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## Gemination and the Proto-Romance Syllable Shift

### 1. Introduction

The problem discussed in this paper is that of the spontaneous shifts in syllable structure commonly assumed to have taken place between prehistoric Latin and the contemporary Romance languages.

Complex onsets consisting of obstruent-liquid sequences must be posited at three stages in the history of Latin-Romance: throughout the entire recent history of each Romance language, in classical Latin and during at least one early stage of prehistoric Latin. However, despite the obvious identity between early Latin, classical Latin and contemporary Romance onset structure, it has been impossible so far to claim complete historical continuity between these stages. Two sound changes have been identified as the source of this difficulty: the Proto-Romance stress shift from antepenult to penult in words like *integra* and the Pre-Latin raising of reduced vowels in items like *con-secro* (from /con-sacr-o/). Both phenomena have been widely interpreted as indicating that at one or more intermediate stages in the history of Latin-Romance obstruent-liquid clusters were heterosyllabic. It is the purpose of this paper to show that obstruent-liquid clusters have been tautosyllabic throughout the entire history of Latin-Romance and that both the Proto-Romance accent shift and the Pre-Latin raising of *a* to *e* in *consecro* require alternative explanations. I begin by making explicit the historical view of Latin-Romance syllabification that must underlie the traditional interpretation of these phenomena.

2. Stages in Latin-Romance syllable structure: a reconstruction of the standard view

2.1. Metathesis and -lo-syncope in early Latin

The earliest Latin sound change differentiating between light and heavy syllables has been identified by A.-C. Juret (1921) as the metathesis of a consonantal sonorant with a following vowel. According to Juret, this sound change took place only if the sonorant was preceded by another segment within the same syllable: "Une explosive devient implosive dans la même syllabe; cette explosive est toujours r, l ou n précédée d'une autre consonne initiale de syllabe; lorsque r, l, n sont seules initiales de syllabe, elles se maintiennent après consonne comme après voyelle; elles se maintiennent devenir vulnèrè" (Juret 1921: 244). Some cases for which metathesis is clearly responsible include tarpezita for trepezita 'money-changer', pulmo for \*plumo 'lung' (cf. Greek pleumon) dulcis for \*dlukui- 'sweet' (cf. Greek glukus).

Juret used metathesis to argue that all intervocalic obstruent-sonorant sequences of Latin were tautosyllabic during this early stage. In his view \*sacro-lo-m metathesized to sacorlom, which eventually became classical sacellum 'small shrine'.<sup>1</sup> Similarly signo-lo-m would have metathesized to signolom, later to become classical sigillum 'small mark'. Metathesis must then have operated at a stage when sacrolom and signolom were syllabified sa.cro.lom, si.gno.lom.

A complete search of the diminutive formations in -elo, Juret's main source of evidence, leads to a conclusion that differs in detail but not in substance from Juret's reconstruction. We may divide the sequences preceding the -elo suffix in three classes: (a) VC<sub>1</sub> sequences as in asin-elo-s 'little donkey'; (b) VC<sub>1</sub>C<sub>2</sub> sequences where the C<sub>1</sub>C<sub>2</sub> cluster is of increasing sonority, as in sacro-elo-s; and (c) VC<sub>1</sub>C<sub>2</sub> sequences where C<sub>1</sub>C<sub>2</sub> is of decreasing sonority, as in vern-elo-s. One observes loss of the suffixal e in class (a) (asinelos → asinlos, eventually asellus); one observes an apparent reordering of e and the immediately preceding sonorant in class (b) sacro-elo-s → sacerlos, eventually sacellus); and one notes that no change takes place in the syllable structure of the last class:

(1)

a. VC-elo- diminutives

asin-us 'ass'; \*asin-elo-s → \*asinlos → asellus  
amphor-a 'amphor'; \*amphor-ela → \*amporla → ampulla

b. VCC-elo- diminutives, where CC is of increasing sonority

\*sacros 'sacred' → sacer; \*sacr-elo-m → \*sacrlom → sacellum  
\*agros 'field' → ager; \*agr-elo-s → \*agrlos → agellus  
cerebrum 'brain'; \*cerebr-elo-m → \*cerebrlum → cerebellum

pugnus 'fist'; \*pugn-elo-s → \*pugnlos → pugillus  
columna 'column'; \*column-ela → \*columnla → columella

c. VCC-elo- diminutives, where CC is of decreasing sonority

cornu 'horn'; corniculus (not \*corn-elo-s → cornlos → \*corellus)  
verna 'slave born in the house'; vernulus (not \*vern-elo-s → \*verellus)  
gland- 'acorn'; glandulae (not \*glandiae, or \*glallae)  
cista 'box'; cistula, cistella (not \*cistla or \*cilla)  
calc-s 'stone'; calculus (not \*calclus)

The generalization appears to be that the vowel e in -elo- is elided after a single consonant or a cluster of increasing sonority (such as cr, gr, br or gn) but not after a cluster of decreasing sonority (such as st, lc, rn). It is safe to assume that this last class of sequences was heterosyllabic at this stage, as throughout the history of Indo-European languages. We may hypothesize then that the one context where e-Elision in diminutives could not take place was after a closed syllable, as in ver-n-elo-s. The natural extension of this hypothesis is that all clusters after which e could be deleted represent complex onsets. We are led then to postulate syllabic divisions such as ce.re.bre.lom, sa.cro.lom etc. and the rule of e-Elision below:

## (2) e-Elision

$$e \rightarrow o / V [C.V]$$

It is entirely possible that e-Elision is simply a restricted version of the general rule of syncope active in prehistoric Latin (cf. Vendryes 1907).

The *nl* and *rl* clusters created by elision (cf. intermediate \**asinlos*, \**sacerlos*) underwent a general rule of Latin, discussed below, and became geminate *ll*. Where elision gave rise to an unsyllabifiable triconsonantal cluster an equally general epenthesis rule inserted *e*: hence intermediate \**sacrlom* - with a syllabically stray *r* - became \**sacerlom*, later *secellum*.<sup>2</sup>

Although this scenario for the derivation of *-elo* diminutives differs from Juret's, his essential idea is upheld: cluster such as *cr* have a different effect in the formation of the diminutives from heterosyllabic consonant sequences such as *lc*. Moreover, Juret's observations on the operation of metathesis proper appear well justified: metathesis always affects complex onsets (*trapezita* → *tarpezita*), never heterosyllabic C-sonorant clusters (such as *vul.ne.ra.re*, \**vulenrare*).

To sum up this portion of the evidence: e-Elision and the sporadic metathesis of a postconsonantal sonorant took place at a stage in the history of Latin when obstruent-liquid clusters, as perhaps all consonant clusters of increasing sonority, formed complex onsets. The fact that consonant clusters such as *gn* behave as onset sequences with respect to e-Elision is strongly reminiscent of the type of complex onsets reconstructible for Indo-European on the basis of Mycenaean, Sanskrit and other Latin evidence (cf. Steriade 1982 and forthcoming). For this reason, I assume that the syllabic divisions indicated by e-Elision represent the earliest stage of Latin syllabification.

## 2.2. Vowel reduction in early Latin

Short vowels in medial syllables underwent a number of related changes during the earliest documented stages of Latin. In open syllables all vowels raised to a high vowel whose backness/roundness matched that of neighboring consonants. In closed syllables *a* and *e* became *e*; *o* raised to *u*. Finally *i* and *u* remained unchanged. The remarkable aspect of this development is that before obstruent-*r* clusters a short *a* raised to *e*, not *i*, as if contained in a closed syllable: *con-sacro* became *consecro*, rather than the expected \**consciro*. Since only this last aspect of vowel reduction is relevant for present purposes, I limit the examples to the normal development of medial short *a*.

(3) Vowel reduction: short medial *a*

- a. before a single C
- ago 'set in motion'; ex-ago → exigo 'drive out',  
 facio 'make'; con-facio → conficio 'fashion'  
 [y]lacio 'throw'; con-[y]lacio → con-[y]licio →  
 con-icio 'throw together'  
 cado 'fall'; con-cado → concido 'collapse'
- b. before two heterosyllable C's
- arceo 'protect'; ex-arceo → exerceo 'train,  
 exercise'  
 [y]lacto 'fling'; con-[y]lacto → con-[y]lecto  
 'fling together'  
 damno 'punish'; con-damno 'condemn'  
 factur 'made'; con-factus → confectus 'fashion-  
 ed'
- c. before obstruent-*r*
- sacr- 'sacred'; con-sacro → consecro  
 'consecrate'  
 tag- 'touch'; in-tag-ro-m → integrom →  
 integrum 'untouched, whole'  
 patro 'accomplish'; per-patro → perpetro  
 'perpetrate'  
 im-patro - impetro 'obtain by asking'

The pattern of raising in (3)c has been in general interpreted as evidence for the syllabification *con.sac.ro*. This hypothesis goes back at least to E. Hermann (1917 and 1923) and is adopted in much of the later work on Latin phonology: cf. Leumann 1977:83 and Safarewicz 1969.

