Adjacent and Non-Adjacent Initial Mutation in Irish

Sebastian Sulger

Universität Konstanz

29.01.2010
1. General Remarks on Irish

2. Two Phenomena of Irish Grammar
   - Lenition
   - Eclipse

3. On the Location of Initial Mutations in the Grammar of Irish
   - What kind of Processes are Initial Mutations?
   - A Possible Location: Phonology

4. Non-Adjacent Mutation

5. Another Approach: Morphology Interfacing with Syntax
   - A Possible Location: Morphology

6. Short Demo of XLE Handling Initial Mutations
Irish - language history

- among the oldest languages of Europe
- fragments (inscriptions in stones) date from the 4th to the 6th century
- related to Scottish Gaelic and Manx (which is regarded as extinct)
- Indo-Germanic $\rightarrow$ Celtic $\rightarrow$ Insular Celtic $\rightarrow$ Goidelic ("Gaelic") $\rightarrow$ Irish (Scottish Gaelic, Manx)
Irish today

- first official language of Ireland
- minority language; spoken predominantly in the so-called Gaeltachtaí (population: 91,862, Irish in everyday life: 60%)
- 1.8 million people (one out of three) on the island speak Irish "to a certain degree"
Dispersion of the *Gaeltachtaí*

*Figure:* Map of Ireland including *Gaeltachtaí*
Lenition

- Initial Mutation (IM) – process affecting first sound of word
- a somewhat ”strong” consonant is ”weakened” (lat. lenis 'soft')
Lenition

- Initial Mutation (IM) – process affecting first sound of word
- a somewhat ”strong” consonant is ”weakened” (lat. lenis 'soft')
- affected consonants:

\[
\begin{align*}
    b (\text{/b/}) & \rightarrow bh (\text{/v/}) \\
    c (\text{/k/}) & \rightarrow ch (\text{/k\h/}) \\
    d (\text{/d/}) & \rightarrow dh (\text{/g/}) \\
    f (\text{/f/}) & \rightarrow fh (\emptyset) \\
    g (\text{/g/}) & \rightarrow gh (\text{/ɣ/}) \\
    m (\text{/m/}) & \rightarrow mh (\text{/v/}) \\
    p (\text{/p/}) & \rightarrow ph (\text{/f/}) \\
    s (\text{/s/}) & \rightarrow sh (\text{/h/}) \\
    t (\text{/t/}) & \rightarrow th (\text{/h/})
\end{align*}
\]
Lenition

- consonants that are not affected: $h, l, n, r$
- vowels are not affected
- realized in various lexical and syntactic contexts
- needs an external trigger in front of the lenited consonant (exception: verbs in the past tense and conditional)
Lenition

- consonants that are not affected: $h, l, n, r$
- vowels are not affected
- realized in various lexical and syntactic contexts
- needs an external trigger in front of the lenited consonant (exception: verbs in the past tense and conditional)
- example (lexical triggering): prefix $an$-: intensification of adjectives

$beag$ /b/ 'small'; $an-bheag$ /v/ 'very small'
$te$ /t/ 'hot'; $an-the$ /h/ 'very hot'
Lenition

- consonants that are not affected: \( h, l, n, r \)
- vowels are not affected
- realized in various lexical and syntactic contexts
- needs an external trigger in front of the lenited consonant (exception: verbs in the past tense and conditional)
- example (lexical triggering): prefix \( an- \): intensification of adjectives

\[
\begin{align*}
\text{beag } /b/ & \text{ 'small'; } an\text{-}b\text{heag } /v/ & \text{ 'very small'} \\
\text{te } /t/ & \text{ 'hot'; } an\text{-}\text{the } /h/ & \text{ 'very hot'} \\
\end{align*}
\]

- example (syntactic triggering): adjectives modifying feminine nouns

\[
\begin{align*}
\text{mór } /m/ & \text{ 'big'; } \text{bean mór } /v/ & \text{ 'big woman'} \\
\end{align*}
\]
Eclipse

- Initial Mutation – process affecting first sound of word
- voiceless plosives and /f/ become voiced; voiced plosives become nasalized
- eclipse is also possible with vowels -→ n- is added in front of the vowel
Eclipse

