Syntactically unjustified morphs and other strategies for hiatus resolution in Irish prepositions[1]

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Introduction

- Previous work has examined cases of lexical conservatism where the phonology uses a syntactically unjustified morph to improve phonotactics (e.g. Steriade 1999 for hiatus, Bonet & Torres-Tamarit 2010 for foot structure).
- A well-known example is Spanish definite articles, where the masculine definite article is used before feminine nouns beginning with stressed [á], which prevents vowel fusion.

(1) a. *la agua ⟶ el agua (Wolf 2008:2)
b. *la arma ⟶ el arma

- Irish prepositions show that the phonology is not blind to the morphological features attached to these morphs, but chooses the least marked among them.
- This paper expands on the analysis presented in O'Brien (2007) by explaining the behavior of prepositions before both singular and plural definite articles and bare NPs, and where they resolve hiatus through morph insertion or schwa deletion.

1. Irish prepositions & a puzzle

- Many Irish prepositions inflect for person and number and occur in this inflected form when their object would be a pronoun. See selected paradigm in (2). (Mac Congáil, 2004)

(2)

GLOSS	BASE FORM	1SG	2SG	3SGM	3SGF	1PL	2PL	3PL
'with'	le /lʲɛ/	liom /lʲʌm/	leat /lʲæt/	leis /lʲɛʃ/	léi /lʲeːi/	linn /lʲɪnʲ/	libh /lʲɪv/	leo /lʲo/
'in'	i(n) /ɪ(nʲ)/	ionam /inəm/	ionat /inət/	ann /an/	inti /ɪnʲtʲi/	ionainn /inɪnʲ/	ionaibh /inɪv/	iontu /intu/
'through'	trí /tʲɾʲiː/	tríom /tʲɾʲiːᵊm/	tríot /tʲɾʲiːᵊt/	tríd /tʲɾʲiːdʲ/	tríthi /tʲɾʲiːhʲi/	trínn /tʲɾʲiːnʲ/	tríbh /tʲɾʲiːv/	tríothu /tʲɾʲiːᵊhu/
'for'	do /də/	dom /dʌm/	duit /dwɪtʲ/	dó /doː/	di /dʲi/	dúinn /duːnʲ/	daoibh /diːv/	dóibh /doːv/
'from'	ó /oː/	uaim /wɪmʲ/	uait /wɪtʲ/	uaidh /waɪ/	uaithi /wɛhi/	uainn /wɪnʲ/	uaibh /wɪv/	uathu /wahu/
'on'	ar /eɾʲ/	orm /oɾəm/	ort /oɾt/	air /eɾʲ/	uirthi /uɾʲhʲi/	orainn /oɾɪnʲ/	oraibh /oɾɪv/	orthu /oɾhu/

- The prepositions maintain their base form before an overt object – they do not agree. (3a-b)
- Prepositions *must* be inflected when the object would be a pronoun. Independent pronouns are bocked in this context. (3c-e)

(3) a. le Máire b. *léi Máire c. *le sí / í d. *léi sí / í e. léi
with Mary with.3SGF Mary with she / her with.3SGF she / her with.3SGF
'with Mary' 'with Mary' 'with her' 'with her' 'with her'

1 I am indebted to Máirín Uí Chéide for her assistance as a language consultant, and to Donca Steriade and Jim McCloskey for helpful comments on this work. All errors are my own.

- Prepositions also take their base form before overt objects that are not personal names.

(4) a. le bean b. *leí bean c. le trí bhean d. *leo trí bhean
[lʲɛ bʲæn] [lʲeːi bʲæn] [lʲɛ tʲɾʲiː vʲæn] [lʲo tʲɾʲiː vʲæn]
with woman with.3SGF woman with three woman with.3PL three woman

- An exception to this occurs before the definite article, *an* /ən/. Prepositions ending in a consonant appear in their base form (5a-b), but those ending in a vowel would give rise to hiatus and do not surface as expected (5c-d).

