Phonological markedness effects on noun-adjective word order in Italian

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Majority of previous work:

- **syntax** → **phonology**

*Raddoppiamento Sintattico* in Italian is a phonological process sensitive to syntactic boundaries

- Devi comprare delle [mappe [di città [v:]ecchie]_{PP} ]_{NP} RS within a phrase
  ‘You must buy some maps of old cities’
- Devi comprare delle [mappe [di città]_{PP} // vecchie ]_{NP} RS fails across a boundary
  ‘You must buy some old maps of cities’

Inkelas and Zec (1995); Nespor & Vogel (1982)
In this work:

Syntax

Phonology

Heavy NP shift constructions in English show prosodic effects on syntax.

- Mark showed to John \([ [ \text{some letters} ]_{\phi} \text{[ from Paris] }_{\phi} ]_{\text{NP}}\)
- *Mark showed to John \([ [ \text{some letters} ]_{\phi} ]_{\text{NP}}\)

Phonological constraints affect sentence formation in English, with results showing that speakers disprefer clash, geminates, hiatus, and other phonologically-marked phenomena between bigrams.

Inkelas and Zec (1995); Breiss & Hayes (2020); Martin (2011)
This work contributes to:

syntax  phonology
## Italian noun-adjective pairs

<table>
<thead>
<tr>
<th>Default ordering</th>
<th>Alternative ordering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOUN</strong></td>
<td><strong>ADJECTIVE</strong></td>
</tr>
<tr>
<td>città</td>
<td>piccola</td>
</tr>
<tr>
<td>city</td>
<td>small.FEM</td>
</tr>
<tr>
<td>‘small city’</td>
<td>‘small city’</td>
</tr>
</tbody>
</table>
Syntax of adjectives

- Two different types of adjectives: indirect modification (IM) and direct modification (DM)
- Only DM adjectives are flexible, via an optional NP raising process
- Though some pairs have semantic differences between prenominal and postnominal ordering, there is free variation
- Given that NP raising is not always semantically/syntactically motivated, I investigate some potential phonological motivations of this movement

Cinque (2010)
Phonological phenomena

1. **Stress clash**
   a. When two prominent syllables are adjacent
   b. *città piccola* (σο σοσο) ‘small city’

2. **Vowel hiatus**
   a. When two vowels are adjacent
   b. *uomo alto* (CV.CV VC.CV) ‘tall man’

3. **Phonological weight**
   a. When the noun and adjective are different lengths
   b. *ar.chi.tet.ta bra.va* (οοοο vs. οο) ‘good architect’
Reordering as an avoidance strategy

NOUN - ADJECTIVE  
Phonological markedness violation

ADJECTIVE - NOUN  
Avoided markedness violation

PHONOLOGY AFFECTING SYNTAX
Hypothesis:

Phonologically-marked phenomena in a language that are avoided phonologically, will also be avoided syntactically, where possible.

Shih & Zuraw (2017)
Phonological phenomena

1. Stress clash  
   a. When two prominent syllables are adjacent  
   b. *città piccola* (σό ødσσ) ‘small city’

2. Vowel hiatus  
   a. When two vowels are adjacent  
   b. *uomo alto* (CV.CV VC.CV) ‘tall man’

3. Phonological weight  
   a. When the noun and adjective are different lengths  
   b. *architetta bravissima* (σοσοσ vs. σσ) ‘good architect’
**Stress Clash:** phonologically avoided

| UNDERLYING STRESS: | | | |
|-------------------|-------------------|-------------------|
| **città**         | **piccola**       | **city**          |
|                   | small.FEM         |                   |
| σό               | σοσο              |                   |

| STRESS RETRACTION: | | | |
|-------------------|-------------------|-------------------|
| **città**         | **piccola**       | **city**          |
|                   | small.FEM         |                   |
| σό               | σοσο              |                   |

Given that stress clash is actively avoided in Italian phonology, where word order is flexible, it will also be avoided syntactically via word-order manipulation in \{noun, adjective\} pairs.

Nespor & Vogel (1979)
It is unclear if vowel hiatus is actively avoided in Italian phonology, so it is unclear if, where possible, it will also be avoided syntactically via word-order manipulation in \{noun, adjective\} pairs.

**Kramer (2009)**

<table>
<thead>
<tr>
<th>Vowel hiatus: <strong>possibly phonologically avoided</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIATUS ALLOWED:</strong></td>
</tr>
<tr>
<td>STEM-INTERNAL</td>
</tr>
<tr>
<td><em>paura</em></td>
</tr>
<tr>
<td><em>fear</em></td>
</tr>
<tr>
<td><strong>HIATUS DISALLOWED:</strong></td>
</tr>
<tr>
<td>ARTICLE ELISION</td>
</tr>
<tr>
<td><em>la artista</em></td>
</tr>
<tr>
<td>l’artista</td>
</tr>
<tr>
<td>the.FEM artist</td>
</tr>
</tbody>
</table>
**Phonological weight: syntactically avoided**

**DEFAULT ORDER: S V O**

<table>
<thead>
<tr>
<th></th>
<th>partito</th>
<th>di</th>
<th>maggioranza</th>
<th>fece</th>
<th>poi</th>
<th>la</th>
<th>stessa</th>
<th>proposta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Il</td>
<td>the</td>
<td>of</td>
<td>majority</td>
<td>made</td>
<td>then</td>
<td>the</td>
<td>same</td>
<td>proposal</td>
</tr>
</tbody>
</table>

‘The majority party then made the same proposal (not a similar one)’