Taken at face value, the facts of Raising before Obstruent-r clusters require that two drastic changes in the syllable structure of early Latin be posited. If the Raising that produced *consecro* reflects a later stage than that uncovered by Juret then the historical development must pass through the following steps: a prehistoric syllabic assignment (*con*).*sa.cro* which feeds e-Elision, a more recent assignment (*con*).*sac.ro* required for Raising, followed by the pre-classical and classical syllabic division *con.se.cro*, *sa.cro*. Neither the early shift from *sa.cro* to *sec.ro* nor the later shift back to *sa.cro* can be tied to any other developments in the phonological system of Latin.

### 2.3. (Pre)Classical Latin: stress and meter

Since about the 4th century BC, Latin stressed the penultimate syllable, if heavy, and otherwise the antepenultimate. Counting as heavy is any syllable containing a long vowel or diphthong and any closed syllable. Penultimate syllables containing a short vowel followed by an obstruent-liquid cluster (as in *vólucris*, *íntegra*, *lócuples*, *ténebra*) appear to be light: the accent falls on the antepenult in such cases.<sup>3</sup> The testimony of the accent is supported by the facts of metrical scansion, in particular by the systematic scansion of V-obstruent liquid -V sequences as  $\bar{\sigma}$   $\sigma$  in the comic poets Plautus and Terentius.

### 2.4. Vulgar Latin and Proto-Romance

In the transition from Latin to Romance, the location of the accent was generally preserved.<sup>4</sup> Thus the contrast between antepenult stressed Classical *pólic-em* 'flea-ACC.sg.' and penult stressed *félic-em* 'happy-ACC.sg.' is still preserved in Romanian *púrce* vs. *feríce*. In particular antepenult stress in words of the form [...V̄CV(C)] is observed unchanged throughout the entire Romance family: *dómina* 'lady', *dómine* 'lord-VOC' become Rom. *dóamna*, *dóamne*

in Romanian, It. *dónna* (from *dónna* with medial syncope of the unaccented vowel); *nébula* 'cloud, darkness' becomes Rom. *négura*; *básflica* 'church' becomes Rom. *bisérlica*; *iúdicem* becomes Italian *guidice*, Rom. *júdece*; *iúvenem* becomes Ital. *gióvine*, Rom. *júne* (from \**júβene*, see below); *léporem* becomes Rom. *iépure*, Fr. *lièvre* (with medial syncope of unaccented o).

The Latin accent shifts rightwards in Proto-Romance when the penult is separated from the ultima by an obstruent-liquid cluster: *íntegrum* → *intégram*, hence Rom. *intégru* (with metathesis of r), It. *intéro* (with spirantization and loss of g) and Fr. *entier* (also with loss of g). It also shifts rightwards when the antepenult and penult are in hiatus: *filíolus* → *filíolus*, hence Fr. *filléul*; *mulferem* → *mulliérem*, hence Sp. *mujér*, Rom. *muiére*.

Let us first eliminate from the discussion the rightwards stress shift in *mulferem* → *mulliérem*. This phenomenon is simultaneous with the formation of Proto-Romance postconsonantal glides: the Latin hiatus between a non-low vowel and a following vowel (*mu.lf.e.rem*, *há.be.at* etc.) is replaced by the Proto-Romance syllabification *mu.lyé.rem*, *há.byat*. In this context, the accentual change is easily explained along the lines suggested by the analyses of similar stress shift cases given in Al-Mozainy et al. (1985), Halle and Vergnaud (forthcoming) and especially Harris (1986): stress shifts within a binary foot from the desyllabified foot head onto the remaining foot syllable. Thus the foot structure of Classical *mulferem* must be *mu.li.e (rem)*, with an extrametrical final syllable (cf. Hayes 1982). Primary stress falls on the rightmost foot and, within it, on the leftmost syllable *li*. When the Proto-Romance glide formation eliminates *li* as a syllable, the remaining vowel *e* inherits the accentual properties of the entire foot. The only sound change that must be recorded is then the glide formation: the direction of accent shift triggered by glide formation is fully predicted by a stress theory that recognizes metrical constituent structure.

We may turn now to the stress shift from antepenult to penult in words of the *íntegrum* class. Suppose that the Proto-Romance assignment of obstruent-liquid clusters is heterosyllabic: *in.teg.ra* rather than *in.te.gra*. Then the

stress predicted by the Latin stress rule should indeed be penultimate: *in.tég.ra*. This is, with minor variations, the explanation offered by every scholar that has written on this subject. This explanation commits one to two more spontaneous syllable shifts: the shift from classical *in.te.gra* to Romance *in.tég.ra* and the shift back to *in.té.gra*, needed to account for the syllabification facts of contemporary Romance (on which see below).

The clearly problematic aspect of this explanation is that one fact - the shift in stress - is given as justification for not one but two changes in the successive grammars of Romance, the second change being needed in order to cancel entirely the effects of the first. Various improbable improvements on this scenario have been proposed, the most widely quoted being Hermann's (1917, 1923) hypothesis that spoken Latin had never gone through the *in.te.grum*, *sa.crum* stage at which obstruent-liquid clusters are complex onsets. Rather, Hermann suggests that spoken Latin - as against literary, *hochsprachlich* Latin - would have preserved the heterosyllabic assignment of obstruent-liquid clusters, from the prehistoric stage reconstructible from the effects of Raising in *consecrare* into the Proto-Romance stage reconstructible from the penult stress in *intégra*. One of the odd corollaries of this idea is that the stress pattern unanimously reported by Latin writers and grammarians is a literary fiction. Another is that the language of Plautus, where obstruent-liquid clusters are systematically tautosyllabic, is *hochsprachlich* in its syllabic divisions and colloquial in everything else. In addition, we are still left in the dark as to how the Romance languages, which on Hermann's hypothesis must have inherited the closed syllabification of spoken Latin, succeeded in acquiring independently of each other the very same onset structure as that of "literary" and Plautinian Latin.

This last point is worth developing in some detail. As in Plautinian Latin, French (Selkirk 1978), Italian (Vogel 1977), Portuguese (Reighard 1982), Spanish (Harris 1983) and Romanian (Steriade 1984) syllabify obstruent-liquid sequences as onsets. It is hard to imagine that the syllabification of contemporary Romance languages resulted from independent innovations; although many unrelated

languages allow a certain subset of obstruent-sonorant clusters as complex onsets, the details of such onset inventories tend to vary substantially from language to language.<sup>6</sup> In contrast, Latin and the Romance language have onset inventories that are identical down to the details: *tl*, *dl* clusters are heterosyllabic in Latin, *ε* as well as Romanian and French.<sup>7</sup> Moreover, it is possible to show that the contemporary tautosyllabic assignment of obstruent-liquid clusters was already present at the earliest stages in the history of individual Romance languages. For example, the 10th century Tuscan diphthongization of stressed mid vowels in open syllable takes place in *pé.de* → *pié.de* 'foot' as well as in *pé.tra* - *pié.tra* 'stone', but not in *fés.ta* 'holiday' (Rohlf 1966:25). The earliest French diphthongization (5th-6th century, according to Fouché 1969:223) affects the open syllables of *ad.ré.tro* → *arri.ère* 'behind', *fé.bre* → *fi.èvr* 'fever', but not the closed syllables of *fes.ta* → *0.fi feste*, \**gen.ru* → *gendre* 'son-in-law' (Fouché 1969:223). If most natural conclusion to be drawn from these considerations is then that the onset structure of contemporary Romance languages cannot be the result of independent innovations: the Romance language are descended from dialect in which words like *intégra*, however stressed, contained an open penult. More evidence for this view will be presented below.

### 3. Guidelines for reconstruction

The primary data usable in the reconstruction of Romance phonology are sequences of segments preserved in the Romance languages. The syllabification of these sequences cannot be directly observed, as no metrical texts can be confidently ascribed to the variety of spoken Late Latin that we call Proto-Romance. Proto-Romance syllabification must then be inferred: the ideas guiding this process are enumerated below.

#### 3.1. Onsets are maximized

One observes frequently that an intervocalic consonant is always syllabified as onset to the second syllable. More significant for our purposes is the observation that consonant sequence that can be syllabified as an onset in given language, must be so syllabified.

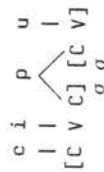
### 3.2. Surface syllabification is exhaustive

A typological study of consonant cluster simplifications shows that, given independent criteria for what is a possible onset and what is a possible coda in a given language, only those clusters surface that can be exhaustively parsed into coda-onset sequences. The most common type of cluster simplification is the loss of  $C_2$  in a medial sequence  $VC_1C_2C_3V$  where  $C_1C_2$  cannot be a coda and  $C_2C_3$  cannot be an onset.

From the two generalizations formulated above two others follow: if in a medial sequence  $VC_1C_2V$  the consonant cluster is heterosyllabic ( $VC_1.C_2V$ ), then  $C_1C_2$  can surface in postconsonantal position ( $VC_3C_1C_2V$ ) only if the cluster  $C_3C_1$  is a possible coda in the language. Conversely, if  $C_3C_1$  is known to be an impossible coda, then the existence of surface sequences  $VC_3C_1C_2V$  indicates that  $C_1C_2$  is a possible onset.