(5) a. as an mála b. ar an mbord c. *le an gcat d. *ó an gcat
[as ən maːla] [eɾʲ ən mɔɾd] [lʲɛ ən gʊt] [oː ən gʊt]
out-of the bag on the table with the cat from the cat

- There are two solutions to resolve this hiatus:
- Certain prepositions resolve it by deleting the schwa of the definite article, leaving an /-n/.

(6) a. /oː ə̲n kʊt/ b. /də ə̲n bʲæn/ c. /fwiː ə̲n bɔɾd/
[oːn gʊt] [dən vʲæn] [fwiːn mɔɾd]
'from the cat' 'for the woman' 'under the table'

- But other prepositions ending in a vowel in their uninflected form take the 3SGM form instead

(7) a. /lʲɛ ən kʊt/ b. /faɾə ən bʲæn/ c. /tʲɾʲiː ən bɔɾd/
[lʲɛʃ ən gʊt] [faɾʲɪʃ ən bʲæn] [tʲɾʲiːdʲ ən mɔɾd]
with.3SGM the cat beside.3SGM the woman through.3SGM the table

- This distribution is laid out in (8). Prepositions where the 3SGM ends in a consonant (8a-b) will use that form, and those ending in a vowel will delete a schwa (8c-d).

(8)

base form:	le /lʲɛ/ + /ən/ 'with the'	ó /oː/ + /ən/ 'from the'
3SGM-insertion	a. leis an gcat [lʲɛʃ ən gʊt] with.3SGM the cat	c. *uaidh an gcat [waɪ ən gʊt] from.3SGM the cat
ə-deletion	b. *len gcat [lʲɛn gʊt] with.the cat	d. ón gcat [oːn gʊt] from.the cat

- Previous work on this problem (O'Brien, 2007) has rightly posited that this lexical conservatism occurs in order to avoid hiatus before the singular definite article.
- However, some additional questions remain: Namely, use of the 3SGM form before the plural definite article, *na* /nə/, where hiatus does not occur:

(9) a. leis na gcait b. *le na gcait
with.3SGM the.PL cat.PL with the.PL cat.PL

- and why 3SGM insertion is not used in other contexts for hiatus resolution:

(10) a. le héan b. *leis éan
[lʲɛ eːən] [lʲɛʃ eːən]
with bird with bird

2. Hiatus between a preposition and a definite article

- My analysis of the use of this syntactically unjustified morph is based on the approaches presented in Wolf (2008) and Steriade (2013).
- Wolf (2008:28) identifies four types of morphological mismatches that can be phonologically triggered, including one describing the Irish prepositions case:

(11) **Feature-mismatch:** A morph is used which contains features other than those which are present in the morpheme it is associated with. (Wolf 2008:28)

- This is the result of a violation of a DEP-MORPH(FEATURE) constraint, which Steriade (2013) adapts to be used outside of the Optimal Interleaving framework of Wolf (2008).

(12) **DEP-M(F)**: For every instance f of the node F at the exponent level, there is an instance f' of the node F at the syntactic level, and f corresponds to f'.

- That is, if any feature is realized as a morpheme at the exponent level, that feature should be in the (morpho-)syntax as well.
- Another approach is the CORR_{LEX} constraints used in Bonet & Torres-Tamarit (2010).
- DEP-M(F) will allow us to penalize the use of morphs which introduce features not justified by the syntax. We can demonstrate this with the Spanish example of 'el agua'.

(13)

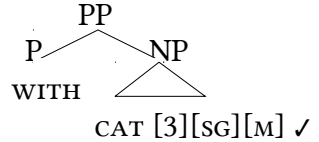
[DEFINITE, F][WATER, F]	*HIATUS	MAX(V)	DEP-M(MASCULINE)
☞ a. el [M], agua [F]			*
b. la [F], agua [F]	*!		
c. l'agua [F]		*!	

- Steriade (2013:4) also introduces a collective base, ***Lex***, which is an extended lexical entry of all listed allomorphs of a given morpheme.
- This base includes the morphs from which the phonology may choose a form that will satisfy the desired phonotactic requirements while incurring the fewest faithfulness violations.
- If we assume the phonology has access to every inflected form of each preposition through ***Lex***, then it will be able to evaluate them relative each other and the base form as candidates.

