Violable and Inviolable OCP Effects on Linguistic Changes: Evidence from Verbal Inflections in Japanese

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FAJL6
September 27, 2012 @ Humboldt Uni, Berlin
Outline

1. Background
   - Research Topic: OCP
   - Categorical Effects & Gradient Effects of OCP
   - Problems and Goals

2. Ongoing Linguistic Change
   - Verbal Inflections in Japanese
   - Variable Phenomena

3. Data
   - Corpus
   - Summary of the Data

4. Examination of OCP Effects in Diachronic Contexts
   - Method
   - Categorical Effects
   - Gradient Effects
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Research Topic: OCP

OCP (Obligatory Contour Principle):
originally proposed based on the data in tone languages
"adjacent syllables may not be marked for the same tone."

(Leben 1973; Goldsmith 1976; McCarthy 1986)

更多一般情况下

OCP
bans representations in which identical specifications are adjacent
Dissimilarity effects, Similarity avoidance
## Research Topic: OCP

**segmental OCP effects:**
- e.g. Consonant pairs in verb roots (Arabic)
  - *dadam*, *sasam* (see Pierrehumbert 1993; Frisch et al. 2004)

**versions:**
- e.g. total OCP (identical); OCP [place], [manner], [voice]

**OCP effects** — examined in a variety of languages and theoretical frameworks
  - (e.g. Meyers 1997; Padget 2002; Frisch et al. 2004)

### OCP effects in Japanese

**Phonology:**
- Lyman’s Law in sequential voicing (Vance 1980; Ito & Mester 2003)
- co-occurrence restriction on consonants in Native Vocabulary (Kawahara et al. 2006)

**Syntax:** Double-ο constraint (see Hiraiwa 2010)
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Categorical Effects & Gradient Effects of OCP

Extensively discussed in Frisch et al. (2004) based on the Arabic data.

- Consonant pairs in verb roots (2,674 items): $C_1VC_2VC_3$
- More similar $\Rightarrow$ less frequent (but frequency is not zero)

OCP [Place] – categorical (inviolable) effects & gradient (violable) effects
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Violable/Inviolable OCP Effects on Linguistic Change
Ongoing Linguistic Change

Examination of OCP Effects in Diachronic Contexts

Problems and Goals

Previous Studies:

- Examination of OCP effects – mostly synchronic aspects
  \(\Rightarrow\) diachronic aspects – understudied (Frisch 2004)

- Data source – e.g. dictionary
  \(\Rightarrow\) actual usage, spontaneous utterances – understudied

Goal: examination of OCP effects in diachronic contexts

1. Ongoing changes in Japanese verbal inflectional paradigm, based on spontaneous utterances in a large-scale corpus
2. Effects/functions of OCP:
   - categorical (inviolable) and/or gradient (violable)
   - trigger and/or blocker (Haraguchi 2008; Kawahara 2012)
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### Verbs in Japanese – 2 types (Bloch 1946)

<table>
<thead>
<tr>
<th>Type</th>
<th>Stem-final Segment</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>consonant verbs</strong></td>
<td>consonant</td>
<td><em>kak-</em> ‘write,’ <em>hasir-</em> ‘run’</td>
</tr>
<tr>
<td><strong>vowel verbs</strong></td>
<td>vowel</td>
<td><em>mi-</em> ‘see,’ <em>tabe-</em> ‘eat’</td>
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**Causative/Potential forms in Japanese – allomorphy**

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<tr>
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</thead>
</table>
Verbal Inflection

### Causative forms

- **consonant verbs**: causative suffix – as(e)
  
  e.g. *kak-ase*, *hasir-ase*  
  ‘let someone write/run’

- **vowel verbs**: causative suffix – sas(e)
  
  e.g. *mi-sase*, *tabe-sase*  
  ‘let someone see/eat’

### Potential forms

- **consonant verbs**: potential suffix – e
  
  e.g. *kak-e*  
  ‘can write,’  
  *hasir-e*  
  ‘can run’

- **vowel verbs**: potential suffix – rare
  
  e.g. *mi-rare*  
  ‘can see,’  
  *tabe-rare*  
  ‘can eat’
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sa-Insertion

1. sa-Insertion: change in causative forms in Japanese
2. restricted to consonant verbs
   ⇒ attaching causative suffix \((\text{as}(e))\) to verb stems

### Configuration of causative forms

- traditional causative: \(V - \text{ase}\)
- sa-Insertion (innovative variant): \(V - \text{asase}\)

Examples: \(kak-\text{asase}-ru\), \(hasir-\text{asase}-ru\) ‘let someone write/run’

\[\text{CSJ } \text{happyoo-o owar-\text{asase}-te-itadakimasu.}\]

‘Let me finish (my) presentation.’ (polite) (A04M0229)
**ra-Deletion**

1. *ra*-Deletion: change in potential forms in Japanese
2. restricted to *vowel verbs*
   - attaching potential suffix (*rare*) to verb stems

