

# Phonetic and psycholinguistic prominences in pun formation: Experimental evidence for positional faithfulness

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## Confluence of two theoretical issues: Issue 1

Similarity effects in phonology:

- Speakers maximize the similarity between corresponding segments (e.g. input and output), and various factors contribute to the measure of similarity (Steriade, 2001, *seq.*).
- We argue that the measure of similarity depends on contextual factors.

# Confluence of two theoretical issues: Issue 2

Positional faithfulness vs. positional markedness:

- Some phonological contrasts are maintained in some positions but neutralized elsewhere.
- **Theory 1: Positional faithfulness theory.** Speakers prohibit changes in phonetically or psycholinguistically prominent positions (Beckman, 1997).
- **Theory 2: Positional markedness theory.** Speakers exert strong pressure against having a contrast in non-prominent positions (Zoll, 1998).

We provide independent experimental support for positional faithfulness theory.

## Our results

We show that in making imperfect puns, speakers disprefer disparities between corresponding segments in prominent positions (initial syllables and long vowels).

- The measure of similarity depends on positional factors.
- The principle of positional faithfulness—the maximization of similarity in strong positions—is independently motivated.

# A larger theoretical background

We would like to situate our work in a larger background: growing interests in using verbal art patterns to probe our linguistic knowledge (especially by way of an experiment/corpus-based method).

(see Fabb, 1997; Fleischhacker, 2000, 2005; Itô, Kitagawa, and Mester, 1996; Kawahara and Shinohara, 2009; Kawahara, 2007, 2009; Steriade, 2003; Shinohara, 2004; Yip, 1999; Zwicky, 1976; Zwicky and Zwicky, 1986, among others.)

## Japanese imperfect puns (*dajare*)

In composing imperfect puns, Japanese speakers create sentences using two similar sounding words or phrases, as in *aizusan-no aisu* ‘Ice cream from Aizu’ or *okosama-o okosanaide* ‘Don’t wake up a kid’.

- Paired words can contain non-identical pairs of sounds ([z] vs. [s] in the first example, and [m] vs. [n] in the second example).
- Speakers nevertheless attempt to maximize the similarity between the corresponding words in Japanese imperfect puns (Cutler and Otake, 2002; Kawahara and Shinohara, 2009; Shinohara, 2004).

## Consonant pairing (Kawahara and Shinohara, 2009)

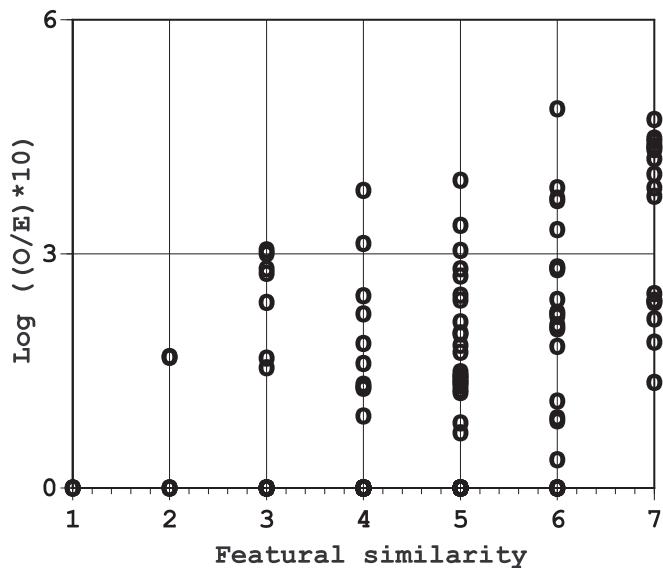


Figure: The correlation between combinability and featural similarity.

Consonants' similarity and combinability in puns correlate with each other.

