

On glide epenthesis and the diphthongization of back vowels before /ɲ/ in the history of Spanish

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RESUMEN: Tres enigmas suelen surgir al considerar la evolución de las vocales posteriores ante /ɲ/ del latín al español: (1) la inhabilidad de la nasal palatal /ɲ/ de impedir la diptongación de /ɔ/ (por no cerrar la vocal medio-abierta a /o/); (2) los tres resultados, aparentemente aleatorios, de las vocales velares /ɔ/ y /o/ ante /ɲ/, es decir /oɲ/, /weɲ/ o /uɲ/; y (3) la coocurrencia, a primera vista paradójica, de la palatalización junto con la metátesis (/ɲj/ > /ɲ/ frente a /nj/ > /jn/) en derivaciones como RISŌNEUM > *risueño*. En este artículo se propone una explicación unificada del desarrollo de las vocales posteriores latinas + /ɲ/, la cual se basa en tres aspectos clave: (1) la epéntesis perceptual de una semivocal palatal (yod) entre la vocal posterior y la nasal alveolopalatal, cuyos rasgos acústicos se aproximaron a los del diptongo /we/; (2) el grado de abertura de la vocal posterior, de modo que sólo las vocales posteriores más abiertas favorecieron la epéntesis de /j/ (y, por extensión, la formación del diptongo /we/); (3) el mantenimiento de tres grados de abertura vocálica en la serie de las vocales posteriores, como /ɔ/, /o/, /ɔ/. Debido a la interacción de estos tres aspectos, la secuencia /ɔɲ/ se cerró en /uɲ/ con poca epéntesis de /j/, la secuencia /oɲ/ permitió la diptongación regular a /ɔɲ/, y luego a /weɲ/, mediante la epéntesis perceptual regular de /j/, y la secuencia /oɲ/ dio ambos resultados –/uɲ/ y /weɲ/– junto con el mantenimiento de /oɲ/. El presente análisis no descarta el importante papel de la analogía o de ciertos factores morfológicos; el objetivo principal es señalar cómo una explicación unificada, basada en la epéntesis perceptual, es capaz de solucionar los tres enigmas asociados con el desarrollo de /ɔ o ɔ/ + /ɲ/ en la historia del español.

Palabras clave: epéntesis de semivocal, transición de formantes, diptongación, vocales posteriores, nasal palatal, metátesis, metafonía.

ABSTRACT: The development of back vowels + palatal /ɲ/ from Latin to Spanish has traditionally presented three enigmas: (1) Why /ɲ/ did not prevent diphthongization through raising of /ɔ/ to /o/; (2) why /ɔ/ and /o/ before /ɲ/, assuming a shared /oɲ/ intermediate stage, should show, randomly, three different outcomes as /oɲ/, /weɲ/, or /uɲ/; and (3) the apparent paradox of both palatalization and glide metathesis (/ɲj/ > /ɲ/ vs. /nj/ > /jn/) in derivations such as RISŌNEUM > *risueño* ‘smiling’. In this article I propose a unified explanation of the back vowels + /ɲ/ based on: (1) perceptual glide epenthesis between vowel and nasal, whose acoustics mimicked the /we/ diphthong; (2) relative height of the back vowel –the lower the vowel the greater the likelihood of glide epenthesis/diphthong formation; and (3) maintenance of three degrees of vowel height, as /ɔ/, /o/, /ɔ/. Thus Hispano-Romance /ɔɲ/ shows minimal diphthong formation and regular closure to /uɲ/, /oɲ/ shows regular glide epenthesis/diphthongization, and /oɲ/ shows both these outcomes, along with no further change beyond /oɲ/. The current approach does not discount the role of analogy or morphological factors; I aim to show how a unified account may shed light on three problems related to /ɔ o ɔ/ + /ɲ/ in the history of Spanish.

Keywords: glide epenthesis, formant transitions, diphthongization, back vowels, palatal nasal, metathesis, metaphony.

1. INTRODUCTION

With regard to the development of the Latin back vowels Ū, Ō, and Ŏ in the history of Spanish, when preceding the alveolopalatal nasal /ɲ/, three sets of questions have traditionally guided the research:

- (a) Given the regular development of Latin ū to /o/ in Hispano-Romance, why should /ɔj/ show three distinct outcomes in Spanish, as /ɔj/, /oj/, or /wej/, e.g., CŪNEUM > *cuño* ‘die’ vs. CALUMNIA > *caloña* ‘trick’ vs. CICŌNIA > *cigüeña* ‘stork’? (Craddock, 1980: 67).
- (b) Why did the alveolopalatal nasal /ɲ/ exert a metaphonic effect upon the Hispano-Romance reflexes of Latin ū, ō but not upon ǔ (i.e., why did /ɲ/ not block the diphthongization of ǔ /ɔ/ to /we/), e.g., CŪNEUM > *cuño* ‘die’, TESTIMŌNIUM > *testimūno* ‘testimony’ vs. LŌNGE > OSp. *lueñe* ‘far’? Similarly, why should the alveolopalatal nasal /ɲ/ allow so many cases of diphthongization, while other palatal consonants like /tʃ ʎ/ were apparently able to block diphthongization of Latin ǔ (/ɔ/) via metaphony, e.g., LŌNGE > OSp. *lueñe* ‘far’ vs. NŌCTEM > *noche* ‘night’, FŌLIA > OSp. *foja*, MSp. *hoja* ‘leaf’ (vs. Leon. *nueche*, *fueya*)? This fact is most striking given that /ɲ/ is “more palatal” than /tʃ ʎ/ in terms of degree of dorsopalatal contact.
- (c) How can one solve the “intractable enigma” mentioned by Craddock (1980: 66-67) and by Rini (1993: 520-522), namely the apparent impossibility of reconciling metathesis and palatalization? That is, if metathesis of the type /rj/ > /jɾ/, CORIUM > [ˈkɔ:.rju] > [ˈkɔj.ru] > [ˈkoj.ro] > *cuero* ‘leather’ applies to /ɲj/ > /jɲ/, e.g., RISŌNEUM > [ri.ˈso:.nju] > [ri.ˈsoj.nu], the glide is in the proper position to permit /oj/ > /we/ (> *risueño* ‘smiling’), but subsequent palatalization of /n/ by off-glide /j/ is very unlikely –the off-glide cannot both palatalize the nasal and combine with /o/ to produce /we/. Conversely, if one postulates palatalization of the nasal by on-glide /j/, e.g., RISŌNEUM > [ri.ˈso:.nju] > [ri.ˈso:.ɲu] ‘smile’, then the glide is absorbed into the nasal, at which point the required nasal + glide > glide + nasal metathesis –parallel to rhotic + /j/ > /j/ + rhotic cases like CORIUM > *cuero*, and necessary in order to locate /j/ next to the back vowel– becomes impossible. In short, /ɲj/ > /jɲ/ metathesis allows formation of the requisite /oj/ diphthong but renders palatalization very unlikely, whereas palatalization via /ɲj/ > /jɲ/ leaves no metathetic way to generate the palatal off-glide of the /oj/ diphthong that subsequently became /we/.

In most instances, investigations that explain the development of Latin ū, ō, and ǔ + Hispano-Romance /ɲ/ from Latin to Spanish tend to assign a specific explanation to a subset of the back vowels in question rather than attribute their respective outcomes to the same factor or set of factors. Thus, regarding the outcomes of Latin ǔ preceding /ɲ/, the research generally centers on the spontaneous diphthongization of ǔ, e.g., FORTIA > OSp. *fuerça*, MSp. *fuerza* ‘strength’, and whether it took place before /ɲ/ as well. In contrast, the development of Latin ū, ō before /ɲ/ is usually explained in reference to a process of glide movement or glide attraction, wherein a palatal glide in the following syllable is attracted into the preceding syllable to become an offglide, e.g., RISŌNEUM > [ri.ˈso:.nju] > [ri.ˈso:.ɲu] > [ri.ˈsoj.ɲo] > Sp. *risueño* ‘smile’. The resulting diphthong /oj/ subsequently became /we/ through analogy with extant /we/ < Latin ǔ and also due to the Castilian predilection for on-gliding diphthongs (Craddock, 1980: 67).

In this article, I propose a unified explanation for the development of Latin ū, ō, and ǔ preceding /ɲ/, based on the relative likelihood that Hispano-Romance listeners perceived glide-like F2, F3 formant transitions from the back vowel into the alveolopalatal nasal. Phonetics research supports the view that low back vowels are much more likely to foster perception of the /j/-like transition, whereas perception of the glide is much less likely before high back vowels. Thus, whereas low-mid /ɔ/ favored perception of a /j/-like transition from vowel into /ɲ/, e.g., LONGĒ > [ˈlɔ:ɲ.ne] > [ˈlɔj.ɲ.ne] > [ˈloj.ɲ.ne] > OSp. *lueñe* ‘far off’, high back /ɔ/ effectively minimized the

listeners' tendency to perceive the off-glide transition, especially after metaphony or hypercorrection raised /ʊ/ to /u/, e.g., CŪNEUM > ['kʊ:.nju] > ['kʊ.ju] > ['kuj.no] > *cuño* 'die' (for stamping coins). In contrast, /o/ (< Latin Ō), due to its intermediate position between /ɔ/ and /ʊ > u/, predictably shows a mix of outcomes, both instances of glide-induced diphthongization as well as minimization of [j]-glide epenthesis (with or without further closure to /ɥ/). In short, I propose a general rule of thumb according to which the lower the back vowel before /ɲ/, the greater the likelihood of diphthong formation via phonemic reanalysis of the [j]-like formant transitions. From this perspective, the apparent problems posed by the eccentric behavior of spoken Latin /ɔ/, vis-à-vis spontaneous diphthongization before /ɲ/, are easily avoided. Finally, rather than view this proposal as a replacement for many of the explanations that have heretofore been proposed to explain the outcomes of Latin Ū, Ō, and Ŏ before /ɲ/, I instead advance the current proposal as a unifying backdrop to the development of the Latin back vowels, based on the phonetics of glide epenthesis, whose most important contribution is to help resolve at least some of the intractable enigmas associated with the back vowels' evolution before /ɲ/ from Latin to Spanish¹.