**Configuration of potential forms**

- traditional potential: \( V - \text{rare} \)
- *ra*-Deletion (innovative variant): \( V - \text{rare} \)

Examples:

- *tabe*-re-ru ‘can eat,’  
  - CSJ oisii mono-ga **tabe**-re-ru.  
  - delicious stuff-NOM eat-POT-NONPAST  
  - ‘(We) can eat delicious foods.’  
  - (S00M0002)

- *ko*-re-ru ‘can come,’
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**Corpus of Spontaneous Japanese (CSJ)**

A large-scale spontaneous speech corpus of Japanese

(Kokuritsu Kokugo Kenkyuujo 2008)

- **Size**: 3,302 speech samples (662 hours, 7.5 million words)
- **Organization**: APS (formal) / SPS (casual)
- **Rich annotations**:
  - speaker attributes, characteristics of each speech
    (e.g. style, nervousness, spontaneity)
  - detailed analysis of external factors
    (e.g. style, gender, socioeconomic background)
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Overall Distribution

- **Sampling**: every utterance in CSJ $\Rightarrow$ 9,698 tokens

- **Variable – innovative/traditional**
  e.g. *kak-asase-*/*kak-ase*, *mi-re/mi-rare*

<table>
<thead>
<tr>
<th></th>
<th>Innovative</th>
<th>Traditional</th>
<th>Prob. of innovative forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>causative</td>
<td>42 (sa-Insertion)</td>
<td>1,498</td>
<td>2.73%</td>
</tr>
<tr>
<td>potential</td>
<td>543 (ra-Deletion)</td>
<td>7,615</td>
<td>6.66%</td>
</tr>
</tbody>
</table>
Chronological Transition of Variable Forms

Figure 1. Chronological changes in prob. of *ra*-Deletion and *sa*-Insertion

Order of the change: *ra*-Deletion ⇒ *sa*-Insertion

- *sa*-Insertion – beginning
- *ra*-Deletion – intermediate stage
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Method

• Pair-wise comparison of segmental similarity in sequences of verb stems and suffixes

• Degree of similarity – # of totally identical segments
  (each segment – totally identical OR not)

  \[\Downarrow\]

  compare the probabilities of innovative forms differing in the degree of similarity

  Forms compared should be in the same inflectional paradigm.
  e.g. *causative & potential

• **Domain of similarity** – local at moraic level (e.g. \(C_iV_j-C_iV_j\))
If OCP is at work in the ongoing linguistic changes . . .

Consequences

Adjacent **CV sequences** in verb stems & suffixes – more similar

Probabilities of **innovative forms** – lower (violable, gradient) or zero (inviolable, categorical)
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Categorical Effect I

Type of verb stem in sa-Insertion

- **Sa-Insertion** – restricted to consonant verbs
  - i.e. **no sa-Insertion in vowel verbs** **WHY?**

  - Causative suffix for vowel verbs: sas(e)
    - e.g. *mi-sase*, *tabe-sase* – ‘let someone see/eat’
  - If sa-Inserted . . .
    - e.g. *mi-sasase*, *tabe-sasase*
  - **Sa-Insertion in vowel verbs**
    - ⇒ obligatorily involves the sequence sasa

No sa-Insertion in vowel verbs ⇒ to block sasa sequences

**categorical effects & blocking function** (total identity)

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Violable/Inviolable OCP Effects on Linguistic Change
Categorical Effect II

Stem-final consonant in *sa*-Insertion

- Verb stems with final $s \Rightarrow sasa$ sequences (adjacent identical CVs)
  
  e.g. $toba-s-asase-$, $arawa-s-asase-$ – ‘let someone fly/express’

- Other stems are less similar
  
  e.g. $kak-asase-$, $hasir-asase-$ – ‘let someone write/run’

- Probability of *sa*-Insertion:
  
  $s$-final stems (identical) < other stems (less similar)?
Categorical Effect II

Figure 2. Probability of *sa*-Insertion by stem-final consonant (fisher, $p<0.05$)

No *sa*-Insertion in verb stems with final *s* ⇒ to block *sasa* sequences (total identity)

categorical effects & blocking function
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### Stem-final CVs in *ra*-Deletion

**verb stems with final ri/re**

- Traditional potential $\Rightarrow$ *rVr*are* sequences *(three identical consonants)*  
  e.g. *kari*-rare-, *ire*-rare* ‘can borrow/insert’*

- *Ra*-Deletion $\Rightarrow$ *rVr*e* sequences *(two identical consonants)*  
  e.g. *kari*-re-, *ire*-re*

- Other stems are less similar  
  e.g. *mi*-(*ra*)re-, *tabe*-(*ra*)re* ‘can see/eat’*
Gradient Effect I

Similarity can be reduced by *ra*-Deletion
Degree of similarity: *ri/re*-final stems (with extra *r*) > other stems

Probability of *ra*-Deletion:
*ri/re*-final stems (more similar) > other stems (less similar)?

