What's in a Villain's Name?

Sound symbolic values of voiced obstruents and bilabial consonants

1 Introduction

1.1 Theoretical background

This paper reports two case studies of sound symbolism, addressing the general question of whether sounds and meanings have systematic associations. Whether sounds have direct relationships with meanings or not has been a topic of intensive debate among philosophers, psychologists and linguists since antiquity, at least going back to Plato's *Cratylus* written during the classical period of Ancient Greece. However, since Saussure (1916/1972), it has been generally taken for granted in modern linguistic theories that relationships between sounds and meanings are fundamentally arbitrary. This is to say that, for example, there is no intrinsic relationship between the sound sequence [k^hæt] and the animal that this sound sequence refers to in English. Indeed, the same animal can be called by different names in different languages; e.g. [neko] in Japanese, [katz] in German and [gato] in Spanish. As Shakespeare puts it, "a rose by any other name would smell as sweet." In the same vein, there is no fundamental meaning associated with the sound [k] or [æ], for instance; generally, in this view, sounds in and of themselves are void of any meanings, and only when they are combined to be a word/morpheme do they bear a meaning.

While the arbitrariness between sounds and meanings is indeed one distinguishing property of human languages (Hockett, 1959), it has been recurrently observed that there are cases in which sounds and meanings have systematic relationships, patterns sometimes referred to "sound symbolism" (for recent reviews of sound symbolism research, see e.g. Dingemanse et al., 2015; Hinton et al., 2006; Lockwood & Dingemanse, 2015; Perniss et al., 2010; Sidhu & Pexman, 2017). Hinton et al. (2006: 1), one of the landmark studies of sound symbolism in the modern era, define sound symbolism as "the direct linkage between sound and meaning." While various definitions and subtypes of sound symbolism have now been proposed in the literature (see, for instance, Hinton et al., 2006; Lockwood & Dingemanse, 2015; Perniss et al., 2010), this paper broadly construes sound symbolism to be "systematic associations between sounds and meanings." As we will observe, however, the types of sound symbolism that we explore in the current paper demonstrably have their bases in the way we manipulate our speech, and we set aside those kinds of patterns that seem to have been established purely by convention, like English phonesthemes (e.g. *gl-* in English: Bergen, 2004, see footnote 2).

One major aim of the current study is to expand the empirical scope of sound symbolism by reporting new case studies. One of the best-known cases of sound symbolism is that, in many languages, the vowel [a] is associated with images that are larger than those connotated by [i] (e.g. Berlin, 1994, 2006; Jespersen, 1922; Sapir, 1929; Shinohara & Kawahara, 2016; Ultan, 1978). For example, Sapir (1929) showed that the nonce word *mal*—which contains the vowel [a]—is judged by English speakers to be a better word for a big table, whereas the nonce word *mil*—containing the vowel [i]—is judged to be a better name for a small table. Jespersen (1922) and Sapir (1929) are two pioneering studies on the sound symbolic values of different vowels in modern linguistic/psychological studies, and they both suggest that these sound-meaning associations may be grounded in the different articulatory configurations of these vowels; e.g., difference in oral aperture (how open the mouth is) or the volume of the suboral cavity in front of the tongue.[1] This difference in articulatory configuration can be projected onto the semantic meanings of these vowels.[2] To quote Sapir (1929, p. 235):

> [i]t is possible that the inherent 'volume' of certain vowels is greater than that of others and that this factor alone is sufficient to explain the results of the experiment. On the other hand, it should be noted that one may unconsciously feel that the tongue position for one vowel is symbolically 'large' as contrasted with the tongue position for another. In the case of *i* the tongue is high up toward the roof of the mouth and articulates pretty well forward. In other words, the vibrating column of air is passing through a narrow resonance chamber. In the case of *a* the tongue is very considerably lowered in comparison, and also retracted. In other words, the vibrating column of air is now passing through a much wider resonance chamber.

Ohala (1994) developed a general, acoustics-based theory of sound symbolism, now often referred to as the "Frequency Code Hypothesis." This theory suggests that sounds with high frequency properties (either f0 or F2) can index an idea of smallness, because everything else being equal, sounds with high frequency energy imply a small vibrator or a small resonating cavity. Under this theory, [i] evokes images of smallness, because it has high f0 and high F2—indeed, the suboral cavity in front of the tongue during the articulation of [i] is small, compared to the articulatory configurations of the other vowels (see Ohala, 1994: Figure 22.4 for illustration). Moreover, Shinohara & Kawahara (2016) have shown that F2 is a good predicter of size ratings by speakers of Mandarin Chinese, English, Japanese and Korean.

