləʊ/	3	3	10194.24	1750	523
Gallardo 2007	/gəˈlɑːdəʊ/	3.5	3.5	9631.56	1430	493
Murcielago 2008	/mɜːtʃəˈlɑːgəʊ/	3.38	3.63	10726.83	1650	571
Lotus						
Elise 2007	/iˈliːz/	1	1	7540.21	785	120
Esprit 2005	/eˈspriːt/	2	1	9690.41	1380	349
Europa 2010	/juˈrəʊpə/	2.5	3.83	7599.48	1130	197
Evora 2010	/iˈvɔːrə/	2.67	3	9898.43	1455	276
Exige Cup 260 2010	/ekˈsiːdʒ/	2	1	7736.91	950	237
Maserati						
GranTurismo 2010	/græn tʊəˈrɪsməʊ/	2.75	2.5	12768.77	1955	399
Spyder GranSport 2008	/ˈspaɪdə/	3.75	2.75	10332.36	1730	395
Mazda						
Demio 2005	/ˈdemɪəʊ/	2.5	2.17	9632.89	960	62
Premacy 2005	/ˈpreməsi/	2.33	1.67	11838.33	1235	108
Mitsubishi						
Colt 1.1 2011	/kəʊlt/	2.5	3.5	10117.89	1010	74
Lancer 1.5 2011	/ˈlɑːnsə/	4.5	4	12159.9	1305	104
Outlander 2.0 2011	/ˈaʊtlændə/	3.83	2.5	14285.06	1560	168
Grandis 2.0 Di-D 2008	/ˈgrændɪs/	3	1.5	14252.76	1785	134
Space Star 1.3 Family 2008	/ˈspeɪs stɑː/	3.75	3.25	10614.46	1239	94
Carisma 1.6 Comfort Plus 2008	/kəˈrɪzmə/	3	2.67	10864.9	1287	102
Pajero 2000i 2008	/pəˈdʒerəʊ/	2.83	2.5	9537	1431	127
Nissan						
Cube 1.5 dCi 2010	/kjuːb/	1	5	11395.44	1375	108
Juke 1.5 dCi 2011	/dʒuːk/	1	5	11512.51	1285	108
Maxima QX 3.0 2011	/ˈmæksɪmə/	3.33	2	12707.57	1540	197
Micra 1.2 2011	/ˈmaɪkrə/	3.75	2.75	9683.83	910	78
Note 1.4 2010	/nəʊt/	2.5	3.5	10899.72	1167	87
Pathfinder 2.5 dCi 2011	/ˈpɑːθ faɪndə/	4.17	3.5	15814.65	2246	169
Pixo 1.0 2011	/ˈpɪksəʊ/	2.25	2.75	8506.6	930	67
Patrol 3.0 TD GL 2009	/pəˈtrəʊl/	2.75	3.25	18280.08	2355	158
Qashqai 1.5 dCi 2011	/ˈkæʃkaɪ/	3.75	1.75	13438.43	1395	104
Murano 3.5 V6 2011	/məˈrɑːnəʊ/	3.5	3.83	15923.44	1794	252
Navara 2.5 dCi 2010	/nəˈvɑːrə/	4	3.67	16826.3	2032	172
Almera 2.2 DCi Accenta 2007	/ælˈmerə/	3.67	1.67	10413.9	1348	110
Primera 1.9 DCi Visia 2007	/prəˈmerə/	3.33	2.33	10153.61	1488	118
Serena 2005	/səˈriːnə/	2.67	2.33	14169.84	1590	145
Skyline 2005	/ˈskaɪ laɪn/	3.5	2.5	11244.65	1380	215
Stagea 350 RX 2004	/ˈsteɪdʒɪə/	2.75	2	12716.62	1580	268
Terrano 2.7 TD Comfort 2008	/təˈrɑːnəʊ/	3.5	3.83	13763.2	1820	123
Tiida 1.5 dCi 2008	/ˈtiːdə/	2.5	2	11283.58	1389	105