2.1 Prepositions before the singular definite article

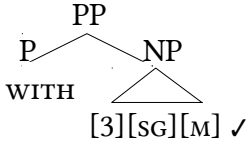
- These DEP-M constraints reference φ-features in the syntax and their exponence in the phonology. I lay out some assumptions about this in (14).
- When there is an overt NP as in (14a), those φ-features are checked off on that noun.
- When there is no overt NP (14b), and because independent pronouns are blocked in this environment, the NP must enter an Agree relation with the P to realize its φ-features as an inflected preposition.

(14) a.



[lʲɛ kʊ̈t]
✓[3,SG,M]

b.



[lʲɛʃ]
✓ [3,SG,M]

- In cases like (14a) this leaves the preposition with zero person, number, or gender features assigned to it syntactically, so any deviation from this will be a violation of a DEP-M(F) constraint. I define the series of these constraints I will use below:

(15) **DEP-M(1ST)** : For every instance f of the feature 1st person at the exponent level, there is an instance f' of the feature 1st person at the syntactic level, and f corresponds to f'.

- Identical constraints for 2nd and 3rd person will be used as well.

(16) **DEP-M(M)** : For every instance f of the feature +masculine at the exponent level, there is an instance f' of the feature +masculine at the syntactic level, and f corresponds to f'.

- A parallel constraint for [+FEMININE] will also be used.

(17) **DEP-M(SG)** : For every instance f of the feature +singular at the exponent level, there is an instance f' of the feature + singular at the syntactic level, and f corresponds to f'.

- A parallel constraint for [+PLURAL] will be used as well.

- Using an example from above with schwa-deletion following a preposition, (18) shows that *HIATUS must outrank MAX(ə) because a schwa will delete rather than surface with hiatus.

(18)

ó + an cat /oː ən kʊt/ 'from' + 'the cat'	*HIATUS	MAX(ə)
☞ a.[oːn gʊt]		*
b. [oː ən gʊt]	*!	

- (19) shows that when both schwa-deletion and 3SGM insertion are available, 3SGM insertion will be chosen, demonstrating MAX(ə) >> DEP-M(3RD) / (M) / (SG).
- The φ-features associated with a preposition in the output appear in [] below the candidate.

(19)

le + an cat /lʲɛ ən kʊt/ 'with' + 'the cat'	*HIATUS	MAX(ə)	DEP-M (3RD)	DEP-M (M)	DEP-M (SG)
☞ a. [lʲɛʃ ən gʊt] [3,SG,M]			*	*	*
b. [lʲɛn gʊt] [Ø]		*!			
c. [lʲɛ ən gʊt] [Ø]	*!				

- Because 1st, 2nd, feminine, and plural features are never inserted to resolve hiatus, a constraint penalizing their insertion must rank above *HIATUS.

- I provide a full example using these constraints for the preposition *le*, 'with', below. The forms available to the phonology are in *Lex* in (20) with their associated φ-features.

(20)

Lex: [lʲɛ] *'with'*	
[lʲəm] 1ST, SG	[lʲɪmʲ] 1ST, PL
[lʲæt] 2ND, SG	[lʲɪv] 2ND, PL
[lʲɛʃ] 3RD, M, SG	[lʲo] 3RD, PL
[lʲɛi] 3RD, F, SG	

(21)

le + an cat /lʲɛ ən kʊt/ 'with' + 'the cat'	DEP-M (1ST/2ND)	DEP-M (F/PL)	*HIATUS	MAX(ə)	DEP-M (3RD)	DEP-M (M)	DEP-M (SG)
☞ a. [lʲɛʃ ən gʊt] [3,SG,M]					*	*	*
b. [lʲɛ ən gʊt] [Ø]			*!				
c. [lʲɛn gʊt] [Ø]				*!			
d. [lʲæt ən gʊt] [2,SG]	*!						*
e. [lʲɪmʲ ən gʊt] [1,PL]	*!	*					