Size-related sound symbolism is perhaps one of the best-known examples of sound symbolism, but later studies have revealed various other semantic dimensions for which sound symbolism can be relevant. Even if we limit ourselves to those images connotated by different vowel qualities, as Lockwood and Dingemanse (2015) succinctly summarize, the following semantic dimensions can be

symbolically represented: precision, brightness, contour, taste, speed, size and redness/yellowness (see their Figure 1 for the references). The "multi-dimensionality" of sound symbolism raises a question regarding which semantic dimension can be (and cannot be) denoted by sound symbolism, a question that is important to address within the ever-growing body of research on sound symbolism. Our case studies reported below aim at addressing this general issue by exploring a new semantic dimension ("villain-ness") which has been hitherto unaddressed. While we admit that our scope is modest, it is a stepping stone toward understanding the nature of sound symbolism in natural languages. Moreover, as we elaborate below, we will examine a set of sounds (=labial consonants) whose sound symbolic nature has been underexplored in the previous literature.

The Saussurean arbitrariness of linguistic signs generally had a substantial influence on modern thinking about languages. However, within cognitive linguistics (e.g., Johnson, 1987; Lakoff & Johnson, 1980, 1999; Langacker, 1987, 1991, 2008), sound symbolism has been considered to be an interesting topic of exploration. We believe that there are three reasons for why this has been the case. First, some instances of the non-arbitrary relationships between sounds and meanings can be understood as cases of *embodiment* (see Shinohara & Kawahara, 2016 and Yoshimura, 2014 for explicit discussion on this point). If the hypotheses entertained by Jespersen (1922), Sapir (1929) and Ohala (1994) reviewed above are on the right track, for example, it means that articulatory characteristics of different sounds, along with their acoustic consequences and perceptual qualities, can be projected onto the meanings of their sounds. The size of an oral aperture (or the size of the suboral cavity in front of the tongue) is mapped onto the size ratings of different vowel types. In other words, the experiences of producing and listening to sounds may have non-trivial influences on how we assign meanings to particular sounds (Perniss & Vigliocco, 2014). More generally speaking, some sound symbolic patterns show that our bodily experiences may shape the way we use our languages, which is one of the fundamental tenets of cognitive linguistics.

The second reason why sound symbolism attracts cognitive linguists' interests is the fact that some sound symbolic patterns may instantiate *iconicity* in natural languages (see in particular Dingemanse et al., 2015). For example, recent studies of Pokémon names, reviewed below in further detail, have revealed that Pokémon characters whose names are longer tend to be larger, heavier and/or stronger in Japanese (Kawahara et al., 2018b), English (Shih et al., 2018, 2019) and various other languages including Cantonese, Korean and Russian (Shih et al., 2019). This systematic correspondence can be understood as a case of *the iconicity of quantity*, in which longer sounds represent something taller, larger and stronger (Haiman, 1980, 1985). This principle is observed outside of the Pokémon lexicon; we commonly observe that lengthening of a segment can be used to express a higher commitment to the proposition expressed by the speaker, as in "*it was sooooooooo weird*" or "*that flight was so looooooong*" (see e.g. Fuchs et al., 2019). To take another example, D'onofrio (2014) and Maurer et al. (2006) demonstrate that sounds produced with lips such as [b]

and [u] tend to be associated with rounded figures. It is very likely, as these authors argue, that lip rounding gestures of these sounds are iconically mapped onto visual images of roundedness. As these examples illustrate, sound symbolism offers a window through which to examine the role of iconicity in natural languages, a topic that is actively explored in cognitive linguistics.

The third reason why sound symbolism may be interesting to study from the perspective of cognitive linguistics is the possibility that sound symbolism is an instance of a more general cognitive mechanism, namely, *cross-modal perception* in which sensation in one cognitive modality affects sensation in another modality (e.g. Lockwood & Dingemanse, 2015; Ramachandran & Hubbard 2001, Spence 2011). It has been found, for instance, that sounds have systematic relationships not only with meanings, but also with visual shapes (Köhler, 1947; see below for more) and taste (e.g. Crisinel & Spence 2009). The iconicity of quantity discussed above is also observed between other domains of cognition (Marks, 1978). A growing body of work shows that our cognitive system is organized in such a way that different modalities are actively influencing one another (Spence, 2011). Sound symbolism is no exception in the sense that it involves a cross-modal mapping from one modality (sounds/audition) to another modality (meaning/size/shape). These observations suggest that sound symbolism instantiates a case in which our linguistic knowledge is shaped by domain-general, rather than language-specific, cognitive mechanisms, supporting another tenet of cognitive linguistics.

2 Sound symbolism in proper names

For the reasons outlined above, sound symbolism is now a topic that is actively explored by phoneticians, psychologists, cognitive scientists, as well as by cognitive linguists. To contribute to this ever-growing body of literature, the present paper builds on research examining sound symbolic patterns in proper names, pursuing the general thesis that names are not chosen randomly. More specifically, we aim to provide further evidence for the hypothesis that certain types of sound with particular phonological properties are chosen to capture an aspect of the named object or person.

