MODELING DIVERGING DIPHTHONGIZATION IN *ESSE* REFLEXES FROM LATIN TO SPANISH AND PORTUGUESE

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Abstract

It is known that the default diphthong structure in Latin was falling (vowel + semivowel) and that the most common diphthongs in the language were *aj aw ej ew oj uj*. Portuguese maintains this default diphthong structure, while Spanish has tended toward rising diphthongs. This divergence in diphthongization patterns affects the preterite, imperfect subjunctive, and future subjunctive paradigms of *ser* and *ir* in both languages. This paper proposes that a combination of changes in morphophonological parameters was responsible for the changes in the perfect reflexes of ESSE from Latin to Spanish and Portuguese. In Spanish, a stress shift to the thematic vowel, combined with a preference for rising diphthongs, caused the preservation and diphthongization (*fue*, *fuimos*) of the Latin sequences. In Portuguese, stress is assigned to the root, causing falling diphthongs in some reflexes (*foi*) while monophthongizing in others (*fomos*). The optimality-theoretic analysis herein harmonically models the divergences of Spanish and Portuguese from Latin and from each other.

Keywords: diphthongization, Latin, Spanish, Portuguese, Optimality Theory

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MODELATGE DE LA DIPTONGACIÓ DIVERGENT EN ELS REFLEXOS D'*ESSE* DEL LLATÍ A L'ESPANYOL I AL PORTUGUÈS

Resum

És conegut que l'estructura del diftong per defecte en llatí era decreixent (vocal + semivocal) i que els diftongs més comuns en la llengua eren *aj aw ej ew oj uj*. El portuguès manté aquesta estructura predeterminada de diftong, mentre que l'espanyol ha tendit a augmentar el nombre de diftongs. Aquesta divergència en els patrons de diptongació afecta els paradigmes de pretèrit, imperfet de subjuntiu i futur de subjuntiu dels verbs *ser* i *anar* en tots dos idiomes. Aquest article proposa que una combinació de canvis en els paràmetres morfofonològics va ser el responsable de les modificacions en els reflexos perfets d'ESSE del llatí a l'espanyol i al portuguès. En espanyol, un canvi d'accent cap a la vocal temàtica, combinat amb una preferència pels diftongs creixents, va provocar la preservació i la diptongació (*fue*, *fuimos*) de les seqüències llatines. En portuguès, l'accent s'assigna a l'arrel, cosa que provoca diftongs decreixents en alguns reflexos (*foi*) i monoftongació en d'altres (*fomos*). L'anàlisi basada en la Teoria de l'Optimitat modela harmònicament les divergències de l'espanyol i el portuguès respecte del llatí i entre ells.

Paraules clau: diftongació, llatí, castellà, portuguès, Teoria de l'Optimitat

MODELADO DE LA DIPTONGACIÓN DIVERGENTE EN LOS REFLEJOS DE *ESSE* DEL LATÍN AL ESPAÑOL Y AL PORTUGUÉS

Resumen

Se sabe que la estructura del diptongo por defecto en latín era descendente (vocal + semivocal) y que los diptongos más comunes en la lengua eran *aj aw ej ew oj uj*. El portugués mantiene esta estructura de diptongo predeterminada, mientras que el español ha tendido a aumentar el número de diptongos. Esta divergencia en los patrones de diptongación afecta a los paradigmas de pretérito, imperfecto de subjuntivo y futuro de subjuntivo de los verbos *ser* e *ir* en ambos idiomas. Este artículo propone que una combinación de cambios en los parámetros morfofonológicos fue el responsable de las modificaciones en los reflejos perfectos de ESSE del latín al español y al portugués. En español, un cambio de acento hacia la vocal temática, combinado con una preferencia por los diptongos crecientes, provocó la preservación y la diptongación (*fue*, *fuimos*) de las secuencias latinas. En portugués, el acento se asigna a la raíz, lo que provoca diptongos decrecientes en algunos reflejos (*foi*) y monoftongación en otros (*fomos*). El análisis basado en la Teoría de la Optimidad modela armónicamente las divergencias del español y el portugués respecto del latín y entre sí.

Palabras clave: diptongación, latín, español, portugués, Teoría de la Optimidad

1. Introduction

The Latin copula ESSE 'to be' exhibited considerably irregular morphology in most of its paradigms, e.g. present indicative SUM, imperfect indicative ERAM, perfect indicative FUĪ, pluperfect indicative FUERAM, pluperfect subjunctive FUISSEM, etc. Likely due to the high frequency and functionality of this verb, these forms tended to survive

in the Romance languages. Each language developed these paradigms following their respective evolutionary phonological patterns.

