# Two Domains for Irish Stem-Initial Consonant Changes

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## 1. Introduction

Irish, like all modern Celtic languages, is well-known for its productive use of stem-initial consonant alternations that are conditioned in morphosyntactic environments (Hamp 1951, Ní Chiosáin 1991, Pyatt 1997, 2003, Green 2006, Pruett 2023, to appear). Despite such a vast literature, the primary focus of this previous research has been on the nature of these mutations and how to best explain the conditioning and phonology of the alternations. Much less attention has be given to understanding the domains in which these mutations apply (to my knowledge the only research on this aspect of Irish mutation includes Pyatt (2003), Kratzer & Selkirk (2007), Sato (2009), and Pruett (to appear)). This paper strives to help fill this gap in the literature. In addition, this paper provides evidence that nonconcatenative types of morphology are constrained to definable domains and should be treated differently than phonological alternations that are much more local. Finally, I put forth an argument for a phonological grammar that operates cyclically over the spell out of syntactic phases.

Traditionally, Irish is said to have four (or as many as six, depending on how one counts) consonant mutations affecting both consonant-initial and vowel-initial words, two of which are the focus of this paper: Lenition and *h*-Prothesis. I demonstrate that these two mutations apply in two very distinct domains and behave differently with respect to their morphological distribution.[1] Based on this data, I conclude that these mutations are not instances of the same type of morphophonological phenomenon. Instead, I argue they are two separate processes: one that is morphophonological and constrained by morphosyntactic domains (Lenition) and one that is purely phonological and is constrained by prosodic domains (*h*-Prothesis).

The remainder of this paper proceeds as follows. Sections §2 and §3 outline a brief overview of the Lenition mutation and *h*-Prothesis respectively. Section §4 provides an analysis of the Lenition data, showing that the domain of application is constrained morphosyntactically. Section §5 gives an analysis of *h*-Prothesis, demonstrating that it is a purely phonological process and is confined to a specific prosodic domain. Section §6 concludes and discusses future directions and implications for the analyses proposed in this paper.

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[1] I set aside *t*-Prothesis as it only occurs on nouns and only after the definite article. As such, I assume that *t*-Prothesis is a process unique to the definite article. I also set aside Eclipsis. The reason for this is simply that Lenition is more common than Eclipsis. There is no reason why this analysis could not be extended to Eclipsis as well. I leave a more in-depth analysis to future research.

## 2. The Empirical Landscape of Lenition

The Lenition mutation (marked orthographically as an *h* after the first consonant of a word) in Irish is a process by which plosive consonants become fricatives.[2] For example, the phoneme /bˠ/ lenites to [βˠ] (1). Or, similarly, /k/ becomes /x/ under Lenition (2).

(1) a. *bó*
/bˠoː/
'cow'

b. *an bhó*
/ənˠ βˠoː/
'the cow'

(2) a. *carraig*
/kɑɾˠɪɟ/
'rock'

b. *ar charraig*
/ɛɾˠ xɑɾˠɪɟ/
'on a rock'

Interestingly, Lenition in Irish is conditioned morphosyntactically and not phonologically (Ó Siadhail 1989, Green 2006, Baoill 2010, Hannahs 2011, 2013). This claim is based on data, like (3), where Lenition applies to a verb in the past tense but not in the present (4). Since both of these verbs are sentence initial, the phonological environment remains the same, yet only in the case of the past tense does Lenition apply. As such, it is clear that the conditioning of Lenition in (3) is morphosyntactic and not phonological as it is only sensitive to morphosyntactic information (i.e., tense features).

(3) *cheap    mé      gur      mhúinteoir í*      [çapˠ mʲeː gəɾˠ βˠuːn̪ʲt̪ʲoːɾʲ iː]
think.PAST 1.NOM.SG COMP.PAST teacher     3.F.ACC.SG
'I thought that she was a teacher'

(4) *ceap-aim      gur      mhúinteoir í*      [capˠ-əmʲ gəɾˠ βˠuːn̪ʲt̪ʲoːɾʲ iː]
think-1.SG.PRES COMP.PAST teacher     3.F.ACC.SG
'I think that she was a teacher'

Some other environments where Lenition applies include: on nouns and adjectives in the feminine nominative singular (5a)/(1), on nouns and adjectives in the masculine genitive singular (5b), on adjectives after masculine nominative plural nouns (5c), and on nouns after certain prepositions (5d)/(2).

(5) a. *an bhean chliste*
DEF woman clever
'the clever woman'

b. *mac an fhir*
son  DEF man.GEN.SG
'the son of the man'

c. *báid    mhóra*
boat.M.PL big.PL
'big boats'

d. *ar charraig*
on rock
'on a rock'

Finally, following Pruett (2023), I consider Lenition to be the result of a [+CONTINUANT] phonological feature (henceforth ᴸ in examples for expository ease) interacting with a following consonant. Under a Distributed Morphology (Halle & Marantz 1993, 1994) approach to the Syntax-PF interface, I take this [+CONTINUANT] feature to be the phonological realization of particular morphosyntactic feature bundles as demonstrated by the following vocabulary items (VI) (6).[3] Using these VIs, examples will henceforth be glossed as in (7).