X-Trail 2.2D 4x4 SE 2007	/ˈeks treɪl/	2.75	1.25	13893.79	1511	112
Porsche						
Cayenne 2009	/keɪˈen/	2.75	1	15808.44	2358	247
Cayman 2.7 2009	/ˈkeɪmən/	2.75	2	10314.29	1530	242
Panamera 2010	/pænəˈmerə/	3.5	2	13718.9	1734	296
Renault						
Clio 1.2 2011	/ˈkliːəʊ/	1.75	2.25	10483.8	1165	77
Espace 1.9 dCi Avantage 2008	/ɪˈspeɪs/	2.25	1.75	15084.1	1770	118
Fluence 1.5 dCi 110 FAP Eco 2011	/ˈfluːəns/	2	4	12444.43	1360	105
Kangoo 1.2 Campus 2011	/kæŋˈguː/	2.5	3	12420.58	1120	74
Laguna 1.5 dCi 110 FAP 2011	/ləˈguːnə/	2.67	3.67	12403.3	1461	108
Megane 1.4 Authentique 2011	/məˈgæn/	3.5	2	10966.94	1220	81
Modus 1.2 2011	/ˈməʊdəs/	2.75	3.25	10677.76	1155	74
Scenic 1.4 Authentique 2008	/ˈsiːnɪk/	1.5	1.5	12667.38	1390	97
Twingo 1.2 Authentique 2008	/ˈtwɪŋgəʊ/	2.25	2.75	8067.49	895	59
Trafic 1.9 DCi Van 2007	/ˈtræfɪk/	3	1.5	21137.31	1677	100
Koleos 2.0 dCi FAP 2010	/ˈkəʊliɒs/	2.5	3.17	14323.86	1724	148
Vel Satis 2.2 dCi 2008	/vel ˈsætɪs/	3	1.33	14388.9	1860	138
Rolls-Royce						
Corniche 2001	/kɔːˈniːʃ/	2	3	24741.01	2735	324
Ghost 2010	/gəʊst/	2.5	3.5	16457.22	2665	563
Phantom 2008	/ˈfæntəm/	3.5	2	19155.2	2495	454
Silver Seraph Automatic 2005	/ˈsɪlvə ˈserəf/	2.75	2.25	15923.52	2400	322
Rover						
City 2003	/ˈsɪti/	1.5	1.5	9131.42	1040	84
Streetwise 2005	/ˈstriːtwaɪz/	2.25	1.75	10413.9	1110	87
Seat						
Alhambra 1.4 TSi 2011	/ælˈhæmbrə/	4	1.67	5716.44	1648	148
Ibiza 1.2 2011	/ɪˈbiːθə/	2.33	2	10007.9	999	69
Leon 1.4 2011	/ˈliːən/	2	2	11163.74	1176	84
Cordoba 1.2 Reference 2008	/ˈkɔːdəbə/	3.33	3.67	10574.85	1080	64
Toledo 1.6 Reference 2008	/təˈliːdəʊ/	2.17	2.5	11214	1225	101
Altea 1.4 2011	/ælˈtɪə/	3.5	1.75	11921.48	1366	84
Arosa 1.0 Prima 2005	/əˈrəʊzə/	3.17	3.17	8634.78	955	49
Exeo 1.6 2010	/ekˈseɪəʊ/	2.67	2	11970.14	1310	101
Skoda						
Fabia 2005	/ˈfæbiə/	3.25	1.5	9621.69	1055	53
Octavia 1.4 Tour 2007	/ɒkˈteɪviə/	3	2.83	11143.31	1250	74
Roomster 1.4 2008	/ˈruːmstə/	2.5	4	11454.99	1230	85
Superb 2.0 TDi Elegance 2007	/suˈpɜːb/	2	4	11230.65	1695	138
Yeti 1.2 TSi 2010	/ˈjeti/	2	1	12943.8	1345	99