The current paper is a contrastive analysis of the development of the Latin perfect indicative forms (FUĪ, etc.) in Spanish and Portuguese. More specifically, the development in question is the presence of the rising diphthong in Spanish forms (*fui* [fwi], *fue* [fwe], *fueron* [ˈfwe.ron], etc.), which in Portuguese is either a falling diphthong (*fui* [fuj], *foi* [foj]) or a pure vowel (*foram* [ˈfo.rẽw̃]). It is proposed that this divergence is due to two systematic differences between the grammars of the languages: a general phonological tendency to diphthongize in one direction or the other, and a morphophonological preference of lexical stress on either the thematic vowel or the verbal stem.

This paper is organized as follows. First, an overview of diphthongization tendencies from Latin to Spanish and Portuguese, as well as a phonological overview of the paradigms in question, is presented. Next, the discussion turns to a brief overview of previous literature regarding optimality-theoretic approaches to phonological evolution in Spanish and Portuguese. The last sections are devoted to the analysis of the developments in each language and conclusions drawn about the evolutionary grammars and tendencies of said languages.

1.1 Diphthongization from Latin to Ibero-Romance

Latin had comparatively fewer diphthongs in its repertoire than Spanish and Portuguese. Specifically, these six vowel combinations were the only ones that would be realized as diphthongs:

Latin vowel sequence	Pronunciation
AE	[aj]
AU/AV	[aw]
OE	[oj]
EI (rare)	[ej]
EU/EV (rare)	[ew]
OU/OV (rare)	[ow]

Table 1. Classical Latin diphthongs

Note that all of these diphthongs are of the order *vowel-glide* – they are *falling* diphthongs. Any ordering of a high vowel before another vowel resulted in a hiatus, e.g. MATERIA /ma.te.ri.a/ instead of */ma.te.rja/. Vulgar Latin did admit rising diphthongs due to the rise of yod /j/ and waw /w/.

Though the respective phonologies of Spanish and Portuguese remain very similar, there are certain notable differences between their sound systems that highlight how they diverged historically (Ferreira & Holt 2014). Both languages feature many more diphthongs than did Latin, mostly due to yod and waw developments. One of the ways in which these languages differ, however, is their treatment of high vowel sequences. In Spanish, it is the standard that the first high vowel become a glide, while in Portuguese the opposite is true. Because of these opposite tendencies, we find cognates with different diphthongs, such as the following:

(1)   COGITĀRE > */coj.daɾ/ > Sp *cuidar* [kwi.ˈðaɾ], Pt *cuidar* [kuj.ˈdaR]

(2)   DEUS > Sp *dios* [djos], Pt *deus* [dews]

(3)   VIDUA > Sp *viuda* [ˈbju.ða] (after metathesis), Pt *viduva* > *viúva* [vi.ˈu.vɐ]

In (1) the words are spelled identically in each language. However, it is evident that the second element in the vowel sequences is the sonority peak in the Spanish reflex, with the first element becoming a semivowel [wi]. We find the opposite in Portuguese, wherein the first element is the most sonorous compared to the second, yielding [uj]. A similar situation arose in the modern descendants of DEUS as shown in (2). Both languages exhibit normal developments of their final vowels: -U > [o] in Spanish and [u] in Portuguese. The -E- in DEUS was short and should have diphthongized [ɛ] > [je] in Spanish as it was the tonic vowel; however, the modern outcome is [i] instead, most likely due to -E- becoming yod before another vowel. In Portuguese, [u] after a vowel frequently becomes an offglide, in this case resulting in the diphthong [ew]. Considering example (3), in both languages the -I- and -U- come into contact

either via metathesis (Spanish) or lenition (Portuguese). The Spanish metathesis positions [u] into the penult and attracts stress, while the preceding [i] becomes an onglide. The lenition of [d] in Portuguese places [i] and [u] in contact with one another, with [u] also drawing primary stress due to the epenthetic [v] which arose in Vulgar Latin. Instead of the [i] becoming a semivowel as in Spanish, this remains a pure vowel and thus stays in hiatus with the following [u], following the Portuguese tendency to not create rising diphthongs (Mateus 1993, Mateus & d'Andrade 1998). Also, because of the stress on [u], it is unable to otherwise become a semivowel to form *[iw].

1.2 Esse *from Latin to Ibero-Romance*

The perfect active indicative paradigm of Classical Latin directly provides the reflexes for the preterite of *ser*[1] in both Portuguese and Spanish, after the predictable phonological changes in the respective languages.

