How Pokémonastics has evolved: Ver 2.1*

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Abstract

Pokémonastics is a research paradigm in which researchers use Pokémon names to explore the nature of sound symbolic patterns in natural languages. In this document, I would like to review how this project has developed so far, highlighting the contributions of my collaborators and other researchers. I hope to keep updating this document, as we complete more case studies within Pokémonastics.

1 How it started

Kawahara et al. (2018b), originally circulated in late 2016, is the very first study in Pokémonastics, a research paradigm in which we use Pokémon names to explore the nature of sound symbolic patterns in natural languages.[1] The whole project came out of in-class discussion during a week-long intensive lecture that I gave at Tokyo Metropolitan University. Gakuji Kumagai, a then PhD candidate, came up with the original idea of analyzing Pokémon names, after my lecture on the phonetic bases of sound symbolism.[2] Atsushi Noto took care of much of the data-coding within a day or two, so that we could complete the preliminary analysis within that week. The paper analyzed the set of existing Pokémon names in Japanese and found that the number of voiced

*I would like to express my gratitude to all my Pokémonastics collaborators, without whom this general project would not have evolved nearly as much. One goal of this document is acknowledge the contribution by each of you. Thank you! I presented an overview of the Pokémonastics project at CNRS, the University of College London, the University of North Carolina, International Christian University and ZAS. I also used some of the Pokémonastics materials for my teaching at International Christian University, Keio University and Tokyo Metropolitan University, as well as at many other invited public lectures that I gave in Japan. All of these opportunities helped me organize my thoughts. All remaining errors are to be solved in future versions of this document.

[1]There is an important precedent: Miura et al. (2012) used a machine learning technique to generate "strong-sounding" Pokémon names.

[2]Gakuji Kumagai, now an associate professor at Kansai University, has been an active Pokémonastics researcher since its inception. He has also extended the domain of sound symbolic analyses to other, related genres (Kumagai et al. 2020; Kumagai 2021, 2022).

obstruents contained in the names as well as the name lengths measured in terms of mora counts positively correlate with several Pokémon-related parameters such as weight, height, evolution levels and strengths. We ended up publishing the paper in *Phonetica* in 2018, as it bears upon Ohala's Frequency Code Hypothesis, whose essence was published in the journal in 1984 (Ohala 1984).

Prior to the publication of Kawahara et al. (2018b), a preliminary version of that initial analysis was also presented in an introductory phonetics book that I wrote in Japanese (Kawahara 2017, Chapter 6).

2 Experimental explorations

Gakuji Kumagai and I followed up on Kawahara et al. (2018b) to address the question of the productivity of the sound symbolic patterns that we identified in the existing names. The first experimental study using nonce names was conducted in early 2017 and appeared as Kawahara & Kumagai (2019a). The second experimental study, written up primarily by Kumagai in Japanese, appeared as Kumagai & Kawahara (2019). A Maximum Entropy (MaxEnt) analysis of sound symbolic connections was first presented in this paper, and my memory suggests that it was mainly Kumagai's idea. This evolving hunch—we can use MaxEnt to model stochastic sound-meaning connections—was further developed in several later works of mine (Kawahara 2020a,d, 2021a,b; Kawahara et al. 2019), and still continues to be one of my current research agendas.

With a different research team, we tested whether the results obtained by Kumagai & Kawahara (2019) would replicate with preschoolers (Kawahara et al. 2018a). This is one direction in which I would like to expand on in the future.

The three experimental studies mentioned so far (Kawahara et al. 2018a; Kawahara & Kumagai 2019a; Kumagai & Kawahara 2019) only tested the notion of evolution. Two experiments reported in Kawahara & Kumagai (2021) in addition tested whether weight, height, and strength can each be signaled by voiced obstruents through sound symbolism in Japanese, and the results were positive. The main inspiration of that work is Winter et al. (2019), who showed the multi-dimensionality of sound symbolism.

3 Going beyond Japanese

When Kawahara et al. (2018b) was still circulated as an unpublished manuscript, an international group of researchers, led by Stephanie S Shih, started analyzing the Pokémon names in other languages, going beyond Japanese (Shih et al. 2018). The name of this general research project—Pokémonastics—is actually due to Shih. This effort has been crystallized as Shih et al. (2019),

which analyzes Pokémon names in Cantonese, English, Japanese, Korean, Mandarin, and Russian.

Many authors of Shih et al. (2019) got together in Tokyo at the 1st International Conference on Pokémonastics held at Keio University in May 2018. This conference also featured a number of other presentations on sound symbolic patterns in several genres.