More concretely, one major inspiration of our current research is a classic observation that male names and female names are characterized by different phonological features in languages like English and Japanese (Brown & Ford, 1961; Cassidy et al., 1999; Cutler et al., 1990; Slater & Feinman, 1985; Tessier, 2010; Whissell, 2001; Wright & Hay, 2002; Wright et al., 2005), and some of these features are demonstrably based on sound symbolic principles (see Sidhu & Pexman 2019 for a recent summary). For example, male names are more likely to contain obstruents (plosives, fricatives, affricates) than female names. In contrast, female names are more likely to contain sonorants (nasals, liquids, glides) than male names. These generalizations are known to hold both in English (Cassidy et al., 1999; Slater & Feinman, 1985; Tessier, 2010; Wright & Hay, 2002;

Wright et al., 2005) and Japanese (Kawahara et al., 2015; Shinohara & Kawahara, 2013; Uemura, 1965). Beyond English and Japanese, cross-linguistically, less sonorous consonants are more likely to appear word-initially for a term meaning "father" than for a term meaning "mother" (e.g., [papa] vs. [mama]) (Murdock, 1959).

These generalizations are demonstrably rooted in another well-studied case of sound symbolism: the *takete-maluma* effect. Köhler (1947) demonstrated that the nonce word *takete* (containing only voiceless obstruents, [t] and [k]) is likely to be associated with an angular object, whereas the nonce word *maluma* (containing only sonorants, [m] and [l]) tends to be associated with a round object. This shape-sound association is replicated by a number of follow-up studies (e.g. D'onofrio, 2014; Kawahara & Shinohara, 2013; Lindauer, 1990; Nobile, 2015). It is not too surprising that these sound-shape associations are extended to other semantic dimensions via further semantic associations; for example, prototypically, male bodies tend to be more angular than female bodies, and hence obstruents may have gotten to be associated with maleness mediated by the notion of angularity. Likewise, sonorants may have gotten to be associated with femaleness mediated by the notion of roundness.

Regarding the question of the phonetic basis of the *takete-maluma* effect, Kawahara & Shinohara (2012) conjectured that this sound-symbolic connection between obstruents and angular shapes derives from abrupt amplitude modulations during the burst and frication of these sounds, acoustic characteristics of obstruents. Jurafsky (2014) and Nobile (2015) entertain a similar idea. Aperiodic noise resulting from the rise of intraoral airpressure—defining features of obstruent—look, literally speaking, spikey and angular on waveforms (Figure 1(a), (b)). On the other hand, periodic energies of sonorants, reflecting regular vocal fold vibrations, look round on waveforms (Figure 1(c), (d)). These acoustic characteristics can be projected onto the perception of different types of shapes. To the extent that this hypothesis is on the right track,[3] these sound symbolic connections imply that listeners' auditory representations of the sounds, shaped by the experience of listening to their acoustic characteristics, non-trivially affect their linguistic knowledge (Perniss & Vigliocco, 2014).

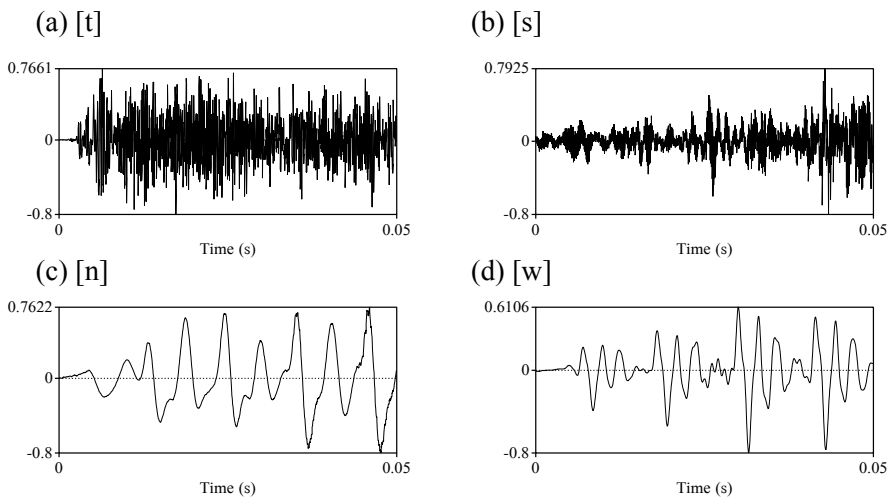

Figure 1: Waveforms of [t], [s], [n] and [w]. Obstruents (the top two panels) look angular, while sonorants (the bottom two panels) look round. Adapted from Kawahara (2017).

Within this larger context of studies of sound symbolism, one emerging general project is exploration of sound symbolic patterns in the Pokémon characters' names, the project now known as Pokémonastics (Godoy et al., 2019; Kawahara et al., 2018a, 2018b; Kawahara & Kumagai, 2019a, b; Kumagai & Kawahara, 2019; Shih et al., 2018, 2019). As of 2017, there were more than 800 Pokémon characters, each possessing particular attributes such as weight, size, and strength. A growing body of work reveals that these attributes can be probabilistically predicted from the sound properties of their names. For example, voiced obstruents ([b], [d], [g], and [z]) were found to be associated with Pokémon characters that are larger, heavier and stronger in the Japanese Pokémon names (Kawahara et al., 2018b), and this sound symbolic association is demonstrably productive, as shown by experiments using new Pokémon characters and nonce names (Kawahara et al., 2018a; Kawahara & Kumagai, 2019a, b; Kumagai & Kawahara, 2019). Subsequent studies of the existing Japanese Pokémon names have shown in addition that bilabial consonants are associated with smaller characters (Shih et al., 2018, 2019).