Latin perfect active indicative	Portuguese preterite	Spanish preterite
FUĪ [ˈfu.**i**ː]	fu**i** [fu**j**]	fu**i** [fw**i**]
FUISTĪ [fu.ˈ**ɪ**s.tiː]	foste [ˈfos.Ti]	fu**i**ste [ˈfw**i**s.te]
FUIT [ˈfu.**ɪ**t]	fo**i** [fo**j**]	fu**e** [fw**e**]
FUIMUS [ˈfu.**ɪ**.mʊs]	fomos [ˈfo.mus]	fu**i**mos [ˈfw**i**.mos]
FUISTIS [fu.ˈ**ɪ**s.tɪs]	fostes [ˈfos.Tis]	fu**i**steis [ˈfw**i**s.tejs]
FUĒRUNT [fu.ˈ**e**ː.rʊnt]	foram [ˈfo.rẽw̃]	fu**e**ron [ˈfw**e**.ron]

Table 3. Latin, Portuguese, and Spanish reflexes

In all three languages, the thematic vowel is highlighted. This morpheme, realized as [iː ɪ eː] in Latin, carries over directly to Spanish through normal phonological evolution. The Portuguese developments only retain the thematic vowel in the 1st and 3rd persons, and only as a semivowel [j]. We see also that the <ui ~ ue> sequences from Latin were hiatuses, which did not persist in either Portuguese or Spanish.

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[1] The perfect of *ser* also provides, suppletively, the preterite forms for *ir* (< ĪRE). For the sake of simplicity, I only refer to modern *ser* in this paper.

Other paradigms developed directly from Latin to Spanish and Portuguese and are ostensibly developed from the Latin perfect, following the pattern of either the 2nd or 6th-person desinence:

(4)   Latin pluperfect indicative FUERAM (cf. 6th person perfect FUĒRUNT)

    a)   Portuguese pluperfect indicative *fora*

    b)   Spanish imperfect subjunctive *fuera*

(5)   Latin pluperfect subjunctive FUISSEM (cf. 2nd person perfect FUISTĪ)

    a)   Portuguese imperfect subjunctive *fosse*

    b)   Spanish imperfect subjunctive *fuese*

(6)   Latin perfect subjunctive FUERIM (cf. 6th person perfect FUĒRUNT)

    a)   Portuguese future subjunctive *for*

    b)   Spanish future subjunctive *fuere* (now archaic and highly literary)

These three paradigms pattern after the preterite regarding thematic vowel retention and diphthongization or lack thereof; in Portuguese the thematic vowel is never retained, while in Spanish the stem vowel coalesces with the following thematic vowel to form a rising diphthong. Given the phonological similarities, the analyses presented herein should apply to these other paradigms in the same manner; accordingly, the analysis will solely involve the modern preterites.

As was customary in antiquity, the Spanish preterite reflexes underwent a period of variability before being standardized to the modern forms. While the modern variants existed in Old Spanish, forms resembling those of Portuguese existed as well. Penny (2014) lists them here:

(7)   Old Spanish preterite variation > Modern Spanish result

    a)   *fu, fúe, fui > fui*

    b)   *fuiste, fueste, foste, fuste > fuiste*

    c)   *fo, fu, fúe > fue*

    d)   *fuemos, fomos, fumos, fuimos > fuimos*

e)   *fuestes, fostes, fustes, fuistes > fuisteis*

f)   *fueron, foron, furon > fueron*

According to Penny, in the Latin of Hispania, the standard reflex FUĪ had a counterpart with a long root vowel: FŪĪ. This is of little historical consequence, as the U/Ū alternation in this reflex would be neutralized because of the metaphonic raising caused by final ī, as shown in (a). This alternation exists in the other five persons, and the presence of the thematic vowel I or E, neither of which would trigger raising, was the source of the radical /o/ variants in (b-f). Penny states that the presence of ū would have absorbed the thematic vowel, also giving rise to the variants without it.[2] These forms with /o/ and without thematic vowels were most frequently found in the 13th century but disappeared gradually until the language was standardized and radical /u/ was prescribed. Notable among the standardized forms was the preservation of FUĪ as *fui*, which should otherwise have evolved to *fue* following the derivational tendencies of Spanish.[3] However, *fui* remained likely due to analogy with regular *-er/-ir* verbs; we see this development also with *fuiste(is)* and *fuimos*.

In light of the evolution of these verbal reflexes and the phonological and morphological changes observed through their history, the purpose of this paper is to contrastively model these diachronic changes using an optimality-theoretic approach, following a precedent by Jacobs (1995). The differences between Latin and the modern languages, as well as the apparent divergences in the modern languages themselves, make such an analysis feasible.

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[2] Da Silva Neto (1970) presents the same for Portuguese, which is entirely plausible and appears to have been the preferred variant, as none of the 2nd, 4th, 5th, and 6th persons of the preterite, nor any reflexes of the pluperfect indicative, imperfect subjunctive, or future subjunctive contain a thematic vowel.

[3] Penny remarks that Nebrija suggested, unsuccessfully, that the standard reflexes for this paradigm should be *fue, fueste, fue, fuemos, fuestes, fueron.* Only two of these reflexes remain as such.

