Irish initial consonant mutation:
Disentangling phonology from morphosyntax

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What are initial consonant mutations?

Initial consonant mutation (ICM)

Systematic phonological alternation of word-initial consonants, depending on morphosyntactic context

- Well-known characteristic of the Celtic languages
- Primarily affects lexical categories: nouns, adjectives and verbs
- Two mutation types in Irish: "lenition" and "eclipsis"

Examples

- *b*róg 'shoe' (initial consonant is /b/)
- *an bh*róg 'the shoe' (initial consonant is /v/)
- *ar an mb*róg 'on the shoe' (initial consonant is /m/)

Why are they interesting?

- At the interface of phonology, morphology and syntax
- Challenging for modular theories of grammar

Strict modularity

(Morpho)syntactic computation makes no reference to phonology, and phonological computation makes no reference to (morpho)syntax.

- Ideal testing ground for two broad theoretical approaches:
  - **Globalism**, which allows phonological and morphosyntactic information to be computed in the same system
  - **Modularity**, which maintains that these modules are distinct and strictly independent from one another

Research question

- Begin with the most restrictive hypothesis: phonology and morphosyntax are distinct and strictly independent from one another

Primary research question

Is the Irish ICM data consistent with this hypothesis?

- Overall aim:
  - Develop a theory of mutation that can account for the facts, while remaining compatible with a strictly modular view of grammar, **OR**
  - Demonstrate conclusively that this cannot be done

General approach

1. Identify aspects of Irish ICM that are the most challenging for strict modularity

2. Investigate whether the phonological and morphosyntactic elements can be disentangled in each case

So far...

Initial analysis suggests that Irish ICM is **not necessarily incompatible** with a strictly modular grammatical system (although some additional assumptions may need to be made).

3. If possible, develop a theory of ICM that can account for the data within a modular framework.

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The Irish data

Initial consonant mutation (ICM)

Systematic phonological alternation of word-initial consonants, depending on morphosyntactic context

Examples

- *bróg* 'shoe' (initial consonant is /b/)
- *an bhróg* 'the shoe' (initial consonant is /v/)
- *ar an mbróg* 'on the shoe' (initial consonant is /m/)

The Irish data – phonological alternations

Radical form		Lenited form		Eclipsed form	
/p/	⟨p⟩	/f/	⟨ph⟩	/b/	⟨bp⟩
/t/	⟨t⟩	/h/	⟨th⟩	/d/	⟨dt⟩
/k/	⟨c⟩	/x/	⟨ch⟩	/g/	⟨gc⟩
/b/	⟨b⟩	/v/	⟨bh⟩	/m/	⟨mb⟩
/d/	⟨d⟩	/ɣ/	⟨dh⟩	/n/	⟨nd⟩
/g/	⟨g⟩	/ʝ/	⟨gh⟩	/ŋ/	⟨ng⟩
/f/	⟨f⟩	∅	⟨fh⟩	/v/	⟨bhf⟩
/s/	⟨s⟩	/h/	⟨sh⟩	–	
/m/	⟨m⟩	/v/	⟨mh⟩	–	
/n/	⟨n⟩	–		–	
/l/	⟨l⟩	–		–	
/r/	⟨r⟩	–		–	

The Irish data – morphosyntactic context

There is an enormous range of contexts that trigger ICM in Irish – below is just a sample:

- In a feminine noun, after the definite article *an*: *an **bh**róg* 'the shoe'
- Following certain prepositions: *roimh **mh**aidin* 'before morning'
- In any definite possessor: muintir ***Sh**eáin* 'Seán's family'
- After possessive pronouns: *ár **gc**at* 'our cat'
- In compounds, following certain prefixes: *an-**mh**aith* 'very good'
- In past tense verbs: ***mh**olamar* 'we praised'
- After certain verbal particles: *nach **gc**reidim* 'that I don't believe'
- In an attributive noun/adjective that modifies a plural noun ending in a palatalised consonant: *buidéi**l bh**ainne* 'bottles of milk'

Problems with non-adjacency:

(1) a. *trí* **sh**ioc *agus* **sh**neachta
   through ^{L}ice and ^{L}snow
   'through ice and snow'

  b. *ár* *dhá* **gc**apall
   our two ^{E}horse
   'our two horses'

Challenges with mutation triggering

Environments that appear identical on the surface, but have mutation in one case and not the other:

(2) a. *súil **gh**loine*
         eye glass.GEN
         'an eye of glass' ('a glass eye')
     b. *clann **f**eirmeora*
         family farmer.GEN
         'a farmer's family'

Challenges for strict modularity

Challenge 1: Coronal blocking of mutation

- Blocking of mutation when two coronals come together at word boundary
- e.g. *an teanga*, *an theanga 'the language'

Challenge 2: Palatalised consonants as triggers?