The article is organized as follows. Section 2 provides a brief overview of the relevant back vowel data from Latin to Spanish; section 3 discusses the process of perceptual glide epenthesis in terms of the acoustic formant transitions from vowel to /ɲ/; sections 4, 5, and 6 analyze in detail the outcomes of the /ɔɲ/, /ʊɲ/, and /oɲ/ sequences, respectively, from spoken Latin to Old Spanish. Section 7 finishes the analysis with a brief conclusion.

2. DATA ON BACK VOWEL + /ɲ/

Latin orthographic Ū, Ō, and Ŏ represent the Classical phonemes /u/, /o:/, and /o/, respectively. It is widely agreed that the phonetic realization of these phonemes was /u/ → [ʊ], /o:/ → [o:], and /o/ → [ɔ] (Penny, 2002: 44-47), with the short vowels /u o/ being realized with a more open articulation, in terms of aperture, whereas the longer duration of /o:/ meant a more close mid-vowel realization as [o:]. In spoken Latin, perhaps by the end of the first century CE (Penny, 2002: 45), vowel length ceased to be phonemic, with the result that the length of a given vowel came to depend upon stress: Tonic vowels were lengthened under stress and atonic vowels were realized as short (regardless of whether these vowels were in earlier times specified phonemically as long or short). Consequently, once length became dependent upon lexical stress, and thus ceased to be contrastive, Classical Ū, Ō, and Ŏ were reanalyzed as /ʊ/, /o/, and /ɔ/, respectively. In this article, I employ the Latin orthographic tradition by using Ū, Ō, and Ŏ with the understanding that, by the time these vowels interacted with Hispano-Romance /ɲ/, they had shifted phonemically to /ʊ/, /o/, and /ɔ/. With regard to word stress, all instances of /ʊ/, /o/, and /ɔ/ in the data below in (1)-(3) are tonic vowels, and were therefore lengthened phonetically in spoken Latin as [ʊ:], [o:], and [ɔ:], respectively.

The back vowel + /ɲ/ data may be organized into three distinct groups. First, as shown in (1), the regular development of Latin Ū (spoken Latin/Hispano-Romance /ʊ/) preceding /ɲ/ in Spanish was to /u/; in contrast, the /ɲ/ from Latin MN was unable to prevent /ʊ/ from opening to /o/, and /ɲ/ from Latin NDI apparently allowed glide attraction into the preceding syllable, resulting in the /we/ diphthong in VERECŪNDIA > OSp. *vergueña* 'shame'. Thus it is not immediately clear why CALŪMŪNIA, AUTŪMNUM, and VERECŪNDIA did not follow the regular Ū > /ʊ/ > /u/ shift.

¹ This approach is therefore similar in spirit to that of Pensado 1983, where the author proposed a unitary phenomenon (1983: 120) –metaphony caused by a word-initial /j-/ for cases in which a high back vowel was maintained following /j-/, e.g., JUGUM > *yugo* 'yoke', JUNCUM > *junco* 'reed', while not rejecting the important role of several other factors, including analogical influence.

(1) Latin ũ (/ʊ/)

CŪNEUM > *cuño* ‘die for stamping coins’
 CŪNEA (C.L. CUNEUS) > *cuña* ‘wedge’
 CLŪNIA > *Coruña* (toponym)
 CALŪMNIA > *caloña* ‘trick, swindle’
 AUTŪMNUM > *otoño* ‘autumn’
 PŪGNUM > *puño* ‘fist’
 VERECŪNDIA > OSp. *vergueña* ‘shame’
 ŪNGULA > *uña* ‘fingernail’

Second, with regard to the data for Hispano-Romance /o/ + /ɲ/ in (2), we find “varying outcomes” (Lloyd 1987: 198), including diphthong formation to *-ueño/-a*, retention of the high-mid vowel as *-oño/-a*, and raising of the high-mid vowel as in *-uño*. None of the three outcomes appears to stand out in terms of a greater degree of regularity; thus one may wonder why the Spanish reflexes of /oɲ/ should be so variegated in terms of their outcome, in comparison to the data in (1) (and also those below in (3)). Moreover, as mentioned briefly in the introduction, the diphthongal outcome in (2), e.g., VITŌNEUM > *vidueño* ‘variety of vine’, is considered by some authors to be an “intractable enigma” (Craddock, 1980: 66-67): The palatal glide /j/ should have either palatalized the nasal /ɲ/ > /ɲ/, or undergone metathesis /ɲ/ > /jɲ/, but not both processes; yet both processes are necessary to permit the creation of the /weɲ/ sequence in Spanish *-ueño/-a*.

(2) Latin ō (/o/)

RISŌNEUM > *risueño* ‘smiling’
 VITŌNEUM > *viduño, vidueño* ‘variety of grapevine’
 CICŌNIA > *cigüeña* ‘stork’
 SYMPHŌNIA > *zampoña* ‘rustic flute’
 FAVŌNIUM > *fabueño, fagüeño* ‘westerly wind, zephyr’
 NORŌNIA > *Norieña* > MSp. *Noreña* (toponym)
 TERRŌNEUM > *terruño* ‘native soil’
 TESTIMŌNIUM > *testimonio, -muño* ‘testimony’
 ASCALŌNIA > *escaloña, escaluña* ‘shallot’

Third, with respect to the data in (3), it is clear that the regular outcome for Latin ō in the Hispano-Romance /oɲ/ sequence was diphthongization to /we/. The most pressing question posed by these data is the reason for the diphthongization –palatal consonants generally cause the metaphonic raising of a preceding vowel (Menéndez Pidal, 1940: 44-50; Lloyd, 1987: 194-198; Penny, 2002: 47-51), so that it is unclear why alveolopalatal /ɲ/ did not prevent spontaneous diphthongization by raising the low mid vowel to */o/.

(3) Latin ȝ (/ɔ/)

BASCŌNIA > *Gascueña* > MSp. *Gascuña* (toponym)
 SAXŌNIA > *Sansueña* (top.)
 CATALŌNIA > *Catalueña* > MSp. *Cataluña* (top.)
 SŌMNIUM > *sueño* ‘dream’
 LŌNGE > OSp. *lueñe* ‘far’

In summary, regarding the data in (1)-(3), one observes that the data in (2) constitute the most disparate or heterogeneous group. In fact, the data in (2) appear to be a sort of transitional grouping that combines the regular diphthongization characteristic of the reflexes of Latin ō before /ɲ/ (e.g.,

RISŌNEUM > *risueño* ‘smiling’) with the maintenance of a high back vowel that was the regular outcome for Latin ū preceding /ɲ/ (e.g., TERRŌNEUM > *terruño* ‘native soil’).

3. EPENTHESIS OF A PALATAL GLIDE

As mentioned in the introduction, the primary thesis of this article is that a detailed understanding of anticipatory palatal-glide epenthesis, and its interaction with the height of a preceding back vowel, can provide a unified treatment of the development of ū, ō, and ō + Hispano-Romance /ɲ/ from Latin to Spanish. From an articulatory perspective, epenthesis of a palatal glide occurs as the product of “wrong timing” (Hock, 1991: 119-120), the result of “anticipatory tongue dorsum raising during the preceding vowel before [palatal] closure is formed” (Recasens, 2013: 113). In other words, during the articulation of a vowel before a palatal consonant, the tongue dorsum is raised in anticipation of the high dorsal gesture required for palatal constriction or closure. In acoustic terms, palatal glide epenthesis results when listeners perceive and assign segmental status to the F2 and F3 vowel-to-consonant formant transitions, e.g., [V⁰ɲ] realizations are consistently perceived as /Vɲ/, or even /Vjɲ/ (Recasens *et al.*, 1995: 270-274; Recasens & Espinosa, 2010: 7-9, 13-14, 19-21; Recasens, 2013: 113-115).

According to Recasens (2013: 114) and Recasens and Espinosa (2010: 7, 19-22), the likelihood that the aforementioned formant transitions be perceived as segmental /j/ depends upon three key factors: (i) the duration of the F2, F3 transitions, especially that of F2, (ii) the end-point frequencies at the end of the glide-like transition into the alveolopalatal consonant, and (iii) the frequency range of the formant transitions –the end-point frequency in comparison to the frequency at the onset of the formant transitions. Consequently, in vowel-consonant sequences where the consonant is palatal or alveolopalatal, the glide-like formant transitions from the vowel into the consonant ought to be especially salient in the case of low and back rounded vowels. Since these vowels possess a relatively low F2, they permit a large frequency range for the formant transitions, and as a result listeners are more likely to perceive a [j]-like percept before /ɲ/ and before other palatal, alveolopalatal, and palatoalveolar consonants, e.g., /s:j/ > [ʃ:] > [ʃ] > /jʃ/ as in PASSIŌNE > [paʃ.ʃoːne] > [pa.ʃon] > Gal. *paixon*, Ptg. *paixão* ‘passion’; FASCIA > [ˈfas.kja] > [ˈfaʃ.ʃa] > [ˈfa.ʃa] > Gal., Ptg. *faixa* ‘band, belt, track’.