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[2] Lenition in Irish is, in fact, a bit more complex than the description given in the main text suggests. For example, in addition to becoming fricatives, coronal plosives debuccalize. These other changes are not important for the purposes of this paper. I refer the interested reader to Ní Chiosáin (1991) and Pruett (2023), and the references therein for more in-depth discussions of the phonology of Irish mutation.

[3] An analysis of Lenition as the interaction between a [+CONTINUANT] feature with an adjacent consonant requires there to be a good deal of syncretism or homophony in Irish morphology. Whether or not this analysis is correct is unimportant for the current discussion and as such I will simply take this to be a fact of Irish morphology.

(6)  a. [F.NOM.SG] ↔ ᴸ          (7)  *báid*    ᴸ          *mhór-a*
     b. [M.NOM.PL] ↔ ᴸ               boat.PL [M.NOM.PL] big-PL
     c. [M.GEN.SG] ↔ ᴸ               'big boats'
     d. [PAST] ↔ ᴸ

Bolding is used to indicate the relationship between the Lenition triggering feature and the consonant that undergoes Lenition. So, for example, in (7) the bolding indicates that the Lenition triggering masculine nominative plural morpheme is realized on the /m/ of the following word. Having now provided a brief overview of Irish Lenition, let us turn to the other mutation that is discussed in this paper—namely, *h*-Prothesis.

## 3. The Empirical Landscape of *h*-Prothesis

Unlike Lenition, *h*-Prothesis has a very limited distribution. *h*-Prothesis only applies to vowel-initial words and is a process of epenthesis whereby an epenthetic [h] surfaces between a vowel-final clitic and a vowel-initial host. For example, the third person feminine singular possessive pronoun, *a* /ə/, cliticizes to the noun which follows the pronoun triggering *h*-Prothesis (8).

(8)  *a*        *h-  iníon*
     3.F.SG.GEN [h]- daughter
     'her daughter'

However, when the clitic is consonant-final, no such *h*-Prothesis may apply (9).

(9)  *bhur*     *\*h-  iníon*
     2.PL.GEN  \*[h]- daughter
     'your (pl.) daughter'

Furthermore, *h*-Prothesis only occurs between a clitic and its host. That is to say, *h*-Prothesis cannot occur across word boundaries (10).

(10)  *páist-í  \*h-  ard-a*
      child-PL \*[h]- tall-PL
      'tall children'

Some other environments in which *h*-Prothesis occurs include: between certain vowel-final prepositions and a vowel-initial noun (11a), between vowel-final forms of the definite article and a vowel-initial noun (11b), and between some vowel-final pre-verbal particles and a vowel-initial verb (11c).

(11)  a. *go h-  Éirinn*      b. *na    h-  éisc*      c. *ná    h-  ól*
        to [h]- Ireland          DEF.PL [h]- fish.PL       NEG.IMP [h]- drink
        'to Ireland'             'the fish(es)'            'don't drink!' (Ó Siadhail 1989)

Having now outlined a brief overview of *h*-Prothesis, let us move to the formal analyses of the domains in which *h*-Prothesis and Lenition apply.

## 4. The Domain of Lenition

Despite the environments laid out in section §1.1, there are nonetheless situations where one might expect Lenition to apply, yet it does not. For example, a feminine noun in the nominative/accusative singular triggers Lenition on a modifying adjective (5a). However, when that same adjective is used in a predicative context, Lenition is not permitted (12).

(12) [CP *tá* [TP *an* ᴸ *bh****ean*** ᴸ [vP [PredP *cliste/\*chliste*]]]]
be.PRES DEF F.NOM.SG woman F.NOM.SG clever

'the woman is clever'

Data like (12) tell us that Lenition is confined to a particular domain. As such, Lenition is permitted to occur within a DP, but it cannot occur across a *v*P boundary, as in (12). Moreover, even within a DP, Lenition is permitted in some contexts, but not others. For example, the attributive adjective in (5a) undergoes Lenition after the feminine noun; however, in possessive genitive constructions Lenition may not occur (13).[4] Complicating things further, in attributive genitive constructions, Lenition can occur (14).

(13) *bróg* ᴸ *fir/\*fhir*
shoe F.NOM.SG man.GEN.SG

'a shoe of a man'

(14) *coinneal* ᴸ *chéarach*
candle F.NOM.SG wax.GEN.SG

'a wax candle'

Thus, we are presented with a puzzle. Lenition is permitted within a DP, but it cannot spread outside of the DP (12). Lenition is permitted in attributive contexts, both adjectival (5b) and attributive genitive constructions (14). Yet, Lenition is not permitted in possessive genitive constructions (13). Therefore, any explanation for the domain of application of Lenition in Irish must be able to capture this complicated distribution. I will argue that Lenition always applies within (and not across) syntactic phases and that variation regarding DP-internal Lenition can be explained by positing different structures for possessive and attributive genitives.