As noted by Shih et al. (2018, 2019), using the Pokémon universe has some distinct virtues for studies of sound symbolism. First, this universe has a large number of creatures, which allows for statistical exploration of sound symbolic patterns in their names. Second, perhaps more importantly, the Pokémon universe has a fixed set of denotations (i.e. the Pokémon creatures), which is held constant across different languages. This feature is not what can be expected to hold in natural languages, because languages differ in terms of the set of denotations that they deploy. For example, Japanese lexically distinguishes "rice plant" (=*ine*), "cooked rice" (=*gohan*), and "raw rice" (=*kome*), but these distinctions are not present in English. Such cross-linguistic differences are

pervasive; some languages do not even have a term for "left" or "right," and instead use absolute direction terms, such as "east" or "west" (Levinson, 1997). If we were to use basic vocabulary to study sound symbolism across languages (e.g. Wichman et al., 2010), we would have to face this problem that the set under consideration is not consistent across languages. This problem does not arise in the Pokémon universe, because in any language we study, the set of characters that are named is fixed.[4] With these advantages in mind, one of the case studies reported below expands on the existing studies of sound symbolic patterns in Pokémon names.

2.1 The current study

The current study is a case study of sound symbolism in personal names, aiming to address one specific question: can villain-ness be symbolically expressed? As mentioned earlier, which semantic properties can be symbolically expressed in human languages is one important question that is (and most likely continues to be) addressed in the studies of sound symbolism. We test two specific hypotheses stated in (1). We will come back to the discussion of why we would expect villain-ness to be symbolically represented in the general discussion section (section 4), but for now, we note that it is interesting to ask whether, in addition to very concrete concepts like size and shape discussed above, an abstract concept like "villain-ness" can be signaled by sound symbolism (see Auracher 2017 and Lupyan & Winter, 2018 for recent discussion on the relationship between sound symbolism and abstract concepts).

(1) Hypotheses to be tested

Hypothesis 1a. Voiced obstruents are favored in villains' names.

Hypothesis 1b. Bilabial consonants are avoided in villains' names.

Hypothesis (1a) is motivated by the observation that, in Japanese, voiced obstruents are generally associated with negative images (e.g., Hamano, 1986; Kawahara et al., 2008; Kubozono, 1999; Suzuki, 1962). For example, Suzuki (1962) discusses minimal pairs like *tori* (chicken) vs. *dori* (non-edible portion of chicken) and *kani* (crab) vs. *gani* (non-edible portion of crab), in which the initial voiced stops of the latter terms express non-edibility, something that is unfavorable. Kawahara (2017) reports that voiced obstruents appear much more frequently in monsters' names in the *Urutoraman* TV series than in actual people's names. Kawahara et al. (2008) report a nonce-word experiment showing that Japanese speakers judged voiced obstruents, especially those in initial syllables, to be dirty.

While this sound-symbolic association is psychologically very salient for Japanese speakers (and hence well-known in the literature), it is yet to be examined whether the same association holds for speakers of other languages. To the best of our knowledge, Shinohara and Kawahara (2009) is the

only study which directly addressed this question; they presented pairs of pictures of the same object, one in its clean state and the other in its dirty state (e.g., a dirty dish vs. a clean dish). Along with these pictures, they presented nonce words containing voiced obstruents and those containing voiceless obstruents (e.g., [zabe] vs. [sape]). Their results showed that Mandarin Chinese and English speakers, as well as Japanese speakers, tend to associate nonce words containing voiced obstruents with "dirty" pictures.[5]

This association between voiced obstruents and dirtiness might arguably have a bodily basis, in that the production of voiced obstruents involves a non-trivial aerodynamic challenge (e.g., Hayes & Steriade, 2004; Jaeger, 1978; Ohala, 1983; Proctor et al., 2010; Westbury & Keating, 1986). The oral constriction required to produce an obstruent blocks the airflow in the oral cavity, which raises the intraoral air pressure, making it hard to sustain sufficient transglottal air pressure to maintain vocal fold vibration. Speakers thus need to resort to extra articulatory maneuvers to expand their supralaryngeal cavity, such as raising of the velum and lowering of the larynx, in order to accommodate this aerodynamic challenge. Indeed, some languages such as Hawaiian entirely lack voiced obstruents (Pukui & Elbert, 1979), and it is likely that this gap is due to this aerodynamic challenge (Hayes & Steriade, 2004). The aerodynamic challenge of voiced obstruents, because of the extra articulatory burden, may cause negative images for voiced obstruents.[6] As the aerodynamic challenge of voiced obstruents is a matter of aerodynamics (i.e., physics), it would come as no surprise if this sound-symbolic association were to be observed across languages, hence the Hypothesis (1a).