As indicated by the Latin-to-Galician-Portuguese data for /s:j/ > [ʃ:] > [ʃ] > /jʃ/, glide epenthesis can function as the last stage of a gradual metathesis in which a palatal, alveolopalatal or palatoalveolar consonant (or a consonant that has undergone secondary palatalization) serves as an intermediate step in an inversion process, whose endpoints form the input and output of a diachronic metathesis (Hock, 1985: 531-532; Blevins & Garrett, 1998; Wireback, 2001; 2002). Viewed from this perspective, the presence of both a diphthong and an alveolopalatal /ɲ/ in developments like CICŌNIA > Sp. *cigüeña* ‘stork’ and RISŌNEUM > Sp. *risueño* ‘smiling’ ceases to be an enigma (Craddock, 1980: 66-67); the palatal glide first palatalized the preceding nasal, /ɲj/ > /ɲ/, then consistent perception of the palatal-glide-like formant transitions from /o/ into /ɲ/ eventually led to reinterpretation of the [o⁰ɲ] sequence as /ojɲ/, and then subsequently as /weɲ/.

Craddock noted that the change from /ojɲ/ to /weɲ/ “still lacks a definitive explanation though its rigorous similarity to another diachronic sequence [= /ew/ > /jo/] in Spanish has been noted” (1980: 67). In my view, this shift may be attributed to the combined effects of the phonetics of diphthongs and analogy. With regard to the phonetics of diphthongs, there is empirical evidence that when vocoids co-occur to form diphthongs, their F1 and F2 formant values are modified such that they become less distinct acoustically (Borzzone de Manrique, 1979: 196-200; Limanni, 2008: 129-131). In other words, the acoustic distance between each vowel “is reduced and there is an evident overlap

between the areas of /e-i/ and /o-u/, respectively” (Borzone de Manrique, 1979: 197). This suggests that the acoustic proximity or overlap between [oj] and [we] is greater than one might expect based on the formant values of each individual [i e o u] vowel, resulting in a higher probability that listeners might misperceive surface [oj] to be phonemic /we/. Second, analogy also plays a key role in the shift from /oj/ to /we/. As Penny observed, “where the new diphthong consisted of a back vowel + palatal glide, it was dramatically modified to /ue/ [= /we/], in part, no doubt, because by this time the diphthong /ue/ (< tonic *õ*) was extremely frequent and because diphthongs stressed on the first element were rare” (2002: 53). Thus, given the acoustic overlap between [oj] and [we], the frequent occurrence of /we/ provided extant on-gliding analogical models against which any [oʲ] ~ [oj] instances of glide epenthesis could be judged, and subsequently reanalyzed, as /we/.

With regard to the back vowels /ɔ o ʊ u/, it appears that the relative height of the vowel plays an important role in the degree to which the glide-like formant transitions are perceived and assigned phonemic status. Recasens notes the following in relation to the perceptibility of a palatal off-glide in Catalan:

La perceptibilitat de l'element [i] de les seqüències [iʲ] i [iɜ] depèn, en bona mesura, del context: és notable immediatament després de vocal mitjana-baixa o baixa, sobretot en posició final de mot; és feble immediatament darrera de vocal mitjana alta o [u], davant de vocal alta o mitjana-alta, i en posició pretònica allunyada de l'accent (Recasens 1991: 289)

La poca perceptibilitat de l'element [i] del diftong fa que pugui elidir-se darrera de [u] tònica, especialment en el cas de vocables monosil·làbics. Hi ha exemples d'aquest fenomen d'elisió a part del domini rossellonès (*cu(i)ta*, *tru(i)ta*, *cu(i)da*) (Recasens 1991: 299)

Thus, in addition to the effects of non-final word position, pretonic/unstressed syllables, and occurrence in monosyllabic words, a more close realization of the back vowel appears to inhibit the perceptibility of a palatal glide. This suggests that diachronic epenthesis of /j/ (as well as long-term maintenance of an already extant /j/) is least likely for the /uj/ sequence, somewhat more likely for /oj/, and most likely for /ɔj/.

Recasens (1991: 289, 299) does not explicitly discuss why the higher back vowels, along with the other aforementioned factors, appear to minimize the perceptibility of the palatal glide. We may speculate that one factor might be the fact that the /uj/ diphthong involves less articulatory movement vis-à-vis /oj/ and /ɔj/ (Fischer-Jørgensen, 1985; Pensado, 1983: 121-123; 1985); this is both in terms of the fact that high palatal vocoids and /u/ both possess a low F1 –neither vocoid in the /uj/ sequence shows any appreciable lowering of the jaw (Recasens, 2004: 163, 183, 190)– and also the fact that, when viewed along a palatal-velopalatal-uvular-pharyngeal axis, the shift to palatal /i j/ from velopalatal /u/ implies less articulatory adjustment than the shift from uvular /o/ or from pharyngeal /ɔ/ (Pensado 1985). Or, alternatively, it may be due to the greater degree of lip rounding in the case of /u/. Higher back vowels generally involve a greater degree of lip rounding (Ladefoged & Maddieson, 1996: 293; Catford, 1977: 172); since one key acoustic effect of lip rounding is to lower F2 (Catford, 1977: 173), it is possible that in the transition from /u/ into /j/, the greater degree of lip rounding produced for /u/ causes a decrease in the endpoint frequency of the F2 transition, which adversely affects the perceptibility of an epenthetic /j/. Finally, it may be the case that the transition from lower back vowels (from /ɔ/ and from more open variants of /o/) moves through a “[e]-like” intermediate point, as the tongue shifts from a retracted low-mid degree of closure on the way to high (front) alveopalatal /j/. This aspect of the transition from lower back vowel to [j] might mimic to a greater degree the acoustics of the [we] diphthong². In any event, the

² Recasens and Espinosa (2005: 11), with regard to intervocalic [j], note that “this hierarchy of vowel contexts suggests that contextual low or mid low vowels cause maximal lowering in [j]”. Perhaps lower back-vowel reflexes of Latin *õ*, *õ* might have had a similar effect on the formant transitions into /j/, thereby creating a more salient [we]-like percept.

more precarious perceptibility of /j/, or of /j/-like formant transitions, following high back /u/ is well documented in the history of the Romance languages, in terms of the reduction of the /uj/ diphthong to /u/, e.g., LUCTA > *luita* > Ptg. *luta* ‘struggle’; PLUVIA > *chuiva* > Ptg. *chuva* ‘rain’; Prov. *bruida* > *bruda* ‘noise’, *cuida* > *cuda* ‘care’, *tuit* > *tut* ‘all’ (Appel, 1918: 38); VULTURE > *buitre* > dial. Sp. *butre* (Torreblanca, 1990: 265-266).

Finally, the palatal nasal’s position in the syllable may have played a role in increasing the probability of glide epenthesis. Recasens (1991: 289) and Recasens *et al.* (1995: 270-274) observe that glide epenthesis is especially likely when /ɲ/ occurs in the syllable coda because the [j]-like formant transitions are more robust in this context. For example, in Majorcan Catalan word-final /ɲ/ is often produced as [j] + assimilated nasal, e.g., *any bo* ‘good year’ > [ajm. 'bɔ]. Several sources for /ɲ/ in Late Latin presumably included a geminate /ɲ:/ intermediate stage whose duration would have spanned the syllable boundary, e.g., PŪGNUM > /'pɔɲ.ɲo/ > *puño* ‘fist’; LÖNGĒ > /'lɔɲ.ɲe/ > OSp. *lueñe* ‘far away’. As a consequence, the initial part of the geminate /ɲ:/ articulation formed a syllable coda; although the duration of this coda portion of the geminate may not have been as long as that of a fully-fledged coda /-ɲ/, it is nonetheless possible that the geminate status of /ɲ:/ increased the likelihood of glide epenthesis in comparison to syllable-initial, singleton /ɲ/. Furthermore, the origin of these instances of geminate /ɲ:/ was a two-consonant sequence whose first segment was originally a full coda consonant, e.g., PUGNUM /'puɲ.nu/; LÖNGĒ /'lɔɲ.ge:/, with the result that the coda phase of the geminate, at its earliest stages, may have approximated the duration of a coda /-ɲ/. Thus, geminate /ɲ:/ in combination with a low back vowel /ɔ/ should make glide epenthesis an especially likely outcome, as in the case of LÖNGĒ > /'lɔɲ.ɲe/ > OSp. *lueñe* ‘far away’³.

In sum, in terms of assigning segmental or phonemic status to the glide-like formant transitions from vowel to /ɲ/, low back vowels seem to favor the perception of /j/, while high back vowels much less so. In addition, the probability of glide epenthesis increases if alveolopalatal /ɲ/ is located in the syllable coda; the coda phase of geminate /ɲ:/ therefore probably further increased the likelihood that [j] be perceived. In instances where the glide-like transitions were robust enough to be perceived on a regular basis, phonetic [ɔj] and [ɔj] were consistently heard as /we/, at least in the context of early Castilian Romance.