In order to come to such an explanation for this data, it is important to understand the structure of the Irish DP. Following the proposals by Duffield (1993, 1995), I assume that the minimal Irish DP is made up of (at least) three projections—DP, NumP, and NP. Furthermore, I assume that there is obligatory N-to-Num movement (Duffield 1995). This yields a structure as in (15).
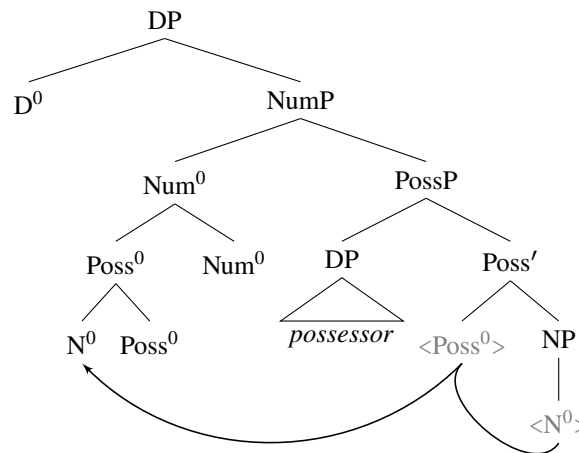
(15)
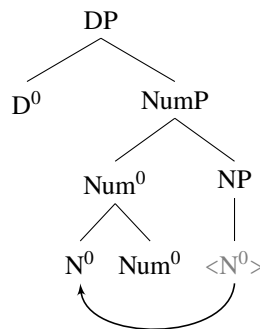


On the other hand, for possessive genitive constructions, I assume the following structure (16). This structure is motivated by cross-linguistic research on possessive constructions (Alexiadou 2003, Alexiadou et al. 2007) as well as Irish specific research on the structure of genitive DPs (Kane 2015, Kane et al. 2016).[5]

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[4] I limit the data to indefinite genitive constructions. The reason for this is that definite genitive constructions have the definite article intervening between the two nouns and the definite article cannot undergo Lenition for independent reasons (neither vowels nor /$\underline{n}^\gamma$/ can lenite).

[5] Kane's structure has a RelationP in place of the PossP in the structure in (16). Although I do not have space to clarify in detail, I assume that the RelationP and the PossP are the same projection. The exact label is not important. The use of PossP grounds the structure in (16) in a more widely accepted cross-linguistic structure for DPs (Alexiadou et al. 2007).

(16)

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                              DP
                    ┌─────────┴─────────┐
                   D⁰                  NumP
                             ┌──────────┴──────────┐
                           Num⁰                   PossP
                    ┌────────┴────────┐      ┌──────┴──────┐
                  Poss⁰            Num⁰      DP           Poss′
               ┌────┴────┐              ┌────┴────┐   ┌────┴────┐
              N⁰        Poss⁰          possessor   <Poss⁰>     NP
                                                                │
                                                              <N⁰>
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The structure in (16) is supported by both syntactic and semantic evidence. For example, Alexiadou (2003) argues that (alienable) possession is different than other (inalienable/attributive) genitive constructions in that true possession can always be semantically interpreted as 'X belongs to Y'. She argues that this is a direct result of the PossP projection. Furthermore, in Irish, all possessive constructions, like those in (13), always can be interpreted in this way. Note that it is these possessive genitive constructions that do not permit Lenition (17). As I argue below, I contend that this distribution of Lenition directly follows from the structure in (16). But first, let us consider some syntactic evidence for the structure in (16).

(17)　a.　*bó* ᴸ　*fir/*fhir*
　　　　　cow F.SG man.GEN.SG

　　　　　'a man's cow (a cow that belongs to a man)'

　　　b.　*cathair* ᴸ　*daoine/*dhaoine*
　　　　　city　　F.SG people.GEN.PL

　　　　　'a people's city (a city that belongs to a group of people)'

The structure in (16) can also be corroborated by syntactic evidence as well. One such piece of evidence comes from DP internal word order. For example, if spell out is mitigated by a condition on linearization like the *Linear Correspondence Axiom* (Kayne 1994), where asymmetric c-command determines linear precedence, then the word order given in (18) is expected to follow from the structure in (16).

(18)　$D^0...N_{possessum}...DP_{possessor}$

A second piece of evidence comes from the distribution of the definite article in these constructions. Given that the possessor is also a DP, it is predicted that (at least in some situations) there should be the possibility for the presence of two $D^0$. While generally this is not permitted in Irish (19), Kane et al. (2016) point out that when the possessor is modified by a demonstrative, both instances of $D^0$ are necessary. For space reasons I cannot discuss the conditioning of when both $D^0$ appear, but for the purposes of this paper it suffices to show that data like (20) confirm that possessive genitives in Irish contain two separate DP projections.