## Vowels (Kawahara and Shinohara, 2008)

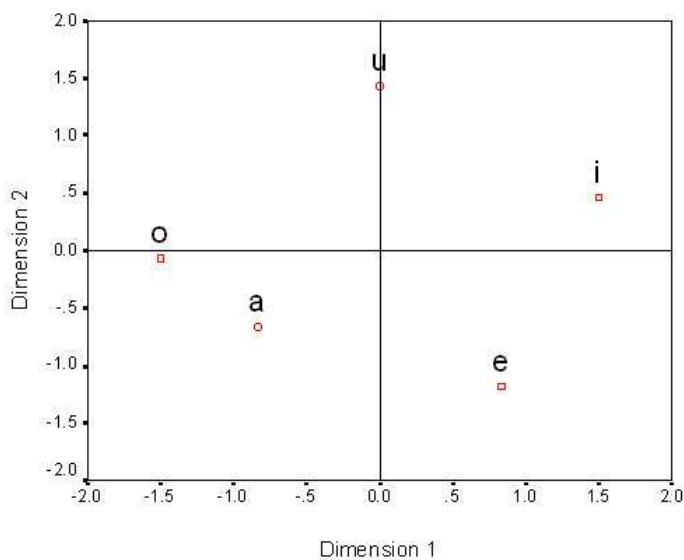


Figure: The distance map b/w five vowels created based on combinability in puns.

The distance map resembles the standard vowel space.

# Experiment I: Psycholinguistic prominence

The first experiment tested whether speakers avoid mismatches in initial positions. Initial syllables play an important role in word recognition.

- Hearing initial portions of words help listeners to retrieve the whole words (Horowitz, Chilian, and Dunnigan, 1969; Horowitz, White, and Atwood, 1968).
- In “tip-of-the-tongue” phenomena, speakers can guess the first sound more accurately than non-initial sounds (Brown, 1991; Brown and MacNeill, 1966).
- Also, in tip-of-the-tongue situations, initial sounds help retrieve the whole word (Freedman and Landauer, 1966).

## Psycholinguistic prominence cont'd

- Listeners are faster when detecting mispronunciations in non-initial positions (Cole and Jakimik, 1980; Cole, 1973)—once they hear initial syllables, they anticipate what's coming next.
- Sound symbolism—particular images associated with particular sounds—is stronger word-initially than non-word-initially (Bruch, 1986; Kawahara, Shinohara, and Uchimoto, 2008).

# Phonological privilege of initial positions

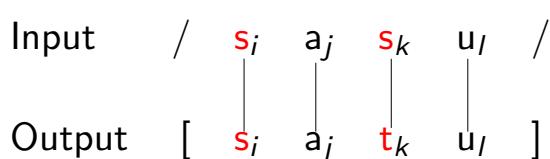
Initial syllables exhibit a privileged status in phonology.

- In Sino-Japanese, while initial syllables can contain a variety of consonants, second syllables only allow [t] and [k] (Kawahara, Nishimura, and Ono, 2002; Tateishi, 1990).
- If there were an underlying form like /sasu/ (as per Richness of the Base), then speakers avoid changing the initial [s] but not the final [s] (perhaps to [satu]).
- In other words, speakers would avoid making changes in initial syllables.

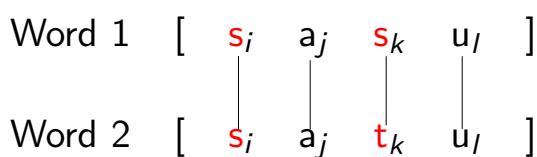
## Correspondence Theory

In terms of Correspondence Theory (McCarthy and Prince, 1995):

In phonology (input-output correspondence):



Likewise in pun formation (surface-to-surface correspondence):



