An autosegmental account of initial consonant mutation in Irish: evidence from preverbal *d'*

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Initial consonant mutation in Irish

Initial consonant mutation (ICM)

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

(1) a. ***ní*** ***dh***únfaidh   siad é [d→ɣ]
         NEG **L**.close.FUT they it
         'They will not close it.'   (**L** = "Lenition")

     b. ***an*** ***gc***reideann   tú í? [k→g]
         Q   **E**.believe.PRS you her
         'Do you believe her?'   (**E** = "Eclipsis")

     c. ***d'*** ***fh***ágfainn   [f→∅]
         HIST **L**.leave.COND.1SG
         'I would leave.'

Trigger word account of ICM

- Floating phonological material on the right edge of a trigger word

(2)   a.   *ní-{L} dúnfaidh* ⟶ *ní **dh**únfaidh*   /d/ ⟶ [ɣ]
      b.   *an-{E} creideann* ⟶ *an **gc**reideann*   /k/ ⟶ [g]
      c.   *d'-{L} fágfainn* ⟶ *d' **fh**ágfainn*   /f/ ⟶ [∅]

- **Prediction:** conditions for insertion of trigger word cannot be sensitive to the post-mutation identity of the target

- Demonstrably fails to hold for preverbal tense particle *d'*

My claim

- Preverbal *d'* is an **underlyingly floating** segment
- Distribution follows from its **interaction with the ICM system**

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Irish ICM: Phonological alternations

Unmutated		Lenition		Eclipsis	
p$^{(j)}$	⟨p⟩	f$^{(j)}$	⟨ph⟩	b$^{(j)}$	⟨bp⟩
t$^{(j)}$	⟨t⟩	h$^{(j)}$	⟨th⟩	d$^{(j)}$	⟨dt⟩
k$^{(j)}$	⟨c⟩	x$^{(j)}$	⟨ch⟩	g$^{(j)}$	⟨gc⟩
b$^{(j)}$	⟨b⟩	v$^{(j)}$	⟨bh⟩	m$^{(j)}$	⟨mb⟩
d$^{(j)}$	⟨d⟩	ɣ$^{(j)}$	⟨dh⟩	ɴ$^{(j)}$	⟨nd⟩
g$^{(j)}$	⟨g⟩	ɣ$^{(j)}$	⟨gh⟩	ŋ$^{(j)}$	⟨ng⟩
m$^{(j)}$	⟨m⟩	v$^{(j)}$	⟨mh⟩	–	–
f$^{(j)}$	⟨f⟩	∅$^{(j)}$	⟨fh⟩	v$^{(j)}$	⟨bhf⟩
s$^{(j)}$	⟨s⟩	h$^{(j)}$	⟨sh⟩	–	–
ʟ$^{(j)}$	⟨l⟩	(l$^{(j)}$)	(⟨l⟩)	–	–
ɴ$^{(j)}$	⟨n⟩	(n$^{(j)}$)	(⟨n⟩)	–	–

(adapted from Iosad 2023)

- **Lenition:** Stops ⟶ fricatives; coronals lose/change place feature
- **Eclipsis:** Voiceless stops ⟶ voiced; voiced stops ⟶ nasal

Irish ICM: Mutation contexts

Mutation following so-called "trigger words":

- Prepositions:
    - **Lenition:** *de* 'from/of', *do* 'for/to', *ó* 'from', *trí* 'through', ...
    - **Eclipsis:** *i* 'in'
- Preverbal particles:
    - **Lenition:** *a* (relative prt), *má* (cond), *ní* (neg), *d'* (tense prt), ...
    - **Eclipsis:** *go* (comp), *an* (question), *dá* (cond), *nach* (neg comp), ...

