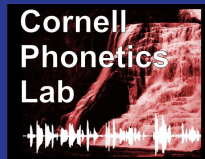
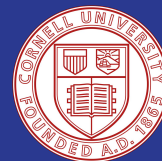


# Phonological markedness effects on noun-adjective word order in Italian

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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 citta [v:]**ecchie** ]<sub>PP</sub> ]<sub>NP</sub> **RS within a phrase**  
'You must buy some maps of old cities'
- Devi comprare delle [ mappe [ di citta ]<sub>PP</sub> // **vecchie** ]<sub>NP</sub> **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 [ [ some letters ]<sub>φ</sub> [ from Paris ]<sub>φ</sub> ]<sub>NP</sub>
- \*Mark showed to John [ [ some letters ]<sub>φ</sub> ]<sub>NP</sub>

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

Default ordering		Alternative ordering	
NOUN	<b>ADJECTIVE</b>	<b>ADJECTIVE</b>	NOUN
<i>città</i>	<i>piccola</i>	<i>piccola</i>	<i>città</i>
city	small.FEM	small.FEM	city
'small city'		'small city'	

# 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

# Phonological phenomena

## 1. Stress clash

a. When two prominent syllables are adjacent

b. *città piccola* (σσ́ σσσ) '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* (σσσσ vs. σσ) 'good architect'

# Reordering as an avoidance strategy

NOUN - **ADJECTIVE**



**ADJECTIVE** - NOUN

Phonological  
markedness violation

**Avoided** markedness  
violation

PHONOLOGY AFFECTING SYNTAX



# Hypothesis:

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

# Phonological phenomena

## 1. Stress clash

*phonologically avoided*

a. When two prominent syllables are adjacent

b. *città piccola* (σσ σσσ) 'small city'

## 2. Vowel hiatus

*possibly phonologically avoided*

a. When two vowels are adjacent

b. *uomo alto* (CV.CV VC.CV) 'tall man'

## 3. Phonological weight

*syntactically avoided*

a. When the noun and adjective are different lengths

b. *ar.chi.tet.ta bra.va* (σσσσ vs. σσ) 'good architect'

## Stress Clash: *phonologically avoided*

<i>UNDERLYING STRESS:</i>	
<i>città</i>	<i>piccola</i>
city	small.FEM
σσ́	σ́σσ
<i>STRESS RETRACTION:</i>	
<i>città</i>	<i>piccola</i>
city	small.FEM
σ́σ	σ́σσ

**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)

## Vowel hiatus: *possibly phonologically avoided*

<i>HIATUS ALLOWED:</i>	
STEM-INTERNAL	
<i>paura</i>	CV.V.CV
fear	'fear'
<i>HIATUS DISALLOWED:</i>	
ARTICLE ELISION	
<i>*la artista</i>	*CV.VC.CV.CCV
<i>l'artista</i>	CVC.CV.CCV
the.FEM artist	'the artist'

**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)

# Phonological weight: *syntactically avoided*

**DEFAULT ORDER: S V O**

Il	partito	di	maggioranza	fece	poi	la	stessa	proposta
the	party	of	majority	made	then	the	same	proposal

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

**ALTERNATIVE ORDER: O V S**

La	stessa	proposta	fece	poi	il	partito	di	maggioranza
the	same	proposal	made	then	the	party	of	majority

'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:

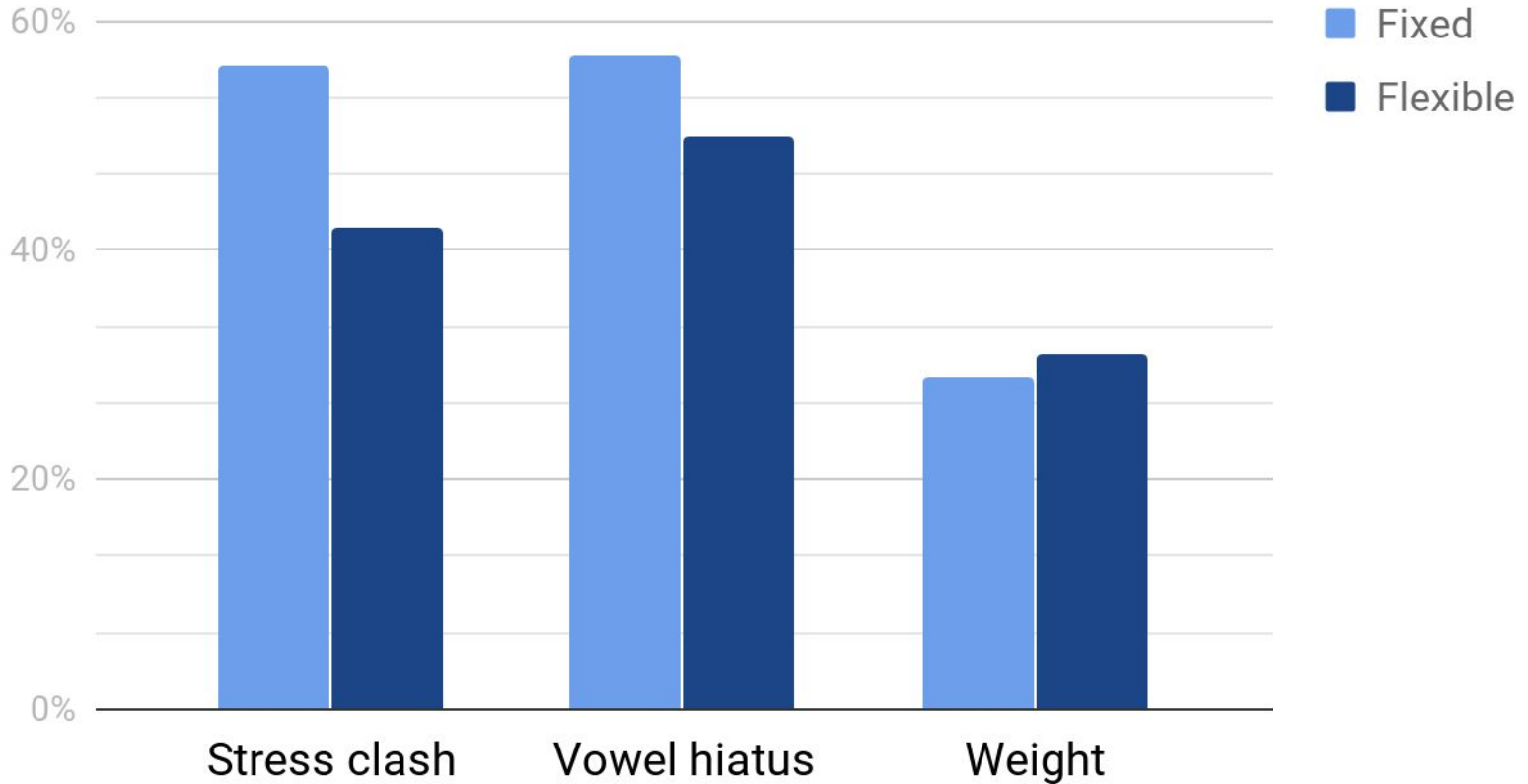
corpus order: città **piccola** 'small city'

- 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



# 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** ( $p = 1.65e-08^*$ )
- 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 ✗

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# Conclusion



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



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# Semantics of adjectives

Prenominal adjectives	N	Postnominal adjectives
individual-level reading		individual-level or stage-level reading
nonrestrictive reading		restrictive or nonrestrictive reading
modal reading		modal or implicit relative clause reading
nonintersective reading		intersective or nonintersective reading
absolute reading		relative or absolute reading
absolute reading of superlatives		comparative or absolute reading of superlatives
specificity-inducing reading		specificity- or non-specificity-inducing reading
evaluative reading of 'unknown'		evaluative or epistemic reading of 'unknown'
NP-dependent reading of 'different'		NP-dependent or discourse anaphoric reading of 'different'