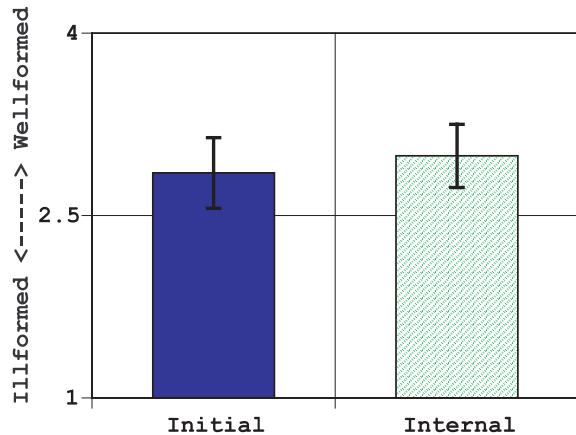
## Method 1

- The experiment was a wellformed judgement task.
- The stimuli were pairs of words that contain a pair of sounds that minimally differ in voicing ([t-d], [d-t], [s-z], [z-s], [k-g], [g-k]).
- To control for the distance between corresponding words, they were always separated by one-mora particle.
- Two conditions:
  - ▶ Initial mismatches (e.g. *sasetsu-ni zasetsu* 'I gave up turning left').
  - ▶ Internal mismatch (e.g. *hisashi-ni hizashi* 'Sunlight on the sun roof').

## Method 2

- We asked two questions: how funny it is and how acceptable it is as a pun pair in a 1-4 scale.
- We included the first question, so that the participants would tease apart these questions.
- The questionnaire started with two sample questions, with one example which is clearly an example of a Japanese imperfect pun and one example which clearly is not.
- 37 speakers participated in this study, but we excluded eight of them because they did not consider the good example as a good pun or considered the bad example as a good pun.

# Result



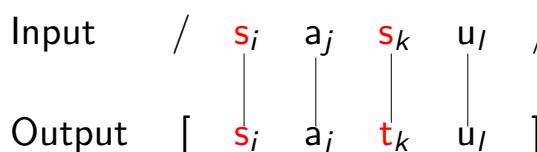
**Figure:** Wellformedness of puns with initial mismatches and those with internal mismatches. The error bars = 95% CIs.

Speakers judged mismatches in initial syllables less acceptable than those in non-initial syllables ( $t(28) = 2.69, p < .05$ ).

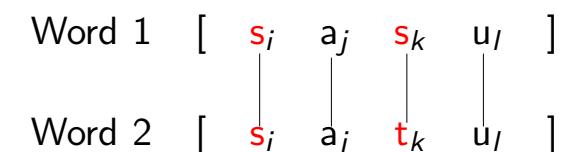
## Discussion

Speakers avoid mismatches in a psycholinguistically prominent position, both in phonology and pun formation.

### Phonology



### Pun formation



The principle of positional faithfulness is observed both in puns and in phonology.

## Experiment II: Introduction

The second experiment tested whether speakers avoid mismatches in long vowels.

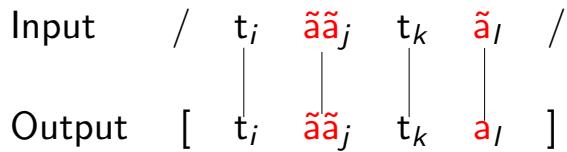
- Long vowels are, by definition, phonetically long.
- Different long vowels are more different from each other than different short vowels (Steriade, 2003)—an [aa]-[ii] pair is more different than an [a]-[i] pair.
- A change in long vowels would be more perceptible also because speakers hyperarticulate long vowels more than short vowels. As a result, long vowels are more dispersed than short vowels (Hirata and Tsukada, 2003).

## Phonological privilege of long vowels

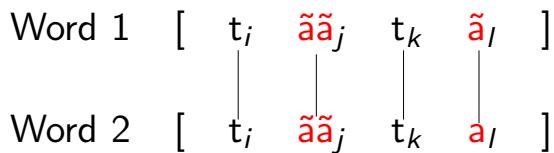
- Hindi for example allows a surface nasality contrast in long vowels, but not in short vowels (Steriade, 1994).
- A hypothetical underlying /tā̃tā/ would map to [tā̃ta].
- In phonology speakers avoid making changes—or neutralizing contrasts—more in long vowels than in short vowels.

