Iconic inferences about personality: From sounds and shapes*

Shigeto Kawahara (Keio University)
Kazuko Shinohara (Tokyo University of Agriculture and Technology)
Joseph Grady (Cultural Logic, LLC)

1 Introduction

1.1 General background and our claim

A general assumption in modern linguistics is that the relationship between sounds and meanings is arbitrary; i.e. that there are no iconic relationships between sounds and meanings. This thesis of arbitrariness was very clearly articulated in the work of Saussure (1916; 1916/1972) as the first principle that governs languages, and it has been influential in modern linguistic theorizing since then. On the other hand, there has also been a large number of studies suggesting that there are some non-arbitrary relationships between sounds and meanings—cases known as "sound symbolism" (Hinton et al., 1994). For example, for speakers of many languages, low and open vowels like [a] are associated with "big" images, whereas high and closed vowels like [i] are associated with "small" images (Sapir, 1929).

Most, if not all, cases of sound symbolism can be considered as an iconic projection from some phonetic properties of sounds to meanings—for the case of [a] being bigger than [i], one plausible explanation is that the mouth is more widely open for the articulation of [a] than it is for the articulation of [i] (see Jespersen 1922/1933; Sapir 1929; Shinohara & Kawahara to appear); or alternatively, the resonance cavity for the second formant resonation (F2) is larger for [a] than it is for [i] (Ohala, 1983, 1994; Shinohara & Kawahara, to appear). Regardless of whether sound symbolism is based on articulatory or acoustic characteristics, we see evidence for iconic relationships

*This study is supported by Japan Society for the Promotion of Science (JSPS) grant No. 26770147 to the first author and No. 25370425 to the second author. We are grateful for the comments that we received from the audience at the Iconicity Conference at Rikkyo University, as well as from Akita Kimi and two anonymous reviewers. We thank Jess Trombetta for her last-minute proofreading of this draft. The usual disclaimer applies.

between sounds and meanings.[1]

From a more general point of view, sound symbolism can be regarded as an instance of a general iconic projection relationship from one cognitive modality (sound) to another (meaning). The following quote from Köhler (1929/1947) summarizes this view succinctly: "I take for granted, then, that there are some similarities between the experiences we have through different sense organs [and] that in primitive languages one finds much evidence for assuming that the names of things and events often originate according to this similarity between their properties in vision or touch, and certain sounds or acoustical wholes" (quoted from Köhler 1929: 242). There are then no reasons to assume that the trans-modal mapping must be limited to a sound-meaning relationship. Rather, the null hypothesis, it would seem to us, is that an iconic projection can hold among other dimensions of human cognition.[2]

Our present case study offers a new case of such an iconic relationship among different modalities of cognition, going beyond traditional studies of sound symbolism. We present experiments that show that particular types of personalities can be iconically related to particular types of sounds and shapes. More specifically, we show that "inaccessible types of personality" are iconically associated with a class of sounds called "obstruents" as well as with angular shapes. The first connection—the one between personalities and sounds—adds to the large body of literature on sound symbolism. The second connection—the link between personalities and shapes—goes beyond traditional cases of sound symbolism, instantiating a case of trans-modal iconic projection from one cognitive modality to another.

1.2 The current case study

Our study is an extension of a by-now well established sound symbolic pattern between obstruents and angular shapes (Ahlner & Zlatev 2010; Berlin 2006; Irwin & Newland 1940; Kawahara & Shinohara 2012; Köhler 1929/1947; see also Ramachandran & Hubbard 2001). A classic study by Köhler (1929/1947) shows that given two shapes, like those in Figure 1, speakers are more likely to associate the rounded figure on the left with sonorants (nasals, liquids, and glides)—*maluma*—and the angular figure on the right with obstruents (oral stops and fricatives)—*takete* (see also Lindauer 1988, 1990 for other meanings associated with these two nonce words). Kawahara & Shinohara (2012) replicated this sound symbolic relationship with an expanded set of nonce words using auditory stimuli.

[1] Patterns of sound symbolisms do not hold as absolute principles—for example, the English word *big* has a "small" vowel. Rather, sound symbolic patterns appear as statistical tendencies in the lexicon (Ultan, 1978), and/or in experimental settings (Sapir 1929 *et seq.*).

