Statistical Anatomy of Unacceptability
A Case Study in Japanese Causatives

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Grammaticality Judgments in Generative Syntax & Their Problems

- Grammaticality of sentences based upon contrast in acceptability judgments:

  ok vs. ** / * / ?? / ??? / ?? / ? / (?)

  — The variation (**~ (?) is often left unexplained.

- Acceptability may be lowered by heterogeneous and extra-grammatical causes.

  — Their discrimination is often neglected.

- Researchers often disagree about the grammaticality of sentences.

  — The difference is ascribed to idiolectal variation or left irreconcilable.
Goals

Attempt to resolve disagreement on grammaticality judgments

Explore a way to discriminate:

speakers' recognition of "ungrammaticality"

from

that of "grammaticality with somewhat lowered acceptability"

Statistical analysis of experimental results on the acceptability judgments by native speakers
Case study: *Sase*-causative in Japanese

- Phonology $\rightarrow$ 'Causativized' complex $V$ at PF

  $\left[ IP \text{ Causer Causee } V\text{-}sase \right]$

- Semantics $\rightarrow$ Syntactically complex structure at LF

  $\left[ IP \text{ Causer (Causee}_1\right) \left[ XP \text{ Causee}_1 \right. \text{ } \left. V \right] \text{ sase } \right]$

- 2 distinct particles can mark causees:

  causee-*ni* 'dat' (= *ni*-causative) or
  causee-*o* 'acc' (= *o*-causative)
Controversy: Syntactic positions of *ni*-causee and *o*-causee

- *ni*-causee as matrix object: (Tonioke (1978))

\[
[\text{IP Causer } \text{Causee}_1\text{-ni} \ [\text{XP } [e]_1 \ldots V \ ] \ sase \ ]
\]

- *o*-causee as matrix object: (Kuroda (1965))

\[
[\text{IP Causer } \text{Causee}_1\text{-o} \ [\text{XP } [e]_1 \ldots V \ ] \ sase \ ]
\]

- No syntactic asymmetry between the two: (Kitagawa (1986))

\[
[\text{IP Causer } \text{Causee-ni/o} \ldots V\text{-sase } ] \ (\text{LF}) \Rightarrow \\
[\text{IP Causer } [\text{XP } \text{Causee-ni/o} \ldots V \ ] \ sase ] \ (\text{LF})
\]
Interpretaive asymmetry between \textit{ni}-causative and \textit{o}-causative

\textit{ni}-causative tends to be more severely \textit{restrained} than \textit{o}-causative, pragmatically and semantically:

a) The causer must assume that \textit{ni}-causee must be willing or has consent to do the action being caused. (Kuroda (1965))

b) The caused act in \textit{ni}-causative must be self-controllable. (Harada (1973))

c) The \textit{ni}-causee must be assumed by the speaker of the utterance to have the ego or the conscious self of his (or its) own in the caused event. (Kitagawa (1979))
A test case: The Distributed Morphology (DM-)analysis (Miyagawa (1998, 1999))

- Overt Syntax — Complex syntactic structure maintained
- PF — "Late insertion" of -$sase$ (make/let) to "$V[cause]"
- LF — $o$-causee moves into the matrix Spec-AGRoP for ACC

\[\text{a) } ni\text{-causative: } \text{Causer-ga } \text{Causee}_i\text{-ni } [\text{IP } [e]_i \ldots V ] \ sase \text{ cause} \]

\[\text{b) } o\text{-causative: } \text{Causer-ga } \text{[IP Causee-o } \ldots V ] \ sase \text{ cause} \]

— $ni$-causee is in the matrix clause
$o$-causee is in the subordinate clause

Predictions: (N.B. (ii) not considered by Miyagawa)

(i) * "$V\text{-Ajct} + \text{causee-}ni$" ($V\text{-Ajct} = \text{Adjunct that modifies V}$)
(ii) * "$\text{causee-o} + C\text{-Ajct}$" ($C\text{-Ajct} = \text{Adjunct that modifies -$sase$}$)
Reported contrast: (From Miyagawa (1999: 249) including judgments)

(1) a. okTaro-ga [IP kooen-e V kodomo_i-o ikV ]-ase-ta.
    Taro-nom park-to child-acc go-cause-past

    b. ???Taro-ga kooen-e V kodomo_i-ni [IP [e]_i ikV ]-ase-ta.
       park-to child-dat go-cause-past

    'Taro made/let (his) child go to the park.'