4. GLIDE EPENTHESIS IN THE /ɔɲ/ SEQUENCE

With respect to the shift of spoken Latin /ɔɲ/ to Spanish /weɲ/, e.g., LONGĒ > OSp. *lueñe* ‘far off’, several studies consider the diphthongization to have been spontaneous in nature, essentially identical to other instances in which low-mid /ɔ/ diphthongized first to /wo/, then to /we/ (Menéndez Pidal, 1940: 60-63), as with FORTE > *fuerte* ‘strong’. From this perspective, alveolopalatal /ɲ/ failed to block diphthongization of /ɔ/, even though it was successful in preventing the diphthongization of /ɛ/, e.g., TENEŌ > *tengo* ‘I hold’ (vs. Leon., OArag. *tiengo* –Krepinsky, 1962: 44). Moreover, in contrast to /ɲ/, the alveolopalatal lateral /ʎ/ apparently did prevent the diphthongization of /ɔ/, e.g., FOLIA > ['fɔ:.lja] > ['fɔ.ʎa] > ['fɔ.ja] > OSp. *foja* ‘leaf’. This inconsistent metaphonic effect of /ɲ/ upon the low-mid vowels /ɛ ɔ/ is surprising given the greater palatal quality of /ɲ/ vis-à-vis /ʎ/ (Malkiel, 1984: 90, 96, 106), in the sense that [ɲ] exhibits more dorsopalatal contact than [ʎ] due to the aerodynamic requirements of the lateral (Recasens 2013:

³ In order to show the ambisyllabic nature of the geminate, I use the same symbol twice, once on each side of the syllable boundary (.), e.g., /'lɔɲ.ɲe/, since otherwise it is difficult to indicate both ambisyllabicity and gemination (cf. Payne, 2005: 154). This is not meant to indicate that the duration of the geminate is twice that of its singleton congener, only that the geminate’s duration is relatively longer and ambisyllabic.

113-114). It is undoubtedly for this reason that several authors have sought an analogical explanation for the diphthongization of /ɔ/ before /ɲ/ in order to explain why the metaphonic closure of /ɔ/ failed to occur in the case of /ɲ/. For example, Ford (1911: XV-XVI) and Hanssen (1913: 23, 40) claimed that the diphthong in LONGĒ > *lueñe* ‘far off’ and SOMNIUM > *sueño* ‘dream’ was due to analogical influence from LONGUM > OSp. *luengo* ‘long’ and SOMNUM > *sueño* ‘sleep’, respectively.

Given the acoustic factors discussed above in Section 3, according to which we should expect a fairly regular degree of /j/ epenthesis between low back /ɔ/ and /ɲ/, the expected development of the /ɔɲ/ sequence is /ɔɲ/ > [ɔjɲ] > /ɔjɲ/ > /weɲ/. Thus the presence of /we/ preceding alveolopalatal /ɲ/ in no way constitutes an exception to the general rule that palatal consonants frequently cause the metaphonic closure of an adjacent vowel, because diphthongization in the present case was not solely the product of the spontaneous diphthongization of tonic /ɔ/. Rather, instances of Late Latin /ɔɲ/ to Spanish /weɲ/ were due to the fact that anticipatory glide epenthesis was especially likely following /ɔ/⁴. As a consequence, one may attribute the regular diphthongization of /ɔ/ before /ɲ/ in the history of Spanish to the same process that caused the diphthongization of Latin /o/ preceding /ɲ/, namely the phonemicization, as /j/, of the F2 and F3 formant transitions between the back vowel and the alveolopalatal nasal (cf. Krepinsky, 1962: 53, 61-62; Sánchez Miret, 1998: 150-151). From this perspective, even though alveolopalatal /ɲ/ probably had a closing or raising effect upon the preceding /ɔ/, so that there may have been somewhat higher variants of /ɔ/ that shifted toward /o/, this closure effect could not prevent diphthongization because diphthongization was due to glide epenthesis rather than to the spontaneous “breaking” of lengthened [ɔ:] to /wo/. Moreover, regularization of this epenthetic diphthongization process was undoubtedly aided by the fact that the palatalization of the Latin -NGĒ- and -MNI- sequences in LONGĒ > *lueñe* ‘far off’ and SOMNIUM > *sueño* ‘dream’ passed through a geminate /ɲ:/ intermediate stage prior to degemination, with the initial portion of the geminate in the syllable coda. As we saw above in section 3, syllable-final /ɲ/ is more conducive to glide epenthesis vis-à-vis /ɲ/ that is restricted to the syllable onset.

The nature of perceptual glide epenthesis also allows us to explain the presence of the diphthong before /ɲ/ in contrast to the absence of diphthong formation preceding /ʎ/. As mentioned above, Romance philologists have wondered why /ʎ/ successfully exerted metaphonic pressure upon spoken Latin /ɔ/, raising the vowel to /o/, whereas as /ɲ/ did not, e.g., FOLIA > [ˈfɔ:.lja] > [ˈfɔ.ʎa] > [ˈfɔ.ja] > OSp. *foja* ‘leaf’ vs. SOMNIUM > [ˈsɔm.nju] > [ˈsɔɲ.no] > [ˈsweɲ.no] > *sueño* ‘dream’. However, since formation of a diphthong did not have to arise through spontaneous diphthongization, but rather via glide epenthesis to /ɔj/ and then reanalysis to /we/, the crux of the issue is not the degree of metaphonic closure exerted upon the back vowel, but rather the degree of perceptibility of [j]-like formant transitions from /ɔ/ into the alveolopalatal nasal. Since [ɲ] involves more dorsopalatal contact than [ʎ], it stands to reason that the greater palatal quality of [ɲ] should render perceptual glide epenthesis more likely – a greater

⁴ This also renders superfluous Malkiel’s (1984) explanation for the presence of the diphthong before /ɲ/. Under his view, a Hispano-Romance vowel-lengthening process that originated with RĒGULA ‘rule’ (vs. RĒGO) and TĒGULA ‘tile’ (vs. TĒGO) became associated with a pre-palatal context, and was then extended to other originally short Latin vowels before palatal sounds (palatal in spoken Latin, e.g., to SPECULUM, then to words like LECTUM, TECTUM, originally with -ĒCT-), thereby blocking the possibility of spontaneous diphthongization (via “previous vowel lengthening”). According to Malkiel, the lengthening rule never managed to reach contexts with /ɲ/, with the result that spontaneous diphthongization was able to shift /ɔɲ/ to /weɲ/ (1984: 106). Malkiel’s complex account was meant to explain the apparent paradox of why a prepalatal context could simultaneously cause and impede diphthongization of low-mid /ɛ ɔ/: as argued in the present article, however, there is no paradox with regard to /ɲ/: The diphthong that issued from the /ɔɲ/ sequence was largely due to perceptual glide epenthesis rather than to spontaneous diphthongization of /ɔ/.

degree of dorsal constriction and contact in turn leads to more salient vowel-to-consonant, glide-like formant transitions (Recasens, 2013: 113-114). In addition, the nasality of [ɲ], more specifically the nasal murmur after the onset of oral closure, may also increase the salience of the transitions. Recasens notes that “spectrographic analysis reveals that [the murmur] of [ɲ] shows a continuation of positive F2-F3 transitions, apparently due to a continuation of tongue movement during lingual closure and complete oro-nasal coupling” (1983: 1352). In contrast, [n] and [ɲ] show very little tongue movement during the murmur phase of the nasal articulation, and therefore no comparable F2-F3 transitions during this phase. Thus the inclusion of nasal murmur, especially in the articulation of alveolopalatal [ɲ], appears to increase the perceptibility of a glide-like component, in comparison to both non-palatal nasals like [n] and [ɲ] as well as non-nasal consonants like [ʎ] (Recasens & Espinosa, 2010: 21).

Finally, even though we may attribute the regular diphthongization of /ɔɲ/ > /weɲ/ to anticipatory glide epenthesis, it still seems prudent to retain the possibility of spontaneous diphthongization of /ɔ/ before some cases of the palatal nasal, at least the early stages of spontaneous diphthongization (Menéndez Pidal, 1950: 126). This is especially so for those cases in which there must have been a certain delay in the formation of /ɲ/. Thus, while it was likely that /ɲ/ developed relatively early in the case of -ŌNIA > -ueña, and perhaps -NGE > -ñe, via palatalization of the nasal by the following yod or front vowel, e.g., SAXŌNIA > *Sansueña*, LONGĒ > *lueñe* ‘far off’, one may envision a somewhat later formation of /ɲ/ in the case of -MNI-, e.g., SOMNIUM > *sueño* ‘dream’ (Krepinsky, 1962: 61), due to the additional stage needed for anticipatory assimilation to convert implosive bilabial /m/ to alveolopalatal /ɲ/. Given the likelihood of such a delay, it is possible that at least the initial phase of spontaneous diphthongization of /ɔ/ had begun to take place, perhaps along the lines of Spore’s “semidiphthong” (1972: 40-41; Lloyd, 1987: 121). In Spore’s view, the first stage of spontaneous diphthongization involved a slight variation in degree of aperture during the articulation of spoken Latin /ɔ/ as it was lengthened under primary stress, e.g., /ɔ/ > [ɔ:] > [oɔ], either because the lengthening process led to a more close realization of the first part of the mid back vowel, or because the possibility of confusion with /o/ < Latin ō led speakers to exaggerate the open quality of /ɔ/ by ensuring a more open realization of the second half of its articulation (1972: 41, 295-299). This slight variation in degree of aperture in the semidiphthong [oɔ] differed from true diphthongs in two respects: (i) neither part of the [oɔ] sequence dominated in terms of bearing the primary stress (that is, neither element was a semivowel), and (ii) there was only one degree of difference in terms of aperture (high-mid > low-mid), in contrast to later stages of /ɔ/ diphthongization like the [wó] diphthong.