(19)　*an teach an fhir*
　　　*DEF house DEF man.GEN.SG

　　　'the man's house'

(20)　*an captaen na　　loinge seo*
　　　DEF captain DEF.F.GEN.SG ship　DEM.THIS

　　　'the captain of this ship' (adapted from Kane et al. (2016), pg. 178: ex.18)

While the structure in (16) easily captures both the syntactic and semantic facts of possessive genitive constructions in Irish, the structure makes incorrect predictions with respect to attributive genitive

constructions. For example, semantically an attributive genitive construction can never be interpreted as 'X belongs to Y' as with the possessives (21). Furthermore, unlike examples like (20) for possessives, attributive genitive constructions in Irish never surface with more than one $D^0$ (22d). This is true for simple definite constructions (22a) and demonstratives (22b). Notice that, the definite article, when present, must precede both nouns (compare (22a) with (22c)). Furthermore, it is also important to point out that these attributive constructions are exactly those which permit Lenition to occur. As I will argue presently, I claim that this is a direct result of a syntactic structure different from that which was proposed for possessive constructions in (16).

(21)    *maidin* ᴸ *fhómhair*
      morning F.SG fall.GEN.SG
      'a fall morning' (meaning 'a morning in fall' and not 'a morning belonging to fall')

(22)   a. *an* ᴸ *mhaidin* ᴸ *fhómhair*       b. *an* ᴸ *choinneal* ᴸ *chéarach*
        DEF F.SG morning F.SG fall.GEN.SG         DEF F.SG candle    F.SG wax.GEN.SG
        'the fall morning'                              *seo*
                                               DEM.THIS
                                               'this wax candle'

    c. *\*maidin an* ᴸ *fhómhair*       d. *\*an* ᴸ *choinneal na céarach*
       morning DEF M.GEN.SG fall.GEN.SG          DEF F.SG candle    DEF.F.GEN.SG wax.GEN.SG
       'the fall morning'                                 *seo*
                                               DEM.THIS
                                               'this wax candle'

Based on similar syntactic and semantic evidence in Greek, Alexiadou (2003) argues that inalienable possession and attributive genitive constructions have a structure like in (23), crucially making them different than (alienable) possessives that have the structure in (16). Since the structure in (23) captures the Irish data, I will simply adopt this structure as the structure for attributive genitives in Irish (keeping in mind the obligatory N-to-Num movement).

(23)
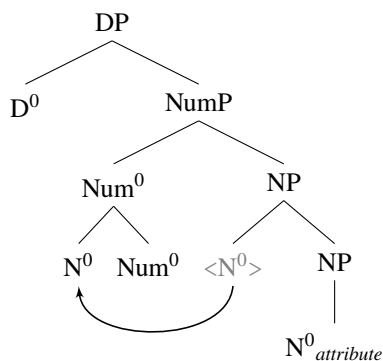


As should be clear from (23), this structure for attributive genitive constructions easily provides an explanation for the distribution of the definite article in comparison to the possessive structure in (16). The reason for this is that the structure in (23) has a single $D^0$ head which allows for a single instance of a definite determiner as opposed to the two $D^0$ heads that are present in possessive constructions. Moreover, the location of $D^0$ as the highest head in the nominal maximal projection only permits lineaization of the definite article to left edge of the determiner phrase (22).

Furthermore, I argue that it is precisely this difference in the number of DPs in the syntactic structure of genitive constructions that determines the possibility of Lenition to occur between the head noun and genitive marked modifier. Specifically, I argue that the presence of two separate DP projections in

possessive constructions blocks the application of Lenition. This argument follows directly from general assumptions about Spell Out (Uriagereka 1999, Chomsky 2001, Kratzer & Selkirk 2007, Sato 2009) and Phase Theory (Chomsky 2000, 2001, 2004, 2008).

In a Minimalist approach to syntax, pieces of syntactic structure are sent to the interfaces at various points during the derivation as opposed to all at once at the end of syntactic structure building. These portions of structure that are sent separately to the PF and LF interfaces are called phases (Chomsky 2001, 2004, 2008). It is widely accepted that there are two phases in the main clausal spine—the CP and $v$P. However, it has also been argued that DP may also be a phase (Citko 2014, Syed & Simpson 2017, Sande et al. 2020). I argue that, if DP is a phase, the distribution of Lenition in the discussion above is easily explained.