### 3.3. Rules that may not affect geminate segments refer to syllabic constituents or syllable boundaries

A set of related Romance sound changes voice and spirantize postvocalic obstruents when followed by vowel or liquid: e.g. *ripa* → *fr. rive*, *capra* → *fr. chèvre*. The general context of these rules can be formulated either as  $[-cons]_o$  [ $+son$ ,  $+cont$ ] or, assuming that obstruent-liquid clusters are onsets, as  $[-cons]_o$  (after a vocoid and at the beginning of a syllable). The choice of formulations is not free: is we adopt the latter, we predict that these sound changes will never affect geminate segments, since in a form like *cippu*,



the postvocalic segment *p* is simultaneously at the beginning of one syllable and at the end of the other, and thus does not satisfy unambiguously the structural description of voicing/spirantization (cf. Schein and Steriade 1986). On the other hand, if we adopt  $[-cons]_o$  [ $+son$ ,  $+cont$ ] as the context of voicing/spirantization, then we predict that geminate obstruents will voice and spirantize, since the segment *p* in *cippu* is indeed preceded by a  $[-consonantal]$

segment and followed by a continuant sonorant. Conversely, if we know that voicing/spirantization fails to affect geminates, we would be naturally led to opt for a formulation of these rules that will predict their inapplicability to geminates: we would choose the context  $[-cons]_o$  and the auxiliary assumption that obstruent-liquid clusters may occur in syllable-initial position.

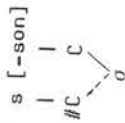
### 3.4. The boundaries of cyclic domains may correspond to syllabic boundaries

Cyclic assignment of syllable structure frequently results in apparent contrasts of syllabic division. Thus the cluster *br* is tautosyllabic in Latin *labrum* 'lip', as everywhere stem-internally, but heterosyllabic in *ab-rogo* 'to annul' and in every case where a prefix or compound boundary separates its two members. The explanation for the contrast may be this: *labrum* contains a single cyclic domain, within which the principle of onset maximization requires that *br* be assigned in toto to the second syllable; but *ab-rogo* contains two independently syllabified domains, *ab* and *rogo*. The concatenation of fully syllabified *ab* and *rogo* yields, predictably, *ab.ro.go*. This observation is of great significance to the present discussion; if the cluster *br* is heterosyllabic in some context then it is expected to behave phonologically like the heterosyllabic *br* cluster of *ab-rogo*.

### 3.5. Heterosyllabic initials and stray adjunction

Latin word-initial clusters are not limited to onsets. An *s* can precede any onset whose initial is a stop: clusters like *st* (*stō* 'I sit'), *sk* (*scelus* 'crime'), *str* (*struo* 'put in order'), *spr* (*spretiō* 'contempt'), *spl* (*splendeō* 'shine') occur initially even though the same sequences are heterosyllabic in intervocalic position (*es.tis* 'you are', *as.tra* 'stars', *as.pra* 'rough-feminine', *re-s.plen.de.ō* 'to glitter back'). An analysis of this pattern was proposed in Steriade (1982): a rule of stray adjunction provides for the syllabic incorporation of an initial unsyllabified *s*:

## (4) Latin Stray Adjunction



Since this rule follows the general process of word-internal syllabification it will allow for the creation of clusters like *str*, where *s* is adjoined to an already complex onset. For the same ordering reason, the syllabic incorporation of initial *s* will be bleb by coda-incorporation in sequences like *re-s.ti.tu.ō*, *re-s.plen.de.ō*. Note that regular complex onsets in the same position do not give rise to the same syllabification pattern: *re.-fre.nō*, *re.-pli.cō*.

*S* is the only segment to which the Latin Stray Adjunction applies. It follows then, from (4) and from the principle of exhaustive syllabification, that no clusters other than (s)[-son])([+son,+cont]) may occur word-initially in Latin. Indeed, a variety of other clusters, some native to Latin and some belonging to the loan vocabulary, are simplified in this position by losing their first member, the stray consonant for which no adjunction provision exists:

(5)

- #tl > l    \*tlātos > lātus 'carry-participle'  
 #dl > (ll) > l    \*dlongos > longus 'long'  
 #gn > ŋn > n    gnixus 'lean-pple' > nixus  
                   gnō- as in i-gnōtus 'unknown', co-gnōscō  
                   'learn' but nōscō 'know', nōmen 'inform-  
                   ation, name', nōtus 'known'  
 #kt > t    \*ktunika > tunica 'shirt' cf. Hebr.  
                   ktionet gk. Ktesiphon > Iesifon  
 #pt > t    gk. ptisane 'barley-gruel' > tisana  
                   kg. Ptolomaid- > Iolomaidi

The Latin treatment of heterosyllabic initials is encountered, with minor variations, in Greek, Sanskrit, in certain Arabic dialects, in Klamath and in many modern Indo-European languages. Abstracting away from the language specific details of stray adjunction rules, one can conclude generally that a cluster  $C_1C_2$  that surfaces as heterosyllabic in intervocalic position can occur word initially only if a stray adjunction rule exists that provides for the incorporation of  $C_1$  in an initial syllable beginning with  $C_2$ . This generalization will also play a role the reconstruction of Proto-Romance syllabic divisions.

## 4. Syllable-based generalizations in Proto-Romance

Equipped with these guidelines, we may now proceed to determine the syllabic status of Proto-Romance obstruent-liquid clusters.

If, at any point during the history of Proto-Romance, obstruent-liquid clusters had ceased to be possible onsets then we would expect a number of accompanying changes:

(a) Neutralization of the contrast between heterosyllabic *br* (*ab-rogo*) and tautosyllabic *br* (*la-bræ*): both clusters should behave like the former with respect to syllable-based rules.

(b) Simplification of certain post-consonantal clusters: a sequence  $VC_1C_2C_3V$ , where  $C_2$  is an obstruent and  $C_3$  is a liquid should surface only if  $C_1C_2$  is a possible coda cluster. For instance, if the coda clusters of both Latin and Romance are of decreasing sonority, one expects that  $VC_1C_2C_3V$  should lose  $C_2$  if both  $C_1$  and  $C_2$  are obstruents.

(c) Simplification of certain initial clusters: if obstruent-liquid clusters cease to be possible onsets one normally expects that such sequences would be preserved only in contexts where their first member can become coda to a preceding syllable. Initially, such clusters should lose their first member.

In the remainder of this section I will present the Romance evidence that disconfirms each one of these predictions.

One should bear in mind, however, that the predictions hold only if the single relevant difference between the phonological system of Latin and that of Proto-Romance is the change in onset structure discussed here and if every thing else is held constant. Each prediction can be voided by adding to the hypothesis of heterosyllabic obstruent liquid sequences various other auxiliary hypotheses. For example, the patently false prediction in (c) - that word-initial obstruent liquid clusters should lose their first member - can be neutralized by postulating a Proto-Romance stray adjunction rule that would allow the syllabic incorporation of an initial obstruent before a continuant sonorant. It is no doubt possible to resort to similar moves in the face of evidence falsifying other predictions of the heterosyllabic hypothesis. The very least I hope to show, then, is that not a single prediction of this hypothesis can be confirmed. Some of the data discussed below make however for a stronger argument and indicate that a better understanding of Romance phonology can be gained if we assume that the Romance onset clusters are the same as those of Classical Latin.

#### 4.1. Regressive Gemination

Consider first the contrast between **ab.ro.go** and **la.bra**. There exists a phonological rule in Latin that is sensitive to this contrast and a Romance continuation of this rule. In Latin, certain heterosyllabic consonant clusters are subject to a regressive gemination rule. To identify the class of clusters subject to gemination, I distinguish below three types of heterosyllabic clusters: (a) clusters of decreasing sonority; (b) clusters of increasing or equal sonority of the form [-coronal,  $\alpha$ sonorant,  $\alpha$ nasal] [+coronal,  $\alpha$ sonorant, nasal]; (c) all other heterosyllabic clusters. One observes that classes (a) and (b) are preserved, while class (c) undergoes regressive gemination.

#### (6) Heterosyllabic clusters in Latin

##### (a) decreasing sonority

- (i) liquid C: **arvus** 'field', **arma** 'weapons', **rursus** 'backwards', **arbos** 'tree', **artis** 'art-Genetive', **pelvis** 'pelvis', **vulnus** 'wound', **alter** 'other',
- (ii) nasal C: **inter** 'between', **infra** 'under', **imperō** 'command', **unguō** 'annoint', **con-temnō** 'despise',
- (iii) sC: **aster** 'star', **aspra** 'rough', **dis-cedō** 'separate', **dis-par** 'unlike', **dis-tineō** 'keep apart'.