In my view, the possible existence of such nascent forms of spontaneous diphthongization is not difficult to reconcile with a more general account of diphthongization that is centered on anticipatory glide epenthesis. If in fact the initial stages of spontaneous diphthongization, as a semidiphthong [oɔ], had begun to surface in the derivation of words like SOMNIUM > *sueño* ‘dream’, it is likely that such a stage would have combined with glide epenthesis as *[oɔʎ] (a semidiphthong plus /j/-like formant transitions into /ɲ/), and that *[oɔʎ] would have ended up as /we/ for the same reasons that other sequences of mid-back vowel + /j/ became /we/ (Penny, 2002: 50-51; cf. Recasens, 2004: 173-175).

In sum, the low back nature of Hispano-Romance /ɔ/ < Latin ō preceding alveolopalatal /ɲ/ made glide epenthesis more likely in comparison to high-mid and high back vowels, and as a consequence one finds regular formation of a diphthong, /ɔ⁽ⁱ⁾/ > /oj/, that subsequently was reinterpreted as on-gliding /we/ (Penny, 2002: 50-51). The regularization of /we/ was likely

assisted by the fact that several sources of Old Spanish /ɲ/ appear to have passed through a geminate /ɲ:/ stage, whose syllable-final component probably increased the likelihood that the formant transitions from lower back vowel to /ɲ/ be perceived as segmental /j/. Finally, in my view there is no reason why analogy could not also have played a role in the regularization of the /we/ diphthong. Analogical influence from SOMNUM > *sueño* ‘sleep’ and LONGUM > *luengo* ‘long’ upon SOMNIUM > *sueño* ‘dream’ and LONGĒ > *lueñe* ‘far off’, respectively, would have brought additional weight to bear upon the tendency to maintain the /we/ diphthong (Ford, 1911: XV; Hanssen, 1913: 23; Zauner, 1921: 17; Lloyd, 1987: 196). Nor must we rule out the possibility of an incipient spontaneous diphthongization of /ɔ/ preceding /ɲ/, especially for those cases of /ɲ/ that arose from /mɲj/, whose labial element probably caused a delay in reaching the /ɔɲ:/ stage. By that point, some variants of SOMNIUM may have begun to “semidiphthongize” as *[‘soɲɲ.no] (or, in concert with glide epenthesis, to reach the threshold of triphthongization as *[‘soɔ^(j)ɲ.no]). In any event, I do not think it is necessary to depend entirely upon spontaneous diphthongization to explain the diphthong of *sueño* < SOMNIUM, as did Krepinsky (1962: 49, 62-63), since our glide epenthesis interpretation is fully capable of explaining the regularization of the /we/ diphthong that issued from Hispano-Romance /ɔɲ/.

5. GLIDE EPENTHESIS IN THE /ɔɲ/ SEQUENCE

As shown by the data above in (1), the regular development for Latin Ū (/ʊ/) was to /u/, with no diphthongization via glide epenthesis. Some have assumed that /ʊ/ merged with long Ō /o:/ to produce Luso- and Hispano-Romance /o/, which subsequently returned to the inventory of high back vowels due to metaphonic raising caused by yod or by an adjacent palatal consonant (Menéndez Pidal, 1940: 47-48, 64; Craddock, 1980: 65-66), e.g., LUCTA > [‘loj.ta] > OPtg. *luita*, MPtg. *luta* ‘struggle’; PUGNUM > [‘poɲ.nu] > [‘poɲ.no] > Sp. *puño* ‘fist’. However, one is not compelled to accept such a zig-zag vowel shift of the type /ʊ/ > /o/ > /u/ for all cases of /ʊ/ in a metaphonic environment (Malkiel, 1983: 212, 222). As Lloyd observed, “[c]ould we not as easily conceive of the yod as having preserved the high quality of the original /u/ when the new wave of merger [= merger of Latin Ū, Ō > /o/] reached Ibero-Romance?” (1987: 197). This is especially so with regard to CŪNEUM > *cuño* ‘die’, CŪNEA > *cuña* ‘wedge’, and CLŪNIA > *Coruña*, where the yod in the /ɲj/ stage prior to the formation of alveolopalatal /ɲ/ could have had an early metaphonic effect upon the preceding /ʊ/, preventing the vowel from opening to /o/, and perhaps even initiating the further closure to /u/ before the advent of alveolopalatal /ɲ/. In the case of PUGNUM > *puño* ‘fist’ and ŪNGULA > *uña* ‘nail’, one could argue that the velar nasal was responsible for maintaining the high quality of the preceding vowel. According to Torreblanca (1990: 254-258, 273), a following velar or velarized consonant, due to its high dorsal articulation, was responsible for preventing the lowering of Latin Ū /ʊ/ to /o/, e.g., PUNCTUM > *punto* ‘point’, IUNCUM > *junco* ‘reed’, SULCUM > *surco* ‘ditch’. Thus with respect to the history of the tonic high back vowels in PUGNUM > *puño* ‘fist’, CŪNEUM > *cuño* ‘die’, CŪNEA > *cuña* ‘wedge’, and UNGULA > *uña* ‘nail’, it is unlikely that the vowels ever reached a /o/ stage (Krepinsky, 1962: 60-61); rather, their quality remained relatively high, within the [u] ~ [ʊ] range, with the result that the formant transitions from high back vowel into /ɲ/ were not perceived by listeners, at least not consistently enough to lead to the regularization of a /uj/ or /we/ diphthong.

Regarding the exceptions to the maintenance of a high back vowel, in the case of CALŪMNIA > *caloña* ‘trick’ and AUTŪMNUM > *otoño* ‘autumn’, it seems that the presence of bilabial /m/, or the nature of the palatalization process, led to either the later palatalization of the nasals to /ɲ:/ or otherwise functioned as a barrier to metaphonic raising by /ɲ/, and as a consequence the [ʊ:]

realization of Latin tonic ũ was allowed to open further to /o/ (Krepinsky, 1962: 57, 61-62; Ford, 1911: XVIII). In terms of AUTŪMNUM > *otoño*, relative chronology suggests a later palatalization –/mn/ became /n:/ in both Spanish and Galician-Portuguese, but instead of palatalization, degemination to /n/ occurred in Luso-Romance, e.g., *otoño* vs. Ptg. *outono* ‘autumn’, thus suggesting a later palatalization subsequent to the dialectal split between Hispano- and Luso-Romance. Furthermore, since no yod was involved in the palatalization of the /mn/ nasal sequence in AUTUMNUM, there was no possibility of an intermediate */Cj/ stage that otherwise may have had an early metaphonic raising effect upon the preceding open-high vowel /ʊ/ (as we surmised for /nj/ > /j/ cases like CŪNEA > *cuña* ‘wedge’ –Menéndez Pidal, 1940: 64). With regard to CALŪMŪNIA > *caloña* ‘trick, false accusation’, even though yod may have palatalized /n/ in roughly the same time period as with other instances of /nj/ > /j/, survival of the syllable-final /m/, at least for a time (e.g., as [mj] or [m̥j]) probably insulated the back vowel from the full metaphonic effects of /j^δ. Moreover, the lowering effects of labiality on F2 meant that, as long as any degree of labiality was maintained for the first nasal in the sequence, perception of [j]-like formant transitions followed by epenthesis of /j/ would also have been inhibited. Thus, even though there may have been instances of raising of the back vowel to /u/, e.g., *caluña* (Corominas & Pascual, 1980-1991: 769, s.v. CALUMNIA), the labial element seems to have impeded glide epenthesis and to have allowed the retention of high mid /o/ in the case of *caloña*.

With regard to VERECŪNDIA > OSp. *vergueña* ‘shame’, one may envisage a somewhat later palatalization of /ndj/ vis-à-vis /nj/ (Krepinsky, 1962: 60; Pensado, 1984: 280), most likely due to the need for additional time to allow the progressive nasalization of /nd/ to /nn/ to take place (cf. Hartman, 1985: 151-152, and “Polyorganic Progressive Cluster Nasalization”). Due to this delay in the palatalization of /ndj/, the dental quality of the sequence shielded the /ʊ/ (< Latin ũ) from an earlier contact with adjacent /j/, so that the open high vowel was able to shift to high-mid /o/. As regards the reflex of /ndj/ once the preceding vowel lowered to /o/, the biconsonantal nature of the /ndj/ sequence would have produced geminate /nj:/, which as I hypothesized above increases the probability of perceptual epenthesis of a palatal glide (Recasens *et al.*, 1995: 270-274). These factors suggest a derivation along the lines of the following: VERECŪNDIA > [βe.re.'kʊŋ.dja] > [βe.re.'koŋ.nja] > [βe.re.'gon.ɲa] > [βer.'goɲ.ɲa] > [βer.'gojɲ.ɲa] > [βer.'gwe.ɲa] > OSp. *vergueña* ‘shame’.