Assuming DP to be a phase, at least the complement of $D^0$ constitutes its own spell out domain (setting aside whether or not $D^0$ is spelled out with its complement), it must be the case that for possessive genitive constructions in Irish there are two instances of spell out (i.e., one for each DP phase) and for attributive genitive constructions there is only one instance of spell out. Under this approach to spell out, it is assumed that phonology also applies cyclically and that the cyclic domain for phonology is equivalent to the syntactic phase (Kratzer & Selkirk 2007, McPherson & Heath 2016, Sande et al. 2020). As such, I argue that Lenition is permitted to occur within a phonological cycle (i.e., within a phase) but not across cycles (across phase boundaries). Thus, when the Lenition triggering morpheme ($^L$) is spelled out in a different cycle from the word that would generally surface with Lenition (assuming that $^L$ only docks rightward), Lenition will not occur. Essentially, I argue that Lenition can only apply within a cycle of spell out/phonology and not across cycles. For space reasons I will not discuss why Lenition cannot apply across cycles, but presumably it is the result of either the deletion of undocked $^L$ autosegments at the end of a phonological cycle or the result of a highly ranked identity constraint penalizing outputs that change already phonologized material (e.g., the IDENTITY(PHASE) OT constraint as proposed by McPherson & Heath (2016)).

This means that in possessive constructions when the possessor is a separate DP phase from the possessum, Lenition will not be permitted to occur between the possessum and the possessor as they are spelled out in different cycles. On the other hand, in attributive constructions, since there is only one cycle of spell out, Lenition can occur between the head noun and its genitive marked attribute, as the $^L$ can dock to the word to its right in its cycle of phonology (i.e., it would not have to dock to a word spelled out in a different cycle). Finally, an analysis that confines Lenition to a phase or spell out domain is not only compatible with the DP data discussed in this section but with data like (12) as well where Lenition does not apply across a $v$P boundary. In fact, such an argument for a phase-based domain for Irish mutation was proposed by Sato (2009) in order to explain the difference between the application of Lenition in examples like (5a) and (12). The data and the analysis provided in this section does not only confirm this proposal but extends its empirical coverage to DP-internal differences in Lenition application as well.

## 5. The Domain of *h*-Prothesis

Unlike Lenition, *h*-Prothesis is not constrained morphosyntactically. Rather, I argue that *h*-Prothesis is a prosodic repair to avoid vowel hiatus at morpheme boundaries in a given prosodic word. Evidence for this claim comes from the fact that (i) *h*-Prothesis does not behave as Lenition does with respect to concord morphology, (ii) *h*-Prothesis can be described as occuring in a particular phonological environment, whereas this is not possible for Lenition, and (iii) *h*-Prothesis cannot be tied to specific morphosyntactic features in the same way Lenition can.

As discussed in section §1.2, *h*-Prothesis occurs between a vowel-final clitic and a vowel-initial host (11). Furthermore, *h*-Prothesis never crosses a prosodic word boundary (10). Since a clitic attaches to a host and forms a single prosodic word, these facts lead to the conclusion that *h*-Prothesis has the following conditioning environment (24a) as opposed to the environment for Lenition (24b).

(24)    a.  *h*-Prothesis is a process of [h] epenthesis that occurs between vowels at a morpheme boundary within a prosodic word.

        b.  Lenition applies when $^L$ docks to the word directly to its right, iff this word is spelled out in the same cycle as $^L$.

Such a phonological conditioning environment is in stark contrast with the conditioning environment for Lenition which does not have a uniform phonological environment for application. This immediately highlights a big difference between these two mutations in Irish. Namely, Lenition is conditioned morphosyntactically, whereas *h*-Prothesis is conditioned phonologically. This difference between morphological mutation and prosodic mutation in Irish has been identified by at least Ó Siadhail (1989) and Ní Chiosáin (1991).

Another piece of evidence for the phonological nature of *h*-Prothesis as opposed to a morphological nature like Lenition comes from the distribution of these mutations in concord contexts within the Irish DP. On the one hand, Lenition appears on every element in a DP that can show concord when the correct morphosyntactic environment is in place. For example, when a feminine noun in the nominative singular is modified by multiple adjectives, all adjectives surface with Lenition (25). On the other hand, in an environment where *h*-Prothesis occurs, like the feminine genitive singular, no such concord arises. In fact, *h*-Prothesis is only permitted to apply between the definite article and the noun (26).

(25) *an* ᴸ *bhean* ᴸ *dheas* ᴸ *chliste*
DEF F.SG woman F.SG nice F.SG clever
'the nice intelligent woman'

(26) *na* *h-* *adhairc-e* *álainn/*h-álainn*
DEF.F.GEN.SG [h]- horn-F.GEN.SG beautiful
'the beautiful horn (gen.sg)'

Finally, Lenition is sensitive to morphosyntactic features, such as gender. In the nominative singular feminine nouns lenite but masculine nouns do not (27). This sensitivity to gender does not hold for *h*-Prothesis. For example, in the nominative plural, it does not matter what the gender of the noun is, if the noun is vowel-initial, *h*-Prothesis will occur between the definite article and the noun (28).