# Correspondence Theory again

In phonology (input-output correspondence):



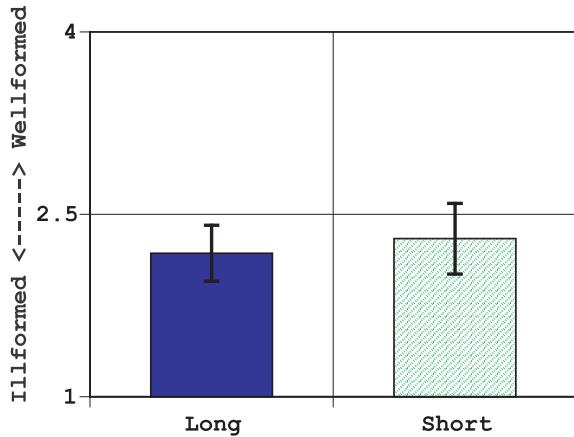
In pun formation (surface-to-surface correspondence):



## Method

- The design had two fully crossed factors: 10 vowel combinations ([a-i], [a-u], [a-e], [a-o], [i-u], [i-e], [i-o], [u-e], [u-o], [e-o])  $\times$  2 lengths (short vs. long).
- An example of a crucial pair was: *jookuu-no jookaa* 'A joker in the sky' vs. *rippu-ga rippa* 'Lips are good'.
- Other details were identical to Experiment 1, except that we had four sample questions (two good examples and two bad examples).
- 26 speakers participated in the study.

# Result



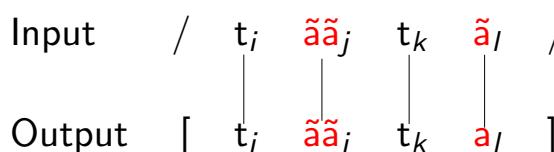
**Figure:** Wellformedness of puns with long vowel mismatches and short vowel mismatches.

Speakers rated those with long mismatches as worse than short mismatches ( $t(25) = 3.83, p < .001$ ).

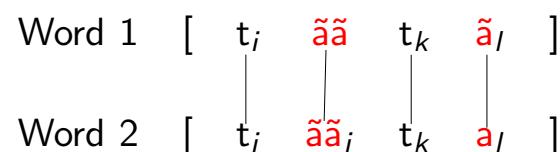
## Discussion

Japanese speakers avoid mismatches in long vowels more than mismatches in short vowels

### Phonology



### Pun formation



Mismatches in long vowels are perceptually salient because of their long duration (Steriade, 2003), and hence avoided by the participants.

# Summary

- Speakers avoid mismatches in initial syllables and long vowels.
- We find this principle both in phonology and pun formation.
- In this regard we find non-trivial parallels between phonology and verbal art patterns.

## Positional faithfulness vs. positional markedness

- The principle of positional faithfulness can explain our results because we observe that speakers avoid mismatches in strong positions (Beckman, 1997; Casali, 1997; Kawahara, 2006; Steriade, 2001, among others).
- Positional markedness has nothing to say about the results because it evaluates the wellformedness of one form only, but not the relation between two forms (Itô and Mester, 2003; Prince and Tesar, 2004; Smith, 2002; Zhang, 2004; Zoll, 1998, among others).

## Some possible responses

- The evidence is based on “para-linguistic patterns”.

Yes, but we find non-trivial parallels between pun patterns and phonology (Kawahara, 2009; Kawahara and Shinohara, 2009), and we would miss the parallels if we treated them separately.

- The effects are so small.

Since speakers have different standards about pun-wellformedness, the effects may look small with respect to relatively large variability. However, the effects are robust enough to be statistically significant when we make within-subject comparisons.

- We need positional markedness constraints, anyway.

We do not wish to imply that positional markedness constraints are not necessary—they do not explain our results.

## Conclusions

- In composing puns, speakers avoid mismatches in phonetically and psycholinguistically prominent positions.
- We find non-trivial parallels between phonology and verbal art patterns.
- This finding provides experimental evidence for the positional faithfulness theory.

# Acknowledgements

These experiments are a part of a larger project, which investigates knowledge of similarity through puns, as outlined in Kawahara (2009). An earlier version of Experiment 1 was done as a BA research by Nobuhiro Yoshida at Tokyo University of Agriculture and Technology, and also presented as Kawahara, Shinohara, & Yoshida (2008).

To get a copy of this slide or to see a summary website for our project, please google “Shigeto Kawahara” and find a link to the summary website from my personal webpage.

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