##### (b) [-cor, $\alpha$ son, $\alpha$ nas] [+cor, son, nas]

- (i) [-son] clusters: **factum** 'deed', **aptus** 'able', **re[ks]i** 'I reigned', **ipse** 'himself', **ob-secrō** 'beseech', **ob-tineō** 'hold',
- (ii) [+son] clusters: **amnis** 'river', **sollemne** 'solemn', **li[ $\eta$ ]num** 'wood', **si[ $\eta$ ]num** 'sign'

##### (c) other clusters

###### (i) C-y

- per-[y]erō**  $\rightarrow$  **per.[y]e.rō**  $\rightarrow$  **pe[yy]erō** spelled <peierō>, 'perjure oneself',  
**con-[y]iciō**  $\rightarrow$  **con.[y]i.ci.ō**  $\rightarrow$  **co[yy]iciō** <coiiciō> 'throw',<sup>9</sup>  
**dis-[y]ungō**  $\rightarrow$  **dis.[y]un.gō**  $\rightarrow$  **dif[yy]ungō** <diungō> 'separate',

###### (ii) C-r

- sub-ripiō**  $\rightarrow$  **sub.ri.pi.ō**  $\rightarrow$  **sur.ri.pi.ō** 'steal'  
 BUT **la.bra** 'lips'  
**ad-ripiō**  $\rightarrow$  **ad.ri.pi.ō**  $\rightarrow$  **ar.ri.pi.ō** 'snatch'  
 BUT **la.drō** 'thief'  
**in-ruō**  $\rightarrow$  **in.ru.ō**  $\rightarrow$  **irruō** 'rush in'

###### (iii) C-l

- ad-loquor**  $\rightarrow$  **ad.lo.quor**  $\rightarrow$  **al.lo.quor** 'address, speak to'  
**lapid-elo-s**  $\rightarrow$  **la.pid.lus**  $\rightarrow$  **lapillus** 'pebble'  
**per-legere**  $\rightarrow$  **per.le.ge.re**  $\rightarrow$  **pellegere** 'scan'



ager-elo-s → a.ger.lus → agellus 'little field'  
 coron-el-a → co.ron.la → corolla 'little crown'  
 in-lūstris → in.lūs.tris → illūstris 'famous'

## (iv) C-nasal

ad-nuō → ad.nu.ō → annuō 'nod in assent'  
 merced-nārius → mer.ced.nā.ri.us → mercennārius 'hired soldier'  
 sub-moveō → sub.mo.ve.ō → sum.mo.ve.ō 'remove'  
 ad-mittō → ad.mit.tō → am.mit.tō 'send to'  
 glüb-ma → glüb.ma → giüm.ma → glū.ma 'peel (of fruit)',<sup>10</sup>  
 pesna (Old Latin) → pes.na → penna 'feather'  
 dis-minuō → dis.mi.nu.ō → diminuo 'dash to pieces'  
 in-mineō → in.mi.ne.ō → immineō 'threaten'

## (v) C-obstruent

sitcus → sit.cus → siccus 'dry' (cf. sitis 'thirst')  
 sub-gerō → sub.ge.rō → suggerō 'provide'  
 ob-ferō → ob.fe.rō → offerō 'offer'  
 ob-cupō → ob.cu.pō → occupō 'occupy'  
 dis-ferō → dis.fe.rō → differō 'differ'  
 ec-ferō → ec.fe.rō → efferō 'carry out'  
 ad-plico → ad.pli.co → applico 'attach to'  
 ad-sideō → ad.si.de.ō → assideō 'sit by'  
 con-cut-sī → con.cut.sī → concussī 'I struck'  
 quid-[kw]am → quid.[kw]am → qui[kkw]am, spelled <quicquam><sup>11</sup>

As the examples in (6a) indicate, sequences of decreasing sonority are not subject to regressive gemination and remain, in general, intact.<sup>12</sup> When the sonority profile of the consonant sequence is not decreasing, two treatments are observed: the [-coronal][+coronal] clusters of identical obstruency and nasality are preserved while all other clusters geminate. Gemination takes place both in sequences of level sonority (sf → ff; cp → pp, nm → mm, rl → ll) and in sequences of increasing sonority (ts → ss, sm → mm, dm → mm, bm → mm, br → rr, dr → rr, dl → ll).

Before formulating the rule, a number of details must be mentioned. Only some underlying instances of gm yield predicted mm: underlying cm becomes gm and, unaccountably, fails to undergo gemination. Thus flag-ma 'flame' becomes flamma, Greek sigma becomes sigma (Schuchardt 1866:146) but sec-mentum becomes segmentum, not \*semmentum. A possibly related fact is that syllable final g becomes w before m in Late Latin: fragmentum is often written fraumentum. If the date of the g → w change is in fact earlier, then perhaps this rule bleeds Regressive Gemination by creating wm, a cluster of decreasing sonority.

Across a prefix boundary, gemination seems wide-spread and perhaps obligatory when it involves two obstruents or two sonorants: dis-ferō → differō; in-ruō → irruō. On the other hand, when prefixation consists of obstruent-sonorant, gemination is clearly optional: both arrideō and ad-rideō, both ad-moveō and ammoveō are encountered. Finally, no classical Latin texts record the possibility of gemination with b.l sequences: only ob-loquor occurs, never \*olloquor.

In some cases, Regressive Gemination is preempted by other processes: ml and mr undergo epenthesis and become mbr, mbl respectively; bn, bm, gn assimilate in nasality and yield mn, mm and ŋn. Manuscript spellings like ab-negō, which seem to violate both the bn → mn rule and Regressive Gemination, are contradicted by inscriptions, where the expected amnegō occurs (cf. Niedermann 1953:135).

The irregularities of Regressive Gemination should not obscure its importance for Latin phonotactics: together with the syllabification process, this rule explains the very limited inventory of Latin medial clusters.

## (7) Latin Regressive Gemination

$$\begin{array}{c}
 x \quad y \\
 \# \text{---} \text{---} \text{---} \text{---} \text{---} \text{---} \\
 C]_o \quad [ \quad \sigma C
 \end{array}$$

unless (a) y is of lower sonority than x or

(b) xy is [-cor, αson, αnas][+cor, αson, αnas]

optional in [-son][+son] sequences; inapplicable to b.l.

For our purposes, the relevant fact is that regressive gemination distinguishes between tautosyllabic obstruent-liquid clusters and heterosyllabic ones: recall **sub.ripiō** → **surripiō** vs. intact **la.bra**.

In the transition from Latin to Romance, Regressive Gemination changed along predictable lines, by eliminating some of its conditions. It began to apply regularly to heterosyllabic **bl** sequences and to all [-son][+son] sequences resulting from prefixation. It was extended to all clusters of increasing or level sonority, including to the [-cor][+cor] clusters. The new rule applied obligatorily across a boundary (in derived environments, as a cyclic rule) and optionally stem-internally (postcyclically). Later, individual Romance languages like Italian made the rule obligatory in all contexts while most others lost it. However, and this is significant, Romance Regressive Gemination never applied to stem-internal clusters of obstruent-liquid: the contrast between geminating **b.r** in **sub-ripiō** and non-geminating **br** in **labra** is preserved in Romance.

## (8)

cyclic: ob-vius → \*ovvius → It. ovvio  
 ad-versarius → \*avversariu → It. avversario, Old Fr. aversier  
 co-[ŋ]nosco → \*connosco → Rom. cunosc, Fr. connais  
 ad-retro → \*arretro → Fr. arrière  
 ad-satis → \*assatis → Fr. assez, Old. Sp. asaz  
 ad-mutuo → \*ammutio → Rom. amutesc  
 sub-levio → \*sullevio → Fr. soulager, Sp. soliviar  
 sub leone → \*sulleone → It. sollione  
 sub-ridere → \*suridere → It. sorridere, Fr. sourir, Rom. suride  
 \*ab-runco → \*arrunco → Rom. arunc  
 sub-terrare → \*sutterare → It. sotterare, Prov. Sp. soterrar  
 ab-solvere → It. assolvere, Old Fr. assoldre

postcyclic: spatula → \*spatla → Prov. spatla  
 \*spalla → It. spalla, Fr. epaule  
 planula → \*planla → It. pialla  
 scamnum → \*scannum → Sp. escano and \*scannum → Rom. scaun  
 li[ŋ]num → \*linnum → Sard. linnu  
 \*linnum → It. legno, Rom. lemn  
 stagnare → \*stagnare → Sard. stanzare  
 fraksinus → \*frassinu → Rom. frasin  
 co[ks]a → \*coksa → Rom. coapsa  
 lactuca → lattuca (301 AD) → It. lattuga, Cat. llatuga  
 → lactuca → Fr. laitue  
 frigidor → \*friddor → Sp. Cat. fredor and \*frigidor → Old. Port., Prov. freidor  
 amygdala → amiddula (Appendix Probi: late Latin)  
 \*aptillare → \*attillare → Fr. atteler  
 aptare → \*attare → Sp., Port. Cat. atar  
 scripsit → \*scrissi → Rom. scriise  
 septem → \*septe → Rom. șapte  
 → \*sette → It. sette

Some of the more important sound changes operating above are: the simplification of geminates in all Romance dialects other than Italian (\*frassinu → Rom. frasin); the Romanian change of a velar stop into a labial before **t, n, s** (**coksa** → **coapsa**); the weakening of a syllable final velar to **i** in Western Romance (**lactem** → **Fr. lait**).