To sum up this section, my main argument is that the high vowel origin of Latin ũ, and its retention as a high vowel, initially varying between /u/ ~ /ʊ/, but eventually coalescing as /u/, minimized the tendency to perceive a glide-like formant transition from the back vowel into alveolopalatal /j/. As a consequence, derivations like CŪNEA > *cuña* ‘wedge’ and PUGNUM > *puño* ‘fist’ show no glide epenthesis because the back vowel never went through a high-mid stage */o/ that, had it existed, would have increased the probability of a perceptual reanalysis of [o^j] and [oj] to /we/. Thus, by combining the high-back vowel’s tendency to minimize glide epenthesis, with maintenance of a high vowel rather than a zig-zag shift */ʊ/ > */o/ > */u/, one may explain why seemingly identical cases of back vowel + /nj/ show consistently distinct outcomes, e.g., CŪNEA > *cuña* ‘wedge’ vs. CICŌNIA > *cigüeña* ‘stork’ (cf. Krepinsky, 1962: 46, n. 1; Alkire & Rosen, 2010: 85; Penny, 2002: 50; Craddock, 1980: 66-67).

⁵ A measure of proof for the later survival of /m/ in the development of CALUMNIA comes from variants like Old Portuguese *coymha*, *coima*, Old Galician *coomia*, and Leon. *calomia* (Corominas & Pascual, 1980-1991, sv. CALUMNIA). Note that if the *mh* in *coymha* represented a palatalized labial (Pensado, 1986: 331), then we have another case of glide epenthesis forming part of a gradual metathesis, e.g., CALUMNIA > *calomia* > *coomia* /mj/ > **coomha* /mⁱ/ > *coymha* /jmⁱ/ > *coima* /jm/ (Wireback, 2002: 321).

6. GLIDE EPENTHESIS IN THE /ɔɲ/ SEQUENCE

As the data clearly show above in (2), lexical items in spoken Latin whose /o/ in the /ɔɲ/ sequence developed from Classical Latin ō present the greatest degree of variation in terms of the eventual fate of the high-mid back vowel. That is, one finds diphthongization, e.g., RISŌNEUM > *risueño* ‘smiling’, alongside maintenance of the high-mid back vowel or further closure of the vowel to /u/, e.g., ASCALŌNIA > *escaloña* ‘shallot’, TERRŌNEUM > *terruño* ‘native soil’. Given the current thesis that the relative height of the back vowel determines the likelihood of glide epenthesis and diphthongization before /ɲ/, it is therefore not surprising that the high-mid /o/ data –whose tonic vowel, roughly speaking, lies at an intermediate point between more open /ɔ/ and more close /u ʊ/– should show examples of both the regular outcome for /ɔɲ/ (diphthongization) and the regular outcome for /ʊɲ/ (closure to /uɲ/ without diphthongization). Or, from another perspective, one might say that high mid /o/ was a little too high to permit the full regularization of diphthongization, but also a bit too low to undergo a regular shift to /uɲ/. From this perspective, it is perhaps best to view the development of Latin ō in the Hispano-Romance /ɔɲ/ sequence as a sort of microcosm of the broader development of the back vowels + /ɲ/ from Latin to Spanish, in the sense of a similar yet smaller window of variation along the parameter of vowel height. Thus, although we classify Latin tonic ō as being realized in spoken Latin as a high-mid [o:] vowel, our knowledge of the phonetics of vowel articulation suggests that there must have been variation in the actual height of /o/, with some variants being realized as slightly higher than other, more open realizations; these latter, more open variants were therefore more prone to favor glide epenthesis, and subsequently the shift to /we/.

Since all the /ɔɲ/ data in (2) appear to have derived the alveolopalatal nasal from a /n/ + yod sequence, one may speculate that the palatal glide, before it had fully palatalized the alveolar nasal to /ɲ/, may have exerted varying degrees of metaphonic raising upon the preceding high-mid back vowel (cf. Torreblanca, 1990: 251, n. 6). In some instances the mid vowel must have remained more open in articulation, so that listeners more frequently perceived the glide-like transition from /o/ into /ɲ/. In these cases, phonemic reanalysis of the transitions as /oj/, and then as /we/, would explain cases of diphthong formation as in RISŌNEUM > *risueño* ‘smiling’, ORŌNIA > *Urueña*, MSp. *Ureña* (toponym), VITŌNEUM > *vidueño* ‘variety of (grape)vine’, CICŌNIA > *cigüeña* ‘stork’. In other cases the palatal on-glide, and subsequently the alveolopalatal nasal, undoubtedly closed to a greater degree the high-mid vowel, with the result that perception of a glide-like formant transition was minimized; listeners consistently heard /ɔɲ/, e.g., CICŌNIA > *cigoña* ‘stork’, ASCALŌNIA > *escaloña* ‘shallot’, TESTIMŌNIUM > *testimoño* ‘testimony’. Furthermore, the closing effect of /ɲ/ upon the preceding high-mid back vowel would have continued after the vowel was sufficiently high enough to minimize off-glide perception; the raised tongue dorsum characteristic of alveolopalatals like /ɲ/ undoubtedly caused further assimilatory closure of /o/ to /u/ in several words (Recasens, 2014: 69-70; Pensado, 1985; Torreblanca, 1990: 252, 273). Alternatively, an acoustically-motivated process of hypercorrection, in response to the partial nasalization of the vowel, may also have applied consistently enough to cause the raising of some /ɔɲ/ sequences to /uɲ/. Anticipatory nasalization of vowels that precede a nasal consonant is a universal phonetic process (Solé, 1992: 30; Laver, 1994: 291-293). In articulatory terms, this process consists of an early lowering of the velum during the articulation of a vocoid, before the onset of full oral closure for the nasal consonant. The percentage of the vocoid articulation that becomes nasalized varies from one language (or dialect) to another. For example, unless the vowel is flanked by two nasal consonants, there is normally less anticipatory nasalization of vowels in Spanish in comparison to English (Solé, 1992, 1995; Quilis, 1999: 149; Hualde, 2005: 110), but anticipatory nasalization does

occur in both languages, and some dialects of Spanish do in fact show more robust anticipatory nasalization of vocoids before nasals (Quilis, 1999: 150, n. 9; Goodin-Mayeda, 2016: 54, 77-78; Hualde, 2005: 110). In any case, it seems very likely that back vowels preceding Hispano-Romance /ɲ/ were at least partially nasalized (cf. Posner, 1996: 25, 29)⁶.

Research in experimental phonetics demonstrates that high nasal vowels tend to be perceived as lower than their oral congeners (Goodin-Mayeda, 2016: 42-43). Consequently, listeners may have judged the mid vowel in phonetic [õɲ] to be due to the acoustic lowering effects of nasalization, thereby reconstructing incorrectly phonemic /ɲ/, e.g., TERRŌNEUM > *terroño > *terruño* ‘native soil’, TESTIMŌNIUM > *testimoño*, *testimuño* ‘testimony’, ASCALŌNIA > *escaloña*, *escaluña* ‘shallot’, VITŌNEUM > *vedoño > *viduño*, *veduño* ‘vine variety’. Such a scenario is all the more likely given the probable coetaneous existence of lexical items like PUGNUM > *puño* ‘fist’, CŪNEUM > *cuño* ‘die’, CŪNEA > *cuña* ‘wedge’, and also UNGULA > *uña* ‘nail’, whose extant /ɲ/ could function as models with which a listener might resolve any uncertainty as regards the height of a back vowel preceding /ɲ/ (Hume, 2004).

As I have theorized above, the major consequence of the high-mid /o/ vowel’s position in a transitional zone –between the more open, diphthong-inducing /ɔ/ on the one hand, and the glide-inhibiting effects of the high back vowels on the other– is the multiplicity of outcomes rather than the regularization and numerical dominance of one specific outcome. While this state of affairs is evident when comparing lexical items to each other, e.g., RISŌNEUM > *risueño* ‘smiling’ /weɲ/ vs. ASCALŌNIA > *escaloña* ‘shallot’ /oɲ/ vs. TERRŌNEUM > *terruño* ‘native soil’ /ɲ/, I would argue that a similar degree of multiplicity should be posited for each lexical item listed above in (2), as suggested by Rini: “Not only is Torreblanca [1990: 251, n. 6] correct in suggesting that the behavior of yod may have been different in different words, but, we might add here, that the yod might have behaved differently in the *same* word, though in different speech communities of the ‘complejo dialectal castellano’”. (1993: 524). In other words, rather than attempting to assign different outcomes to distinct dialect zones (Krepinsky, 1962: 45), which as Pensado observed is not well supported by the data (1984: 279), it is more in line with the data to propose multiple variants of the same word within the same dialect group, in circulation during approximately the same time period. In fact, in many cases, the data show exactly this, e.g., ASCALŌNIA > *escaloña*, *escaluña*, TESTIMŌNIUM > *testimoño*, *testimuño*, VITŌNEUM > *viduño*, *veduño*, *vidueño*, CICŌNIA > *cigüeña*, *cigoña*.

With multiple variants in play, other key factors helped to determine which variant would eventually triumph. For example, a comparison of certain Latin ō /ɔ/ data, SAXŌNIA > *Sansueña*, CATALŌNIA > OSp. *Catalueña*, BASCŌNIA > *Gascueña*, with ORŌNIA > *Urueña*, MSp. *Ureña*, NORŌNIA > *Norueña* > MSp. *Noreña*, strongly suggests a toponymic component, wherein variants with the diphthong came to be associated with a place-name function. Similarly, as Lloyd noted, the propagation of forms with the diphthongal outcome may in part “be creations of medieval Castilian with the suffix *-ueño* rather than Latin formations that developed as whole words” (1987: 198). Thus the diphthongal variant that issued from RISŌNEUM, *risueño* ‘smiling’, may have been chosen due to its adjectival function, similar to *halagüeño*, *pedigüeño*, *pastueño*, *sangüeño* (Pharies, 2002: 519-520); the fact that the root of *halagüeño* ‘flattering’, *halagar* ‘to flatter’ is Arabic in origin (Corominas & Pascual, 1980-1991, s.v. *halagar*) supports Lloyd’s emphasis on lexical creation during the medieval period.