The first case study presented in the current paper tests Hypothesis (1a) by examining the names of English Disney characters. The prediction is that if voiced obstruents are associated with general negative images in English (just as in Japanese), voiced obstruents should be more likely to appear in the names of villains than in those of non-villains. To examine whether a similar tendency holds in Japanese, the second case study uses existing Japanese Pokémon names to investigate whether the names of villainous characters are more likely to contain voiced obstruents than those of non-villainous characters.

Hypothesis (1b) was inspired by the recent observation by Kumagai and Kawahara (2020) that bilabial sounds such as [p] and [m] are often used in the names of Japanese diapers (e.g., *mamiipoko* and *meriizu*). These studies show that not only are [p] and [m] often used in existing diaper names, when Japanese speakers are asked to come up with new diaper names and adult cosmetic names, all types of bilabial consonants appear in diaper names more frequently than in adult cosmetic names. Their follow-up forced-choice task using nonce words moreover shows that when presented with nonce words with bilabial consonants and those with coronal consonants, the former is more likely

to be chosen for diaper names. In short, it appears to be the case that bilabials in Japanese can symbolically represent baby diapers.

Kumagai & Kawahara (2020) point out that bilabials emerge relatively early in the language acquisition process—bilabials occur very frequently in babbling, and they are one of the first sets of sounds that are acquired by infants in general (Jakobson, 1941; MacNeilage et al., 1997). Ota (2015) provides a summary of studies on the acquisition of different phonemes by Japanese children, and these studies generally show that bilabials are indeed among those that are acquired early.[7] To the extent that bilabial consonants are very often used by babies, it is not too surprising that they are symbolically associated with the image of "baby-ness" (for a related proposal, see also Jakobson, 1969). Indeed, Japanese employs the onomatopoetic expression [babuu] to mimic babies' babbling. Furthermore, Kumagai (2019) demonstrates that bilabial sounds such as [p] and [m] are judged to be cuter than any other consonants by Japanese speakers. In addition, Shih et al. (2018, 2019) found that Japanese Pokémon characters whose names include bilabial sounds tend to be smaller, which implies that Japanese speakers may make a sound-symbolic association between bilabial sounds and smallness. To summarize, the results of these studies predict that bilabial sounds would be avoided in villains' names, assuming that villainous characters are not meant to be cute, weak, or a baby-like.

Before we proceed, one caveat on our analyses is in order. As pointed out by an anonymous reviewer, since [b] is both bilabial and a voiced obstruent, the two hypotheses in (1) make conflicting predictions regarding [b]. This issue is inevitable, as a sound is defined on multiple dimensions (generally speaking, place of articulation, manner of articulation and laryngeal contrasts), each of which can have a sound symbolic value (see e.g. D'onofrio, 2014 for multiple-dimensionality of the sounds, and what that means for sound symbolism). The same sound—for the case at hand, [b]—can potentially be both villainous and a baby-like (implying non-villain-ness) at the same time. However, one could be concerned that counting [b] in the analyses as representing both villain-ness and cuteness may promote confirmation biases. To be conservative, therefore, we excluded [b] from the analyses altogether.[8]

3 Names of villainous Disney characters

The first case study targeted Disney characters' names in English, and we believe that this is the first attempt to analyze Disney characters' names from the perspective of sound symbolism. Moreover, as far as we know, neither of the hypotheses in (1) has been tested using English names in general. The corpus of English Disney character names provides a sufficiently large dataset for quantitative testing of these hypotheses. Testing villains' names using Disney characters' names is interesting because the tension or conflict between heroes and villains is a prominent theme in Disney stories,

and Disney designers (consciously or unconsciously) may therefore consider it to be important to highlight villains' evil qualities.[9] This is not to deny that "surprise" is also an important factor in Disney films, and a character's villainous status should not be guessed solely on the basis of their names.

3.1 Method

Disney characters' names were collected from "The Disney Wiki: Characters from theatrical animated features," and villains' names from "The Disney Wiki: List of Disney Villains." Names labelled as "redeemed," "neutral," or "deleted" were excluded from the current analysis, as were titles such as "Mr." and suffixes based on existing names (e.g., "king"), phrases containing prepositions (e.g., "of") and determiners (e.g., "the"). For example, in the case of "Willie the Whale", only the "Willie" portion was coded. If a particular name appeared in more than one movie, that name was counted only once. This procedure resulted in 179 villains' names containing 297 obstruents and 785 names of non-villains containing 1,244 obstruents. Orthographic representations were automatically converted to semi-phonemic transcriptions using the LOGIOS Lexicon Tool, allowing us to access the presence of voiced obstruents and bilabial consonants in each name; the set of bilabial consonants in English included [p, m, w] (recall that [b] was excluded from the analysis). The set of names that was analyzed is made available online as a part of the supplementary materials at xxx.