Mutation linked to morphosyntactic features on the target word:

- Adjectival agreement:
    - *bean **bh**eag **dh**ílis* 'a **L**.small **L**.loyal woman'
- Definite possessors:
    - *bád (mór) **Sh**eáin* '**L**.Seán's (big) boat'

ICM in an autosegmental framework

- Morphology is fundamentally concatenative
- Phonologically defective morphemes
  (e.g. Trommer 2011; Bye & Svenonius 2012; Zimmermann 2022)

Floating phonological material + Target consonant $\longrightarrow$ Mutated target

e.g. floating features (Lieber 1983)
floating elements (Breit 2019)
floating geometric structure (Iosad 2014)

Advantages:

- Compatible with strict modularity (Scheer 2010; Bermúdez-Otero 2012)
- No ad hoc diacritics (cf. Hamp 1951; Pyatt 1997)
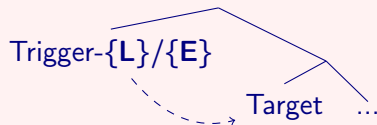- Captures phonological regularities (cf. Stewart 2004; Green 2006)

ICM in an autosegmental framework

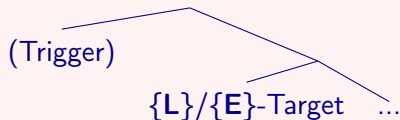**Possible sources of mutation-inducing material**

- **Type 1:** Mutation material at right edge of a trigger word
- **Type 2:** Mutation material as a prefix on the target word

Type 1:

Trigger-{**L**}/{**E**}

Target   ...

Type 2:

(Trigger)

{**L**}/{**E**}-Target   ...

- **Both sources** are necessary to account for the Irish ICM data

The puzzle of the historic tense particle

- **"Historic" tenses:** past indicative/habitual/subjunctive; conditional

- Markers of historic tense: ("independent" clauses)
  - Preverbal "historic tense particle" *d'*
  - "Historic tense lenition" on the verb

  (3)   *d'*   ***fh****ág*   *mé*
            HIST **L**.leave I
            'I left'

Hypothesis: Preverbal *d'* is a **mutation trigger word**

(4)   Historic tense marker:
       [+HIST] ⟷ d {L}

(4) Historic tense marker:
$[+\textsc{hist}] \longleftrightarrow$ d {L}

However, *d'* only appears in a **subset** of phonological environments

$\implies$ Phonologically conditioned allomorphy?

(5) Historic tense marker (revised):

$$[+\textsc{hist}] \longleftrightarrow \begin{cases} \text{d \{L\}} & \text{in Phonological Environment A} \\ \varnothing \text{ \{L\}} & \text{in Phonological Environment B} \end{cases}$$

Q: What is "Phonological Environment A"?

The puzzle of the historic tense particle

- *d'* appears only before words that are underlyingly vowel- or *f*-initial

(6) a. **d'** *ól*   *mé*   ⟵ empty consonantal slot
           HIST drink I
           'I drank.'

  b. **d'** **fh***ág* *mé*   ⟵ empty consonantal slot
           HIST **L**.leave I
           'I left.'   (Gussmann 1986; Ní Chiosáin 1991)

  c. **(*d')** **bh***og* *mé*
           (HIST) **L**.move I
           'I moved.'

- Recall: f "deletes" under lenition: $f^{(j)} \longrightarrow \varnothing^{(j)}$ (orthographic ⟨*fh*⟩)

Evidence for the empty consonantal slot

In vowel-initial words:

(7)   a.   [ihirʲ]   *ithir*   'soil'

        b.   [ə**nʲ** ihir]   *an ithir*   'the soil'   (Ní Chiosáin 1991:80)

(8)   a.   [iːsʲ]   *aois*   'age'

        b.   [ə**n** iːsʲ]   *an aois* 'the age'   (Ní Chiosáin 1991:81)

Following lenition of f:

(9)   a.   [fʲoːlʲ]   *feoil*   'meat'

        b.   [ə**nʲ** oːlʲ]   *an **fh**eoil*   'the **L**.meat'   (Gussmann 1986:894)