**Figure 3. Probability of *ra*-Deletion by stem-final CVs** ($\chi^2(2)=31.32, p<0.01$)
**Gradient Effect I**

- **ri**-final stems – higher probability of **ra**-Deletion
  - to reduce the degree of similarity
    - (# of segments with identity)

  **But**

- **re**-final stems – same or lower probability of **ra**-Deletion
  - If **re**-final stems are **ra**-Deleted . . .
  - ⇒ **rere** sequences (e.g. **ire-re**-)
  - \[\downarrow\]
    - to avoid the total identity, **ra**-Deletion does not apply.

**gradient effects & triggering/blocking function**
Gradient Effect II

Following constituent in *ra*-Deletion

- Some following constituents – initial *r*
  - e.g. *mi-*rare-*ru* ‘can see (nonpast)’
  - *tabe-*rare-*reba* ‘can eat (conditional)’

- following constituents with initial *r*
  - ⇒ enhance the similarity by adding extra *r* (*rarerV*)

- other constituents – no contribution
  - e.g. *-nai, -masu, -te, -tari, -tara, -soo*

- Probability of *ra*-Deletion:
  - *r*-initial constituents > other constituents?
-ru, -reba – higher probability of ra-Deletion
⇒ to reduce the similarity
- reba > -ru
Gradient Effect II

- \textit{-reba} > -\textit{ru}  
  -\textit{reba} renders the sequence \textit{rere}  
    e.g. \textit{mi-rare-reba}, (cf. \textit{mi-rare-ru})

- Similarity in -\textit{reba} is higher than in -\textit{ru}  
  ⇒ more likely to trigger ra-Deletion

\textbf{gradient effects & triggering function}
Conjugation type of verbs in *ra*-Deletion

Vowel verbs – *i*-stem (upper uni-grade) & *e*-stem (lower uni-grade)

*i*-stem verbs
- Traditional potential: **Ci-rare**
  - e.g. *mi-rare*, *kari-rare* – ‘can see/borrow’

*Ra*-Deletion: **Ci-re**
- e.g. *mi-re*, *kari-re* – ‘can see/borrow’

No vowel co-occurrence in traditional potential & *ra*-Deletion
Conjugation type of verbs in *ra*-Deletion

**Vowel verbs – *i*-stem (upper uni-grade) & *e*-stem (lower uni-grade)**

**e-stem verbs**
- Traditional potential: **Ce-rare**
  - e.g. *tabe*-rare-, *age*-rare- ‘can eat/raise’
- *Ra*-Deletion: **Ce-re**
  - e.g. *tabe*-re-, *age*-re- ‘can eat/raise’

**Vowel co-occurrence in *ra*-Deletion: **e-re**
(traditional potential – *e* and *re* are not in adjacent syllables **e-rare**)

In *e*-stem verbs, *ra*-Deletion can enhance the similarity \(\Rightarrow\) blocked?

\[\downarrow\]

probability of *ra*-Deletion: *i*-stem verbs > *e*-stem verbs?
Figure 5. Probability of *ra*-Deletion by conjugation type of verbs ($\chi^2(1)=74.79$, $p<0.01$)

- *e*-stem verbs – lower probability of *ra*-Deletion
  - to avoid vowel co-occurrence *[high] & *[high]*
- *height dissimilation* – cross-linguistically uncommon

(İto 1986; Suzuki 1998)

**gradient effects & blocking function**
OCP effects & development of the change

Figure 6. Chronological changes in the prob. of *ra*-Deletion (*i*-stem/*e*-stem)

- probability of *ra*-Deletion:
  - *i*-stem > *e*-stem in every time-period (except for 1910s and 1980s)

- synchronic restriction – consistent
  \[\Rightarrow\] synchronic pattern – accumulate diachronically
Conclusion

- Two types of OCP effects in diachronic contexts
- Ongoing changes in Japanese verbal inflectional paradigm

**Diachronic pattern**

Adjacent CV sequences in verb stems & suffixes – more similar

Probabilities of innovative forms – lower or zero
Conclusion

Summary

1. OCP is active in shaping novel verbal inflectional forms.
2. OCP is at work synchronically & *diachronically*.
3. OCP effects: strong version (inviolable, categorical) weak version (violable, gradient)
4. OCP functions as a *blocker* and a *trigger*.
5. Domain of OCP: within lexical items & across morphological boundaries

*Synchronic restriction ➔ Diachronic patterns ➔ Lexicon/Grammar*
Conclusion

**Lexical Diffusion** (Wang 1969, among others)

- progress of some changes differs according to lexical items
- causes for lexical diffusion
  - e.g. word frequency (Bybee 2002 et seq., Phillips 2006, Sano 2012)

- OCP $\Rightarrow$ selectional restriction on lexical items
  $\Rightarrow$ OCP – also a cause for lexical diffusion
Thank you!
References I


Frisch, Stefan. (2004) Language processing and segmental OCP effects. In Bruce Hayes, Robert Kirchner, and Donca Steriade (eds.), Phonetically-Based Phonology, Cambridge University Press.

References II


References IV