(2) *Adjunct movement in (1b):

    Taroo-ga [VP kooen-e V [VP kodomo_i-ni [IP [e]_i t_i ikV ]-ase ]]]-ta
    park-to child-dat |
    ↑___________________ x __________|

—VP-adjunction for the final landing of movement is prohibited (Miyagawa (1997))
The DM-analysis (cont’d)

(3) Why is (1b) not completely unacceptable?

("Taro-o-ga \[x_p \text{ KOOEN-}E^V \[v_p \text{ kodomo}_i-\text{ni} \[i_p \text{ e}_i \text{ t}_1 i^kV \]-ase]\]-ta
    park-to     child-dat
    ↑___________ok____________|  

— "... there is a focus position above the VP (Miyagawa (1997)),
    which is a legitimate landing site for 'to the park'. "
(Miyagawa (1999: 249))
Easily found counter-examples

(4) ???V-Ajct causee-ni [ … V ] CAUS

OK Kooti-wa hiraoyogi-deV sensyu-tati-ni oyogV-aseta coach-top breaststroke-in swimmers-dat swaim-caused 'The coach had the swimmers swim in the breaststroke.'

(コーチは、平泳ぎで選手達に泳がせた。)
cf. こんなにひどくお前達に心配させちゃって済まない。

(5) ???[ causee-o C-Ajct V ] CAUS

OK Kariforunia-wa subeteno huhoonyuukokusya-o kyouseetekiniC Carifornia-top all illegal.alien-acc coersively kikokus-aseCta. (カリフォルニア州は、全ての不法入国者を強制的に帰国させた。)
cf. 守衛さんは、切符のない僕たちを見て見ぬ振りをして入場させてくれた。
Research questions

1. What factors and their interactions lower acceptability in causative Ss and to what extent?

Is the prediction of the DM-analysis supported?

2. Can we and should we recognize dialectal or idiolectal variations in the case in question?

If so, in what way are they distinguished?
Design of test sentences

Pre-test sentences:

• V-adjunct vs. C-adjunct
• In V-frame vs. C-frame

\(2 \times 2 \times 6 = 24\) Sentences
Design of test sentences (cont'd)

(6) Acjt-testing frames:

a. **V-frame**:

Syuzyutu-no yokuzitu aono kanzya-wa {ziyuuni\textsuperscript{V} / # kyooseetekini\textsuperscript{C}} arukimawatta opertion-gen next.day that patient-top freely coersively walked.around 'That patient walked around { freely / coersively } on the next day of the operation.'

(手術の翌日、その患者は {自由に\textsuperscript{V} / # 強制的に\textsuperscript{C}}歩き回った。)

b. **C-frame**:

Isya-ga watasi-ni {# batahurai-de\textsuperscript{V} / muriyari\textsuperscript{C} /} saseta koto-ga aru doctor-nom I-dat butterfly.stroke.in coersively made thing-nom exit 'There is something the doctor made me do { in the butterfly stroke / coersively }.

(医者が、私に {# バタフライで\textsuperscript{V} / 無理矢理\textsuperscript{C} }させた事がある。)

→ Check if speakers properly distinguish the adjuncts to be associated with V and those associated with the causative predicate, and if the adjuncts can be safely used in the main experiment.
Experimental causative sentences:

- Adjunct type: \( V\text{-Ajct} \) vs. \( C\text{-Ajct} \) (6 adjuncts \( \times \) 2)
- Particle: \( ni \) vs. \( o \) (2 types)
- Location of adjunct: \( left \) vs. \( right \) (2 types)

\( (2 \times 2 \times 2 \times 6 = 48 \text{ Sentences}) \)

\( \rightarrow \) Test the influence of all these relevant factors and their interaction on acceptability judgments.
Design of test sentences (cont’d)

Causative sentences in Pseudo-cleft:

(7) V-adjunct + *ni*:

\[ \text{Background } \ldots hiraoyogi-de^V \text{ sensyutati-}ni \text{ oyog}^V\text{-ase-ta-no-wa } \]

\[ \text{breast.stroke-in swimmers-dat swim-cause-past-NZR-top} \]

\[ \text{Focus } \text{ano-kooti-desu } \]

\[ \text{that.coach-copula} \]

'It is that coach who made the swimmers do the breaststroke.'