(10)   a.   [fɑnʲə]   *fáinne*   'ring'

        b.   [ə**n** ɑnʲə]   *an **fh**áinne*   'the **L**.ring'   (Gussmann 1986:894)

The puzzle of the historic tense particle

(6)   a.   ***d'***   *ól*   *mé*   ⟵ empty consonantal slot
            HIST drink I
            'I drank.'

       b.   ***d'***   ***fh****ág*   *mé*   ⟵ empty consonantal slot
            HIST **L**.leave I
            'I left.'
                                        (Gussmann 1986; Ní Chiosáin 1991)

       c.   ***(*d')***   ***bh****og*   *mé*
            (HIST) **L**.move I
            'I moved.'

Context for insertion of historic tense particle *d'* (Phon. Env. A)

An **empty consonantal slot** in the **post-mutation** form of the target word

Alternative analyses of *d'* pattern

- Surfaces to satisfy onset requirement?
    - No – see (11)

- Surfaces if syllabification does not violate phonotactic constraints?
    - No – see (12)

(11)   a.   ***d'*** ***fh****liuch sí* [...]
             HIST **L**.wet she
             'She wet [...].'

        b.   ***d'*** ***fh****reagair sí*
             HIST **L**.answer she
             'She answered.'

(12)   a. *(***d'**)* *léim sé*
             (HIST) jump he
             'He jumped.'

        b. *(***d'**)* *rith sé*
             (HIST) run he
             'He ran.'

Context for insertion of historic tense particle *d′* (Phon. Env. A)

An **empty consonantal slot** in the **post-mutation** form of the target word

⟹ **Spell-out timing paradox!**

- Historic tense marker inserted **before** mutation?
  - cannot be sensitive to post-mutation form of the target

  d-{L} *ól*   ∅-{L} *fág*   ∅-{L} *bog*

- Historic tense marker inserted **after** mutation?
  - cannot be the origin of mutation-inducing material

  d-{L} *ól*   *d*-{L} **fh**ág   ∅-{L} **bh**og

A morphosyntactic solution: {L} separate from *d'*

Two distinct exponents of historic tense:

- Historic tense prefix {L}- triggers lenition
- Historic tense particle *d'* inserted separately

$$\textbf{\textit{d'}} \qquad \textbf{\{L\}}\text{-}\textit{fágfainn}$$

Recall: **independent evidence** for mutation-inducing prefixes in Irish

(13)   a.   *bád (mór) **Sh**eáin* 'L.Sean's (big) boat'
         b.   *ár (dhá) **gc**apall* 'our (two) E.horse(s)'

Q: Is there any evidence that the *d'* and {L}- are separate entities?

A morphosyntactic solution: {L} separate from *d'*

- Past tense impersonal forms in Irish resist mutation:

  (14)   a.   ***bh**ogfaí* '(someone) would **L**.move'   (COND.IMPERS)
         b.   ***b**ogadh* '(someone) moved'   (PST.IMPERS)

  (15)   a.   *má **bh**ogaim* 'if I **L**.move'   (PRES)
         b.   *má **b**ogadh* 'if (someone) moved'   (PST.IMPERS)

- **Prediction:** *d'* should only appear before vowel-initial verbs

- **Observation:** *d'* **never** appears

  (16)   a.   *(*d') bogadh* '(someone) moved'   (PST.IMPERS)
         b.   *(*d') óladh* '(someone) drank'   (PST.IMPERS)
         c.   *(*d') fágadh* '(someone) left'   (PST.IMPERS)

- Further problem: evidence from **Munster dialects** (see Appendix A)

(6) a. ***d'*** *ól* *mé*   ⟵ empty consonantal slot
         HIST drink I
         'I drank.'

     b. ***d'*** ***fh****ág* *mé*   ⟵ empty consonantal slot
         HIST **L**.leave I
         'I left.'   (Gussmann 1986; Ní Chiosáin 1991)

     c. ***(*d')*** ***bh****og* *mé*
         (HIST) **L**.move I
         'I moved.'