- This approach will also derive the behavior of the vowel-final prepositions which do not use their 3SGM form before the definite article, but delete the vowel of the definite article:

(22)

Lex: [o:] '*from*'	
[wɪmʲ] 1ST, SG	[wɪnʲ] 1ST, PL
[wɪtʲ] 2ND, SG	[wɪv] 2ND, PL
[waɪ] 3RD, M, SG	[wahu] 3RD, PL
[wɛhi] 3RD, F, SG	

(23)

ó + an cat /o: ən kʊt/ 'from the cat'	DEP-M (1ST/2ND)	DEP-M(F/PL)	*HIATUS	MAX(ə)	DEP-M (3RD)	DEP-M (M)	DEP-M (SG)
☞ a. [o:n gʊt] [Ø]				*			
b. [o: ən gʊt] [Ø]			*!				
c. [waɪ ən gʊt] [3,SG,M]			*!		*	*	*
d. [wɪmʲ ən gʊt] [1,SG]	*!						*
e. [wahu ən gʊt] [3,PL]		*!			*		

2.2 Use of the 3SGM form before the plural definite article

- A further puzzle lies in the behavior of prepositions before the plural definite article.
- The problem is to explain why *le,* 'with', and *fara,* 'beside', appear in their 3SGM form before the plural definite article without hiatus there, but trí 'through' reverts to its base form.

(24)

Base (gloss)	/___[+DEF, +SG] (ən)	/___[+DEF, +PL] (nə)	expected
a. le (with) [lʲɛ]	leis an [lʲɛʃ ən]	leis na [lʲɛʃ nə]	le na [lʲɛ nə]
b. fara (beside) [faɾa]	fairis an [faɾʲɪʃ ən]	farais na [faɾʲɪʃ nə]	fara na [faɾa nə]
c. trí (through) [tʲɾʲiː]	tríd an [tʲɾʲiːdʲ ən]	trí na [tʲɾʲiː nə]	trí na [tʲɾʲiː nə]
d. ó (from) [oː]	ón [oːn]	ó na [oː nə]	ó na [oː nə]
e. do (for) [də]	don [dən]	do na [də nə]	do na [də nə]

- To solve this problem, I propose that there is a Uniform Exponence (Kenstowicz, 1998) effect which holds between the form of the prepositions as they occur before both forms of the definite article.
- It is the form that appears before the singular article, /ən/, which is chosen for the evaluation cell due to its higher frequency. (= p_2 ,below)

(25) **CORRFEATURE(PREP/_[+DEF.ART])$_{SG/PL}$** : For any pair of prepositions, p_1, p_2, where p_1 and p_2 occur in the context immediately before a definite article, assign a violation to p_1 if the φ-features associated with p_1 are not identical to those associated with p_2, the canonical example of a preposition in this context.

- This output-output constraint outranks the three input-output constraints from before:

(26)

le + na cait 'with the cats'	CORRF(PREP /_[+DEF])$_{SG/PL}$	DEP-M (3RD)	DEP-M (M)	DEP-M (SG)
☞ a. [lʲɛʃ nə gʊtʲ] [3,SG,M]		*	*	*
b. [lʲɛ nə gʊtʲ] [Ø]	*!			
p_2: lʲɛʃ [3,SG,M]				

(27)

ó + na cait 'from the cats'	CORRF(PREP /_[+DEF])$_{SG/PL}$	DEP-M (3RD)	DEP-M (M)	DEP-M (SG)
☞ a.[oː nə gʊtʲ] [Ø]				
b. [oːn nə gʊtʲ] [Ø, +DEF,+SG]	*!			
p_2: oː- [Ø]				

- Now, how do we allow variation for *trí,* 'through', using its 3sgM form only to resolve hiatus?
- Avoidance of a higher-ranked markedness violation: namely, that contact with the non-palatal /n-/ of the plural definite article would cause the final /-dʲ/ of *tríd* to depalatalize.
- Palatalization assimilation across word boundaries can occur between alveolars (Quiggan (1906:146-50) and Ó Siadhail (1989:85)).