(自由形の競技なのに 平泳ぎで 選手達に泳がせたのは、あのコーチです。)

→ The adjuncts placed in the background portion of a pseudo-cleft sentence to avoid their focus interpretations.
Design of test sentences (cont’d)

Filler sentences:

– Grammatical Causatives 6 Sentences
– Ungrammatical Non-causatives 18 Sentences

(8) Boku-ga teeneeni hara-o-tateteiruno-wa aitu-ga hidoku ayamarooto-sinai-kotodesu
   I-nom politely am.angry-NZR-top he-nom badly wouldn't.apologize-thingCOP
   'The reason why I am politely angry is because he wouldn't badly apologize.'

*僕がていねいに腹を立てているのは、あいつがひどく謝ろうとしないことです。

cf.*私たちが健康に望んでいるのは、家族全員がたったひとつ暮らしていくことです。

– Involve the same type of improper modification as in ungrammatical pre-test Ss and allegedly ungrammatical 'V-Ajct + ni' exmerimental causative Ss.

➔To obtain the base line judgment of clearly acceptable and clearly unacceptable sentences.
## Abbreviation of sentences

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>G-pre</strong></td>
<td>pre-test sentences where V/C-Ajcts are used in the compatible frames</td>
</tr>
<tr>
<td><strong>U-pre</strong></td>
<td>pre-test sentences where V/C-Ajcts are used in the incompatible frames</td>
</tr>
<tr>
<td><strong>o-caus</strong></td>
<td>Causative sentences with the particle '-o' as the causee marker</td>
</tr>
<tr>
<td><strong>ni-caus</strong></td>
<td>Causative sentences with the particle '-ni' as the causee marker</td>
</tr>
<tr>
<td><strong>G-filler</strong></td>
<td>filler sentences that has no problem</td>
</tr>
<tr>
<td><strong>U-filler</strong></td>
<td>filler sentences with improper modification or otherwise infelicitous use of vocabulary</td>
</tr>
</tbody>
</table>
Procedure

• Acceptability judgments by 58 native speakers (college students, 18 – 20 years old) by silent reading.

• 4-grade rating scale
  a: Perfectly legitimate
  b: Not perfect, but basically legitimate
  c: May be interpretable, but not permissible
  d: Never permissible

• This ordinal 4 scale (a ~ d) was treated as continuous (4 ~ 1).

• Sentences are randomized in order within pre-test and others (experimental causative sentences & fillers).
Pre test result: V-Ajct vs. C-Ajct

V- & C-adjuncts are distinguished based on the acceptability in two frames.

⇒ Adjuncts can be reliably used in Analysis 1 & 2.
Analysis 1: Experimental Causative Sentences

• Investigate the influential factors working on the judgments of \(ni\)/\(o\)- causatives

• 2-way ANOVA of repeated measures
  – Dependent variables: acceptability scores (4 - 1)
  – Independent variables (treated as within-subject factors)
    Particles: \(ni\) vs. \(o\)
    Location of adjuncts: left vs. right (of causee)

  – Conducted for V-Ajct & C-Ajct data separately.
Results: V-Ajct

- \( ni < o \): \( F(1, 305) = 218.00, \quad p < .001 \)
- left < right: \( F(1, 305) = 76.26, \quad p < .001 \)
- \( ni \times \) left = worst: \( F(1, 305) = 66.81, \quad p < .001 \)
Results: C-Ajct

- *ni* < *o*: $F(1, 305) = 161.3, \quad p < .001$
- no location effect: $F(1, 305) = 3.53, \quad p = .061$
- *ni* × *left* = worst: $F(1, 305) = 28.47, \quad p < .001$
Discussion: Influential Factors on Acceptability Judgments

1. Particle effect for both V/C-Ajct:
   $ni < o$ regardless of adjunct type

2. Location effect for V-Ajct but not for C-Ajct:
   left < right only for V-Ajct
   (not observed: left > right for C-Ajct)

3. Particle $\times$ Location interaction for both V/C-Ajct:
   $ni \times$ left is least acceptable regardless of adjunct type
   $\Rightarrow$ Incompatible with the prediction of the DM- analysis.

Source of the effects (1, 2 above)?

- $ni < o$: Pragmatic restriction on $ni$-causatives
- left < right: Markedness on the position of an adjunct relative to the modified V/C
Meaning of ‘mean’ acceptability

- $V\text{-Aanj} \times ni \times \text{left} = 3.05$: Low enough to support the prediction?
  - Not really. They are well above U-fillers and U-pre sentences.

![Graph showing token by token mean acceptability](image-url)
Analysis 2: Variation among speakers

• Investigate if there is a sub-group of speakers whose grammar is distinct (e.g., the DM-analysis).