3.2 Results

Table 1 shows the distribution of voiced and voiceless obstruents in the names of Disney villains and non-villains. We observe that villains are more likely to have names that contain voiced obstruents (e.g., *Drizella*, *Gantu* and *Gaston*) than non-villains, and this skewed distribution is statistically significant ($\chi^2(1) = 9.868$, $p < .01$, $\varphi=0.80$). As expected, the sound-symbolic effect is not deterministic—that is, it is not a dichotomous decision but it instead manifests itself as a stochastic (probabilistic) tendency. This result suggests that while a language is a system that can connect sounds and meanings in an arbitrary way, as Saussure (1916/1972) and Hockett (1959) suggested, sound symbolic principles can exert their influence in a stochastic way.

Table 1: Voiced obstruents vs. voiceless obstruents in the names of Disney characters

	Voiced	Voiceless	Total
Villains	118 (39.7%)	179 (60.3%)	297
Non-villains	374 (30.1%)	870 (87.1%)	1,244
Total	492	1,049	1,541

Table 2 shows that bilabial sounds are more often used in the names of non-villains (e.g., *Pinocchio*, *Pochatontas*, *Moana*, *Micky*) than in villains' names. Although the size of this difference

is small, it is nevertheless statistically significant ($\chi^2(1) = 3.877$, $p < .05$, $\varphi = 0.037$).[10] This finding is especially interesting because, to the best of our knowledge, this sound symbolic value of bilabial consonants in English has been understudied. Descriptively, we can conclude that villains' names in English avoid bilabial consonants to a statistically significant degree; this pattern holds, maybe because English speakers (like Japanese speakers) associate bilabial consonants with images of innocence, cuteness or baby-ness, as these sounds are prototypically observed in babies' speech, as detailed in section 1.3.

Table 2: Bilabial consonants vs. non-bilabial consonants in the names of Disney characters

	Bilabial	Non-bilabial	Total
Villains	54 (9.7%)	500 (90.3%)	554
Non-villains	293 (12.9%)	1,974 (87%)	2,267
Total	347	2,474	2,821

4 Names of villainous Pokémon characters

The previous section has shown that it is possible to represent villain-ness with sound symbolism. Two questions arise: (1) is villain-ness expressed symbolically in a language other than English? and (2) would we observe a similar sound symbolic pattern in a domain other than Disney characters? To address these questions, we explore another empirical domain, the Pokémon universe. The analysis offered in this section was inspired by Pokémonastics, a series of studies on sound symbolic patterns in Pokémon names, which show different types of sound symbolic patterns in the Pokémon universe across different languages (see section 1.2). These previous studies have targeted Pokémon characters' weight, height, evolution levels and their strengths and examined whether these parameters can be (probabilistically) predicted from their names. The present analysis explores one unexplored aspect of Pokémon characters, namely, *types*.[11] This study thus not only addresses the question of whether Japanese expresses villain-ness by way of sound symbolism, but it also expands the scope of the Pokémonastics research paradigm.

4.1 Method

All Pokémon names available as of February 2018 (i.e., up to the 7th generation) were included in this analysis. In the games, Pokémon characters are classified into different types. In the current study, three villainous types were grouped together: Dark, Poison and Ghost. The aim was to explore whether these names were more likely to contain voiced obstruents and less likely to contain bilabial sounds, compared to other types of Pokémon characters. Those that are both Ghost and Fairy types were excluded because of their ambivalent status. Pokémon names that include symbols indicating gender (♂ and ♀) or numerical expressions were also excluded, as it is not unambiguously clear how these are to be read. This procedure yielded 141 villain names containing 277 obstruents, and

653 non-villain names containing 1,168 obstruents. Geminate consonants (i.e. long consonants) were counted as one instance, not two. Japanese contrasts plain (non-palatalized) consonants and palatalized consonants; both plain and palatalized consonants were counted. The set of target Japanese bilabial consonants thus included [$p^{(j)}$, $m^{(j)}$, $\phi^{(j)}$, w] ([ϕ] is a voiceless bilabial fricative; [w] does not have a palatalized counterpart). The list of names that was analyzed is made available as a part of the online supplementary materials.

4.2 Results

Table 3 shows the distribution of voiced obstruents and voiceless obstruents. As predicted, there are more voiced obstruents in villains' names (e.g., *Abusoru, Dogaasu, Derubiru*) than in those of non-villains, and this difference is statistically significant ($\chi^2(1) = 10.827$, $p < .001$, $\varphi=0.087$). This result is compatible with the observation that Japanese speakers generally find voiced obstruents to be associated with negative images. It is also compatible with the observation by Kawahara (2017) that voiced obstruents very often appear in Japanese monsters' names.