- **Previously:** *d'* is only inserted in a subset of phonological contexts

- **Instead:** What if *d'* is **always inserted**, but only pronounced under specific phonological conditions?

A phonological solution

- Mutation-inducing material {L} inserted alongside *d'*

- A **separate factor** prevents *d'* from surfacing in some contexts

$$\textcolor{red}{\textit{(d)-\{L\}}} \quad \textit{fágfainn}$$

My proposal

- Preverbal *d'* is a phonologically deficient "floating *d*"
- Only pronounced if linked to an **empty consonantal slot**

- Similar to liaison in French: *peti[t] chat* vs. *peti[t] enfant*

A phonological solution

Working within a strict CV framework... (Lowenstamm 1996; Scheer 2012)

Proposed historic tense morpheme: $[+\text{hist}] \leftrightarrow$ |
                                                       d {L}

Assumptions:

- {L} docks onto the consonant **immediately to its right** (if present)
- Floating *(d)* only pronounced if linked to an **adjacent C-slot** that is both **segmentally empty** and **licensed**
- Phon. processes apply **whenever their conditions are met** (Kaye 1992)

My claim

Observed distribution of *d'* is derived **entirely within the phonology**

A phonological solution

Historic tense morpheme:

$$[+\text{hist}] \leftrightarrow \begin{array}{c} | \\ d \quad \{L\} \end{array}$$

Before C-initial verb: *bog* 'move'

$$\begin{array}{ccc} & C_1 & V_1 & C_2 & V_2 \\ & | & | & | \\ d \ \{L\} \cdots\rightarrow b & o & g \end{array}$$

$\implies$ Result: **bh**og

Before V-initial verb: *ól* 'drink'

$$\begin{array}{ccc} & C_1 & V_1 & C_2 & V_2 \\ & & | & | \\ d \ \{L\} \cdot\not\rightarrow & ó & l \end{array}$$

$\implies$ Result: **d'** ól

A phonological solution

Historic tense morpheme:

$$[+\text{hist}] \leftrightarrow \underset{d\ \{\text{L}\}}{|}$$

Before f-initial verb: *fág* 'leave'

$\implies$ Result: ***d' fh****ág*

- Lenition-inducing material {L} deletes initial f
- Empty C-slot becomes available for floating *(d)* to link to

$$\implies \text{Derives observed distribution of preverbal } d'$$

(analysis of *fr-* and *fl-* clusters in Appendix B)

A phonological solution

- Resolves the "spell-out timing paradox"

- Consistent with autosegmental approach to phonology

- Irish already has a rich system of prevocalic consonantal prefixes
    - **_t_-prefixation** after M.SG definite article
        - *an **t**-éan* 'the bird'
    - **_n_-prefixation** in many eclipsis environments
        - *ár **n**-athair* 'our father'
    - **_h_-prefixation** after a range of particles/prepositions
        - *go **h**Éireann* 'to Ireland'

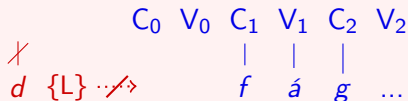- Only difference here is the interaction with the mutation system

- **Recall:** Past tense impersonal forms resist mutation **and** d-prefixation

  (17)   a.   *bogadh* '(someone) moved'   (*__bh__ogadh*)

             b.   *óladh* '(someone) drank'   (*__d'__ óladh*)

             c.   *fágadh* '(someone) left'   (*__d' fh__ágadh*)

- **Solution:** these forms carry additional structure at their left edge

  (e.g. Breit 2019; Scheer 2012)

$$C_0 \quad V_0 \quad C_1 \quad V_1 \quad C_2 \quad V_2$$
$$\phantom{d \{L\}} \qquad\quad | \quad\ | \quad\ |$$
$$d \quad \{L\} \cdots\!\not\!\nearrow \qquad f \quad á \quad g \quad …$$