• *Factor Analysis* to explore possible 'latent dimensions' (a.k.a. *factors*) underlying the speakers' judgments.
  – *Unweighted Least square* method, *varimax rotation* (non-orthogonal) with *Kaiser normalization*

• Data set: acceptability judgments (4-1) of All subjects (58) × All sentences (96)
  – *Cronbach’s alpha* (reliability measure) = .993
Result of Factor Analysis

• 3 factors extracted (criterion = eigenvalues > 1.0, $R^2 = .766$).

• Speakers divided in 3 groups based on relative magnitude of factor load (i.e., correlation with 3 factors).

  Group 1 (32 speakers) = high Factor 1 load
  Group 2 (19 speakers) = high Factor 2 load
  Group 3 (7 speakers) = high Factor 3 load

→ Grouping is not related to regional affiliation of the speakers ($\chi^2 = 5.505, p = .064$). → No grouping by dialects

<table>
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<tr>
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<th>Group 2</th>
<th>Group 3</th>
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<tr>
<td>Eastern JPN</td>
<td>19</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Western JPN</td>
<td>13</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>
Interpretation of factors: Factor 1

- The higher Factor 1, the larger the rating differences between G- and U-sentences.

→ Factor 1 = (Speakers' tendency of being) Discriminant of grammaticality
Interpretation of factors: Factor 2

• The higher Factor 2, the lower the ratings of *ni*-causatives & *U*-sentences.
  – Cuts across grammaticality
  – *ni*-causatives pragmatically more restricted than *o*-causatives.

→ Factor 2 = Sensitive to extra-grammatical degrading of the sentences
Group 1 & 2, Rating for Causatives

- Group 1 and 2 have homogeneous judgment patterns.
- Group 2 with lower acceptability of *ni*-causatives irrespective of positions and Ajct types.
Interpretation of factors: Factor 3

The higher Factor 3, the higher U-pre Ss were rated.

→ Factor 3 = Equivocal in judgments on Ajct use.

→ Group 3 = Unable to discriminate between V & C-Ajct (fail to qualify the pre-test).
Discussion

Subgroups of Speakers were identified:

Group 1: Clear judgments on grammaticality
Group 2: Sensitive to extra-grammatical degrading
Group 3: Equivocal judgments

→ No subgroups with distinct grammar.
Goals

Attempt to resolve disagreement on grammaticality judgments

Explore a way to discriminate:
  speakers' recognition of "ungrammaticality"
  from
  that of "grammaticality with somewhat lowered acceptability"

Statistical analysis of experimental results on the acceptability judgments by native speakers
Conclusions

1. Ⓐ 'Ungrammaticality' vs. Ⓑ 'Grammaticality with lowered acceptability' can be distinguished.

2. Controversy on grammaticality judgment can be resolved.

   Test case: *ni-causative* should be regarded as a case of Ⓑ
   → The DM-analysis should be rejected as a case involving the confusion between Ⓐ & Ⓑ above.

3. Proposal — Effective method to resolve controversy through experimental investigations involving:

   (i) Large sample of speakers' acceptability judgments
   (ii) Quest for the fine structure of the collected data (e.g., data mining appealing to statistical analysis)
Future projects

• New experiments on different linguistic phenomena that may involve similar confusion between 'Ungrammaticality' vs. 'Grammaticality with lowered acceptability'.
  (e.g., LF Intervention effect + Anti-superiority)

• Other analyses to reconfirm the results of the present analysis (cluster analysis, nonparametric methods, etc.).

• Corpus study to investigate the frequency distribution of causative Ss.
Thank you for your attention

Special thanks to Yuki Hirose for providing experimental resources
References


Sentences (factor 1 & 2)

- **Factor 1**
  - Divides U-sentences (U-filler, U-pre) from others (G-sentences)

- **Factor 2**
  - Divides about 3/4 of *ni*-causatives from other causative Ss
Sentences (Factors 2 & 3)

- **Factor 3**
  - Divides U-sentences into U-filler and U-pre
  - Backs up the interpretation of Factor 3 (Group 3 fails to properly distinguish C-/V-Achts)
Prediction to be tested (the DM-analysis)

- **V-Ajct**: adjunct to the left of causee is dispreferred with the particle 'ni'. (left panel)
- **C-Ajct**: adjunct at the right of causee is dispreferred with the particle 'o'. (right panel)

→ Significant interaction (Location × Causee marker) is predicted