2. Previous accounts – Optimality Theory and language change in Spanish and Portuguese

Due to the proximity of Spanish and Portuguese, both geographically and linguistically, the differences between the otherwise very similar languages stand out considerably. One account by Holt (2007) describes various tendencies of sound change in Old Spanish, framing them within Ibero-Romance as a subfamily and noting where Spanish differentiated itself from languages such as Galician and Portuguese. Much of the information presented in this study is based on prior work by Holt (1999, 2003), which in part investigated the development of sonorants from Latin to Portuguese and Spanish. It is understood that the development of intervocalic /l ll/ was equivalent to that of /n nn/ in each language: in Portuguese the simpletons elided and the geminates reduced to simpletons, and in Spanish the simpletons remained and the geminates converted into palatals /ʎ ~ ʝ/ and /ɲ/. According to Holt, the restriction on moraic sonorants was the principal restriction on geminate retention, followed by merger avoidance. Faithfulness constraints aimed at preventing deletion, insertion, or feature modification of segments was the most violable constraint (as a whole).

Intended to be a continuation or a different perspective of the question presented by Holt (2003), Graham (2017) examined the divergent behaviors of intervocalic Latin simpleton /l n/ and geminate /ll nn/ in Spanish and Portuguese. While Holt approached the issue based on the interplay of moraicity of sonorants, merger avoidance, and feature preservation (in a tantamount manner), Graham found that the same constraints applied to Galician-Portuguese would not deliver the appropriate result; that is, the constraint set was not sufficient to model the evolutionary behavior of these segments in Portuguese. To resolve this issue, Graham created a set of constraints common to both Spanish and Portuguese that, when reordered, would yield the desired evolutionary results. These constraints prioritized blocking gemination and phonemic merger – a common behavior of both Spanish and Portuguese – and were to be rearranged to correctly model the outcomes in each language. The appropriate analysis involves Spanish phonological evolution prioritizing preservation of voiced onsets, place retention, and mora preservation over maximizing

onsets, while in Portuguese place retention, maximizing onsets, and preserving onsets are prioritized over mora retention.

The analysis by Graham (2017) is a spiritual predecessor of the current study. Given the commonalities between Spanish and Portuguese, there is precedent for contrastive modeling of each language with a common set of phonological constraints. The following section describes the process by which the evolution of the Spanish and Portuguese reflexes of perfect indicative ᴇꜱꜱᴇ shall be modeled.

3. The current study – methodology

In the following section the two methods of analysis – context-specific and context-free – will be employed in order to determine the more appropriate approach to modeling this diachronic divergence. The working hypothesis is that the context-free approach will be the most efficient manner in which to harmoniously model the relevant changes. This represents a clear advantage over the context-specific approach to this problem, as the six relevant reflexes (more if we include other paradigms) could potentially require six separate analyses.

Each phase of the analysis uses the reflexes of the perfect active indicative paradigm of ᴇꜱꜱᴇ as the input. Possible output candidates will include (a) the faithful candidate that aligns most closely with the original Latin form, (b) the candidate that "prevailed" in each respective language, and (c) any other possible candidates that did not persist in a language, such as the Spanish result in Portuguese and vice versa, or other potential candidates that were viable but were ultimately ruled out by the constraint hierarchy.

Recalling the evolutionary tendencies of the reflexes of Portuguese and Spanish as they descended from Latin, these are the key points to consider:

- In Latin reflexes ꜰᴜī, ꜰᴜɪᴛ, ꜰᴜēʀᴜɴᴛ, etc. the thematic vowel /i ~ ɪ ~ e/ remained in hiatus with the preceding stem vowel /u/.

- In Portuguese reflexes *fui* and *foi*, the thematic vowel remains but is reduced to a semivowel /j/, and it forms a falling diphthong with the preceding stem vowel. All other reflexes – *foste*, *fomos*, *fostes*, *foram* – have completely lost the thematic vowel.

- In all six Spanish reflexes, the thematic vowel remains and carries lexical stress. The lexical stem vowel /u/ consequently becomes a semivowel /w/ and forms a rising diphthong with the thematic vowel.

The outcomes represent a set of evolutionary tendencies that can be represented as a bivalent parameter: hiatus or diphthong, rising or falling diphthongs, preservation or loss of the thematic vowel. The following section is dedicated to establishing models for the evolution to either language, using constraints and manipulating the hierarchies of said constraints in order to accurately predict the outcome in each language.

4. Analysis and discussion

This analysis takes place in two parts. The first phase involves only the forms from Latin that would evolve to have diphthongs in both the target language: FUĪ and FUIT. The second phase incorporates the other four reflexes. In each phase, the goal is to arrive at an arrangement that satisfactorily models all the reflexes involved.