- Initial Mutation – process affecting first sound of word
- voiceless plosives and /f/ become voiced; voiced plosives become nasalized
- eclipse is also possible with vowels -> n- is added in front of the vowel
- affected consonants:
  
  \[
  \begin{align*}
  b (\text{/b/}) & \rightarrow mb (\text{/m/}) \\
  c (\text{/k/}) & \rightarrow gc (\text{/g/}) \\
  d (\text{/d/}) & \rightarrow nd (\text{/n/}) \\
  f (\text{/f/}) & \rightarrow bhf (\text{/v/}) \\
  g (\text{/g/}) & \rightarrow ng (\text{/n/}) \\
  p (\text{/p/}) & \rightarrow bp (\text{/b/}) \\
  t (\text{/t/}) & \rightarrow dt (\text{/d/})
  \end{align*}
  \]

- -> orthography: letters for new pronunciation
Eclipse

- consonants that are not affected: \( h, l, m, n, r, s \)
- eclipse is realized in various lexical and syntactic contexts
- eclipse needs an external trigger in front of the eclipsed consonant
Eclipse

- consonants that are not affected: *h, l, m, n, r, s*
- eclipse is realized in various lexical and syntactic contexts
- eclipse needs an external trigger in front of the eclipsed consonant
- example (lexical triggering): prepositional phrases containing the preposition *i*

\[\text{teach (}/t/\text{)} \text{'house'}; \text{i }\text{dteach (}/d/\text{)} \text{'in a house'}\]

\[\text{Corcaigh (}/k/\text{)} \text{'Cork'}; \text{i }\text{gCorcaigh (}/g/\text{)} \text{'in Cork'}\]
Eclipse

- consonants that are not affected: \( h, l, m, n, r, s \)
- eclipse is realized in various lexical and syntactic contexts
- eclipse needs an external trigger in front of the eclipsed consonant
- example (lexical triggering): prepositional phrases containing the preposition \( i \)

\[
\text{teach} (/t/) \ 'house'; \ i \ d\text{teach} (/d/) \ 'in \ a \ house' \\
\text{Corcaigh} (/k/) \ 'Cork'; \ i \ g\text{Corcaigh} (/g/) \ 'in \ Cork'
\]

- example (syntactic triggering): prepositional phrases containing an NP with definite article

\[
\text{bord} (/b/) \ 'table'; \ ar \ an \ mbord (/m/) \ 'on \ the \ table' \\
\text{cat} (/k/) \ 'cat'; \ roimh \ an \ g\text{cat} (/g/) \ 'before/in \ front \ of \ the \ cat'
\]
What happens and where?

- IM: processes where first sound of word is changed
What kind of Processes are Initial Mutations?

What happens and where?

- IM: processes where first sound of word is changed
- processes depend on:
  - words that come before affected word
  - syntactic environments of affected word
What happens and where?

- IM: processes where first sound of word is changed
- processes depend on:
  - words that come before affected word
  - syntactic environments of affected word
- processes do not depend on:
  - phonological environment of affected word
What happens and where?

- IM: processes where first sound of word is changed
- processes depend on:
  - words that come before affected word
  - syntactic environments of affected word
- processes do not depend on:
  - phonological environment of affected word

→ IM processes are not Sandhi
What happens and where?

- IM: processes where first sound of word is changed
- Processes depend on:
  - words that come before affected word
  - syntactic environments of affected word
- Processes do not depend on:
  - phonological environment of affected word

→ IM processes are not Sandhi
→ IM processes apply regardless of phonological environment
BUT:

We have looked at *the environments* of Initial Mutation.
BUT:

We have looked at *the environments* of Initial Mutation.

- What about the processes themselves?
- What kind of processes are they?
- We do find sound changes – so the processes are phonological, no?
Does it happen in the Phonology?

- First guess: Phonology
  ➔ Looks promising, since
Does it happen in the Phonology?

First guess: Phonology

→ Looks promising, since
  - IM are apparently regular processes
  - IM are processes involving sound changes
  - IM can be described using phonological features
Does it happen in the Phonology?

- First guess: Phonology
  → Looks promising, since
    - IM are apparently regular processes
    - IM are processes involving sound changes
    - IM can be described using phonological features
  - a lot of literature on phonological approaches to IM
    - Ó Siadhail (89), Swingle (93), Grijzenhout (95), Gnanadesikan (97) etc.
Does it happen in the Phonology?