Inspired by Shih et al. (2018), Jeff Moore and I conducted two nonce-word experiments with English speakers. The experiments were conducted in 2018. Various factors contributed to the delay of publication of this paper, which finally appeared in print in 2021 (Kawahara & Moore 2021). After this paper was accepted, together Canaan Breiss and I conducted two follow-up experiments with English speakers to address the additional issue of cumulativity in sound symbolism (Kawahara & Breiss 2021).

A team of researchers in Brazil, led by Mahayana Godoy, ran a series of studies that elicit Pokémon names in Brazilian Portuguese, since in Brazil, they use English Pokémon names (Godoy et al. 2020). Building on these experimental studies, Kumagai & Kawahara (2022) studied another language, i.e. Russian speakers, exploring what kind of phonetic features Russian speakers use to express evolution in Pokémon names—Kumagai et al. (2022) is a follow-up study, addressing some issues that were left unanswered in Kumagai & Kawahara (2022). Glewwe et al. (2024) tested Georgian speakers, and found interesting sound symbolic effects of voiced obstruents and ejectives.

One interesting cross-linguistic generalization that is emerging from these studies is that in all the languages which have been tested experimentally so far (Japanese, English, Brazilian Portuguese, Russian and Georgian), voiced obstruents tend to be associated with post-evolution Pokémon names. This cross-linguistically prevalent sound symbolic connection may arise because voiced obstruents are associated with the image of largeness, which itself may stem from the expansion of the oral cavity that is associated with the articulation of voiced obstruents (Proctor et al. 2010) and/or low frequency energy that is characteristic of voiced obstruents (Ohala 1984). It would be interesting to test this sound symbolic connection in other languages.

4 Why phonologists should study sound symbolism

Starting around 2020 I started thinking about why I, as a theoretical phonologist/phonetician, am interested in sound symbolism. During the time of lockdown due to COVID-19 in the spring of 2020, I came across a handout by Bruce Hayes (Hayes 2020) (which has now been published as Hayes 2022). Hoping that I could do something fun (i.e. Pokémonastics) during that depressing time, while at the same time addressing issues that theoretical linguists would be interested in, I tested the quantitative prediction of MaxEnt laid out by Hayes (2020). This resulted in the article published in *Phonology* (Kawahara 2020d). A direct follow-up study is reported in Kawahara

(2021b).

These two studies were actually inspired by a term paper written by Michinori Suzuki, a then undergraduate student at International Christian University, which analyzed *move* names (Suzuki 2017). With Kumagai and Suzuki, I ran a follow-up judgment study, which is reported in Kawahara et al. (2020b). All of these studies, as well as Kawahara & Breiss (2021), address the general issue of the cumulativity of sound symbolism (Kawahara 2020a)—whether sound symbolic effects are cumulative, and if so, how? This general issue of cumulativity, I believe, is one factor that makes studies of sound symbolism potentially interesting for theoretical linguists, as (non-)cumulative nature of phonological patterns is one topic that is actively debated in the theoretical phonology literature (Breiss 2020).

More generally, I now have a strong feeling that theoretical phonologists have much to learn by studying sound symbolic patterns in natural languages. For example, we can explore the phonetic bases of sound symbolism, just like we explore the phonetic grounding of phonological patterns (Hayes et al. 2004). Whether phonology is phonetically natural—and if so, to what extent this thesis holds—continues to be one of the most debated topics in phonology; the same question can be addressed by studying sound symbolic patterns . We can also address the issue of whether phonetic bases of sound symbolism are articulatory or auditory (or both), just as we explore whether distinctive features should be defined in terms of articulation or (psycho)acoustics (Kingston 2007). I wrote a brief summary/position article on this topic (Kawahara 2020b), explaining why it is interesting/important for theoretical phonologists to look at sound symbolic patterns.

Put simply, one question that we can and should explore is, can we treat sound symbolic sound-meaning connections just like input-output mappings that we posit in phonological analyses? More generally, how similar are sound-symbolic connections and phonological mappings? Kawahara & Kumagai (2024) is an attempt that addresses this question. They focused on a classic observation that "phonology does not count" (McCarthy & Prince 1986)—more concretely, there are many languages that prohibit two occurrences of the same segment/feature, but there do not seem to be any languages that prohibit three while allowing for two (Ito & Mester 2003). In fact, a recent experimental study on rendaku by Kawahara & Kumagai (2023) shows that Japanese speakers do not appear to distinguish forms with two voiced obstruents and those with three voiced obstruents. On the other hand, Kawahara & Kumagai (2024) showed that sound symbolic effects are stronger for forms with three voiced obstruents and those with two. In this sense, sound symbolism exhibits a counting capacity that phonological constraints arguably do not have—at least, how Japanese speakers treat voiced obstruents are different between the judgment of rendaku and sound symbolic patterns.