- Lenition of attributive adjectives and nouns after a plural noun ending in a palatalised consonant
- e.g. *buidéil bhainne* 'bottles of milk'

Question: Can these be accounted for without violating strict modularity?

Previous approaches

- First attempt: Hamp's morphophoneme theory (Hamp, 1951)
  - Mutation particles residing on the right edge of trigger words
  - e.g. *mo*^{L} + *cóta* → *mo* **ch***óta*
- Rule-based approaches: A mutation diacritic triggers the application of phonological mutation rules (e.g. Ní Chiosáin, 1991; Pyatt, 1997)
- Syntactic accounts: Explain the triggering of mutation through syntactic structure (e.g. Duffield, 1995)
- Suppletion accounts: Remove the mutations entirely from the phonology (e.g. Green, 2006)
- Optimality Theory accounts: Use OT tableaux to allow phonological and morphosyntactic constraints to interact (e.g. Wolf, 2008)
- Affixation accounts: Mutations triggered by floating phonological features (e.g. Breit, 2019)

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Coronal blocking (CB) – the problem

Challenge 1: Coronal blocking of mutation

- Blocking of mutation when two coronals come together at word boundary
- e.g. *an teanga*, **an th*eanga 'the language'

- Regularly after the definite article *an*
- Occasionally in attributive adjectives and nouns
- In compounds, after some prefixes but not others

Question: Is CB an example of the mutation triggering mechanism being influenced by phonological factors?

Coronal blocking (CB) – analysis

- Evidence that CB (in compounds at least) is influenced by stress patterns
- Seems to apply only to targets that carry primary stress
- Examples of primary stress targets:
    - *in*-'*d*éanta, **in*-'*dh*éanta 'do-able'
    - '*an*-'*d*ona, **'an*-'*dh*ona 'very-bad'
- Examples of secondary stress targets:
    - **'mion*-ˌ*t*orthaí, '*mion*-ˌ*th*orthaí 'micro-products'
- Next steps: can we generalise this to non-compounds?
    - e.g. Does CB apply to any target that carries primary stress within the NP?

Coronal blocking (CB) – analysis

Question: Is CB an example of the mutation triggering mechanism being influenced by phonological factors?

- Evidence from epenthesis (Ní Chíosáin, 1991)
- CB is sometimes circumvented through insertion of an epenthetic vowel
- e.g. *an + dona* → '*an*-'*dona* **OR** '*an[ə]*-'*dhona* 'very bad'
- Suggests mutation is still triggered as usual via morphosyntax
- Separate phonological process later blocks mutation when two coronals come together

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Phonological triggering – the problem

Challenge 2: Palatalised consonants as triggers?

- Lenition of attributive adjectives and nouns after a plural noun ending in a palatalised consonant
- e.g. *buidé**il bh**ainne* 'bottles of milk'

- Most mutation environments can be defined without reference to phonological features of the trigger or target
- One putative exception: the presence or absence of a palatalised consonant influences whether or not mutation is realised in the above mutation environment
  - See e.g. the Irish grammars of De Bhaldraithe (1953), Christian Brothers (1960), Ó Sé (2000), Ó Curnáin (2007)

Question: Can this triggering environment be explained without reference to phonology?

Phonological triggering – analysis

Evidence against phonological triggering:

- Triggering of mutation by a set of words ending in schwa (orthographically *-igh*, plural form of *-ach*) in some dialects
- Triggering of mutation by English plural borrowings that are not palatalised, e.g. *teora**ms mh**aith* 'good terms'
- No other mutation environment in Irish makes direct reference to phonology

Phonological triggering – analysis

Comparison with Irish nominal plural classes:

- Irish nouns divided into "plural classes' (Carnie, 2008)
- Set of plural words that trigger mutation aligns closely with plural class "W1"
- Both sets share the following properties:
  - "Weak" plural types, i.e. no syncretism between plural forms
  - Formation of plural does not increase syllable count
  - Common plural form ends in a consonant (usually palatalised)
  - Include the *-igh* forms mentioned above

Proposal

Plural nouns marked as members of this plural class class trigger lenition

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Plural nouns marked as members of this plural class class trigger lenition

- New nouns (e.g. borrowings) are admitted to this class based on whether they have any of the core defining features
- e.g. English borrowings such as *teora**ms mh**aith* 'good terms':
  - do not usually increase syllable count when forming the plural
  - generally have a common plural form that ends in a consonant

Advantage of this proposal: triggering mechanism can be entirely removed from the phonology

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Syntactic aspects of ICM

Syntactic constraints on mutation:

Trigger constraint (Lieber, 1983)

A mutation trigger must immediately precede and c-command its target.