## (9) Romance Regressive Gemination

$$x \quad y$$

$$\downarrow \quad \text{---} \quad \downarrow$$

$$C]_o \quad [{}_oC \quad \text{unless } y \text{ is of lower sonority than } x$$

cyclic: obligatory  
 postcyclic: optional

As a result of the Romance Regressive Gemination rule, no heterosyllabic clusters of equal or increasing sonority are preserved across a prefixal boundary in the Romance languages; and only very few such clusters (most of the

class [-cor,ason,anas][+cor,ason,anas] are reconstructible for Proto-Romance stem-internally. Weinrich (1958-230) reaches essentially the same conclusion: "es gibt keine Konsonantengruppen mehr [in Proto-Romance] mit einem Verschlusslaut als erstes Element, ausser wenn das zweite Element r oder l ist (Muta cum Liquida)". Conversely, adds Weinrich, the only possible biconsonantal clusters in late spoken Latin are, aside from obstruent-liquid sequences, the clusters of decreasing sonority: liquid-C (cardo, valde), s-stop (vespa, vestis, piscis), nasal-obstruent (campus, inde, longus).

I sketch below the treatment of stem-internal obstruent-liquid clusters in Romance. The generalization that emerges is that these fail to undergo the Romance Regressive Gemination. Two conclusions will follow: the Romance rule, like its Latin counterpart, applies only to heterosyllabic clusters; and that stem-internal obstruent-liquid clusters are tautosyllabic.

#### 4.2. Romance postvocalic onsets

Obstruent-l clusters were preserved occasionally in French (cf. \*aboclu → aveugle 'blind'; \*duplu → double) and systematically in Istrian (e.g. auricla → urecla 'ear'). Elsewhere l became y in such clusters and the resulting sequence underwent further, less general, changes: \*tribla 'threshing sledge' → \*tribya → Ital. trebbia; auricla → \*aurikya → Rom. urekya (spelled <ureche>).<sup>13</sup>

The Latin obstruent-r clusters are generally preserved in Romanian, Spanish, and Southern Italian:

- (10) nigrum → Rom. negru 'black'  
 februaru → It. febbraio 'february' (COMPARE sub-ridere → sorridero)  
 \*quadrus → Rom. codru 'large forest' (COMPARE ad-runcō → \*arrunc, arunc)  
 capra → Rom., Ital. capra 'goat'  
 lacrima → Rom. lacrima, It. lagrima, Sp. lagrema 'tear'  
 petra → Rom. piatra, It. pietra, Sp. piedra 'stone'

In the Central Romance dialects (French, Provençal, Northern Italian and Tuscan) voiceless stops are voiced and spirantized before tautosyllabic r. At a relatively early stage the voiced spirant becomes a glide in preconsonantal position. The rules involved seem to be ordered differently depending on the clusters and on the individual dialects:

- (11) integrum → \*inte<sub>1</sub>ru → \*inteiru (Fr. entier)  
 agrum → \*a<sub>1</sub>grum (Fr. aigre): Voicing after Spirantization)  
 patrem → \*pa<sub>1</sub>drem → \*pa<sub>1</sub>re (Prov. paire): Spirantization after Voicing

The rules of Voicing and Spirantization illustrated above applied not only to the postvocalic member of an obstruent-liquid cluster but also to intervocalic obstruents. If we assume that all stem-internal obstruent-liquid clusters are tautosyllabic in Romance, then the disjunction of [-cons]<sub>1</sub> and [-cons]<sub>2</sub> liquid contexts reduces to the environment postvocalic and syllable initial. Most Romance dialects had rules of voicing and spirantization in this context: the only variable factor is the class of obstruents subject to such rules. In Northern Italian the rule applied to all obstruents<sup>14</sup>. In Romanian, one of the more conservative dialects in this respect, spirantization is limited to a postvocalic, syllable-initial b, which becomes w. In intervocalic position this w is eliminated entirely: libertare → \*liwertare → \*liertare → iertare 'forgiving'. Before a liquid, however, w becomes u, a detail predictable from the fact that the intermediate wr, w clusters must have been heterosyllabic in Proto-Romanian: fabru → \*fa<sub>1</sub>w.ru → fa<sub>1</sub>.ur 'artisan'; stablum → \*stawa.lum → staul 'stable', cribu → cri<sub>1</sub>w.ru → ciur 'sieve'. In contrast with the regular spirantization of the postvocalic onset b, Romanian coda b is occasionally preserved: subtilis → sub<sub>1</sub>fire 'thin', sub<sub>1</sub>ter → sub(t) 'under', in precisely those contexts where Romance Regressive Gemination had been optional. The relevant sound changes are outlined below:

#### (12) Romanian Spirantization

- a. b → w/ [-cons] [<sub>1</sub> -  
 b. w → Ø/ [-cons] [<sub>1</sub> -

As noted above in (3.3), the context of Romance voicing and spirantization could in principle be restated in terms independent of syllabic divisions: [-cons]\_ [+son, +cont]. The argument for the syllable-dependent context given in (12) is provided by the failure of geminate obstruents to undergo voicing or spirantization: contrast French rive (← ri.pa), chèvre (ca.pra) with cep (← cip.pu) or Romanian bere (← \*bi.were → bi.be.re) with gheb (← glib.bu). In conjunction with a theory of geminate blockage such as the one presented in Schein and Steriade (1986), the syllable-dependent formulation of voicing and spirantization explains these contrasts. The alternative does not.

To sum up this part of the argument: Regressive Gemination (9), a streamlined version of the Latin rule (7), must be reconstructed for Proto-Romance, since its effects are regularly reflected in each Romance language. The Romance rule did not affect stem internal obstruent-liquid clusters, an indication that these sequences continued to be tautosyllabic. The early Romance sound changes that voice and spirantize postvocalic onsets affect the first member of obstruent-liquid clusters, demonstrating again their tautosyllabic status.<sup>15</sup>

#### 4.2. Cluster Simplification

Latin coda clusters were of two types: nasal-obstruent (emp.sī, iunc.tus) and liquid-obstruent (ar[ks] 'citadel', cal[ks] 'heel'). Obstruent-s codas are attested only word-finally.<sup>16</sup>

In the transition from Latin to Romance, codas became restricted to one member. First, already in Latin, liquid-obstruent codas simplified word-medially by losing their last member: farc-tus 'stuffed' became fartus, ulc-tus, ulc-sī 'avenge' became ultus, ulsī. At a later stage, nasal-obstruent codas lost their second member: unc-tus, unc-sī 'anoint' became untus, unsi, temptō 'to feel by touching' became tentō. False spellings like lancterna for lanterna (itself resulting from the simplification of Greek lampter), attested already in the 2nd century AD (Väänänen 1967:64), indicate a relatively early date for the complete elimination of complex codas from the system.

Since Proto-Romance had inherited a syllable type that disallows coda clusters, the analysis of any triconsonantal consonant cluster is disambiguated: VC<sub>1</sub>C<sub>2</sub>C<sub>3</sub>V could surface only if C<sub>2</sub>C<sub>3</sub> was a possible onset. If complex onsets are eliminated from Proto-Romance, the triconsonantal clusters inherited from Latin should lose their middle member in all contexts. But if the onset structure of Proto-Romance is identical to that of Latin, then such clusters should surface if C<sub>2</sub> is an obstruent and C<sub>3</sub> is a liquid. The latter prediction turns out to be the correct one: clusters like ltr (altra → Lat. altera 'other-feminine'), cultrum 'knife', scl (masclus → Lat. masculus 'male-dimin. '), mbr (umbra 'shade'), mps (amplus 'wide'), ngl (ungla → Lat. ungula 'nail') are preserved in the individual Romance languages and suffer only dialect-specific sound changes, never the loss of the medial C<sub>2</sub>.<sup>17</sup> The inherited triconsonant clusters were preserved because the complex codas had already been simplified in Late Latin and because no change had occurred in the structure of the onset.

Moreover, consonant clusters newly created within the early stages of the history of individual Romance languages were preserved under the same conditions: if they could be parsed into a single coda consonant and a Latin-style onset. In Provençal, for instance, one observes the contrast in the treatment of two syncope outputs: \*pertga from pertiga (Lat. pertica 'pole, rod') simplifies to perga whereas martror from martirorum 'martir-Gen. pl' is preserved intact. Similarly domestgar from domestigar 'game' simplifies to domesgar whereas anglu from angulu is preserved (cf. Pellegrini 1960). The same observation can be abundantly illustrated with data from the early history of French (cf. Fouché (1966: 825-851)) and Romanian (cf. Nandriş (1963: 284-285)): syncope rules creating triconsonantal clusters are followed by the loss of C<sub>2</sub> in C<sub>1</sub>C<sub>2</sub>C<sub>3</sub> only when C<sub>2</sub>C<sub>3</sub> is not a possible Latin onset.

#### 4.3. Initial clusters

I summarize here the main facts about the development of Latin initial clusters in Romance and their implications for the reconstruction of Romance syllabic divisions.

The Romance languages maintain in general the Latin word-initial obstruent-liquid clusters. For the reconstruction of the Proto-Romance situation, the relevant generalization is that each type of Latin obstruent-liquid onset is reconstructible at the beginning of the word: *placere* 'please' → Rom. *placere*, Fr. *plaisir*; *frenu* 'rein' → Rom. *frîn*, It. *freno*, Fr. *frein*; *florem* 'flower' → Rom. *floare*, Fr. *fleur*; *blasfemare* 'curse' → Rom. *blestema*, Sp. *blasma*, Fr. *blamer*; *breve* 'short' → It. *breve*, Fr. *bref*; *trabem* 'wood beam' → Rom. *treaba*, It. *trave*, O.Fr. *tref*; *draconem* 'dragon' → Rom. *drac*, Fr. *dragon*, Cat. *drag*; *clavem* 'key' → Fr. *clef*, Rhet. *klaf*, Prov. *claus*; *glacies* 'ice' → Fr. *glace*, Prov. *glatz*; *crucem* 'cross' → Rom. *cruce*, It. *croce*, Fr. *croix*; *grana* 'grain' → Rom. *grîne*, It. *grana*, Fr. *grain*. The preservation of these clusters in initial position is predicted straightforwardly if their tautosyllabic status was transmitted from Latin to Romance.