5 Studying types and beyond

To my pleasant surprise, two undergraduate students at Tokyo University of Agriculture and Technology (Yuta Hosokoawa and Naho Atsumi) expanded the scope of Pokémonastics by studying Pokémon types (Hosokawa et al. 2018)—bilabial sounds are overrepresented in the fairy type, whereas voiced obstruents are overrepresented in villainous types. Their observations were experimentally assessed by Kawahara & Kumagai (2019b). The analyses were also further developed in Uno et al. (2020), who also discuss why it is interesting to study sound symbolism from the perspective of Cognitive Linguistics (e.g. Lakoff & Johnson 1980).

Maha Godoy pointed out that both Socrates and the Upanishads talk about the possible sound symbolic connections between sibilants and the notion of wind/sky/flying. We tested their ancient claim within Pokémonastics in Kawahara et al. (2020a). Accidentally, the link to our online experiment was advertised on a Pokémon fan website, and we obtained more than 700 participants over night, which highlights a distinct forte of running an experiment using Pokémon names.

Whether English speakers and Brazilian Portuguese speakers are also sensitive to sound symbolism related to Pokémon types was tested by Kawahara et al. (2021) and Godoy et al. (2021), respectively.

Kilpatrick et al. (2023b) even further expanded the scope of Pokémonastics by analyzing the base friendship parameters in various languages, including English, Japanese, Korean, Mandarin Chinese, German and French. They found that those Poémon characters having names with bilabial consonants tend to be friendly, whereas those with voiced obstruents tend to be unfriendly. These findings seem to be in line with the previous literature on sound symbolic values of these consonants (see e.g. Kumagai 2019 and Hamano 1998).

6 Other studies

Inspired by Winter & Perlman (2021), Kawahara (2022a) reanalyzed the data elicited by Kawahara & Kumagai (2019a) using random forest. It shows that an unsupervised learning algorithm can build a classifier which shows an important role of [d] and [g] (but not that of [b]), when distinguishing the names of pre-evolution characters and those of post-evolution characters. Kilpatrick et al. (2023a) further extended the scope of this random forrest analysis.

Just for fun, I used Pokémons to test the *bouba-kiki* effect (Ramachandran & Hubbard 2001) with English speakers, by presenting pairs of roundish Pokémons and angular Pokémons (Kawahara 2021a). The results basically replicated those of D'Onofrio (2014). I have run a similar experiment with Japanese speakers, but I feel that it is necessary to run a follow-up study to make sense of what's going on (the effects of orthography were really salient in the results). I think it

would be fun to test the *bouba-kiki* effect using Pokémons in other languages as well.

I am making an active use of these materials in my undergraduate teaching, and I have a feeling that Pokémonastics can work as a 'hook' that can attract students' interest as well as attention from the general public (Kawahara 2017, 2019, 2020c). Just to provide one example, an article explaining my research on Pokémonastiscs (written in Japanese)[3], itself an excerpt of a popular science book that I published in 2022 (Kawahara 2022b), received more than 33,000 likes and were retweeted more than 10,000 times on Twitter (now X).

7 More topics to think about

What else do I want to do? Analyses of existing Pokémon names in languages that were not covered by Shih et al. (2019) is one obvious direction. I hear from people from time to time that they have actually analyzed a new language, and I hope to see their results published soon. Ćwiek (2022) develops a detailed analysis of sound symbolism in German Pokémon names in the first generation. I would be very much interested in conducting experimental studies on languages other than English, Japanese, Brazilian Portuguese and Russian; I would love to see other researchers doing Pokémonastics experiments (for example, see Glewwe et al. 2024 on Georgian).

Another topic that I am currently thinking a lot about is whether sound symbolic principles can cause phonological alternations, and relatedly, whether phonological considerations can impact sound symbolic patterns. I am fairly optimistic that such cases exist (Akimbo 2021; Akita 2020; Alderete & Kochetov 2017; Dingemanse & Thompson 2020; Jang 2021; Kumagai 2019), implying that formal phonological systems and sound symbolic patterns are closely related with one another, at least more tightly than currently believed.

Resources

1. Almost all the papers that I wrote about Pokémonastics can be found on this web page: `http://user.keio.ac.jp/kawahara/research.html`
2. In this YouTube talk, I present a more extensive review of Pokémonastics research as of December 2020: `https://www.youtube.com/watch?v=fcEE5aaVRcA&t=1505s`.
3. Here is the conference website for the 1st International Conference on Pokémonastics. Some slides are available: `https://1stpokemonastics.wordpress.com`.

[3] `https://twitter.com/livedoornews/status/1537435894449606656`

4. Here's a nonce name generator that I use from time to time for my Pokémonastics experiments: `http://sei-street.sakura.ne.jp/page/doujin/site/doc/toolgenKanaName.html`

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