[2] Related to this idea is the claim that sound symbolism is an instance of synesthesia (Berlin, 2006; Ramachandran & Hubbard, 2001), which is not limited to the sound-meaning relationship. See also Ahlner & Zlatev (2010), Barkhuysen et al. (2010), Lindauer (1988), Lindauer (1990), Martino & Marks (2000), and Spence (2011), among others, for

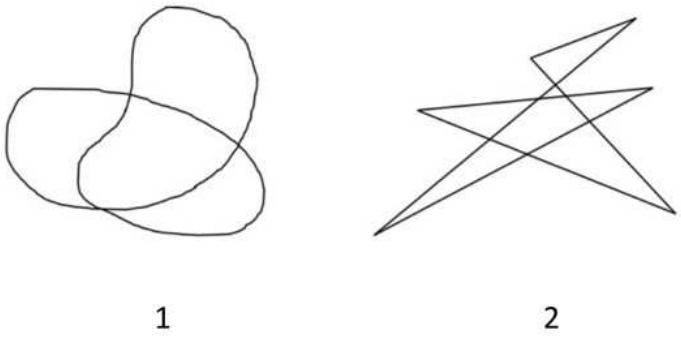

Figure 1: Two figures representing angularity and roundness

Kawahara & Shinohara (2012) argue that this association may be modulated via the acoustic properties of the two types of sounds (see also Ahlner & Zlatev 2010). Obstruents involve abrupt amplitude changes, which, when visualized on a waveform, look "angular"—the intervals annotated as "t-burst" and "s-frication" in Figure 2 involve aperiodic energies with abrupt amplitude changes, which look angular. Sonorants, on the other hand, involve more gradual amplitude changes, as shown in Figure 3, and therefore look more "rounded" when their amplitude changes are plotted. Based on these observations Kawahara & Shinohara (2012) proposed that the well-known case of sound symbolism comes from an iconic relationship between the acoustical shapes of the sounds and visual perception: "acoustic shapes"—angular and round—are mapped onto visual shapes.

discussion on cross-modal perception.

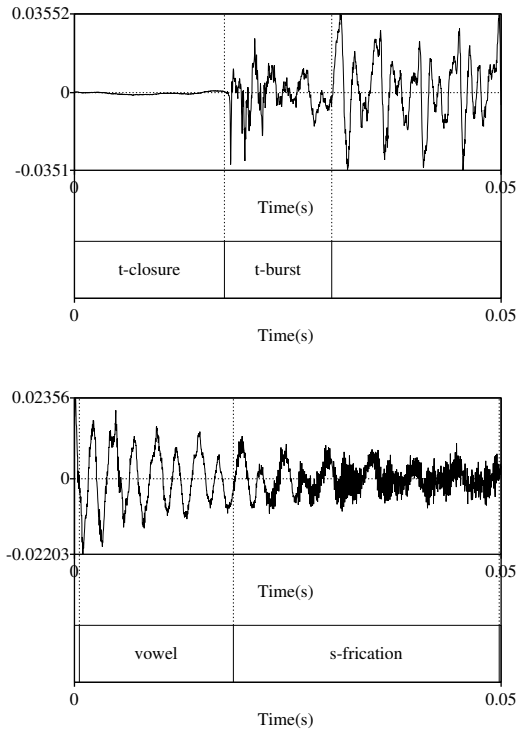

Figure 2: Acoustic representations of obstruents: the top panel=[t] and the bottom panel=[s].

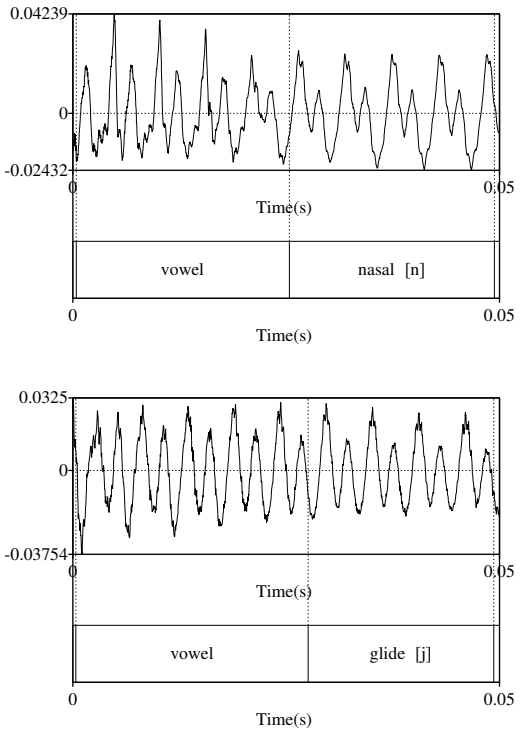

Figure 3: Acoustic representations of sonorants: the top panel=[n] and the bottom panel=[j] (as in *young*).