        $\Longrightarrow$ Result: *__f__ágadh*

Key takeaways

- Irish preverbal *d′* is **underlyingly floating**

- Distributional pattern derived **entirely within the phonology**

- Consistent with **modular grammatical architecture**:
  - Morphosyntax $\Longrightarrow$ insertion of floating material
  - Phonology $\Longrightarrow$ application of regular phonological processes

- Analysis is **superior to the alternative** morphosyntactic solution

Go raibh míle maith agaibh!
Thank you!

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Appendix A: Evidence from Munster Irish

- So far: based on standard variety of Irish   (Christian Brothers 1960)

- Same pattern robustly observed in dialects of Connaught (de Bhaldraithe 1945; Ó Curnáin 2007) and Ulster (Hughes 1986)

- Munster Irish: more widespread use of preverbal *d'/dh'*   (Ó Sé 2000)

Standard	Munster[*]	Gloss
ní **fh**ásann	*ní* **dh' fh**ásann	'(it) doesn't grow'
má **fh**anann	*má* **dh' fh**anann	'if (he) stays'
d' *imigh*	*(do)* **dh'** *imigh*	'(he) went away'

*Note: <dh> = [ɣ] in Munster Irish

- However, **phonological restrictions on *dh'* are the same**

- **Morphosyntactic account:**
  - {L} originates at right edge of triggering particles (*ní*, *má*, etc.)
  - But preverbal *dh'* sits **between** trigger and mutated consonant
  - ⇒ Forced to conclude *dh'* and {L} are inserted together – a contradiction

- **Phonological account:**
  - Floating *(ɣ)* found in **all** lenition-triggering environments
  - Reanalysed as part of the basic lenition pattern in the clause

	Standard	Munster
Preverbal particles	*ní*-{L}	*ní*-*(ɣ)*{L}
	má-{L}	*má*-*(ɣ)*{L}
	...	...
Historic tense marker	*(d)*{L}	*do*-*(ɣ)*{L} / *(ɣ)*{L}

Appendix B: *fr*- and *fl*- clusters

(18)   a.   **d' fh**liuch sí [...]   (19)   a.   *(*d')* léim sé
            HIST **L**.wet   she   (HIST) jump he
            'She wet [...].'   'He jumped.'

       b.   **d' fh**reagair sí   b.   *(*d')* rith sé
            HIST **L**.answer she   (HIST) run he
            'She answered.'   'He ran.'

- In both cases, surface form of verb is *l-/r*-initial

- However,
    - in (18), empty C-slot remains following deletion of word-initial *f*
    - in (19) there is no such empty slot
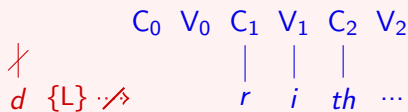
Appendix B: *fr-* and *fl-* clusters

- Assume infrasegmental government relationship (IG; $\Longleftarrow$) between consonants in a cluster
  (Scheer 1998)

Initial *fr-* cluster: *freagair*

$$[C_1 \ V_1 \ C_2] \ V_2$$

$d \ \{L\} \cdots\triangleright [f \Longleftarrow r] \ ea$
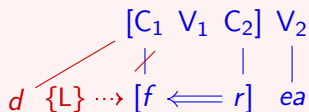
$\Longrightarrow$ Result: **d' fh**reagair

Initial *r-* (PST.IMP): *ritheadh*

$$C_0 \ V_0 \ C_1 \ V_1 \ C_2 \ V_2$$

$d \ \{L\} \cdots\not\triangleright \qquad r \quad i \quad th \ \cdots$

$\Longrightarrow$ Result: **r**itheadh

- **Q:** How does **lenited *fr-* cluster** differ from **empty CV before *r*?**
  - **A:** IG structure is retained following deletion of initial *f-*