Different Theories applied to IM

1) derivational analyses: set of rules effecting mutation
Does it happen in the Phonology?

Different Theories applied to IM

1) derivational analyses: set of rules effecting mutation

- problems:
  - need to identify phonological features to describe the changes

  Irish Lenition:
  
  oral stops + m \rightarrow fricatives
  coronal obstruents \rightarrow debuccalized (h)
  tense coronal sonorants \rightarrow laxed
  f \rightarrow deleted

  Generalize these processes via features??
Does it happen in the Phonology?

2) OT analyses: assume some element in input, triggering the mutation

- output with mutation form must be shown to be more harmonic than candidate with radical (non-mutated) form
- triggering element: floating autosegment/morpheme (Lieber 87), segmentally empty $\rightarrow$ not pronounced; at right edge of triggers
Does it happen in the Phonology?

2) OT analyses: assume some element in input, triggering the mutation
   - output with mutation form must be shown to be more harmonic than candidate with radical (non-mutated) form
   - triggering element: floating autosegment/morpheme (Lieber 87), segmentally empty $\rightarrow$ not pronounced; at right edge of triggers
   - problems:
     - syntax-triggered mutation – evidence for the morpheme?

   bean mhór dhubh
   woman big dark
   ‘a big dark woman’

   - non-adjacent mutation (more below)
Non-Adjacent Mutation: Why IM Cannot be Phonological

- IM usually applies in adjacent fashion
  - trigger words/triggering syntactic environments *directly* before affected word
  - speaks in favor of triggering segment at right edge of trigger
Non-Adjacent Mutation: Why IM Cannot be Phonological

- IM usually applies in adjacent fashion
  - trigger words/trIGGERing syntactic environments *directly* before affected word
  - speaks in favor of triggering segment at right edge of trigger

→ BUT: cases where IM is applied in a non-adjacent fashion
Two Cases of Non-Adjacent Mutation:

1) [Possessive Pronoun + dhá ‘two’ + Noun]_{NP}
Non-Adjacent Mutation: Why IM Cannot be Phonological

Two Cases of Non-Adjacent Mutation:

1) [Possessive Pronoun + dhá ‘two’ + Noun]_{NP}

bhur d teach
your.pl house
‘your (pl.) house’ \rightarrow possessive pronoun triggers eclipsis on noun
Two Cases of Non-Adjacent Mutation:

1) [Possessive Pronoun + dhá ‘two’ + Noun]_{NP}

bhur  d teach
your.pl house
‘your (pl.) house’ → possessive pronoun triggers eclipsis on noun

dhá  theach
two house
‘two houses’ → numeral dhá triggers lenition on noun
Non-Adjacent Mutation: Why IM Cannot be Phonological

Two Cases of Non-Adjacent Mutation:

1) \([\text{Possessive Pronoun} + \text{dhá ‘two’} + \text{Noun}]_{NP}\)

bhur d teach
your.pl house
‘your (pl.) house’ → possessive pronoun triggers eclipsis on noun

dhá theach
two house
‘two houses’ → numeral dhá triggers lenition on noun

bhur dhá d teach
your.pl two house
‘your (pl.) two houses’ → possessive pronoun triggers eclipsis on noun
even though the two are not adjacent
Non-Adjacent Mutation: Why IM cannot be phonological

2) \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]]_{NP}]_{PP}\)
Non-Adjacent Mutation: Why IM cannot be phonological

2) \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{NP}]_{PP}\)

*do bhuachaille*

to boys

‘to boys’ → preposition *do* triggers lenition on noun
Non-Adjacent Mutation: Why IM cannot be phonological

2) \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{NP}]_{PP}\)

- `do bhuachaillí`
to boys
‘to boys’ \(\rightarrow\) preposition `do` triggers lenition on noun

- `do bhuachaillí nó chailíní`
to boys or girls
‘to boys or girls’ \(\rightarrow\) preposition `do` triggers lenition on both nouns
even though 2nd noun is not adjacent to preposition
Non-Adjacent Mutation: Why IM cannot be phonological

2) \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{NP}]_{PP}\)