**ALTERNATIVE ORDER: O V S**

<table>
<thead>
<tr>
<th></th>
<th>stessa</th>
<th>proposta</th>
<th>fece</th>
<th>poi</th>
<th>il</th>
<th>partito</th>
<th>di</th>
<th>maggioranza</th>
</tr>
</thead>
<tbody>
<tr>
<td>La</td>
<td>the</td>
<td>same</td>
<td>made</td>
<td>then</td>
<td>the</td>
<td>party</td>
<td>of</td>
<td>majority</td>
</tr>
</tbody>
</table>

‘The majority party then made the same proposal (not a similar one)’

**O V S not allowed:** *La stessa proposta fece poi Gianni/lui.*

Cardinaletti (2010)
Phonological weight

Given that syntactic structure is sensitive to the phonological weight of NPs elsewhere in Italian (e.g., in OSV ordering), it will also be sensitive to phonological weight in flexible {noun, adjective} pairs, preferring an order which generates a heavy-final pair.
Corpus methods

- Universal Dependencies corpus of Italian
  - 14,167 sentences / 14,498 pairs
  - Syntactic category information

- PhonItalia lexical database of Italian
  - 120,000 word forms
  - Syllable, stress, segmental information
Corpus Results

- Default order = postnominal [noun adjective]
  - 68% default order (noun adjective)
- Flexible adjectives = those appearing in both positions
  - 28% flexible / 72% fixed
- Phonological phenomena
  - Possible **Clash**: only 3% of flexible adjective pairs
  - Possible **Hiatus**: 29% of flexible adjective pairs
  - Possible **Weight**: 68% of flexible adjective pairs
Avoided phenomena

- If in the **corpus** order, clash occurred = (true) clash:

  corpus order:   città piccola  ‘small city’

- If in the **reversed** corpus order, clash **would** occur = **avoided** clash:

  corpus order:   piccolo colibrì  ‘small hummingbird’
  reversed order:  colibrì piccolo
Proportion of marked phenomena by adjective type

<table>
<thead>
<tr>
<th>Adjective Type</th>
<th>Fixed</th>
<th>Flexible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress clash</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Vowel hiatus</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Weight</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>
Statistical methods

- Logistic regression predicting **adjective flexibility**
  - Effects: avoided clash, avoided hiatus, avoided light-final
  - **Expect:** an avoided light-final or avoided clash pair increases likelihood of having a flexible adjective

- Mixed effects logistic regression predicting **word ordering**
  - Fixed effects: clash, hiatus, weight
  - Random effect: adjective identity
  - **Expect:** an avoided light-final or avoided clash pair increases likelihood of prenominal (non-default) word order
Stress clash affects word ordering

- Logistic regression predicting **adjective flexibility**
  - Significantly more likely to be a flexible adjective if there is **avoided clash** \( p = 1.65 \times 10^{-08} \)

- Mixed effects logistic regression predicting **word ordering**
  - Significantly more likely to be prenominal (non-default) if doing so would avoid stress clash \( p = 0.006 \)

- Non-default ordering is exploited in order to avoid phonologically-marked stress clash
Vowel hiatus affects word ordering

- Logistic regression predicting adjective flexibility
  - Significantly more likely to be a flexible adjective if there is avoided hiatus \((p < 2e-16^*)\)
- Mixed effects logistic regression predicting word ordering
  - Significantly more likely to remain postnominal (default) to avoid hiatus in prenominal order \((p = 5.15e-10^*)\)
- Non-default word ordering also tends to result in phonologically-marked hiatus, so default order is utilized
Phonological weight does not affect word ordering

- Logistic regression predicting adjective flexibility
  - Insignificant result: weight does not help predict if an adjective is flexible ($p = 0.88$ NS)
- Mixed effects logistic regression predicting word ordering
  - Insignificant result: weight does not help predict if order is prenominal (non-default) ($p = 0.96$ NS)
- Syntactic reordering does not appear to be utilized as a strategy to avoid light-final pairs
Results Summary

- Stress clash: ✔
- Vowel hiatus: ❓
- Phonological weight: ❌
Conclusion

- A unidirectional Y-model in which only phonology can be constrained by syntax is untenable.
- Rather: a bidirectional cosprespence model which allows each level of representation (syntax and phonology) to be constrained by the other is supported.

Inkelas and Zec (1995)
References


## Semantics of adjectives

<table>
<thead>
<tr>
<th>Prenominal adjectives</th>
<th>N</th>
<th>Postnominal adjectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>individual-level reading</td>
<td>individual-level or stage-level reading</td>
<td></td>
</tr>
<tr>
<td>nonrestrictive reading</td>
<td>restrictive or nonrestrictive reading</td>
<td></td>
</tr>
<tr>
<td>modal reading</td>
<td>modal or implicit relative clause reading</td>
<td></td>
</tr>
<tr>
<td>nonintersective reading</td>
<td>intersective or nonintersective reading</td>
<td></td>
</tr>
<tr>
<td>absolute reading</td>
<td>relative or absolute reading</td>
<td></td>
</tr>
<tr>
<td>absolute reading of superlatives</td>
<td>comparative or absolute reading of superlatives</td>
<td></td>
</tr>
<tr>
<td>specificity-inducing reading</td>
<td>specificity- or non-specificity-inducing reading</td>
<td></td>
</tr>
<tr>
<td>evaluative reading of ‘unknown’</td>
<td>evaluative or epistemic reading of ‘unknown’</td>
<td></td>
</tr>
<tr>
<td>NP-dependent reading of ‘different’</td>
<td>NP-dependent or discourse anaphoric reading of ‘different’</td>
<td></td>
</tr>
</tbody>
</table>