Model	Predicted RP Pronunciation	Mean vertical scoring for vowels	Mean horizontal scoring for vowels	Overall size of the vehicle (dm^3)	Weight of the vehicle (kg)	Power of the car's engine (hp)
SsangYong						
Korando 2.9 TD 2007	/kəˈrændəʊ/	3.17	2.5	14853.65	1865	118
Kyron 2.0D 2007	/ˈkaɪrɒn/	3.75	3.75	15446.03	1893	139
Rexton RX 290S 2008	/ˈrekstən/	3	2	15739.55	1851	118
Rodius 270 XDi 2008	/ˈrəʊdiəs/	2.25	2.75	18024.77	2220	161
Subaru						
Forester 2.0 X Active 2008	/ˈfɒrɪstə/	3.33	3.33	12416.64	1435	124
Impreza 1.6 TS 2005	/imˈpretsə/	2.67	1.67	11195.86	1385	94
Justy G3X 1.3 2008	/ˈdʒʌsti/	2.5	2	9554.71	1005	93
Legacy 2.0 AWD 2007	/ˈlegəsi/	2.33	1.67	11619.89	1405	136
Outback 2.5i 2007	/ˈaʊtbæk/	3.75	2.25	13077.66	1430	163
Tribeca 3.0 R 2007	/traɪˈbekə/	3.5	2.17	15427.5	2000	242
Suzuki						
Alto 1.1 Classic 2011	/ˈæltəʊ/	3.25	2.25	7562.8	875	62
Grand Vitara 1.6 2011	/ˈgrænd vɪˈtɑːrə/	3.75	2.75	11903.35	1480	105
Jimny 1.3 2011	/ˈdʒɪmni/	1.5	1.5	9926.62	1140	85
Kizashi Sport 2011	/kəˈzɑːʃi/	3	3	12706.42	1005	150
Splash 1.0 2011	/splæʃ/	4	1	10058.88	1050	65
Swift 1.2 DDiS 2011	/swɪft/	2	2	9974.24	1140	75
Ignis 1.3 DDiS Club 2008	/ˈɪgnɪs/	2	2	9554.71	1030	69
Liana 1.3 Club 2008	/liːˈɑːnə/	3.33	3	11488.6	1210	89
Toyota						
Auris 1.33 2010	/ˈɔːrɪs/	2.5	3.5	11434.2	1295	98
Aygo 1.0 2011	/ˈeɪgəʊ/	2.5	2.5	8144.39	875	68
Camry Hybrid 2010	/ˈkæmri/	2.5	1	12939.38	1295	146
Corolla 1.3 Advanced 2010	/kəˈrɒlə/	3.67	3.67	11919.18	1295	100
FJ Cruiser 2010	/ˈkruːzə/	2.5	4	16268.62	1295	255
Hilux 2.5 D-4D SingleCab 2010	/ˈhaɪlʌks/	3.75	2.75	15734.24	1735	119
Land Cruiser 3.0 D-4D 4WD 2011	/ˈlænd ˈkruːzə/	3	3	17129.07	2400	171
Prius 2011	/ˈpraɪəs/	3.25	2.75	11733.75	1445	97
Verso 1.6 2011	/ˈvɜːsəʊ/	2.75	3.25	13056.3	1495	130
Yaris 1.0 2011	/ˈjɑːrɪs/	3.5	3.5	9922.22	1350	105
Fortuner 3.0D-4D Automatic 2010	/ˈfɔːtʃənə/	3.33	3.67	16172.7	1790	161
Sprinter 140i 2008	/ˈsprɪntə/	3	2.5	10516.88	1097	96
Avensis 2.0 D-4D 2007	/əˈvensɪs/	2.67	2	12237.07	1475	114
Celica GT 2005	/səˈliːkə/	2.67	2.33	9892.6	1100	140
Ipsum 2005	/ˈɪpsəm/	2.5	2.5	13774.49	1794	157