\text{do bhuachaillí}
\text{to boys}

‘to boys’ → preposition \text{do} triggers lenition on noun

\text{do bhuachaillí nó chailíní}
\text{to boys or girls}

‘to boys or girls’ → preposition \text{do} triggers lenition on both nouns

even though 2nd noun is not adjacent to preposition

*(Lenition appears on all conjuncts within coordinated structures)*
Non-Adjacent Mutation: Why IM cannot be phonological

2) \[[\text{Preposition}] + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{NP}\]_{PP}

do bhuachaillí

to boys

‘to boys’ → preposition \textit{do} triggers lenition on noun

\[\]

do bhuachaillí nó chailiní

to boys or girls

‘to boys or girls’ → preposition \textit{do} triggers lenition on both nouns
even though 2nd noun is not adjacent to preposition

- (Lenition appears on all conjuncts within coordinated structures)
- Examples speaking against floating autosegment approach (e.g. Swingle 93, Gnanadesikan 97)
- Mutation of non-adjacent words cannot be explained
What about Morphology?

- Massam (83), Green (03): IM processes are in Morphology
  - IM forms are instances of inflection
  - different IM forms are produced by Morphology
  - syntax then enforces restrictions on which form to use
What about Morphology?

- Massam (83), Green (03): IM processes are in Morphology
  - IM forms are instances of inflection
  - different IM forms are produced by Morphology
  - syntax then enforces restrictions on which form to use

**Consequences:**

→ Phonology has nothing to do with IM processes
→ Morphology merely provides forms (‘word-and-paradigm’-approach)
→ Lexicon/Syntax selects right forms using morphosyntactic constraints
How does this apply to Adjacent IM?

- Eclipsis Example (lexical triggering): prepositional phrases containing the preposition *i*

  \[\text{teach} (/t/) \ 'house'; \ i \ d\text{teach} (/d/) \ 'in a house'\]
  \[\text{Corcaigh} (/k/) \ 'Cork'; \ i \ g\text{Corcaigh} (/g/) \ 'in Cork'\]
How does this apply to Adjacent IM?

- Eclipsis Example (lexical triggering): prepositional phrases containing the preposition *i*

  \[
  \text{teach} (/t/) \ 'house' ; \ i \ d\text{teach} (/d/) \ 'in \ a \ house' \\
  \text{Corcaigh} (/k/) \ 'Cork' ; \ i \ g\text{Corcaigh} (/g/) \ 'in \ Cork'
  \]

- Morphology generates all forms of nouns (radical, lenited, eclipsed)
How does this apply to Adjacent IM?

- Eclipsis Example (lexical triggering): prepositional phrases containing the preposition *i*

  *teach* (/t/) 'house'; *i dteach* (/d/) 'in a house'
  *Corcaigh* (/k/) 'Cork'; *i gCorcaigh* (/g/) 'in Cork'

- Morphology generates all forms of nouns (radical, lenited, eclipsed)
  - Preposition lexically selects for eclipsed form
How does this apply to Adjacent IM?

- Eclipsis Example (lexical triggering): prepositional phrases containing the preposition *i*

  \(\text{teach (/t/) 'house'; } i \text{ dteach (/d/) 'in a house'}\)
  \(\text{Corcaigh (/k/) 'Cork'; } i \text{ gCorcaigh (/g/) 'in Cork'}\)

- Morphology generates all forms of nouns (radical, lenited, eclipsed)
- **Preposition lexically selects for eclipsed form**
  → Need constraint in lexicon entry for *i* that says: “Need eclipsis if noun follows *i*”
How does this apply to Adjacent IM?

- Lenition Example (syntactic triggering): adjectives modifying feminine nouns

\( \text{mór} /m/ \ 'big'; \ bean \text{ mhór} /v/ \ 'big woman' \)
How does this apply to Adjacent IM?

- Lenition Example (syntactic triggering): adjectives modifying feminine nouns

\textit{móir} /\textit{m}/ 'big'; \textit{bean mhóir} /\textit{v}/ 'big woman'

- Again: Morphology generates all forms of adjectives (radical, lenited, eclipsed)
How does this apply to Adjacent IM?