4.1 Context-specific analysis of fui *and* fue/foi

It has been established that Portuguese diphthongization tends toward the falling (vowel-glide) pattern, while Spanish has shown a tendency toward rising (glide-vowel) diphthongs. This is especially applicable to sequences of high vowels, as in both Portuguese and Spanish high vowels have a semivowel allophone. To control the

direction of diphthongization, two diametrically-opposed constraints are defined, following concepts discussed in Prince & Smolensky (2002):

(8)   **V$_H$G$_H$**

"adjacent high vowels in the input form a falling diphthong in the output"

(9)   **G$_H$V$_H$**

"adjacent high vowels in the input form a rising diphthong in the output"

Also, to prevent any diphthongization, the following faithfulness constraint is defined:

(10)   ***DIPHTHONG-IO**

"adjacent vowels in the input do not form diphthongs in the output"
(from Rosenthall 1994)

Constraints (8-9) condition the conversion of one high vowel into a semivowel in order to form a diphthong, differing in which high vowel is preserved and which one becomes non-syllabic. Constraint (10) prevents diphthongization by regulating the syllabic property of each vowel; as semivowels are non-syllabic, gliding would violate this constraint. These are the proposed constraint hierarchies of each language:

(11)   Constraint hierarchies
      (a)   Portuguese: V$_H$G$_H$ >> *DIPHTHONG-IO >> G$_H$V$_H$
      (b)   Spanish: G$_H$V$_H$ >> *DIPHTHONG-IO >> V$_H$G$_H$

As Portuguese requires diphthongization of two high vowels to be falling, and as Spanish requires the opposite, it is obvious that the highest- and lowest-ranking constraints would be what they are. Moreover, as neither language permits these sequences to remain hiatuses by default, it is evident that *DIPHTHONG-IO must be an inviolable constraint.

In each stage of the analysis, the underlying (phonemic) Latin representation will be our input. The outputs will consist of a faithful base (closer to Latin phonetics) and Portuguese and Spanish reduplicants. Assuming that vowel length ceased to appear in early Romance, we will ignore this feature at every point of the analysis. We begin by evaluating our proposed constraint ranking for the descendants of FUĪ:

/fui:/		V_HG_H	*DIPHTHONG-IO	G_HV_H
a)	fu.i	*!		*
b)	fwi	*!	*	
c) →	fuj		*	*

Tableau 4. OT analysis of FUĪ > Pt fui

/fui:/		G_HV_H	*DIPHTHONG-IO	V_HG_H
a)	fu.i	*!		*
b)→	fwi		*	*
c)	fuj	*!	*	

Tableau 5. OT analysis of FUĪ > Sp fui

The constraints crucially militate against preservation of the Latin hiatus. In Tableau 4, the ranking appears to accurately predict the Portuguese result of *fui* /fuj/ by blocking the formation of a rising diphthong. In the same manner, Tableau 5 represents the Spanish result of *fui* /fwi/ by effectively preventing the development of a falling diphthong.

However, the same constraint ranking does *not* conclusively predict the evolution of FUIT to either *fue* or *foi*, as we see in Tableaux 6 and 7:

/fuit/		V_HG_H	*DIPHTHONG-IO	G_HV_H
a) ??	fo.i[4]			
b) ??	fwi	(*!)	*	
c) 🙁	foj		*	

Tableau 6. OT analysis of FUIT > Pt foi

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[4] Portuguese final /-e/ from Spoken (Vulgar) Latin closes to [i ~ ɨ] in word-final position, cf. DĪXĪ, DĪXIT > *disse* /dʒisi/. This has no impact on the analysis.

/fuit/		G$_H$V$_H$	*DIPHTHONG-IO	V$_H$G$_H$
a) ??	fu.e			
b) 🙁	fwe		*	
c) ??	foj		*	

Tableau 7. OT analysis of FUIT > Sp fue

Though at first glance these constraints might allow for the proper candidate to surface, the defined constraints V$_H$G$_H$ and G$_H$V$_H$ implicitly stipulate that the output must retain the [+high] feature. The desired Portuguese outcome of [foj] and the Spanish [fwe] contain mid vowels, following regular phonological development in each language. The final [ɪ] does not trigger metaphony in Portuguese, thus allowing [u] to open to [o]. Furthermore, in Spanish final [ɪ] undergoes regular development and lowers to [e]. Without a sequence of high vowels in the output, the evaluation of these constraints for what should be the desired candidates instead remains inert.

It might be possible to include another low-ranking constraint that would allow for the syllabic vowels to change their height. However, the purpose of this study is to find a consistent model of all reflex derivations, not six independent brute-force analyses. Thus, a context-free approach to the issue may be the appropriate direction in which to go.

