

# A cross-linguistic study of sound symbolism: The case of Voicing

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## Introduction: Sound symbolism and its bodily basis

### Sound-meaning relationships are not necessarily arbitrary:

- High, closed vowels are “smaller” than low, open vowels (Sapir 1929).
- Voiceless stops are associated with sharp, angular objects, whereas sonorants are associated with soft and round objects (Köhler 1929).

### Bodily (articulatory) basis of sound symbolism

- The size image correlates with the openness of the mouth (Berlin 2006; Paget 1930).
- Acoustic bursts of voiceless stops create sharp and angular images (Berlin 2006).

### The universality of sound symbolism?

- If sound symbolism comes from articulatory considerations, then sound symbolism should be observed universally.

## Background: Voicing and dirtiness in Japanese

### Voiced obstruents in Japanese are considered to be “dirty”

- Voiced obstruents ([b, d, g, z]) are called *dakouon* (“non-transparent sounds”).
- Onomatopoeic words (*toro-toro* vs. *doro-doro*).
- A rating experiment shows that we observe the correlation in nonce-words (Kawahara, Shinohara, & Uchimoto 2008).

### We can hypothesize that the “dirtiness” image has an articulatory basis.

- Voicing in obstruents is articulatorily challenging, because speakers have to keep sending air to their close mouth (Ohala 1983). Speakers therefore have to make complex articulatory adjustments (e.g. advancing tongue roots, larynx lowering) to make voiced obstruents (Ohala & Riordan 1979).
- In fact, many languages disprefer voiced obstruents (e.g. Hawaiian: Hayes & Steriade 2004).
- The articulatory challenge may be responsible for the dirtiness image.

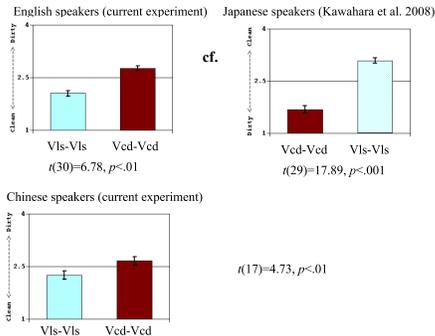
If the dirty image associated with voiced obstruents have an articulatory basis, then we predict that voicing in obstruents cause dirty images in other languages.

## Experiment 1: Rating experiment

### Method:

Stimuli: 20 disyllabic words with voiced obstruents (e.g. *bagu*) vs. 20 disyllabic words with voiceless obstruents (e.g. *kupa*).  
Task: Rated dirtiness in 1-4 scale.  
Participants: 31 English speakers; xx Chinese speakers.

### Results:



### Discussion:

1. Chinese and English speakers *do* associate voiced obstruents with dirty images.
2. It is interesting that speakers do not consciously realize this association (unlike in Japanese), but nevertheless show a statistically significant correlation.

## Experiment 2: Picture naming experiment

### Method (inspired by Köhler 1929):

Rationale: Do speakers match objects with “appropriate names”?  
Participants: 22 Chinese speakers; 21 English speakers, 25 Japanese speakers.  
Stimuli: 6 pairs of “minimal pair” pictures (the same objects, different states).

### Stimuli:



### Task:



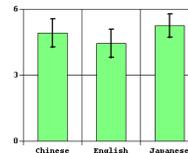
1. zabe sape
2. sape zabe

These options were read orally by the experimenters.

### Analysis:

We counted the number of “right” answers, (“right” when dirty pictures were associated with names with voiced obstruents). If participants associated names with pictures randomly, then they should score 3 (6 \* 1/2 = 3) on average (this is our H<sub>0</sub>).

### Results:



Stats (do the responses differ from 3?):

Chinese: t(21)=2.98, p<.01  
English: t(20)=4.68, p<.001  
Japanese: t(24)=8.84, p<.001

### Analysis by picture pair:

	Chinese	English	Japanese
1. Dish	86%	76%	96%
2. Sponge	68%	76%	96%
3. Glove	91%	76%	92%
4. Screen	91%	67%	84%
5. Sink	64%	71%	76%
6. Pad	91%	76%	80%

The sink pair may not have been the prototypical “clean-dirty” pair.

### Conclusion:

Speakers from all three languages associated dirty pictures with names with voiced obstruents at a more than chance frequency.

## Conclusions

Both the rating and picture-naming experiments reveal the association between voiced obstruents and dirty images in all three languages, Chinese, English and Japanese.

This result is predicted if the sound symbolism has an articulatory basis i.e. speakers from all languages have access to the connection between voicing in obstruents and dirty images, whether consciously or not—the images have a bodily basis which is independent of individual phonology.

We hope that this project stimulates further cross-linguistic studies of sound symbolisms, and investigations on the bodily basis of sound symbolisms.

Further questions: (i) other images related to voicing? (Shinohara & Kawahara in progress), (ii) bodily bases of other sound symbolic patterns?

A larger question: to what extent sound symbolic patterns—and phonological patterns in general—have such articulatory bodily basis?

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