Furthermore, Kawahara & Shinohara (2012) show that the relationship between obstruents and angular shapes may go beyond the relationship between sounds and meanings: obstruents and angular shapes are associated with kinds of emotions that involve abrupt onsets such as "shocked" and "surprised", as opposed to those that do not involve such abrupt onsets such as "happy" and "sad". Kawahara & Shinohara (2012) further argue that obstruents involve abrupt onsets, and that this phonetic characteristic of obstruents leads to the association with emotions with abrupt onsets.

The current experiment builds on some previous studies (Lindauer, 1990; Shinohara & Kawahara, 2013) and shows that obstruents and angular shapes can also imply a particular type of personality. Lindauer (1990) demonstrates that *takete* is judged to be "unfriendly", whereas *maluma* is considered to be "friendly". Shinohara & Kawahara (2013) capitalize on the two types of female personalities that became common in the recent Japanese culture: (i) the unapproachable type of girls who are "blunt", "confident", and "unapproachable" (*tsun*), and (ii) approachable type of girls who are "modest", "cute", and "approachable" (*moe*).[3] They show that, when given a pool of particular type of young Japanese girls (so-called "*meido*"—a particular type of Japanese waitresses), Japanese speakers associate the names with obstruents with the first type of girls and the names with sonorants with the second type of girls.[4] Shinohara & Kawahara (2013) further argue that, again, these associations have acoustic bases—acoustic angularity of obstruents lead to the images of "unapproachability", whereas acoustic roundedness of sonorants lead to the images of "approachability". To the extent that these sound symbolic patterns have phonetic bases, then one prediction that can be tested is that this relationship should hold universally (as the phonetic bases are plausibly universal).

Experiment I was therefore conducted to address whether English speakers make these associations, and also whether Japanese speakers do the same for female names not specifically related to "meido". This experiment in short tested an iconic relationship between sounds and personalities. Experiment II went beyond traditional studies on sound symbolism and addressed whether there is a direct iconic relationship between shapes and personalities. Both experiments show that transmodality relations do hold. Figure 4 shows the summary of the current findings and the roadmap of the paper.

[3] It is difficult to provide precise definitions of these two concepts within limited space. See the wikipedia articles on "tsundere" and "moe (slang)" for more details on these concepts. People do argue about the precise definitions of these concepts, and the debate is unsettled, as far as we are aware of. However, it is generally clear, at least superficially, which category a person belongs to.

[4] The study built upon previous work on sound symbolic patterns in personal names both in Japanese and English (Brown & Ford, 1961; Cassidy et al., 1999; Cutler et al., 1990; Kawahara, 2012; Slater & Feinman, 1985; Whissell, 2001; Wright & Hay, 2002; Wright et al., 2005), as well as the effect of names on personal attractiveness (Perfors, 2004).

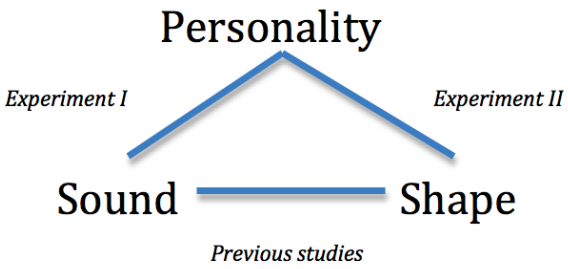

Figure 4: The summary of the current findings and the roadmap of this paper

2 Experiment I: Personality and sounds

Experiment I examined whether the relationship between obstruents and the unapproachable-type of personality holds for Japanese and English speakers.

2.1 Method

2.1.1 Stimuli

The stimulus structure followed that of Shinohara & Kawahara (2013), which involved ten pairs of trisyllabic CVCVCV names, none of which exist as real names in English or Japanese. Each member of a pair had either only obstruents and sonorants, as listed in Table 1. Vowels were controlled within each pair; e.g. *setaka* vs. *meyana*. The stimuli included only light, CV syllables.

Table 1: The list of the stimuli used in Experiment I.