- Lenition Example (syntactic triggering): adjectives modifying feminine nouns

  mór /m/ 'big'; bean mhór /v/ 'big woman'

- Again: Morphology generates all forms of adjectives (radical, lenited, eclipsed)

- **Morphosyntactic Constraint** selects for lenited form
How does this apply to Adjacent IM?

- Lenition Example (syntactic triggering): adjectives modifying feminine nouns
  
móir /m/ 'big'; bean mhóir /v/ 'big woman'

- Again: Morphology generates all forms of adjectives (radical, lenited, eclipsed)

  **Morphosyntactic Constraint selects for lenited form**

→ Need morphosyntactic constraint that says: “Need lenition if adjective follows feminine noun”
And what about Non-Adjacent IM?

\[ \text{Preposition} + \left[ \text{Noun} + \text{Conjunction} + \text{Noun} \right]_{NP} \rightarrow \text{PP} \]

do bhuachaillí nó chailíní

to boys or girls

‘to boys or girls’ \(\rightarrow\) preposition *do* triggers lenition on both nouns
even though 2nd noun is not adjacent to preposition
And what about Non-Adjacent IM?

- \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{NP}]_{PP}\)

\text{do bhuaichailí nó chailíní}
to boys or girls
‘to boys or girls’ → preposition \text{do} triggers lenition on both nouns
even though 2nd noun is not adjacent to preposition

- Again: Morphology generates all forms of nouns (radical, lenited, eclipsed)
And what about Non-Adjacent IM?

\([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]_{\text{NP}}]_{\text{PP}}\)

do bhuaċaillí nó chailíní
to boys or girls
‘to boys or girls’ → preposition *do* triggers lenition on both nouns
even though 2nd noun is not adjacent to preposition

Again: Morphology generates all forms of nouns (radical, lenited, eclipsed)

**Morphosyntactic Constraint selects for lenited form**
And what about Non-Adjacent IM?

- \([\text{Preposition} + [\text{Noun} + \text{Conjunction} + \text{Noun}]]_{NP}\)_{PP}

\[\text{do bhuachaillí nó chailiní} \]
\[\text{to boys or girls} \]
\[\text{‘to boys or girls’} \rightarrow \text{preposition } do \text{ triggers lenition on both nouns} \]
\[\text{even though 2nd noun is not adjacent to preposition} \]

- Again: Morphology generates all forms of nouns (radical, lenited, eclipsed)

- **Morphosyntactic Constraint selects for lenited form**

  \[\rightarrow \text{Need morphosyntactic constraint that says: “Need lenition on all conjuncts”} \]
Wrap-Up & A Possible Implementation
* IM are not phonological processes.
Wrap-Up & A Possible Implementation

* IM are not phonological processes.
* They are in Morphology and best handled in a Morphology-Syntax Interface.
* IM are not phonological processes.
* They are in Morphology and best handled in a Morphology-Syntax Interface.
* They can be regarded as inflection, realized due to lexical and morphosyntactictic constraints.
Wrap-Up & A Possible Implementation

How to implement this in a computational grammar for parsing Irish?
Wrap-Up & A Possible Implementation

How to implement this in a computational grammar for parsing Irish? XEROX Linguistic Environment (XLE) providing all necessary machinery:
How to implement this in a computational grammar for parsing Irish?

XEROX Linguistic Environment (XLE) providing all necessary machinery:

- Finite-State Morphologies reflect word-and-paradigm approach to Morphology

→ Generate all possible mutation forms
Wrap-Up & A Possible Implementation

How to implement this in a computational grammar for parsing Irish?
XEROX Linguistic Environment (XLE) providing all necessary machinery:

- Finite-State Morphologies reflect word-and-paradigm approach to Morphology
  → Generate all possible mutation forms
- Multiword-Transducers reflect Morphology-Syntax Interface
  → Take care of Morphosyntactic Constraints
DEMO: XLE Handling Lexical Initial Mutations
Thank you!
Further Examples

Syntactic IM - Evidence for Morpheme?

bean  mhór dhubh
woman big  dark
‘a big dark woman’

fear  món dubh
woman big  dark
‘a big dark man’
Further Examples

Non-Adjacent Mutation in PP

in Dublin and Belfast
‘in Dublin and Belfast’ →
preposition *do triggers eclipse on first noun only
even though 2nd noun is part of coordinated structure