⁶ “Partial nasalization”, as a measure of the degree of nasalization, means here that only a percentage or portion of the full duration of the vowel articulation coincides with a lowered velum. However, degree of nasalization may also be in terms of the cross-sectional area of velopharyngeal opening, which determines the volume of air flowing through the nasal cavity (Laver, 1994: 295; Ladefoged & Maddieson, 1996: 298-299).

For those lexical items that originally had Latin \bar{O} , and that managed to avoid diphthongization, the outcome of the back vowel depended upon, as mentioned above, the degree to which the alveolopalatal nasal raised further the articulatory height of /o/, or the degree to which listeners tended to hypercorrect (Ohala, 1989: 188-191, 1993: 249-261) any nasalized [õ] variants as /u/, under pressure from words like *puño* ‘fist’, and *cuña* ‘wedge’, whose high back /u/ may have been at least partially nasalized, and thus perceptually somewhat lowered into the mid-vowel range. TERRÖNEUM > *terruño* ‘native soil’ must therefore be an “early convert” to /uj/, since *terroño does not appear to be attested; variation between *testimoño*, *testimuño* ‘testimony’ and *caloña*, *caluña* ‘slander, trick’ (Corominas & Pascual, 1980-1991, s.v. *calumnia*), on the other hand, clearly documents the uncertainty as to the height of the prenasal back vowel. Note that this includes nasal + nasal sequences like /mn/ whose development to /j/ occurred somewhat later (Krepinsky, 1962: 60-61; Pensado, 1984: 279-280). Even though the later development allowed the lowering of Latin \bar{U} to /o/, high-vowel variants like *caluña* could begin to surface once the - $\bar{U}MN$ - sequence had become /oj/.

In sum, the main argument of this section is that the variability of outcomes for /oj/ may be attributed to the high-mid vowel’s intermediate position between more open /ɔ/ and more close /ʊ u/. In terms of the back vowels’ relative propensity to favor perception of glide-like transitions into alveolopalatal /j/, spoken Latin /o/ occupied a transitional acoustic space between the more favorable low-back /ɔ/ and less favorable /ʊ u/. As a result, /oj/ presents, in addition to continuation as /oj/, both the outcome characteristic of /ɔj/, namely development of /oj/ to /we/, and the outcome most regular for /ʊj/, which was little or no perception of an /j/-like transition together with instances of further vocalic closure to /uj/. Given the likelihood that this multiplicity of variants depended in large part upon perceptual factors, that is to say: (i) the degree to which glide-like formant transitions were perceived and phonemicized (/oj/ vs. /ojj/ > /wej/), and (ii) the degree to which speakers/listeners subsequently hypercorrected undiphthongized [õj] to /uj/, it is logical to invoke Rini’s (1993: 524) proposal of multiple variants for each lexical item that originally contained /onj/ > /oj/ in spoken Latin⁷. With more than one variant for each lexical item in the arena, as it were, other factors, e.g., preference for /uj/ via analogy with *cuña* ‘wedge’, or pressure to select [wěj] > /wej/ due to association with toponymic meaning, ORÖNIA > *Urueña*, undoubtedly played an important role in determining which of the three principal variants in play would eventually be chosen in a given instance⁸.

⁷ In Rini’s analysis (1993: 525-527), the existence of multiple variants provided a way to account for the “intractable enigma” of palatalization vs. metathesis. In the present article, I consider the existence of multiple variants to be the normal product of the perception-based nature of glide epenthesis, especially with regard to high-mid /o/ + /j/.

⁸ As suggested by an anonymous reviewer of an earlier version of this article, it is possible that vowel-to-vowel coarticulation also played a role in the development of Latin tonic \bar{U} , \bar{O} , and \bar{O} . Such V-to-V effects would be in terms of the influence of final /-o/ < Latin - $\bar{U}(M)$ vs. that of final /-a/ on the tonic back vowel. More specifically, research on V-to-V coarticulation suggests that languages with a less crowded vowel space (i.e., fewer vowel phonemes) should permit greater V-to-V coarticulation since there is less risk of a loss of vocalic contrast (Manuel, 1990; Beddor *et al.*, 2002). Since spoken Latin /ɛ/ and /ɔ/ diphthongized to /je/ and /we/ in Castilian, with the result that the earlier tonic seven-vowel /i e ε a ɔ o u/ system developed to the /i e a o u/ five-vowel system, it is possible that final /-a/ may have had a greater lowering effect upon /o/ since there was no risk of confusion with non-existent /ɔ/. If so, perhaps some instances of diphthongization via glide epenthesis may have been due to the lowering effects of final /-a/ upon tonic /o/, e.g., NORÖNIA > OSp. *Norueña*, CICÖNIA > *cigüeña* ‘stork’, RISÖNEA, *risueña* ‘smiling’ (= whenever this adjective modified a feminine noun), perhaps also VERECÖNDIA > OSp. *vergueña* ‘shame’. Similarly, some cases of the retention of tonic /o/, rather than further closure to /u/, may have also been due to the lowering effects of final /-a/, e.g., SYMPHÖNIA > *zampoña* ‘rustic flute’, ASCALÖNIA > *escaloña* ‘shallot’. On the other hand, the fact that the intervening consonant was /j/ may have minimized these putative V-to-V effects. According to Recasens and Pallarès (2000: 511), Recasens (1999: 97), and Recasens *et al.* (1997: 558), the magnitude of vowel-dependent coarticulation tends to be minimized by an intervening /j/, and those V-to-V effects that do occur appear to be more in terms of carryover (V₁ upon final V₂) rather than of anticipation.

7. CONCLUSION

The primary thesis of this article is that a unified approach to the interaction between back vowels /ɔ o ʊ/ and /ɲ/, from Latin to Spanish, can be achieved through a detailed analysis of glide epenthesis in terms of the perception and phonemic reanalysis of palatal-glide-like formant transitions between the vowel and the alveolopalatal nasal.

By attributing the origin of the /we/ diphthong to perceptual glide epenthesis rather than to spontaneous diphthongization, one may solve the apparent paradox of diphthongization in a context that otherwise should have blocked diphthongization via metaphony (Sánchez Miret, 1998: 150-151). Furthermore, by incorporating a gradual process of metathesis, that includes an intermediate alveolopalatal consonant stage, e.g., /onj/ > [onj] > [ɔɲ] > [o⁽ⁱ⁾ɲ] > [oɲ] > /weɲ/, one may resolve the “intractable enigma” cited by Craddock (1980: 65-66) –how to reconcile an offglide-producing metathesis with palatalization of /ɲj/ to /ɲ/. Under the current approach, the glide developed via anticipatory glide epenthesis rather than abrupt metathesis.

By viewing perceptual glide epenthesis as dependent in part on the relative height of the preceding back vowel, another enigma may be explained, namely why *[ɔj] should show multiple outcomes as /u/, /o/, or /we/ before /ɲ/ (Alkire & Rosen, 2010: 84-85). In my view, Latin words with original Ū /ʊ/ may be analyzed apart from the other data, in that the high nature of the original vowel was never fully lost, e.g., PUGNUM > *puño* ‘fist’, CŪNEUM > *cuño* ‘die’, CŪNEA > *cuña* ‘wedge’. Thus, lowering of the high back vowel, with consequently greater susceptibility to diphthong formation, occurred only in cases where the bisyllabic nature of the nasal consonant sequence, as well as its later palatalization, were key factors, e.g., VERECŪNDIA > OSp. *vergueña* ‘shame’. Finally, the multiple outcomes characteristic of the /ɔɲ/ sequence are to be expected given the high-mid vowel’s intermediate degree of closure between the more open, glide-epenthesis favoring /ɔɲ/ sequence on the one hand, and the minimal glide epenthesis associated with /ʊɲ/ and /uɲ/ on the other. It seems that all options were available for the /ɔɲ/ sequence. For this reason, it is most logical to invoke a high degree of variation, in the form of multiple variants of the same lexical items, in the same Castilian dialect area, during the same time period (Rini, 1993: 525), whose eventual distillation to one preferred form (with or without the complete elimination of its erstwhile competitors) would depend upon the action of other, more specific factors. Examples of these factors include the selection of variants with /u/ due to analogy with other *-uño/-uña* lexical items, selection of *-ueñ-* due to denominal or deverbal adjectival function (Pharies, 2002: 519-520), preference for a consistent toponymic meaning, or perhaps simply the word’s status as a late medieval borrowing (14th century), as with *zampoña* ‘rustic flute’ < SYMPHŌNIA (Lloyd, 1987: 198; Pharies, 2002, v. suffix *-fonia*). In this way, the current glide epenthesis-based account, and its dependence upon differing degrees of back-vowel height /ɔ o ʊ u/, may provide a unified approach to the problems posed by the development of Latin Ō, Ū + /ɲ/ in the history of Spanish, yet without negating the important roles played by several other specific factors like analogy or morphological function.