(28) a. /l, n, s/ palatalize before /sʲ, tʲ, dʲ, lʲ, nʲ/
b. /rʲ, lʲ, nʲ, tʲ, dʲ/ become depalatalized before /t, d, n, l, r/

- The final /-sʲ/ of *leis* and *farais* are not affected, but the /-dʲ/ of *tríd* is.

(29) ***TʲN** : Assign one violation for each instance of a palatalized alveolar consonant appearing before a non-palatalized alveolar consonant.

- This must outrank the correspondence constraint in order to prevent **tríd na...* from surfacing.

(30)

trí + na cait /tri: + nə kʊtʲ/ 'through the cats'	*TʲN	Ident (Palatal)	CorrF(prep /_[+def])$_{sg/pl}$	Dep-M (3rd)	Dep-M (M)	Dep-M (sg)
☞ a. tʲɾʲi: nə kʊtʲ [Ø]			*			
b. tʲɾʲi:d̲ʲ nə kʊtʲ [3,sg,M]	*!			*	*	*
c. tʲɾʲi:d̲ nə kʊtʲ [3,sg,M]		*! (dʲ→d)		*	*	*
p_2: tʲɾʲi:d̲ʲ [3,sg,M]						

3. Hiatus before a vowel initial noun

- There are also hiatus contexts involving prepositions in contexts besides before /ən/.

- Before a vowel-initial noun, there is schwa deletion to resolve hiatus:

(31) a. /dʲə̲ eːən/ b. /də̲ eːən/
[dʲ eːən] [dʲ eːən]
off bird for bird
'off a bird' 'for a bird'

- But there is never insertion of a syntactically unjustified morph.

(32) a. le héan b. *leis éan c. le hocht n-éan d. *leis ocht n-éan
[lʲɛ eːən] [lʲɛʃ eːən] [lʲɛ ɔxt neːən] [lʲɛʃ ɔxt neːən]
with bird with bird with eight bird with eight bird

- Our previous constraints can explain the availability of schwa deletion to resolve hiatus:

(33)

do + éan /də eːən/ 'for' + 'a bird'	*Hiatus	Max(ə)	Dep-M (3rd)	Dep-M (M)	Dep-M (sg)
☞ a. [dʲeːən]		*			
b. [də eːən]	*!				

- But we can't predict why we don't get 3sgM insertion in (34).
- 3sgM insertion was considered the optimal solution for hiatus in cases where both schwa deletion and insertion were available. (See in (19), above.)

(34)

le + éan /lʲɛ eːən/ 'with' + 'a bird'	*Hiatus	Max(ə)	Dep-M (3rd)	Dep-M (M)	Dep-M (sg)
☹ a. [lʲɛ eːən]	*!				
☞ b. [lʲɛʃ eːən] [3,sg,M]			*	*	*

- If we're willing to delete a schwa before nouns (as in 33), why won't we insert the 3sgM form?
- To explain this, I make further use of the CorrF constraint which I used above.
- Here, it will be a constraint on featural correspondence between forms of the preposition which occur *not* before a definite article.
- (This is undesirable due to the Elsewhere Condition, and being unable to define the contexts in which this Uniform Exponence condition holds.)

(35) **CorrFeature(/_[-def.art])$_{prep}$** : For any pair of prepositions, p_1, p_2, where p_1 and p_2 occur in the context *not* immediately before a definite article, assign a violation to p_1 if the φ-features associated with p_1 are not identical to those associated with p_2, the canonical example of a preposition in this context.

- Here, because there are more noun contexts which begin with a consonant than with a vowel, it is the base form of the preposition which is chosen for the evaluation cell, rather than one that is optimized for resolving hiatus.

