

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)

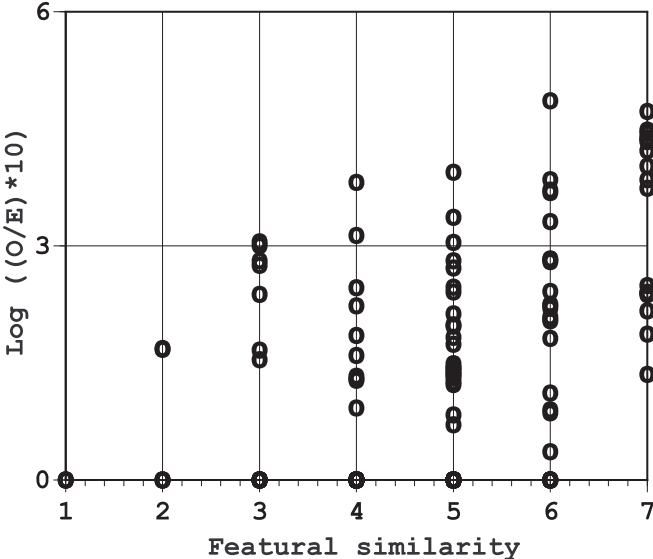


Figure: The correlation between combinability and featural similarity.

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

Vowels (Kawahara and Shinohara, 2008)

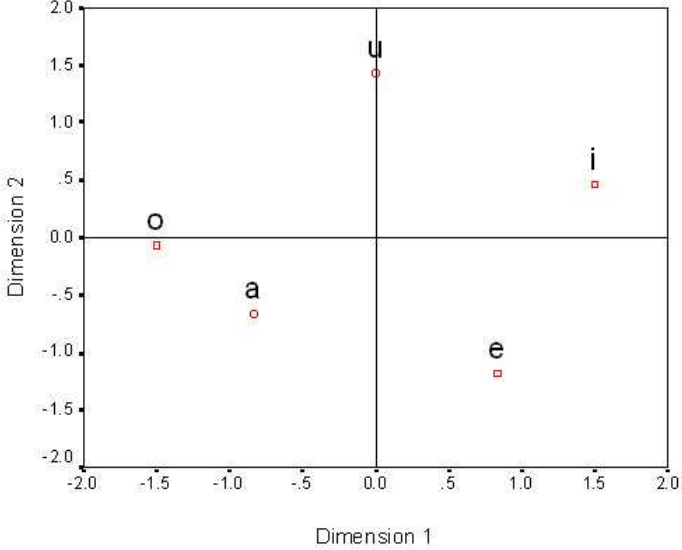


Figure: The distance map b/w five vowels created based on combinability in puns.

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

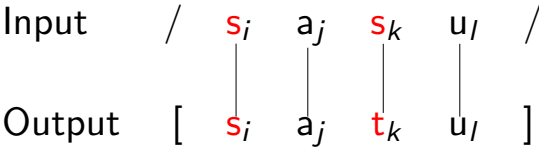
Initial syllables exhibit a privileged status in phonology.

- 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 /sasʉ/ (as per Richness of the Base), then speakers avoid changing the initial [s] but not the final [s] (perhaps to [satʉ]).
- In other words, speakers would avoid making changes in initial syllables.

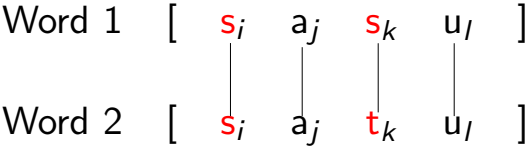
Correspondence Theory

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

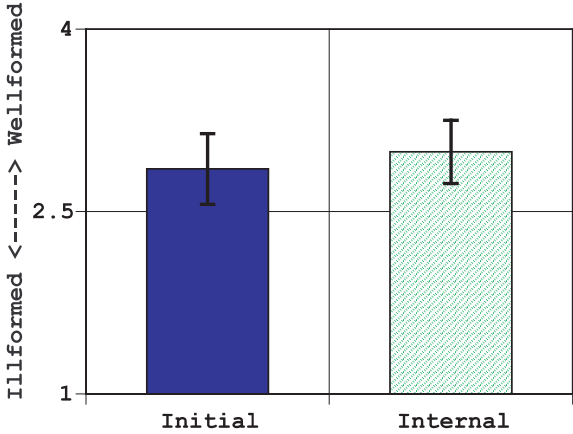


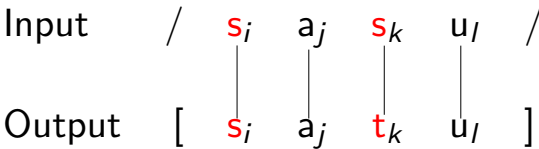
Figure: Wellformedness of puns with initial mismatches and those with internal mismatches. The error bars = 95% CIs.

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

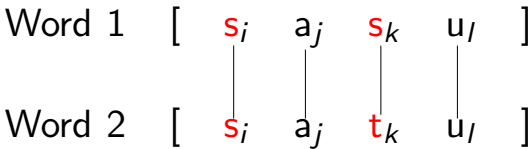
Discussion

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 /tããtã/ would map to [tããta].
- 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):

Input / t_i ãã_j t_k ã_l /
Output [t_i ãã_j t_k a_l]

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

Word 1 [t_i ãã_j t_k ã_l]
Word 2 [t_i ãã_j t_k a_l]

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]) × 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

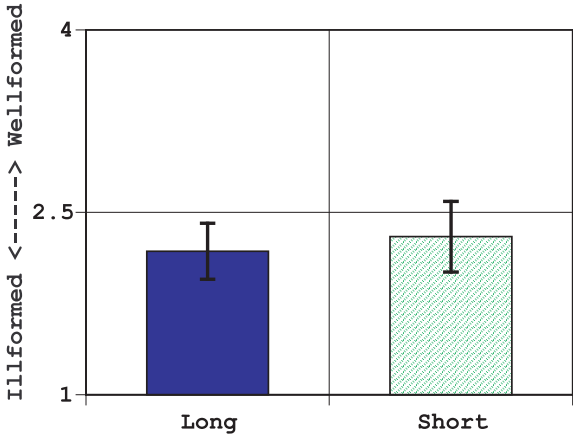


Figure: Wellformedness of puns with long vowel mismatches and short vowel mismatches.

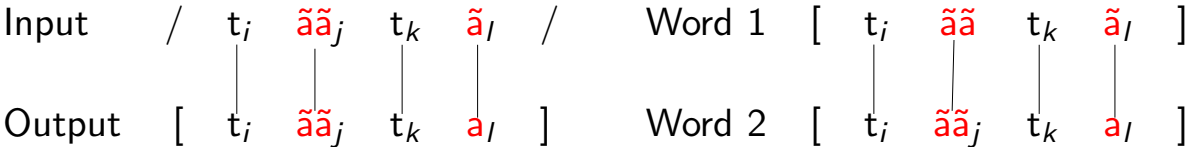
Speakers rated those with long mismatches as worse than short mismatches ($t(25) = 3.83, p < .001$).

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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