4.2 Context-free analysis of fue/foi

This phase of the analysis abandons the constraints (8-10) used in the context-specific approach in favor of a new set of constraints meant to be applicable on a more universal basis. It is expected, then, that, unlike in Section 4.1, the same constraint hierarchy should yield the expected results. The appropriate markedness constraints are as follows:

(12)   **ST**[E]**M DOM**[INANCE]

"lexical stems bear prosodic stress"

(from Gerlach 2002)

(13)   **T**[HEMATIC] **V**[OWEL] **DOM**[INANCE]

             "thematic vowels bear prosodic stress"

The constraint STM DOM used by Gerlach (2002) involved cliticization and syllabification of Portuguese verbs; however, given the distinction between lexical stress position in the relevant Portuguese and Spanish reflexes, it should be appropriate for use in this application. This paper proposes an opposite constraint of TV DOM for the purposes of representing the Spanish tendency toward of stressed thematic vowels. That is, while STM DOM would be low-ranking and violable in Portuguese, TV DOM should be low-ranking and violable in Spanish as a countermeasure. Furthermore, in order to condition the elimination of the faithful candidate in favor of outputs containing diphthongs, we retain *DIPHTHONG-IO but add this next constraint:

(14)   ***HIATUS-IO**

             "adjacent vowels from input are syllabic in output"

These constraints, as they are defined, should condition the outcomes in each language if ordered correctly. We know that, in both Spanish and Portuguese, the hiatus from Latin was lost completely, and so *HIATUS-IO is the undominated constraint. Furthermore, both outcomes contain diphthongs, and so *DIPHTHONG-IO is the lowest constraint. We expect, then, that the difference in conditioning of the outcomes rests with the relative ranking of STM DOM versus TV DOM. These are the proposed hierarchies for each language:

(15)   Constraint hierarchies

   (a)   Portuguese: *HIATUS-IO >> STM DOM >> TV DOM, *DIPHTHONG-IO[5]

   (b)   Spanish: *HIATUS-IO >> TV DOM >> STM DOM >> *DIPHTHONG-IO

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[5] For Portuguese alone, the relative ranking of TV DOM and *DIPHTHONG-IO will be inconsequential. The outcomes remain the same if *DIPHTHONG-IO strictly dominates TV DOM, but for the sake of space these alternative analyses will not be presented here.

Do these hierarchies properly condition the evolution of FUĪ in each language? The analyses in Tableaux 8 and 9 suggest that they do:

/fui:/		*HIATUS-IO	STM DOM	TV DOM	*DIPHTHONG-IO
a)	fu.i	*!		*	
b)	fwi		*!		
c) →	fuj			*	*

Tableau 8 – Context-free analysis of FUĪ > Pt fui

/fui:/		*HIATUS-IO	TV DOM	STM DOM	*DIPHTHONG-IO
a)	fu.i	*!	*		
b) →	fwi			*	*
c)	fuj		*!		*

Tableau 9. Context-free analysis of FUĪ > Sp fui

As predicted, the constraint rankings accurately predict the outcomes of FUĪ in each language. In Portuguese the falling diphthong is the desired result represented as the chosen candidate (c). The hiatus in (a) violates the highest constraint as expected, and candidate (b) violates the high-ranking constraint of STM DOM as a reflection of the Portuguese tendency to parse $V_H V_H$ sequences as falling diphthongs. The constraints as ranked in Tableau 9, the analysis of Spanish, also returns the desired result in the same manner as Portuguese with the exception of the falling diphthong candidate being eliminated in favor of the parsing of the $V_H V_H$ sequence as a rising diphthong.

Here is the most crucial test: without modifying the constraint hierarchies in any way, do they still correctly condition the evolutions of FUIT to their resultant forms in Portuguese and Spanish? The analyses in the following tableaux (10-11) suggest that this is indeed the case:

/fuit/		*HIATUS-IO	STM DOM	TV DOM	*DIPHTHONG-IO
a)	ˈfo.i	*!		*	
b)	fwi		*!		
c) →	foj			*	*

Tableau 10. Context-free analysis of Fᴜɪᴛ > Pt foi

As in Tableau 8, the falling diphthong output – candidate (c) – is our desired candidate, and it prevails. Candidates (a) and (b) are eliminated for the same reasons as in the earlier analysis.

/fuit/		*HIATUS-IO	TV DOM	STM DOM	*DIPHTHONG-IO
a)	ˈfu.e	*!	*		
b) →	fwe			*	*
c)	foj		*!		*

Tableau 11. Context-free analysis of Fᴜɪᴛ > Sp fue

Again, the desired candidate (b) is the prevailing result, with (a) and (c) being eliminated for the same reasons as in Tableau 9.

Now that the cases of Fᴜɪ and Fᴜɪᴛ have been handled, the question of the remaining four reflexes – from Fᴜɪsᴛɪ̄, Fᴜɪᴍᴜs, Fᴜɪsᴛɪs, and Fᴜᴇ̄ʀᴜɴᴛ – must be answered. Since it has already been shown that a context-specific analysis of their derivation is undesirable, such an analysis will not be shown here, and the context-free approach will be the sole analysis.