(27) a. *an* ᴸ *bhean*          b. *an fear*
DEF F.SG woman               DEF man
'the woman'                  'the man'

(28) a. *na* *h-* *adharc-a*     b. *na* *h-* *éisc*
DEF.PL [h]- horn.F-PL           DEF.PL [h]- fish.M.PL
'the horns'                     'the fish(es)'

And so, given that *h*-Prothesis can be defined as applying in a particular phonological environment, it does not participate in morphological process like concord, and it is insensitive to the morphosyntactic features that drive other mutations like Lenition, it is reasonable to conclude that *h*-Prothesis is a phonological phenomenon and not a morphological one. The question then is how to account for when *h*-Prothesis applies and when it does not where we might expect it to. In section §1.2 as well as the phonological envrionment defined in (24), I proposed that *h*-Prothesis applies between vowel-final clitics and vowel-initial words. This is not, strictly speaking, fully correct. In fact, there are plenty of cases where there is a vowel final clitic, yet no *h*-Prothesis occurs between the clitic and a vowel-initial word. One such example is the negative marker *ní* (29). Another would be the third person masculine singular possessive pronoun *a* (30).

(29) *ní* *ith-im (*h-ithim) feoil*      (30) *a* *iníon (*h-iníon)*
NEG eat-1.SG.PRES meat                    3.M.GEN.SG daughter
'I do not eat meat'                       'his daughter'

Although examples like those above may seem to be counterevidence to the description of *h*-Prothesis in (24), all of these instances of the "unexpected" lack of *h*-Prothesis share one thing in common—when the vowel-final clitic is followed by a consonant-initial word, Lenition (or Eclipsis) usually applies (31). That is to say, *h*-Prothesis occurs only after clitics (32b) that in other environments would not trigger any mutation (32a). Clitics that do usually trigger consonant mutation never show *h*-Prothesis between the clitic and the following word.

(31)  a.  *ní* <sup>L</sup> *thuig-im*
          NEG understand-1.SG.PRES
          'I do not understand'

     b.  *a* <sup>L</sup>    *ch*at
          3 M.GEN.SG cat
          'his cat'

(32)  a.  *a*    *cat*
          3.F.GEN.SG cat
          'her cat'

     b.  *a*    *h- iníon*
          3.F.GEN.SG [h]- daughter
          'her daughter'

These data suggest that the presence of the Lenition triggering morpheme/feature blocks the application of *h*-Prothesis. In many ways this may be unexpected. For example, given the assumption that <sup>L</sup> is an autosegmental [+CONTINUANT] feature, it would generally be assumed that this feature and the consonants/vowels that it interacts with are on separate tiers of an autosegmental representation (Goldsmith 1976). As such, it is not expected that the floating feature should block an epenthesis process that applies on another tier (i.e., *h*-Prothesis would apply to a tier separate from where the <sup>L</sup> feature is located). Despite the fact that phonologically, there is no *a priori* reason that the <sup>L</sup> should block *h*-Prothesis, I contend that the number of morpheme boundaries within the phonological environment of *h*-Prothesis plays a role in determining when vowel hiatus is permissible and when epenthesis must be used as a repair.

In an example like (31b), it is clear that there are (at least) three morphemes present. Since *a* is a clitic, it is the case that (31b) is also a single phonological word. Therefore, it must be the case that the phonological word that is (31b) has two morpheme boundaries as indicated in (33). On the other hand, in an example like (32a), there is only one morpheme boundary as indicated in (34).

(33)  $(a+^L+cat)_\omega \rightarrow (\partial x\alpha \underset{\circ}{t}^\gamma)_\omega$

(34)  $(a+cat)_\omega \rightarrow (\partial k\alpha \underset{\circ}{t}^\gamma)_\omega$

The question, then, that must be answered is why (33) has two morpheme boundaries but (34) only has one. I argue that this is a result of morphological pruning prior to the application of phonology (Embick 2010). Specifically, since [F.GEN.SG] has no overt realization (it is not associated with either segmental or autosegmental phonological content), I argue that this feature bundle has the following vocabulary item (35a). Given the vocabulary item for the third person possessive pronoun (35b), the morphological structure of (32a) is as in (36) after vocabulary insertion prior to other morphological operations and phonology.

(35)  a.  [F.GEN.SG] ⇔ ∅
     b.  [3RD.GEN] ⇔ *a*

(36)  [3RD.GEN]+[F.GEN.SG]+$\sqrt{CAT}$
     $\Rightarrow (a+\emptyset+cat)_\omega$

However, it has been argued that phonologically null morphemes are pruned (i.e., deleted) prior to phonological computation (Embick 2010). As a result, by the end of the application of morphological operations the input to phonology only has two morphemes as in (34). This contrasts with examples like (33) where the morpheme [M.GEN.SG] does have a phonological realization (albeit autosegmental) and as such there is no pruning. This derives the difference in the number of morpheme boundaries with respect to the phonological input.