Table 3: Voiced obstruents vs. voiceless obstruents in the names of Pokémon characters

	Voiced	Voiceless	Total
Villains	111 (40.1%)	166 (59.9%)	277
Non-villains	346 (29.6%)	822 (70.4%)	1,168
Total	457	988	1,445

Table 4 shows the distribution of bilabial and non-bilabial consonants. Although villains' names are less likely to contain bilabials than those of non-villains, the difference was not significant ($\chi^2(1) = 2.922$, *n.s.*, $\varphi=0.033$). To analyze the pattern in further detail, we compared the Dark type (which in Japanese literally means "evil") and the Fairy type, which is the least villainous. Each of these types had 46 names. As shown in Table 5, this follow-up analysis highlights the difference in the use of bilabial consonants between the two groups, which is significant ($\chi^2(1) = 14.326$, $p < .001$, $\varphi=0.216$. This finding accords well with the previous finding that bilabial consonants are associated in Japanese with images of babies (Kumagai & Kawahara, 2020). As bilabial consonants connote innocence, smallness and cuteness, they are not considered to be very appropriate for Dark characters.

Table 4: Bilabial vs. non-bilabial consonants in the names of Pokémon characters

	Bilabial	Non-bilabial	Total
Villains	66 (13.6%)	420 (86.4%)	486
Non-villains	359 (16.9%)	1,768 (83.1%)	2,127
Total	425	2,188	2,613

Table 5: Bilabial vs. non-bilabial consonants: Dark vs. Fairy.

	Bilabial	Non-bilabial	Total
Dark	17 (10.7%)	142 (89.3%)	159
Fairy	42 (28.4%)	106 (71.6%)	148
Total	59	248	307

5 General discussion and conclusions

This paper has contributed to studies of sound symbolism, the stochastic and systematic correspondence between sounds and meanings, by showing that a concept as abstract as "villain-ness" can be signaled symbolically. Previous studies have shown that proper names of particular types are often characterized by particular phonological characteristics, some of which are based on sound-symbolic principles. Building on these studies, we have demonstrated that the names of both English Disney villains and Japanese Pokémon villains are more likely to contain voiced obstruents and less likely to contain bilabial sounds than those of non-villains (although the effect of bilabiality in Pokémon names was confined to a comparison between Dark and Fairy types). These novel findings augment the growing body of research confirming the existence of sound symbolism in natural languages. The effects of bilabial consonants in Disney names were especially interesting, as the sound symbolic effect of bilabial consonants is, to the best of our knowledge, understudied in English.

As discussed in section 1.3, voiced obstruents may be associated with negative images because of the aerodynamic challenge they present, and extra articulatory adjustments that are called for to accommodate that challenge. Bilabial consonants may be associated with "baby-ness" because these are the prototypical sounds that babies most often make in their babbling. If these hypotheses are on the right track, it seems reasonable to hypothesize that the sound symbolic relationships that we have identified in the current studies may have their basis in the ways we manipulate and observe our speech. In that sense, then, sound symbolism constitutes a case of *embodiment* in language.

Finally, we would like to reflect briefly upon the further implications of the present study. While

most previous studies of sound symbolism have investigated primary perceptual properties like size, shape, or hardness/softness, the present findings suggest that more abstract concepts like *evilness* may be symbolically associated with particular sets of sounds, which might yield important clues about the origins of ethics. Not all abstract concepts are probably signaled by sound symbolism; to our knowledge, there is no empirical evidence that the concept of "responsibility," for example, can be symbolically associated with any phonological category. Where does this difference lie? We tentatively propose that, to survive, our human ancestors had to make informed judgments about other members of the society, especially in order to distinguish those who are not altruistic. As many researchers, including Tomasello (2009), have argued, humans' altruistic tendencies distinguish them from other animals. Acquired through evolution, this trait is likely to have contributed to our survival. To sustain strong communities, we must be able to detect and eliminate "betrayers"—free-riders who exploit others' altruism or tyrants who destroy the welfare of community members (Boehm, 2012). As proposed by Alexander (1987), the selection-by-reputation theory contends that humans may have evolved a sensitivity to society's "bad members" or "evil ones" and learned to disseminate this information by means of language. If so, properties like evilness may not be totally abstract, but instead provide near-perceptual information to which we pay special attention. If sounds can signal who is likely to be vicious, this may also be advantageous, explaining at least in part why there can be an association between certain sounds and the image of evilness. See also the recent claim by Auracher (2017) who demonstrates that sound symbolism can signal notions related to social dominance.

This explanation finds an interesting parallel with what Shih et al. (2019) concludes based on an extensive cross-linguistic comparison of Pokémon names. They observe that unlike in the real world (see section 1.2), we do not observe robust sound symbolic effects to signal gender differences in the Pokémon world. They argue that this difference arises because finding a mate is crucial for survival in the real world, but not so much in the Pokémon world. This claim is further supported by the fact that Pokémon strength status is actively signaled by way of sound symbolism across languages, and this is so because Pokémon characters routinely fight with each other. They conclude that sound symbolism is actively deployed to signal those attributes that are important for their lives in the given world. Integrating their conclusions with ours, we would like to close this paper by suggesting that exploring the sound symbolism of ethics-related concepts may prove to be a fruitful topic for future studies, especially in the context of cognitive linguistics.

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Tools and Corpus (on the Web)

LOGIOS Lexicon Tool
http://www.speech.cs.cmu.edu/tools/lextool.html (accessed 2018/01/10)

The Disney Wiki: Characters from Theatrical Animated Features
http://disney.wikia.com/wiki/Characters_from_theatrical_animated_feature (accessed 2018/01/10).