(36)

le + éan /lʲɛ eːən/ 'with a bird'	Dep-M (1,2,F,pl)	Max(V)	CorrF (/_[-def])$_{prep}$	*Hiatus	Max(ə)	Dep-M (3sgM)
☞ a. [lʲɛ eːən] [Ø]				*		
b. [lʲeːən] [Ø]		*!				
c. [lʲɛʃ eːən] [3,sg,M]			*!			***
d. [lʲɪnʲ eːən] [1,pl]	*!*					
p_2: lʲɛ [Ø]						

- These constraints will still derive correct results for prepositions where a schwa is deleted to resolve hiatus before a noun, such as *de* /dʲə/ 'off' and *do* /də/ 'for'.
- However, it is important to note that the CorrF constraints must evaluate preposition pairs based on the φ-features associated with them.
- If the similarity were based on phonological form, the deletion of the schwa would cause a violation of this constraint, and favor the wrong candidate.

(37)

do + éan /də eːən/ 'for a bird'	Dep-M (1,2,F,pl)	Max(V)	CorrF (/_[-def])$_{prep}$	*Hiatus	Max(ə)	Dep-M (3sgM)
☞ a. [dʲeːən] [Ø]					*	
b. [də eːən] [Ø]				*!		
c. [doː eːən] [3,sg,M]			*!	*		***
d. [doːv eːən] [3,pl]	*!					*
p$_2$: də [Ø]						

- As a final note, example (38) shows that insertion of a 3sgM form is triggered only by the definite article (sg or pl) and not by a syntactic [+def] feature.
- Here, the preposition remains in its uninflected form before the definite genitive phrase 'the cat of the neighbors':

(38) a. le cat na comharsan
[lʲɛ kʊt nə ˈkoːɾsən]
with cat the.gen neighbors.gen
'with the cat of the neighbors'

b. *leis cat na comharsan
[lʲɛʃ kʊt nə ˈkoːɾsən]
with.3sgM cat the.gen neighbors.gen

4. Conclusions

- Irish prepositions will use insertion of a 3sgM form to resolve hiatus before the singular definite article /ən/.
  - If this strategy is unavailable, the grammar will resort to schwa-deletion rather than inserting a more marked inflected form.
  - This suggests that the grammar can see the different lexical forms available and choose the least marked among them.
- Insertion of 3sgM forms for hiatus resolution is not available across the board:
  - Uniform Exponence holds between prepositions in the environments of 'before a definite article' and 'elsewhere'.
  - This leads to overapplication of 3sgM insertion before plural definite articles, and underapplication of it in other hiatus contexts.

Appendix
Preposition & relative pronoun, preposition & possessive pronoun

- Another context for hiatus resolution following prepositions is their behavior when fused with a possessive pronoun or a relative pronoun. Here we see epenthesis of /n/.
- Consonant-final prepositions do not fuse in this context. See '*out of*', at the bottom of (39).
- The third person (masculine, feminine, and plural) possessive pronoun is *a*, which is the same as the non-past relative pronoun/extraction marker *a*.
- The past relative pronoun/extraction marker, *ar*, is similar enough to the first person plural possessive pronoun *ár*, that these have fallen together as well.
- Because both *a* and *ar/ár* are vowel-initial, there is hiatus whenever they are combined with a vowel-final preposition.
- Here, whenever the preposition ends in a schwa, that schwa is deleted, with compensatory lengthening. When the preposition does not end in a schwa, an epenthetic /n/ is inserted.

(39)

English gloss	Irish citation form	**+ a** (3SGM/F, 3PL possessive) **/ə~æ~a/** (non-past relative)	**+ ár /a:ɾ/** (1PL possessive) **+ ar /aɾ/** (past relative)
of	de /dʲə/	dá /da:/	dár /da:ɾ/
for	do /də/	dá /da:/	dár /da:ɾ/
under	faoi /fwi:/	faoina /fwinə/	faoinár /fwinaːɾ/
from	ó /o:/	óna /o:nə/	ónár /o:naːɾ/
through	trí /tʲɾʲi:/	trína /tʲɾʲi:nə/	trínár /tʲɾʲi:naːɾ/
with	le /lʲɛ/	lena / lʲɛnə/	lenár /lʲɛnaːɾ/
out of	as /as/	as a /as a/	as ar, as ár /as a(:)ɾ/

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