The previous discussion leads us to the conclusion that *h*-Prothesis in Irish is an extremely local phonological epenthesis that only applies at morpheme boundaries within a prosodic word. That is to say, only when two vowels are adjacent at a morpheme boundary will *h*-Prothesis apply. When there is more than one morpheme boundary separating the two vowels, *h*-Prothesis does not occur. This can be derived in Optimality Theory (Prince & Smolensky 1993) via the constraints given in (37) and the ranking in (38).

(37)  a.  *(v+v)_ω: *Assign one violation for every instance of adjacent vowels at a morpheme boundary within a prosodic word.*

     b.  DEP: *Assign one violation for every segment in the output that is not present in the input.*

     c.  MAX: *Assign one violation for every segment in the input that is not present in the output.*

(38)  *(v+v)_ω, MAX >> DEP

This ranking is shown by the tableaux in (39) and (40) for the prepositions *go* and *faoi* which permit *h*-Prothesis and do not permit it respectively.

(39)

| *(go+Éirinn)_ω* 'to Ireland' | *( v+v)_ω | MAX | DEP |
|---|---|---|---|
| ☞ a. *go hÉirinn* | | | * |
| b. *go Éirinn* | *! | | |
| c. *g'Éirinn* | | *! | |

(40)

| *(faoi+^L+Éirinn)_ω* 'about Ireland' | *( v+v)_ω | MAX | DEP |
|---|---|---|---|
| a. *faoi hÉirinn* | | | *! |
| ☞ b. *faoi Éirinn* | | | |
| c. *f'Éirinn* | | *! | |

And so, to conclude this section, it has been argued that *h*-Prothesis does not behave morphologically in the same way Lenition does. *h*-Prothesis can be defined with respect to a phonological environment (unlike Lenition). *h*-Prothesis is demonstrated to be a phonological process of epenthesis to repair vowel hiatus at morpheme boundaries within a prosodic word. And finally, *h*-Prothesis can be accounted for by an OT grammar that ranks *(v+v)_ω and MAX above DEP. As such, it must be concluded that *h*-Prothesis is confined to a phonological domain as opposed to a morphosyntactic one like Lenition.

## 6. Discussion and Conclusion

In this paper it has been argued that initial consonant mutations in Irish should be separated into two groups based on their domain of application. There are morphological mutations (Lenition) which are confined to a morphosyntactic domain—namely the syntactic phase or spell out domain. There are also phonological "mutations" (*h*-Prothesis) which are more accurately described as prosodic changes used to avoid marked phonological sequences like vowel hiatus and are confined to a phonological domain—a morpheme boundary within a prosodic word.

I argue that Lenition is confined to a spell out domain such that a mutation-triggering morpheme cannot cause mutation on the following word if the trigger and the target are spelled out in different phases. I argue that *h*-Prothesis is confined to the morpheme boundary within a prosodic word such that [h] is epenthesized to avoid vowel hiatus at such a boundary. By separating Irish mutations into separate groups based on their distributional behavior it is possible to gain insight into the morphological and syntactic structures of elements within the Irish DP. More broadly this paper provides evidence that nonconcatenative types of morphology are constrained to definable domains (like the phase/spell out domain) and should be treated differently than phonological alternations that are much more local (between segments/syllables). I put forth an argument for a phonological grammar that operates cyclically over the spell out of syntactic phases (but without any cophonologies in the grammar). These findings are consistent with the approach developed in Pruett (2023) strengthening the evidence for an analysis of Irish mutation as a complex morphophonological phenomenon that is best modeled through DM and OT.

Moving forward this research would benefit from discussion of mutation being blocked at other phase boundaries as well, most notably the CP phase. Specifically, since the specifiers of phase projections are accessible/spelled out in the next phase, it is, in theory, possible for a mutation triggering feature to trigger mutation on an element in that specifier, but when that specifier is not filled, it should be expected that no mutation applies. Of course this hypothesis must be tested and confirmed. Fortunately, the proposals in this paper provide a good foundation for testing further predictions. It would also be good to consider the domains of the other mutations as well (*t*-Prothesis and Eclipsis). Finally, this research gives a proposal for the locality domains of mutation in Irish. However, this research is not the first of its kind and as such it would be good to compare these proposals with those that already exist in the literature (like the prosodic accounts of Lenition given in Pyatt (2003) and Kratzer & Selkirk (2007)).

# References

Alexiadou, Artemis. 2003. Some Notes on the Structure of Alienable and Inalienable Possessors. In Martine Coene & Yves D'hulst (eds.), *From NP to DP: The Expression of Possession in Noun Phrases*, vol. Volume 2, chap. Chapter 6. John Benjamins Publishing Company. `https://doi.org/DOI:10.1075/la.56.12ale`.