Obstruent names	Sonorant names
sataka	wamana
setaka	meyana
sateka	ramena
sotaka	yomana
setoka	reyona
tesoka	meyona
tasoka	wamona
tesuka	reyuna
tosoka	yomona
teseka	merena

2.1.2 Procedure

The task was 2 alternative forced choice (2AFC) format; for example, given *sataka* and *wamana*, the participants were asked which one represents an approachable type of name and which one represents an unapproachable name. Each pair of names appeared on a separate page in the online questionnaire. The two types of personality were defined as "blunt", "confident", and "unapproachable" and "modest", "cute", and "approachable", respectively. Since the definitions of these two types may not be familiar to English speakers, these definitions appeared on the top of the screen for each question. The test was distributed online using Surveymonkey, an online questionnaire system. In the instructions, the participants were asked not to use an analogy with existing names, but instead use their auditory impression to answer the questions. The main session was preceded by a practice session with two practice questions.

2.1.3 Participants

The participants were 44 native speakers of English (33 female and 11 male; average age: 26.3) and 40 native speakers of Japanese (16 female and 24 male; average age: 21.7).[5] The English participants were invited through *Psychology on the net*.[6] The Japanese participants were mainly students of the Tokyo University of Agriculture and Technology.[7] They participated in the experiment voluntarily, and there were no monetary compensations for the participation.

2.2 Result

First, the probabilities of obstruent names being associated with the unapproachable-type of girls were calculated (=$p(c)$), whose chance level is 0.5. The average $p(c)$ for the native speakers of English was 0.79, which was statistically significant by a Wilcoxon test ($p. < 001$). Since $p(c)$ may not be the best measure for 2AFC experiments (Macmillan & Creelman, 2005), d'-scores—signal detection measures of sensitivity—for a 2AFC design experiment were also calculated.[8]

[5]Those who reported that they have studied sound symbolism have been excluded from the numbers above.

[6]http://psych.hanover.edu/research/exponnet.html

[7]As an anonymous reviewer pointed out, Japanese speakers receive at least 6 year of education in English, and therefore they are not completely monolingual. This limitation is practically unavoidable, however, since the English education is required at the governmental level. We also note that the general English proficiency level of this pool of participants is not very high.

[8]The formula was (Macmillan & Creelman 2005: 167-170):

$$d' = \frac{z(Hit) - z(FA)}{\sqrt{2}} \tag{1}$$

where Hit is the probability of saying unapproachable-approachable to a obstruent-sonorant pair and FA (for False Alarm) is the probability of saying unapproachable-approachable to a sonorant-obstruent pair. $z(1)$ and $z(0)$ were replaced by $z(1 - 0.5/n)$ and $z(0.5/n)$, respectively (where n is the number of relevant pairs) (Macmillan & Creelman 2005: 8).

D'-scores for 2AFC design experiments range, roughly, from 0 to about 2, and if d'=0, it means that the participants were responding randomly. The average d' for English speakers was 1.06, which is significantly different from chance ($p < .001$). We conclude that English speakers can associate names with obstruents with the unapproachable type of personality above the chance level.

The results of Japanese speakers show that the average $p(c)$ was 0.8, which was statistically different from the chance response ($p < .001$). The average d' was 1.09 which was again significantly different from the chance level.

2.3 Discussion

These results show that particular sounds in names can convey particular images about their personality (Perfors, 2004). What we believe is noteworthy is that the same pairing was found for both English speakers and Japanese speakers.

The sound symbolic relationship identified in this experiment may have an acoustic basis (Ohala, 1983, 1994), as speculated by Kawahara & Shinohara (2012) and Shinohara & Kawahara (2013). Acoustically, as shown in Figure 2, stop bursts as well as frication during fricatives involve abrupt energy changes, which when visualized, look "angular". These acoustic shapes of obstruents may be mapped onto the images of "unapproachability".

Sonorants, on the other hand, involve more gradual changes, as we can observe in Figure 3. These acoustic representations in listeners' minds may be mapped onto "soft" and "accessible" images.

3 Experiment II: Personality and shapes

Given the results of Experiment I, the next experiment went beyond traditional studies on sound symbolism and tested whether we can identify an iconic relationship between shapes and types of personalities.