4.3 Context-free analysis of all other reflexes

As the constraints from the prior phase of the analysis correctly predict the outcome in each language, these constraints and their language-specific hierarchies will carry forward to this phase. There is a new issue, however: in Portuguese, the reflexes all have the pure vowel /o/ with no trace of the thematic vowel from Latin. This outcome is not observed in Spanish, and thus it provides a situation that

necessitates the inclusion of another violable constraint, one that restricts the deletion of segments. As defined:

(16)   **MAX**[IMALITY]**(TV)**

             "no deletion of thematic vowels from input to output"

             (adapted from Kager 1999)

MAX(IMALITY) is a well-known constraint that is used in OT analyses involving deletion of syllables, segments, or features. It is often refined to militate against specific characteristics; in the current analysis, as thematic vowels are lost in the Portuguese reflexes but not in those of Spanish, MAX(TV) is defined in such a way as to be undominated in Spanish or completely violable in Portuguese. With the new constraint, the hierarchies are newly defined below:

(17)   Constraint hierarchies
     (a)   Portuguese: *HIATUS-IO >> STM DOM >> TV DOM >> *DIPHTHONG-IO >> MAX(TV)
     (b)   Spanish: *HIATUS-IO >> MAX(TV) >> TV DOM >> STM DOM >> *DIPHTHONG-IO

Having defined the hierarchies, do they correctly model the other four reflexes in each language?

/fuisti:/ /fuimus/ /fuistis/ /fue:runt/		*HIATUS-IO	STM DOM	TV DOM	*DIPHTHONG-IO[6]	MAX(TV)
a)	fu.ˈis.Ti fu.ˈi.mus fu.ˈis.Tis fu.ˈe.rẽw̃	*!	*			
b)	ˈfujs.Ti ˈfuj.mus ˈfujs.Tis ˈfuj.rẽw̃			*(!)	*(!)	
c) →	ˈfos.Ti ˈfo.mus ˈfos.Tis ˈfo.rẽw̃			(*)		*
d)	ˈfwis.Ti ˈfwi.mus ˈfwis.Tis ˈfwe.rẽw̃		*!		*	

Tableau 12. Analysis of Portuguese reflexes

The analysis of Portuguese outputs does indeed model the appropriate outcome. As expected, the faithful candidates in (a) that preserve the Latin hiatus are eliminated first. The next-highest-ranking constraint, STM DOM, eliminates candidate (d), as the modern reflexes should be rhizotonic. With candidates (b) and (c), depending on the position taken regarding the loss of the thematic vowel in (c), both of them violate the equally-ranked constraints TV DOM and *DIPHTHONG-IO. If the missing thematic vowel in (c) is analyzed as inert and thus unaffected by the constraint, then (b) is eliminated here as the thematic vowel is an offglide and cannot carry stress. However, if the loss of the vowel is treated as a violation, the tantamount constraint *DIPHTHONG-IO still eliminates (b) due to the diphthongization of the root and thematic vowels. Thus candidate (c) prevails, which is what is desired.

Having determined that these constraints are sufficient to model the evolutionary behavior of Portuguese, the analysis now focuses on Spanish. As before,

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[6] The 6th-person reflexes of *ser* in Portuguese end in a nasal diphthong, which would at face vowel trigger a violation of this constraint. However, it clears the filter due to *DIPHTHONG-IO requiring first that heterosyllabic vowels be present in the input, which is not the case here.

the 2nd, 4th, 5th, and 6th-person reflexes are analyzed as a unit due to their phonological similarities.

/fuistiː/ /fuimus/ /fuistis/ /fueːrunt/		*HIATUS-IO	MAX(TV)	TV DOM	STM DOM	*DIPHTHONG-IO
a)	fu.ˈis.te fu.ˈi.mus fu.ˈis.te(j)s fu.ˈe.ron	*!		*	*	
b)	ˈfujs.te ˈfuj.mos ˈfujs.te(j)s ˈfuj.ron			*!		*
c)	ˈfos.te ˈfo.mos ˈfos.te(j)s ˈfo.ron		*!	(*)		
d) →	ˈfwis.te ˈfwi.mos ˈfwis.te(j)s ˈfwe.ron				*	*

Tableau 13. Analysis of Spanish reflexes

As with the Portuguese output set, candidate (a) containing hiatuses is eliminated first. Next, the outputs patterned after Portuguese – those in candidate (c) with the radical [o] and no thematic vowel – are excluded by high-ranking MAX(TV). Candidate (b) with falling diphthongs, and thus no stress on the thematic vowel, violates TV DOM and is accordingly eliminated. Candidate (d) only violates low-ranking STM DOM and *DIPHTHONG-IO and is our desired outcome, reflecting the reality of modern Spanish.