Significantly, the Latin heterosyllabic initials were preserved less uniformly in Romance. Already in Late Latin initial s-obstruent clusters triggered an optional prothesis rule: inscriptions and late texts provide forms like *ispopondit* (Class. *spopondit*) 'he pledged', *espopondiderunt* (Class. *spoponderunt*), *iscripta* (Class. *scripta*) 'written'. The prothesis of a short *i* or *e* was not limited to s-obstruent initials but applied generally to all heterosyllabic initials: *izmaragdus* (Greek *smaragdos*), *ismurna* (Greek *Smyrna*), *eksenium* (Greek *ksenion*). I assume that the rule was postcyclic, since its cyclic application would produce intermediate unattested sequences in cases like *re-stituō* \**re-istituō*: a postcyclic prothesis rule will permit such forms to syllabify as *res.ti.tu.o* before it comes into effect.

(13) Romance Prothesis 1 (postcyclic, optional)

$\emptyset \rightarrow V / \# \_ C'$  ... C' = unsyllabified C

Because Romance Prothesis was optional, the attested Late Latin treatment of heterosyllabic initials shows three possible variants, tabulated below:

(14)	With Prothesis	Without Prothesis
rule (4)	<i>iscripta</i> , <i>espopondiderunt</i>	<i>scripta</i> , <i>spoponderunt</i>
	applic.	applic.
rule (4)	<i>ismurna</i> , <i>eksenium</i>	<i>ptisane</i> → <i>tisana</i>
	inapplic.	<i>psalterium</i> → <i>salterium</i>

Table (4) shows that where prothesis fails to apply, the Latin rule (4) continues to incorporate the initial stray *s*; but that heterosyllabic initials to which neither prothesis nor rule (4) has applied – the latter failing predictably before sequences other than *s*-[-sonorant] – simply lose their initial unsyllabified member, as comparable clusters had in Classical and Preclassical Latin. This, of course, is the direct consequence of the principle of exhaustive syllabification discussed earlier.

In this context, the failure of word-initial obstruent-liquid clusters as in *placere* or *crucem* to trigger either prothesis or cluster simplification becomes significant. On the hypothesis that these continued to be tautosyllabic in Late Latin, this is the predicted outcome: both prothesis and cluster simplification require an initial stray consonant in the postcyclic stage of the derivation, whereas obstruent-liquid initials have already been syllabified as onsets on the initial cycle. The idea that obstruent-liquid clusters were heterosyllabic in Romance makes, in its most natural form, the prediction that *placere*, *crucem* should similarly have varied between \**iplacere*, \**icrucem* and \**lacere*, \**rucem*.

The reflexes of the heterosyllabic initials in different Romance languages vary depending on the fate of rule (13). In Western Romance, where the rule became obligatory everywhere word-initially, heterosyllabic initials are preserved uniformly with a prothetic *e*: *sponsu* 'spouse' → Old Fr. *espos*, *schola* 'school' → Old Fr. *escole*, *smaragdu* → Old Fr. *esmeralde*. Fouché (1967: 703) mentions the fact that the Old French *pt*, *pn*, *ps*, *ks*, *hl*, *hr* heterosyllabic

initials failed to undergo prothesis and, instead, lost their first member: *psalmu* → *saume*, *pneuma* → *neume*, *phthisis* → *tesie*, Frankish *hlot* → *lot*. This indicates that Romance prothesis was inherited into French in a limited form, applying only before a syllabically stray *s*.

(15) Romance Prothesis 2 (obligatory)

$\beta \rightarrow v / \# \_ s'$

Heterosyllabic initials not subject to (15) simplified in the predicted fashion.

In Italian, prothesis became first restricted to heterosyllabic initials found postconsonantly in close-knit phrases: in *iscuola* but postvocalic *la scuola* and *scuola* in phrase-initial position. As in French, prothesis seems to have affected primarily *s*-obstruent clusters, but occasionally other heterosyllabic initials show its effects: Old Tuscan seems to have had prothesis also before *ñ* (spelled *gn*) initials, as in *ignudo*, *ignocco* (Rohlf's 1966: 220). Early Italian, like Proto-Romance, must have maintained, in addition to its limited prothesis rule, the old Latin and Romance rule (4): the *s*-obstruent clusters surface initially regardless of whether prothesis has applied, whereas other heterosyllabic initials fail to surface without prothesis: Gothic *knohha* → *nocca* 'knot', Old High German *slack* → *It. lacco* 'weak'.

Finally, Prothesis was entirely eliminated from Eastern Romance: as a result, Romanian preserves only those heterosyllabic initials whose syllabic incorporation was provided for by rule (4). One can compare the treatment of clusters resulting from the loss of an initial vowel: *expavimen* → *\*kspaimen* → *spaima* 'terror', *ekspono* → *\*kspono* → *spun* 'I say' but *fossatum* → *fsatu* → *sat* 'village', *budenie* → *\*bdenie* → *denie* 'religious service', *dvornicu* → *vornic* 'mayor' (Nandriș 1966: 173). In Old Romanian, the optional elimination of an initial vowel is automatically followed by the simplification of any resulting heterosyllabic initial (*imparatul* → *\*mparatul* → *păratul* 'emperor': *insellare* → *\*nshellare* → *gălară* 'they saddled', *ambulamus* → *\*amblamu* → *mblamu* → *blam* 'we walk'), unless the initial cluster consists of *s*-obstruent (*Istambul* → *Stambul*, *ispovedire* → *spovedire*).

Needless to add, neither prothesis nor cluster simplification ever affected the initial obstruent-liquid clusters of French, Italian or Romanian.

5. The causes of stress shift

The preceding sections have shown that the only respect in which the syllable structure of Romance differs from that of Classical Latin is the degree to which complex codas had been eliminated. Complex onsets, on the other hand, remained unchanged from Classical Latin into the individual Romance languages to the present.

I return now to one of the questions raised at the beginning of this paper: why did stress shift rightwards in words of the *integra* class? So far we have only concluded that the most obvious explanation, a shift in syllable boundaries, is not available.

I will suggest in this section that the stress shift was due to a reinterpretation of the Latin stress rule.

Several factors had made it difficult to interpret the relation between syllable weight and stress in Proto-Romance. First the syncope of *u* between a stop and *l* created penult stressed sequences in *apfcla*, *aurfcla*, *sofclcu* etc. from *apfcula*, *aurfcula*, *sofclulu*. The syncope rule itself was not fully general so that the stress pattern of *apfcla* could not be transparently justified in terms of the interaction between stress and syncope. Items like Romanian *\*ftflu* come from unsyncopeated Romance *\*ftflu*: Romance *\*ftflu* would have become *\*ftflu* and then *\*ftkyu* in Romanian. Italian *távola* comes from unsyncopeated *távula*.<sup>18</sup> Cul syncope created a very large class of words of the *aurfcla* type, in which a surface *Cl* onset is preceded by penult stress. Practically no Latin words like *lócuples* (with an underlying *Cl* cluster) had been preserved.<sup>19</sup> Nothing would then prevent speakers from deducing that all *Cl* onsets attract stress on the preceding syllable.

Further, the desyllabification of high and mid vowels in hiatus created a second class of words in which a surface complex onset seemed to attract stress on the penultimate syllable. Words like *camfsia* 'shirt', *cicónea* 'stork',

albſtia 'whiteness', exágium 'weighting, weight', mancſpium 'property' became ca.mí.sya (Rom. cămăşă), ci.có.nya (Fr. cigogne), al.bí.tya (Rom. albediță), es.sa.gyu (It. saggio). That at least some of the C-Glide sequences resulting from Glide Formation were tautosyllabic in Proto-Romance is again indicated by the fact that the initial consonant of the cluster underwent the voicing reserved to postvocalic onsets: artemſia → Fr. armoise (with [z]); camſia → Fr. chemise; nađsea → Fr. noise; eoclésia → Fr. église.<sup>20</sup> Words of the ca.mí.sya class represented a second apparent instance of stress occurring on the syllable preceding a complex onset. Moreover, since no medial Cy onsets existed in Classical Latin, no words like \*ca.mi.sya prevented Romance speakers from generalizing: all Cy onsets attract stress on the preceding syllable.

Thirdly, a pervasive but optional rule of Late Latin inserted epenthetic vowels into consonant clusters containing r. The Latin evidence for this rule was gathered by Schuchardt (1867):

- (16) sacrum → sacerum 'sacre'  
 Alexandri → Alexandiri  
 supra → supera 'above'  
 Petro → Petero  
 mitra → mitara 'cap'

In some cases, the Romance languages preserved the lexicalized outputs of this epenthesis rule: mitera (from mitra) occurs in Old Italian (Korting 1907: 659), setenberes (from septembris) and enterecen (from integrent) occur in Old Spanish (Menendez Pidal 1950: 197). Epenthesis in r clusters was continued as an obligatory rule in Sardinian (Wagner 1907): umbara from umbra 'shadow', ainturu from adintru 'inside'.