3.1 Method

3.1.1 Procedure

As with Experiment I, the format of the experiment was a 2AFC experiment, and the task was to match particular shapes with particular types of personalities. In this experiment, the participants were instructed to be an assistant for Steve Spielberg for a new movie about an extraterrestrial planet, on which creatures communicate via visual signs. The participants were asked to come up

with “good visual signals” that represent particular type of personalities for these extraterrestrial creatures.

For each trial, the participants were presented with two figures, one angular and the other rounded, together with two types of personality, approachable and unapproachable. Some example figures are given in Figure 5. They were asked to choose a better match between each pair of figure and two types of personality. The participants went through one practice trial and twelve main trials. The order of the stimuli, as well as the order of the two choices, was randomized.

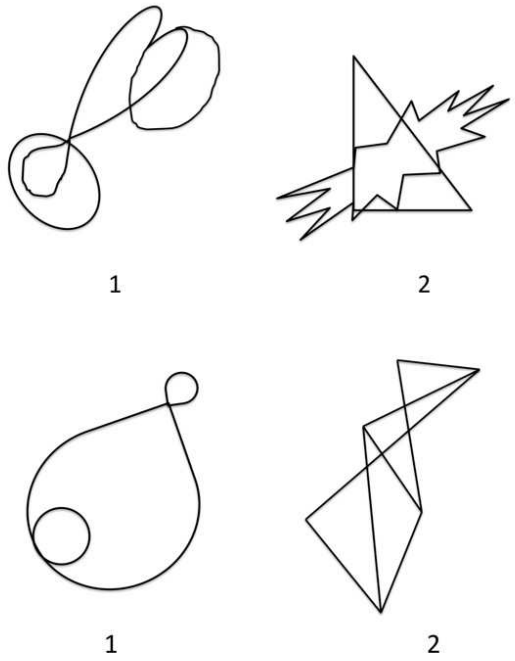

Figure 5: Example figures used in Experiment II.

3.1.2 Participants

Seventy native speakers of English (55 female and 15 male; average age: 29) and 65 native speakers of Japanese (13 female and 52 male; average age: 22) participated in this experiment. The experiment was done online using Surveymonkey, and the participants participated in this experiment voluntarily without any monetary compensations. Other details are the same as Experiment I. There is no overlap between the participants of Experiment I and those of Experiment II for Japanese speakers; for English speakers, there may be an overlap because the two experiments are posted on the same website (*Psychological Research on the net*).

3.2 Result and discussion

The mean $p(c)$ for English and Japanese speakers were 0.90 and 0.94, respectively, which were both statistically significantly different from 0.5 by a Wilcoxson test at the $p < .001$ level. The average d'-values were 1.59 and 1.72, which were again, statistically significantly different from 0 at the $p < .001$ level. We thus conclude that an iconic relationship holds between angular shapes and the unapproachable type of personality, both for English speakers and Japanese speakers.

4 General discussion

Experiment I established a general relationship between names with obstruents and the approachable-type personality, both for English and Japanese speakers. Experiment II showed that there is an iconic relationship between angular shapes and the unapproachable-type personality. Overall, the current paper supports the tripartite trans-modality relationship between sounds, vision, and personality, as shown in Figure 4.[9] This conclusion further supports that of Kawahara & Shinohara (2012) that sound symbolic relationships are an instance of a more general trans-modality relationship that holds among different domains of cognition.

References

Ahlner, Felix & Jordan Zlatev (2010) Cross-modal iconicity: A cognitive semiotic approach to sound symbolism. *Sign Sytems Studies* **38**(1/4): 298–348.

Barkhuysen, Pashiera, Emiel Krahmer, & Marc Swerts (2010) Crossmodal and incremental perception of audiovisual cues to emotional speech. *Language and Speech* **53**(1): 3–30.

Berlin, Brent (2006) The first congress of ethonozoological nomenclature. *Journal of Royal Anthropological Institution* **12**: 23–44.

Brown, R. & M. Ford (1961) Address in American English. *Journal of Abnormal and Social Psychology* **62**: 375–385.

Cassidy, Kimberly Wright, Michael H. Kelly, & Lee'at J. Sharoni (1999) Inferring gender from name phonology. *Journal of Experimental Psychology: General* **128**: 362–381.

Cutler, Anne, James McQueen, & Ken Robinson (1990) Elizabeth and John: Sound patterns of men's and women's names. *Journal of Linguistics* **26**: 471–482.

Hinton, Leane, Johanna Nichols, & John Ohala (1994) *Sound Symbolism*. Cambridge: Cambridge University Press.