Alexiadou, Artemis, Liliane Haegeman & Melita Stavrou. 2007. *Noun phrase in the generative perspective* (Studies in Generative Grammar). Berlin Germany: Mouton de Gruyter.

Baoill, Dónall Ó. 2010. Irish. In Martin J. Ball & Nicole Müller (eds.), *The Celtic Languages*, 2nd, 163–229. Abingdon, UK: Routledge Taylor & Francis Group.

Chomsky, Noam. 2000. Minimalist inquiries: the framework. *Step by Step: Essays in Minimalist Syntax in Honor of Howard Lasnik*. 89–155.

Chomsky, Noam. 2001. Derivation by phase. *MIT Occasional Papers in Linguistics* 18. Phases.

Chomsky, Noam. 2004. Beyond explanatory adequacy. *Structures and beyond*. 104–131.

Chomsky, Noam. 2008. On phases. *Foundational Issues in Linguistic Theory*. Phases.

Citko, Barbara. 2014. *Phase theory: an introduction*. Cambridge University Press.

Duffield, Nigel. 1993. Irish construct state nominals & the radical pro-drop phenomenon. *North East Linguistics Society* 23(1).

Duffield, Nigel. 1995. *Particles and projections in irish syntax*.

Embick, David. 2010. *Localism versus globalism in morphology and phonology*. The MIT Press.

Goldsmith, John. 1976. *Autosegmental phonology* Thesis.

Green, Antony. 2006. The independence of phonology and morphology: the celtic mutations. *Lingua* 116. 1946–1985.

Halle, Morris & Alec Marantz. 1993. Distributed Morphology and the Pieces of Inflection. In Kenneth Hale & S. Jay Keyser (eds.), *The View from Building 20*, 111–176. Cambridge, MA: MIT Press.

Halle, Morris & Alec Marantz. 1994. *Some Key Features of Distributed Morphology*. Conference Paper.

Hamp, Eric. 1951. Morphophonemes of the keltic mutations. *Language* 27(3).

Hannahs, S. J. 2011. Celtic Mutations. In Marc van Oostendorp, Colin Ewen, Elizabeth Hume & Keren Rice (eds.), *The Blackwell Companion to Phonology*, vol. 5, 2807–2830. Blackwell Publishers.

Hannahs, S. J. 2013. Celtic initial mutation: pattern extraction and subcategorisation. *Word Structure* 6(1). 1–20. `https://doi.org/10.3366/word.2013.0033`.

Kane, Frances. 2015. *The fine structure of the irish np* dissertation.

Kane, Frances, Raffaella Folli & Christina Sevdali. 2016. Irish genitive phrases the pseudo-construct state. *Rivista di Grammatica Generativa* 38. 173–185.

Kayne, Richard. 1994. *The antisymmetry of syntax*. MIT press.

Kratzer, Angelika & Elisabeth Selkirk. 2007. Phase theory and prosodic spellout: the case of verbs1. *The Linguistic Review* 24. 93–135.

McPherson, Laura & Jeffrey Heath. 2016. Phrasal grammatical tone in the dogon languages: the role of constraint interaction. *Natural Language & Linguistic Theory* 34. 593–639.

Ní Chiosáin, Máire. 1991. *Topics in the phonology of irish* Thesis.

Ó Siadhail, Mícheál. 1989. *Modern irish: grammatical structure and dialectal variation*. Cambridge, UK: Cambridge University Press.

Prince, Alan & Paul Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Manuscript. OT Citation.

Pruett, Jack. 2023. *Representing Irish Gaelic Initial Mutations in Distributed Morphology and Optimality Theory*. Conference Paper.

Pruett, Jack. to appear. *Where Mutation does not Occur—Mutation Blocking in Irish Gaelic and Evidence for DP Phases*. Conference Paper.

Pyatt, Elizabeth. 1997. *An integrated model of the phonology and syntax of celtic mutation* Thesis.

Pyatt, Elizabeth. 2003. Relativized mutation domains in the celtic languages. *University of Pennsylvania Working Papers in Linguistics* 9(1). `https://repository.upenn.edu/pwpl/vol9/iss1/16`.

Sande, Hannah, Peter Jenks & Sharon Inkelas. 2020. Cophonologies by ph(r)ase. *Natural Language and Linguistic Theory* 38. 1211–1261.

Sato, Yosuke. 2009. Spelling Out Prosodic Domains: A Multiple Spell-Out Account. In Kleanthes Grohmann (ed.), *InterPhases: Phase-Theoretic Investigations of Linguistic Interfaces*, 234–259. Oxford University Press.

Syed, Saurov & Andrew Simpson. 2017. On the dp/np status of nominal projections in bangla: consequences for the theory of phases. *Glossa: a journal of general linguistics* 2(1).

Uriagereka, Juan. 1999. Multiple spell-out.