The joint effect of Cul syncope, Glide Formation and r-Epenthesis was to obscure the relation between Latin stress and syllabification. The generalization that stress is assigned to a syllable preceding Cl and Cy clusters could be extended further: almost all Romance consonant clusters would appear to have the same effect, simply because most clusters were heterosyllabic. The tell-tale exceptions that might have prevented such a generalization were precisely

words like in.te.gra, in which a Cr onset separates the final from the penult. But, due to the optional epenthesis in r clusters, the analysis of integra was no longer clear: gr surfaced both intact and as gvr. The result was that very limited data stood in the way of the following reinterpretation of the Latin stress rule:

- (17) Stress the penult if it is followed by a consonant cluster.

What must have been the decisive advantage of an approach based on (17) was the fact that it eliminated the opacity of the relation between Cul syncope, Glide Formation and stress: syncope and Glide Formation can now stand in a transparent feeding relation to the stress rule. I suggest then that the stress shift in integra was due to the reinterpretation of the Latin Stress rule as (17).

If this suggestion is on the right track, then one might expect a limited range of idiolectal variation to have existed: individual speakers may have succeeded in reconstructing from the available data the Classical Latin stress rule, and its opaque relation to Cul syncope, Glide Formation and r Epenthesis. From such idiolects one may expect forms like the ones in (18), where the stress did not shift rightwards:

- (18) méretrix Old. Lomb. méltris  
 púllitru Ital. pulédro but Fr. poutre, Cors.  
 féretru Fr. fièntre  
 cólobra Old Astur. cuélebra (Menendez-Pidal  
 1950: 165)  
 cúlciitra Ital. cúlcietra, O.Sp. acólcietra

Had the rightwards shift in stress represented the automatic result of a change in syllable structure, there would be no way to explain these vestigial forms: throughout Proto-Romance, genuinely closed penults as in potéstas had continued to receive obligatory stress.

## 6. Speculations on the reversal of the stress shift

Both Italian and Spanish have by now reverted to a version of the Latin stress rule: stress cannot recede beyond a closed penult, but it can beyond an open one, even when such a syllable is followed by a complex onset. Harris (1983: 109) cites Spanish *ó.mi.cron, i.dó.la.tra, fú.ne.bre, mál.ti.ple*. Similar Italian examples are *té.ne.bre, cá.li.bro, mál.ti.plo*. In both languages, as everywhere else in Romance, the loss of vowel quantity distinctions added a further complicating factor to the stress rule: since words like Spanish *esquimál* do not differ from words like *canfbal* (as in Harris (1983)) in order to account for both types with the same stress rule. In the case of Spanish, extrametricality involves the final segment: hence *es.qui.mál* with a final heavy syllable, but *ca.ní.ba(1)* with a final light syllable. The stress rule itself is identical to that of Latin: stress a final (non-extrametrical) syllable if heavy, otherwise stress the penult. Similar provisions can be made for Italian, where extrametricality, however, involves syllables rather than segments.

Romanian on the other hand, appears to have preserved intact rule (17): of the approximately 45 words longer than two syllables and containing an obstruent-liquid cluster at the boundary between final and penult, none is attested with antepenultimate accent. Loanwords such as *masá cru, algébra, echilíbru, escádra, idiolátru, neútru, speráclu, porécia* are also stressed in accordance with (17).<sup>21</sup>

Two complementary questions need to be asked: why did Spanish and Italian abandon (17) in favor of a revived Latin stress rule? Why did Romanian preserve (17)? My answers to both are speculative.

I begin with the first question. The suggestion in this case will be that Spanish and Italian lost most of the strings that provided critical evidence for (17). The intervocalic Romance complex onsets were either simplified to a single consonant or underwent gemination and became heterosyllabic. The first type of development affected the Northern Italian, Provençal, French and Spanish sequences *VdrV, VgrV*, which become *VirV*. Of the Romance *Cr* onsets, Spanish preserved only the *dr, br, gr* clusters corresponding

to Romance *tr, pr, kr*. Tuscan and Southern Italian preserved some instances of both voiceless-*r* and voiced-*r* onsets but many fewer than the full set inherited, due to a wide-spread process of liquid metathesis that turned *CVCrV* sequences into *CrVCV*. This process operates throughout the Italian dialects, as Milanese *intrég* from *intégro*, Lombard *cadréga* and Venetian *cadréa* from *catédra*, Lucanian *attrófu* from *ottóbre*, Sicilian *triátu* from *teátru* (cf. Rohlfs 1966: *passim*) indicate.

Gemination eliminated the onset *Cl* clusters of Provençal, French and Spanish: they became *C* first and then geminate  $\lambda\lambda$ . In Italian, the *Cl* onsets became *Cy* (perhaps through a stage *Cλ*); then a distinct gemination rule turned all *Cy* onsets - including those resulting from older *Cl* - into *CCy* heterosyllabic sequences (cf. fn. 20). The same gemination rule affected regularly all labial-*r* onsets and, occasionally, other *Cr* onsets.

The global effect of these sound changes was to eliminate from the surface strings of Italian, French and Spanish most postvocalic complex onsets that continued to motivate (17) as the stress rule. In the absence of such strings, the evidence supporting the generalization expressed by (17) - that stress cannot recede beyond a penult followed by a consonant cluster - could be reinterpreted: one could draw the phonologically more natural conclusion that stress cannot recede beyond a closed penult. It is this conclusion that was incorporated into the modern stress rules of Spanish and Italian.

Romanian, on the other hand, is the most conservative of major Romance languages in its preservation of Latin postvocalic onsets. All non-labial voiced stops and all voiceless stops were preserved intact before *r* (Mandriş 1963: 143). The change of *l* to *y* in *Cl* onsets did not affect the structure of the cluster: the resulting *Cy* sequence did not geminate to *CCy* as in Italian or become heterosyllabic, as in Spanish. Simply, one type of complex onset, *Cl*, was replaced by another, *Cy*. It is conceivable then that the presence of strings like *u.ré.kye* (from *au.rí.cia*), *pá.dú.kye* 'louse' (from *\*pe.df.clus*) etc. continued to provide evidence for the Romance stress rule. In addition, stress shifted rightwards on the penultimate in many cases where a liquid alone separated the final from the penult



(Puşcariu (1903): búttula 'small jar' → butoára, fébru 'shiver' → féu.ru then fe.ú.ru and eventually fi.ó.ru; cúculus 'bird sp.' → cocóru, pópolus 'people' → popóru; \*sécale (Väänänen 1967:33) → secára 'rye'. This last development is not well understood, but represents perhaps the result of an alternative rationalization of the surface stress pattern inherited from Romance. In any event, the presence of a rule like (19) in the contemporary grammar of Romanian, accounts not only for items like cocóru but also for masécru, neútru, etc.

- (19) Stress the penultimate if the final onset contains a continuant sonorant.

Aside from the cases covered by (19), stress is assigned in contemporary Romanian by a rule essentially identical to that of Latin (cf. Steriade 1984) modified by lexically governed extrametricality provisions, as in Spanish.

#### 7. Earlier syllable shifts

We have seen so far that the onset structure of contemporary Romance languages is identical to that of Classical Latin because it is descended from it. The Romance stress shift in the *integra* class, the only phenomenon that could argue for discontinuity in the history of Latin-Romance onset structure, has been given an alternative explanation.

Two complementary syllable shifts have been eliminated in this way: the shift from *in.te.gra* to *in.teg.ra* and the shift back to *in.te.gra*. Recall now that similar shifts in syllabic division appeared necessary for an explanation of the patterns of syncope and vowel raising in prehistoric Latin: from *con.sa.cro*, a syllabification required by e-Syncope, one must shift to *con.sac.ro* in order to explain the prehistoric raising to *consecro*, and then back to attested *con.se.cro*. Without the intermediate stage *con.sac.ro*, it would seem impossible to explain why the short *a* did not raise to high (as in *conficio* from *con.fa.ci.o*).

One detail in the paradigm of Raising Indicates however that this traditional explanation for *consecro* is on the

wrong track: Raising did take place before Obstruent-1 clusters as if the preceding vowel was in an open syllable. Thus \**veheclom* 'vehicle' became *vehiclum*. If obstruent-liquid clusters had been heterosyllabic at the time Raising took place, one would have predicted \**veheclum*.

As Bernardi Perini (1974) has noted, a simple explanation is available for the vowel height of the *consecro* class, which does not require syllable shifts and which does not run afoul of *vehiclum*. Latin lowers *i* to *e* before *r*. This rule affects vowels that have been raised in non-initial open syllables: hence the contrast between *pario* 'produce' but *re-perio* 'find' from intermediate, post-Raising \**re-pirio*. The same rule, if extended to apply across an intervening consonant, will correctly derive *consecro* from intermediate *con.si.cro*. Since the lowering of *i* to *e* does not take place before *l*, the vowel quality in *vehiclum* can now be correctly predicted. An elaborate case for this analysis is made in Bernardi Perini (1974), so I will not repeat here the details of the argument.<sup>22</sup>

#### 8. Conclusion

This investigation has a factual conclusion and a number of methodological ones.