[9] These kinds of trans-modality relationships may be mediated via a more general mechanism of conceptual metaphors (Lakoff & Johnson, 1980, 1999); pursuing this idea further, however, is beyond the scope of the present study.

Irwin, Francis W. & Elizabeth Newland (1940) A genetic study of the naming of visual figures. *Journal of Psychology* **9**: 3–16.

Jespersen, Otto (1922/1933) Symbolic value of the vowel i. In *Phonologica. Selected Papers in English, French and German*, vol. 1, Copenhagen: Levin and Munksgaard, 283–30.

Kawahara, Shigeto (2012) Abrupt amplitude changes imply male names: A case of acoustic-based sound symbolism. Ms. Rutgers University (Talk presented at PhonoFesta 7, Shiga).

Kawahara, Shigeto & Kazuko Shinohara (2012) A tripartite trans-module relationship between sounds, shapes and emotions: A case of abrupt modulation. In *Proceedings of the 34th Annual Meeting of the Cognitive Science Society*, Naomi Miyake, David Peebles, & Richard P. Cooper, eds., Austin, TX: Cognitive Science Society, 569–574.

Köhler, W. (1929/1947) *Gestalt Psychology*. New York: Liveright.

Lakoff, George & Mark Johnson (1980) *Metaphors We Live By*. Chicago: Chicago University Press.

Lakoff, George & Mark Johnson (1999) *Philosophy in the Flesh*. New York: Basic Books.

Lindauer, S. Martin (1988) Size and distance perception of the physiognomic stimulus *taketa*. *Bulletin of the Psychonomic Society* **26**(3): 217–220.

Lindauer, S. Martin (1990) The meanings of the physiognomic stimuli *taketa* and *maluma*. *Bulletin of Psychonomic Society* **28**(1): 47–50.

Macmillan, Neil & Douglas Creelman (2005) *Detection Theory: A User's Guide. 2nd Edition*. Mahwah: Lawrence Erlbaum Associates Publishers.

Martino, G. & L. E. Marks (2000) Cross-modal interaction bewteen vision and touch: The role of synesthetic correspondence. *Perception* **29**(6): 745–754.

Ohala, John J. (1983) The phonological end justifies any means. In *Proceedings of the 13th International Congress of Linguists*, S. Hattori & K. Inoue, eds., Tokyo: Sanseido, 232–243.

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

Perfors, Amy (2004) What's in a name?: The effect of sound symbolism on perception of facial attractiveness. *Proceedings of CogSci 2004* .

Ramachandran, V.S. & E. M. Hubbard (2001) Synesthesia–A window into perception, thought, and language. *Journal of Consciousness Studies* **8**(12): 3–34.

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

Saussure, Ferdinand de (1916) Cours de linguistique générale. Payot.

Saussure, Ferdinand de (1916/1972) *Course in general linguistics*. Peru, Illinois: Open Court Publishing Company.

Shinohara, Kazuko & Shigeto Kawahara (2013) The sound symbolic nature of Japanese maid names. *Proocedings of Japan Cognitive Linguistics Association* **13**: 183–193.

Shinohara, Kazuko & Shigeto Kawahara (to appear) A cross-linguistic study of sound symbolism: The images of size. In *Proceedings of Berkeley Linguistic Society 36*, Berkeley: Berkeley Linguistics Society.

Slater, Anne Saxon & Saul Feinman (1985) Gender and the phonology of North American first names. *Sex Roles* **13**: 429–440.

Spence, C. (2011) Crossmodal correspondences: A tutorial review. *Attention, Perception & Psychophysics* **73**(4): 971–995.

Ultan, Russell (1978) Size-sound symbolism. In *Universals of Human Language II: Phonology*, Joseph Greenberg, ed., Stanford: Stanford University Press, 525–568.

Whissell, Cynthia (2001) Cues to referent gender in randomly constructed names. *Perceptual and Motor Skills* **93**: 856–858.

Wright, Saundra & Jennifer Hay (2002) Fred and Trema: A phonological conspiracy. In *Gendered Practices in Language*, Sarah Benor, Mary Rose, Devyani Sharma, Julie Sweetland, & Qing Zhang, eds., CSLI Publications, 175–191.

Wright, Saundra, Jennifer Hay, & Bent Tessa (2005) Ladies first? Phonology, frequency, and the naming conspiracy. *Linguistics* **43**(3): 531–561.