The Disney Wiki: List ofDisney Villains.
http://disney.wikia.com/wiki/List_of_Disney_villains (accessed 2018/01/10).

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[1] While this experiment by Sapir (1929) is now generally considered as one of the major inspirations of modern experimental studies of sound symbolism, which is true to some extent, as an anonymous reviewer reminded us, his results may need to be interpreted with more caution. Sapir (1929) tested different comparisons among different vowels, and even tested those vowels that do not exist in English. The subsequent studies citing Sapir (1929) tend to focus on the clearest contrast—[a] vs. [i]—which may have exaggerated the importance of his finding. With these said, later studies following up on Sapir (1929) have established, convincingly in our opinion, that different vowels evoke different size ratings (patterns often referred to as "magnitude sound symbolism": see e.g. Nuckolls, 1999).

[2] Not all sound-meaning correspondences may have such a bodily basis in the articulatory nature of our speech. For example, the English *gl-* sequence is often used for words that mean something

related to light (e.g. *glitter, glare* and *glow*), but there is no phonetic sense in which *gl-* emits any kind of light. As such, these patterns are sometimes referred to as "systematicity," distinguished from other types of sound symbolism, and they are very often language-specific (e.g. Dingemanse et al. 2015). See Bergen (2004) for an extensive discussion of this pattern, also known as "phonaesthemes." However, many if not all patterns of sound symbolism seem to have a basis either in articulatory or acoustic properties of the sounds (see Kawahara 2017, 2020 for recent exemplification), and the patterns that the current study analyzes are no exceptions.

[3] We fully admit that that establishing a causality relationship is impossible, and that Kawahara & Shinohara's (2012) proposal remains as a hypothesis.

[4] This methodology is foreshadowed by Berlin (1994, 2006) who studied the names of tinamou and rail (i.e. "ethnozoological nomenclature") across 17 languages. In his work too, the set of denotation is fixed across all the target languages.

[5] A number of studies, starting with Newman (1933), have shown that English speakers associate voiced obstruents with images of largeness and/or heaviness. The analysis of English Pokémon names shows that there is a correlation between size/power and the number of voiced obstruents (Shih et al. 2019). One of the experiments reported by Kawahara & Breiss (2020) shows that English speakers tend to associate nonce names with voiced obstruents with larger, post-evolution Pokémon characters (though see Kawahara & Moore, 2020). Shih & Rudin (2019) demonstrate that when they examine the nicknames of Major League Baseball players, there is a positive correlation between the number of voiced obstruents and their height. Iwasaki et al. (2007) show that English speakers are at least partially sensitive to the meanings of voicing in obstruents when guessing the meanings of Japanese onomatopoetic expressions.

[6] An underlying assumption here is that articulatory challenge, which we take to be a negative thing, can be projected onto negative images. As an anonymous reviewer pointed out, this is a big assumption which should not be taken for granted. The reviewer also suggested an alternative hypothesis: to quote, "since voiced obstruents are associated with larger size, this idea of larger size might itself be suggestive of negativity, since what is viewed in a negative way might seem larger and out of control." One way to address this alternative is to test whether other sounds that are judged to be large (e.g. [a]) are also judged to be negative; testing this alternative is beyond the scope of the current paper, however. The reviewer also asked if we should consider this sound symbolic relationship to be a conventional one that is specific to Japanese, just like *gl-* sequence in English. We doubt that this is the case, as the effects of voiced obstruents are observed in languages other than Japanese, as our current study shows (see also Newman 1933; Iwasaki 2007; Kawahara & Breiss 2020; Shih & Rudin 2019), and that this sound symbolic association arguably has an articulatory basis. However, we acknowledge that it is important to examine languages other than Japanese and English, if we are to argue that the sound symbolic connection is universal.

[7] The bilabial fricative [ɸ] is a clear exception to this generalization. To reconcile this observation with their experimental results, Kumagai & Kawahara (2020) propose that their results instantiate a case of feature-based generalization; i.e. the sound-symbolic association holds at the level of distinctive features rather than at individual segments, involving some sort of abstraction.

[8] This analytical strategy is conservative to the extent that follow-up experimental studies show that

[b] is suited to express both villain-ness (Kawahara & Kumagai, 2019b) and cuteness (Kumagai 2019; Kumagai & Kawahara, 2019b, 2020). Including [b] in the current analyses did not change the results.

[9] See also Teshigawara (2003), who showed that villains' voices have some salient phonetic characteristics, demonstrably involving pharyngeal expansion and accompanying lowering of F2. See also Miyakoda & Oshita 2019.

[10] Since the two hypotheses in (1) were pre-planned rather than post-hoc, the alpha level was not corrected.

[11] While this paper was under review, a follow-up experimental study further examined the productivity of the sound symbolic effects on Pokémon types (Kawahara & Kumagai 2019b). It still remains to be the case that this paper is the first one that has established the sound symbolic effects on Pokémon types.