Previa 2005	/ˈpreviə/	2.75	1.5	15165.36	1525	160
Soarer 2005	/ˈsɔːrə/	3.5	4	11249.38	1730	276
Sparky 2005	/ˈspɑːki/	3	3	10887.76	1070	87
Urban Cruiser 1.3 2010	/ˈɜːbən ˈkruːzə/	2.75	3.5	10428.79	1195	100
Will VS 2005	/wɪl/	2	2	10936.37	1460	127
Vauxhall						
Agila 2005	/əˈgiːlə/	2.67	2.33	9726.21	1020	57
Antara 2.0 CDTi 2007	/ænˈtɑːrə/	4.33	3	14217.28	1855	148
Astra 1.7 D 2004	/ˈæstrə/	4	2	11271.96	1335	80
Corsa 2005	/ˈkɔːsə/	3.5	4	9218.81	905	57
Frontera 3.2 2005	/frʌnˈtɪərə/	3.5	2.83	14641.44	1820	202
Insignia 2.0 CDTi 2010	/inˈsɪgniə/	1.83	1.67	13503.6	1503	108
Meriva 1.7 D 2003	/məˈriːvə/	2.67	2.33	11222.55	1320	74
Monaro 2005	/məˈnɑːrəʊ/	3.5	3.83	12406.1	1655	328
Omega 2.2 2005	/ˈəʊmɪgə/	2.83	2.83	12805.66	1608	142
Signum 2005	/ˈsɪgnəm/	2.5	2.5	12277.44	1395	120
Tigra 2005	/ˈtiːgrə/	2.5	2	9099.13	1150	89
Vectra 2.0 D 2002	/ˈvektrə/	3.5	2	12171.6	1580	100
Vivaro 1.9 2008	/vɪˈvɑːrəʊ/	3.17	3.5	18023.33	1677	100
Zafira 2005	/zəˈfɪərə/	3.17	2.83	12776.4	1390	100
Volkswagen						
Beetle 1.4 2011	/ˈbiːtl/	1	1	10743.3	1182	74
Caddy 1.2 TSI 2011	/ˈkædi/	2.5	1	14764.68	1538	84
Eos 1.4 TSi 2011	/ˈiːɒs/	2.5	3	11510.1	1461	120
Fox 1.2 2011	/fɒks/	4	5	4012.18	979	54
Golf 1.2 TSi 2011	/gɒlf/	4	5	11228.49	1158	104
Jetta 1.2 TSI 2011	/ˈdʒetə/	3.5	2	12084.42	1227	104
Passat 1.4 TSi 2011	/pæˈsæt/	4	1	14644.01	1446	120
Phaeton 3.0 V6 TDi 4Motion 2011	/ˈfeɪtn/	2.5	1.5	14110.32	2160	237
Polo 1.2 Fun 2011	/ˈpəʊləʊ/	2.5	3.5	10050.26	1538	63
Scirocco 1.4 TSI 2011	/sɪˈrɒkəʊ/	2.83	3.5	10932.01	1244	120
Sharan 1.8 T 2010	/ˈʃærən/	3.5	2	14693.95	1599	148
Touareg V6 2011	/tʊˈɑːreg/	3.33	3.33	16005.6	1993	276
Citi Sport 1.4i 2009	/ˈsɪti spɔːt/	2	2.67	8663.76	1224	83
Bora 1.4 2008	/ˈbɔːrə/	3.5	4	11050.74	1165	74
Amarok 2.0 TDi 4x4 2011	/ˈæmərɒk/	3.67	3	18872.88	1998	161
T5 California 2.5TDi 2009	/kæləˈfɔːniə/	3.13	2.75	18718	1224	172
Caravelle 2.5 TDi 2009	/kærəˈvel/	3.33	1.67	18437.23	1224	172
Lupo 1.0 2008	/ˈluːpəʊ/	1.75	4.25	8562.02	968	49
Tiguan 1.4 2010	/ˈtɪgwæn/	3	1.5	13625.79	1551	148
Touran 1.6 2007	/tuˈræn/	2.5	3	12988.8	1427	101