4.4 Discussion and pan-Romanic contextualization of the analysis

This divergence in development of ESSE reflexes patterns with the respective diphthongization direction tendencies of Spanish and Portuguese, but it is an isolated occurrence within the verbal repertoires of each language. Several other Latin verbs contain the relevant vocalic sequences, but they did not evolve in the same manner as ESSE. For example:

(18)   HABEŌ (inf. HABĒRE) > Sp *haber*, Pt *haver*

    a)   Latin perfect 1sg HABUĪ > Sp *ove* > *hube*, Pt *houve*

    b)   Latin perfect 3sg HABUIT > Sp *ovo* > *hubo*, Pt *houve*

(19)   PŌNŌ (inf. PŌNERE) > Sp *poner*, Pt *pôr*

    a)   Latin perfect 1sg POSUĪ > Sp *puse*, Pt *pus*

    b)   Latin perfect 3sg POSUIT > Sp *puso*, Pt *pôs*

(20)   SALIŌ (inf. SALĪRE) > Sp *salir*, Pt *sair*

    a)   Latin perfect 1sg SALUĪ > Sp *salí*, Pt *saí*

    b)   Latin perfect 3sg SALUIT > Sp *salió*, Pt *saiu*

It is evident that the diphthongization observed in ESSE did not occur in any of the verbs in (19-21). Metathesis and metaphony are postulated to be the cause of the changes in the reflexes of HABĒRE and PŌNERE (see Lloyd 1987 and Penny 2014 for their accounts of Spanish), while the preterite reflexes of SALĪRE are now regularized due to analogy. The best explanation for this difference could be that the ESSE reflexes are much shorter than those of the above verbs, which precluded both metathesis and metaphony.

Considering other Romance languages that preserve the ESSE reflexes in some form or fashion, it appears that the Portuguese development is the customary, unmarked route and that the Spanish development is extraordinary. That is, the ongliding of the stem vowel and preservation of the thematic vowel is the marked development, whereas the preservation of the stem vowel and the syncope of the

thematic vowel is more common and thus unmarked. The following table is an inexhaustive comparison of these developments:

Latin	FUĪ	FUIT	FUIMUS	FUĒRUNT
Portuguese	*fui* [fuj]	*foi* [foj]	*fomos* [ˈfo.mus]	*foram* [ˈfo.rã]
Galician	*fun* [fuŋ]	*foi* [foj]	*fomos* [ˈfo.mos]	*foron* [ˈfo.ron]
French (*passé simple*)	*fus* [fy]	*fut* [fy]	*fûmes* [fym]	*furent* [ˈfyʁ]
Italian (*passato remoto*)	*fui* [ˈfuj]	*fu* [fu]	*fummo* [ˈfum.mo]	*furono* [ˈfu.ro.no]
Catalan (*passat simple*)	*fui* [fuj]	*fou* [fow]	*fórem* [ˈfo.rem]	*foren* [ˈfo.ren]
Romanian (*perfect simplu*)	*fui* [fuj]	*fu* [fu]	*furăm* [ˈfu.rəm]	*fură* [ˈfu.rə]
Asturian	*fui* [fwi]	*foi* [foj]	*fuemos* [ˈfwe.mos] *fuimos* [ˈfwi.mos]	*fueron* [ˈfwe.ron]
Spanish	*fui* [fwi]	*fue* [fwe]	*fuimos* [ˈfwi.mos]	*fueron* [ˈfwe.ron]
Aragonese	*fue* [fwe]	*fue* [fwe]	*fuemos* [ˈfwe.mos]	*fueron* [ˈfwe.ron]

Table 14. Romance descendants of relevant forms

The /u.ɪ/ hiatus in FUĪ/FUIT either evolved to a falling diphthong or was resolved to a monophthong /U/ in most languages shown in Table 14. These same languages evolved to /u ~ o/ in other paradigms after losing the thematic vowel. Languages that align with Spanish, such as Aragonese (Martínez Cortés et al. 2017), evolve to feature a rising diphthong /wi ~ we/. This is mostly the case of Asturian, with the sole exception of FUIT > *foi* which aligns more closely with Portuguese or Galician.

5. Conclusions and future directions

This paper has demonstrated how diphthongization principles determined the eventual evolution of FU- reflexes of ESSE from Latin to Portuguese and Spanish. Portuguese, a language in which falling diphthongs are the clear preference, admitted a falling diphthong in the 1st and 3rd persons of the preterite while losing the Latin thematic vowel in other persons (and in all other paradigms in which the Latin stem was FU-), thus precluding any diphthongization. The result in Spanish, however, was that the /u.i ~ u.e/ sequence in these reflexes evolved to rising diphthongs /wi ~ we/.

Future research would involve extending the OT analysis to other languages for the purpose of comprehensiveness. Another direction may be to examine the intermediate forms in archaic varieties of Spanish and Portuguese in order to determine any points of divergence between the two languages and any factors affecting variation among those forms.

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