The factual conclusion is that the tautosyllabic status of obstruent-liquid clusters in contemporary Romance languages goes back in a straight line to the earliest reconstructible stages of Italic. The history of Latin-Romance syllable structure emerging from this study is one of remarkable stability: over a period of approximately 25 centuries, onset structure has remained essentially the same; coda clusters, originally allowing [+son][-son] sequences, became restricted over the entire documented history of Latin to one consonant only; the same Stray Adjunction rule - (4) above - has provided for the limitations on heterosyllabic initials from Italic and perhaps Indo-European to contemporary Romanian.

Several points of method have also been established. The independent criteria used here in reconstructing syllabic divisions have validated each other. Thus the principles of exhaustive syllabification and onset maximization have led

to the reconstruction of syllabic divisions like *re.tro* on the basis of the observation that clusters like *rtr*, *ltr*, *str* were preserved in Romance. The assumption of cyclic syllabification has led to Romance \**ad.runco* contrasting with \**que.drus*: this contrast has explained a fairly complex pattern of gemination (\**arrunco* → *Rom. arunc* but *quadru* → *Rom. codru*) which in turn has provided an independent argument for the tautosyllabic status of obstruent-liquid clusters. The assumption that rules which fail to affect geminates must refer to syllabic boundaries or syllable constituents has helped select one formulation of Romance voicing/spirantization, and this choice has once again led to the conclusion that obstruent-liquid sequences were complex onsets.

One important guideline for reconstruction has not been made explicit so far: sound change proper is the source of only a small subset of the transformations in the surface strings of Latin and Romance. Most of the historical developments reconstructed here are changes in the format of existing rules (e.g. the simplification of Latin Regressive Gemination (7) leading to its Romance version (9)); automatic consequences of the interaction between phonological rules and syllabification (e.g. the change in the syllabification of Latin *sta.blu* → \**sta.wlu* (by (12a) → \**staw.lu* → *Rom. staul*; or the automatic cluster simplification following syncope in Provençal *domesticare* → *domestgar* → *domesgar*); or, finally, instances of restructuring (in the sense of Kiparsky 1965). Belonging to the last category are the Romance stress shift of *Integra* to *Intégra* and the Italian/Spanish reversals of this shift: both shifts are due to the changing relation between a stress rule and the surface strings providing transparent evidence for it.

## NOTES

- 1 On the assimilation of *rl* to *ll* see section 4.
- 2 The quality of the vowel preceding the derived *ll* sequence is not always clear: while *sacellum*, *cerebellum* etc. are the expected results, *pugillus*, *sigillum*, *asellus*, *ampulla* cannot be reconciled with the sound laws or with each other. Some discussion of the facts is provided in Leumann 1977:143.
- 3 The statements of Latin writers and grammarians on the location of the accent are collected in Schoell (1876).
- 4 "The Latin accent has been extraordinarily tenacious and the accented Latin syllables have remained accented in Proto-Romance essentially without exception." (Meyer Lübke 1890 : 522).
- 5 Cf. also Väänänen 1967:34 and Pulgram 1975.
- 6 A sample of such onset systems is discussed in Levin 1985 and Steriade forthcoming. See also Devine and Stephens 1977. English, whose onset clusters are the same as those of Latin-Romance, behaves in this respect as a French dialect. Germanic languages like Icelandic, which have been shielded from massive Romance influence, have a radically different onset system (cf. Steriade forthcoming).
- 7 Harris (1983) and Reighard (1982) report that *tl*, though not *dl*, may be tautosyllabic in Spanish and Portuguese. The Latin evidence for the assignment of such clusters is discussed in Steriade (1982).
- 9 There are two alternative ways in which the cluster *ny* may surface: *co[n]içiō* and *co[ly]çiō*. The first option results from simplifying the initial *yi* to *i*, as elsewhere in Latin (*a.[yi]s* 'you say' → *a.is*). The second option results from the Regressive Gemination rule discussed in the text. Note that both options can be obtained by simply varying the order between the two rules. If *yi* → *i* simplification applies first, Regressive Gemination is bled, for lack of *y*. If, on the other hand, Regressive Gemination applies first, then a geminate *yy* cluster is created, i.e. a single segment multiply associated to both the onset and the coda of the adjacent syllables. Such structures are generally immune to the application of phonological rules which, like *yi* → *i*, require reference to the syllable (cf. Schein and Steriade 1986). For this reason, Regressive Gemination in *co[ly]çiō* bleeds *yi* → *i*.

10 Latin geminate clusters are simplified after long vowels, hence *glū.ma* from intermediate *glūm.ma*.

11 On Latin *qu* (=kw) see Devine and Stephens 1977 and Steriade 1982.

12 A different rule of gemination affects certain liquid clusters of decreasing sonority: *rs*, *ls* become *rr* and *ll* respectively; certain old instances of *ln* become *ll* (cf. Niedermann 1953:141). The progressive direction of this rule, as well as its limited scope identify it as a phenomenon distinct from the one discussed in the text.

13 I believe that Meyer-Lübke (1890:440) was the only one to have noted, with no further comment, the systematic contrast between regressive gemination in cases like *sub-leonem* → *sollione* and the absence of it in *\*tribla*, *auricla* etc.

14 Cf. Rohlf's (1966:39) who notes the fact that pre-liquid obstruents are treated by this rule exactly as if they were prevocalic.

15 Cf. also Weinrich's (1958:238) comments on the context of the Pan-Romanic phenomena of voicing and spirantization: "wo Kurzkonsonanten intervokalisiert variieren, da werden sie auch zwischen Vokal und r, l variiert." Weinrich goes on to point to the connection between the treatment of postvocalic obstruent-liquid sequences and the fact that only obstruent-liquid clusters are permitted after consonant in Romance. See below.

16 The analysis of the medial clusters *kst kstr* found in *sekstus*, *ekstra* remains unclear: these are the only instances of inter-obstruent *s* found stem-internally in Latin. In general, a cluster [-son]s[-son] loses its first member: *seks-centī* → *sescentī* 'six hundred', *Opseī* → *Oscī* 'Oscans'. See Niederman 1953:159, who claims, on the basis of epigraphic evidence, that the *kst* pronunciation was restricted to the literary language.

17 This fact was already noted by Weinrich (1958:233): "Es gibt nur Dreiergruppen deren letztes Element ein r oder l ist. Das ist das vulgärlateinische 'Drei-Konsonantengesetz'."

18 It has been suggested (most recently by Otero (1985)) that the cluster resulting from syncope was evenly divided among adjacent syllables: thus *au.ri.cu.la* → *au.ri.cu.la*. Although other cases have been encountered in which the post-syncope syllabification of a cluster differs from the pre-syncope assignment available to the same sort of cluster

(Prince 1980), considerations internal to Romance invalidate this hypothesis: the stop-liquid clusters resulting from syncope do not differ in their evolution from the inherited stop-liquid onsets. Thus the stop in *\*lepre* from *leporem* undergoes the postvocalic voicing reserved for onsets, not Regressive Gemination or the change to *i* to which coda stops are subjected in Western Romance: the result is Fr. *lievre* 'hare', Sp. *liebre*. Compare the identical treatment of an inherited *pr* onset in *coprum* 'copper' → Old Fr. *cuevre*, Sp. *cobre*.

19 The following are all the Classical Latin words of three syllables or longer in which an underlying *Cl* onset separates a light penult from the final: *cátapulus*, *céntuplex*, *cfniflo*, *lócuples*, *múltiplex*, *quádruplus*, *óctuplus*. None have been preserved in any Romance language, which makes it doubtful that they were present in Proto-Romance at the time of the stress shift.

20 Stop-y clusters, however, underwent a later Romance rule of progressive gemination: e.g. *sapiat* → It. *sappia*, French *sache* from *\*sappyat* → *sappāa* → *sapāa* → *sasā*, where the absence of postvocalic voicing indicates that the obstruent portion of the cluster had been geminate when that sound change took place. Similarly *habeat* → *\*habyat* → *\*habbyat* → It. *abbia*, Rom. *aibă*, where the fact that *b* fails to spirantize by rule (12) is again due to the presence of a geminate *bb* at the time of Romanian Spirantization. On progressive gemination within stop-y clusters see Schein and Steriade (1986). The fact itself that the gemination rule applying to the stop-y clusters is not the Regressive Gemination rule in (9) indicates that they were tautosyllabic, like the obstruent-liquid onsets. Had VCyV been divided VC.yV, one would have expected *\*camisya* to undergo Regressive Gemination to *\*camiyya*, as in Latin *dis-yungo* → *diyungo*.

21 One observes that French is the major source of loanwords into Romanian: if so, the penult stress in examples like *masăcru* (from French *massacre*) may be attributed to the influence of the French source. Note however that words like *ne.ó.tru*, which are loans from Latin *néuter*, not from French (*neutre* i.e. [noétrə]), cannot be so explained.

22 When presenting this argument at the LSRL conference, I had been unaware of Bernardi Perini's work.

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