BIBLIOGRAFÍA

- ALKIRE, T. and ROSEN, C. (2010), *Romance Languages: A Historical Introduction*, Cambridge, U.K., Cambridge U. P.
- APPEL, C. (1918), *Provenzalische Lautlehre*, Leipzig, Reisland.

- BEDDOR, P. S., HARNSBERGER, J. D. and LINDEMANN, S. (2002), "Language-specific patterns of vowel-to-vowel coarticulation: acoustic structures and their perceptual correlates", in *Journal of Phonetics*, 30, 591-627.
- BLEVINS, J. and GARRETT, A. (1998), "The origins of consonant-vowel metathesis", in *Language*, 74, 508-556.
- BORZONE DE MANRIQUE, A. M. (1979), "Acoustic analysis of the Spanish diphthongs", in *Phonetica*, 36, 194-206.
- CATFORD, J. C. (1977), *Fundamental Problems in Phonetics*, Bloomington, Indiana U. Press.
- COROMINAS, J. and PASCUAL, J. A. (1980-1991), *Diccionario crítico etimológico castellano e hispánico*, 6 vols. Madrid, Gredos.
- CRADDOCK, J. R. (1980), "The contextual varieties of yod: An attempt at systematization", Edward L. Blansitt and Richard V. Teschner (eds.): *A Festschrift for Jacob Ornstein: Studies in General Linguistics and Sociolinguistics*, Rowley, MA, Newbury, 61-80.
- FISCHER-JØRGENSEN, E. (1985), "Some basic vowel features, their articulatory correlates, and their explanatory power in phonology", Victoria A. Fromkin (ed.): *Phonetic Linguistics: Essays in Honor of Peter Ladefoged*, New York, Academic Press, 79-99.
- FORD, J. D. M. (1911), *Old Spanish Readings, Selected on the Basis of Critically Edited Texts*, Boston, Ginn and Co.
- GOODIN-MAYEDA, C. E. (2016), *Nasals and Nasalization in Spanish and Portuguese: Perception, Phonetics and Phonology*, Amsterdam, J. Benjamins.
- HANSEN, F. (1913), *Gramática histórica de la lengua castellana*, Halle, Max Niemeyer.
- HARTMAN, S. L. (1985), "On opening black boxes: Latin *-nge-* and *-ng'l-* in Hispano-Romance", Larry D. King and Catherine Maley (eds.): *Selected Papers from the XIIIth Linguistic Symposium on Romance Languages*, Amsterdam, Benjamins, 149-162.
- HOCK, H. H. (1985), "Regular metathesis", in *Linguistics*, 23, 529-546.
- (1991), *Principles of Historical Linguistics*, 2d ed., Berlin, Mouton de Gruyter.
- HUALDE, J. I. (2005), *The Sounds of Spanish*, Cambridge, U.K., Cambridge U. P.
- HUME, E. (2004), "The indeterminacy/attestation model of metathesis", in *Language*, 80, 203-237.
- KREPINSKY, M. (1962), *Inflexión de las vocales en español*, ed. Vicente García de Diego, (*Revista de Filología Española*, Supplement 3), Madrid.
- LADEFOGED, P. and Maddieson, I. (1996), *The Sounds of the World's Languages*, London, Blackwell.
- LAVIER, J. (1994), *Principles of Phonetics*, Cambridge, U.K., Cambridge U. P.
- LIMANNI, A. (2008), "From *uo* to *ue* in Spanish and from *uo* to *o* in Sicilian: same problem, different solutions", Laura Colantoni and Jeffrey Steele (eds.): *Selected Proceedings of the 3rd Conference on Laboratory Approaches to Spanish Phonology*, Somerville, Cascadilla Proceedings Project, 125-139.
- LLOYD, P. M. (1987), *From Latin to Spanish*, Philadelphia, American Philosophical Society.
- MALKIEL, Y. (1983), "Alternatives to the classic dichotomy family tree/wave theory? The Romance evidence", Irmengard Rauch and Gerald F. Carr (eds.): *Language Change*, Bloomington, Indiana U. P., 192-256.
- (1984), "Old-Spanish resistance to diphthongization, or previous vowel lengthening?", in *Language*, 60, 70-114.
- MANUEL, S. Y. (1990), "The role of contrast in limiting vowel-to-vowel coarticulation in different languages", *Haskins Laboratories Status Report on Speech Research*, 103-104, 1-20.

- MENÉNDEZ PIDAL, R. (1941), *Manual de gramática histórica española*, 6th ed., Madrid, Espasa-Calpe.
- (1950), *Orígenes del español*, 6th ed., Madrid, Espasa-Calpe.
- OHALA, J. J. (1989), “Sound change is drawn from a pool of synchronic variation”, L. E. Breivik and E. H. Jahr (eds.): *Language Change: Contributions to the Study of its Causes*, Berlin, Mouton de Gruyter, 173-198.
- (1993), “The phonetics of sound change”, C. Jones (ed.): *Historical Linguistics: Problems and Perspectives*, London, Longman, 237-278.
- PAYNE, E. M. (2005), “Phonetic variation in Italian consonant gemination”, in *Journal of the International Phonetic Association*, 35, 153-181.
- PENNY, R. (2002), *A History of the Spanish Language*, 2d ed, Cambridge, U.K., Cambridge U. P.
- PENSADO RUIZ, C. (1983), “Sobre los resultados de las vocales velares latinas precedidas de yod inicial”, in *Revista de filología románica*, 1, 109-135.
- (1984), *Cronología relativa del castellano*, Salamanca, Univ. de Salamanca.
- (1985), “El cierre de las vocales romances ante una palatal y su motivación articulatoria”, José L. Melena (ed.): *Symbolae Ludovico Mitxelena septuagenario oblatae*. Vol. 1., Universidad del País Vasco, 639-646.
- (1986), “Comha, ravha, y otras grafías similares en portugués medieval”, in *Verba: Anuario galego de filoloxia*, 13, 329-340.
- PHARIES, D. (2002), *Diccionario etimológico de los sufijos españoles y de otros elementos finales*, Madrid, Gredos.
- POSNER, R. (1996), *The Romance Languages*, Cambridge, U.K., Cambridge U. P.
- QUILIS, A. (1999), *Tratado de fonología y fonética españolas*, Madrid, Gredos.
- RECASENS, D. (1983), “Place cues for nasal consonants with special reference to Catalan”, in *Journal of the Acoustical Society of America*, 73, 1346-1353.
- (1991), *Fonètica descriptiva del català: Assaig de caracterizació de la pronúncia del vocalisme i consonantisme del català al segle XX*, Barcelona, Institut d’Estudis Catalans.
- (1999), “Lingual coarticulation”, William J. Hardcastle and Nigel Hewlett (eds.): *Coarticulation: Theory, Data and Techniques*, Cambridge, U.K., Cambridge U. P., 80-104.
- (2013), “The role of coarticulation and production constraints on glide insertion and elision in the Romance languages”, Fernando Sánchez Miret and Daniel Recasens (eds.): *Studies in Phonetics, Phonology and Sound Change in Romance*, Munich, Lincom, 113-120.
- (2014), *Coarticulation and Sound Change in Romance*, Amsterdam, J. Benjamins.
- RECASENS, D., FONTDEVILA, J. and PALLARÈS, M. D. (1995), “A production and perceptual account of palatalization”, Bruce Connell and Amalia Arvaniti (eds.): *Phonology and Phonetic Evidence: Papers in Laboratory Phonology*, Cambridge, U.K., Cambridge U. P., 265-281.
- RECASENS, D., PALLARÈS, M. D. and FONTDEVILA, J. (1997), “A model of lingual coarticulation based on articulatory constraints”, in *Journal of the Acoustical Society of America*, 102, 544-561.
- RECASENS, D. and PALLARÈS, M. D. (2000), “A study of F1 coarticulation in VCV sequences”, in *Journal of Speech, Language, and Hearing Research*, 43, 501-512.
- RECASENS, D. and ESPINOSA, A. (2005), “The role of contextual and prosodic factors on consonant lenition and elision: the case of intervocalic [j] in Majorcan Catalan”, in *Journal of Portuguese Linguistics*, 4, 7-37.

- (2010), “The role of spectral and temporal cues in consonantal vocalization and glide insertion”, in *Phonetica*, 67, 1-24.
- RINI, J. (1993), “On the evolution of Spanish *cigüeña* and the blending of multiple variants”, in *Hispanic Review*, 61, 519-529.
- SÁNCHEZ MIRET, F. (1998), *La diptongación en las lenguas románicas*, Munich, Lincom Europa.
- SOLÉ, M.-J. (1992), “Phonetic and phonological processes: The case of nasalization”, in *Language and Speech*, 35, 29-43.
- (1995), “Spatio-temporal patterns of velopharyngeal action in phonetic and phonological nasalization”, in *Language and Speech*, 38, 1-23.
- SPORE, P. (1972), *La diphtongaison romane*, Odense, Universitets Forlag.
- TORREBLANCA, M. (1990), “Sobre la evolución /ũ/ latina > /u/ en español: *junco, surco, ducho*”, in *Journal of Hispanic Philology*, 14, 247-276.
- WIREBACK, K. J. (2001), “A gradual approach to sibilant + /j/ metathesis in Hispano-Romance”, in *La corónica*, 30, 159-203.
- (2002), “On the metathesis of labials + /j/ in Hispano-Romance”, in *Hispanic Review*, 70, 311-331.
- ZAUNER, A. (1921), *Altspanisches Elementarbuch*, 2d ed., Heidelberg, Winter.