- Provides a strong constraint on possible triggering elements within the syntactic structure.
- Gives a hint as to what sorts of structures to look for when trying to understand the mutation triggering mechanism.
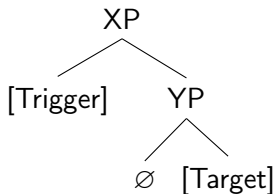
Other proposed constraints (Borsley et al, 2007):

- Mutation process is sensitive only to post-movement structure
- Mutation tends to target only complements

Example 1: when the trigger does **not** c-command the target (Kane, 2015)

(3)   *an bhean   **sh**antach **s**in*
        the woman greedy   that
        'that greedy woman'
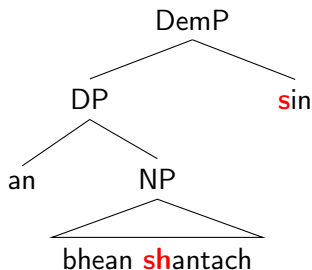
Example 2: the effect of an intervening null element

```
              XP
             /  \
       [Trigger]  YP
                 /  \
                ∅   [Target]
```

Two possibilities:

- Mutation is not realised on the target – e.g. if the null element itself has become the target, and the mutation is realised vacuously
- Mutation is **only** realised in the presence of a null element – implying that the "null" node itself carries the mutation trigger

Possible evidence for second possibility in Irish numeral phrases

- Most Irish nouns exhibit singular morphology in numeral phrases
- However, a small group of "measure nouns" appear in plural form after numerals
- Numerals trigger lenition, but only on singular nouns

(4)   a.   *trí*   ***ch**at*
            three cat.SG
            'three cats'

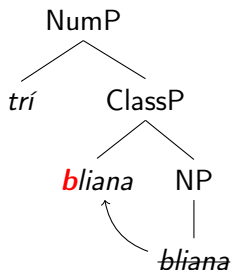   b.   *trí*   ***b**liana*
            three year.PL
            'three years'

Syntactic aspects of ICM

Acquaviva (2008): measure nouns incorporate some sort of classifier into their structure

*trí **ch**at* 'three cats'

```
        NumP
       /    \
     trí   ClassP
          /    \
         ∅     NP
                |
               chat
```

*trí **b**liana* 'three years'

```
        NumP
       /    \
     trí   ClassP
          /    \
       bliana   NP
                 |
               bliana
```
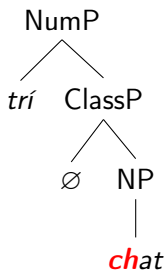
Example 3: attributive vs possessive nouns

(5)   a.   *súil **gh**loine*
              eye glass.GEN
              'an eye of glass' ('a glass eye')

      b.   *clann **f**eirmeora*
              family farmer.GEN
              'a farmer's family'

- Attributive nouns are treated more like adjectives
- e.g. definite article *an* is permitted before attributive noun-noun phrases, but not possessive noun-noun phrases (Kane, 2015)
- Suggests possibility of a different underlying syntactic structure

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An ongoing project – mutation types in Irish

- Currently investigating how three different phenomena are distributed over mutation environments:
  - Coronal blocking
  - Non-adjacency effects
  - Whether the triggering of mutation is affected by morphosyntactic features of the trigger/target
- For the moment, focusing on the NP
- Emerging picture is of two distinct mutation types:
  - **Local type**, fundamentally associated with the trigger word
  - **Agreement type**, fundamentally associated with the target word

An ongoing project – mutation types in Irish

	Local type	Agreement type
Coronal blocking	Y	N
Non-adjacency	N	Y
Morphosyntactic features	N	Y

Possible explanation

- **Local type**: Part of the spell-out of a (possibly null) syntactic head
  - Latches onto the start of a linearly adjacent target word
- **Agreement type**: Spell-out of some morphosyntactic feature on the target word
  - Mutation material is inserted alongside the phonological material of the target

In both cases, the "mutation material" could consist of floating phonological features (with the possibility of allomorphy)

An illustrative example: *an traein dheas* 'the nice train'
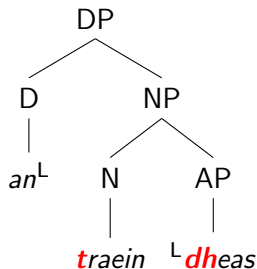
Assuming a bottom-up spell-out system, we derive a relatively simple explanation of the difference between CB and non-CB environments.

Summary

- Initial analysis suggests that Irish ICM is **not necessarily incompatible** with a strictly modular grammatical system
  - Evidence that coronal blocking happens later in the derivation
  - So-called "phonological triggering" can be accounted for without reference to the phonology
- Evidence that **syntactic structure is important** in the triggering of initial consonant mutation
- Emerging evidence for **two distinct mutation types**
  - Sheds light on the inner workings of phenomena such as non-adjacency and coronal blocking

Thank you!

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