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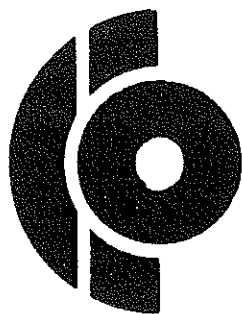
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THE EVOLUTION OF THE PORTUGUESE DIPHTHONGS EI AND OU
IN THE DIALECTS OF LIBSON AND MONSANTO

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1. Introduction

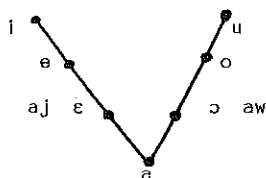
As is well-known, one of the most salient features differentiating Portuguese from its Iberian neighbour, Spanish, is the absence of any evidence for the diphthongization of Vulgar Latin (or Romance) stressed e and o during the course of its evolution. Whereas in Portuguese, the low mid vowels in question remained unchanged, in Spanish, e and o evolved to je and wo>we by the tenth century (Bourciez 1923, 377). Compare, for example: herba > Port. herva, Sp. hierba 'grass, weed', petra > Port. pedra, Sp. piedra 'stone', socra > Port. sogra, Sp. suegra 'mother-in-law', rota > Port. roda, Sp. rueda 'wheel'.

On the other hand, whereas Old Portuguese manifests the falling diphthongs ei ([ej]) and ou ([ow]) (resulting, for instance, from Romance ai ([aj]) and au ([aw])), Spanish generally shows the simple vowels, e and o, as reflexes of these Romance sources. This contrast can be seen in correspondences such as: auru > Port. ouro, Sp. oro 'gold', paucu > Port. pouco, Sp. poco 'little', cantai > Port. cantei, Sp. canté 'sing

(1sg. pret.)', habeo aio > Port. hei, Sp. hé 'have (1 sg. pres. indic.)'.

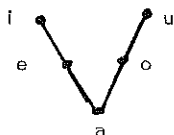
Viewed in isolation, this divergent development appears to be nothing more than an idiosyncratic split in the two languages. However, if one extends the time dimension somewhat and examines the dynamics of the Romance vowel system from which Spanish and Portuguese evolved, it is possible to obtain a natural explanation for the observed variance. The Vulgar Latin vowel system characteristic of most of Romania can be represented as in (1).

(1)



As can be seen, the simple vowels form a system featuring four degrees of vowel height. In terms of phonological markedness, this situation deviates from the least marked system which is characterized by three degrees of aperture, as in (2).

(2)



wherein the vowels are maximally distinct, separated by approximately equal perceptual distances along the periphery of the vowel space. The addition of the low mid ɛ and ɔ in the Vulgar Latin system (1) reduced the scope of allophonic variation possible for the mid series:

A basic weakness of the Vulgar Latin vowel system is that the front and higher mid e/o are a little too close to the lower mid ɛ/ɔ in terms of linguistic comfort. In other words, the margin of tolerance between /e/ and /ɛ/ and between /o/ and /ɔ/ is not enough for phonemic security (Romeo 1968, 63).

The existence of a four-degree vowel height system does not, in itself constitute a situation which would tend to lead to a restructuring. Such systems are, in fact, very common among the world's languages. However, we observe in (1) that Vulgar Latin possessed, in addition to the seven simple vowels, the diphthongs aj and aw monophthongized. The reduction of aw, a diphthong present in Classical Latin, was completed before the first written documents and can be formalized as (3).¹

$$(3) \quad \begin{bmatrix} V \\ + \text{ low} \\ + \text{ back} \\ - \text{ round} \\ 1 \end{bmatrix} \quad \begin{bmatrix} G \\ + \text{ round} \\ 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 \\ + \text{ round} \end{bmatrix} \quad \emptyset$$

aw coalesces to ɔ

As a consequence of this change, a push chain effect was set in motion. There was now pressure on Romance ɔ to remain distinct from this derived ɔ, but also to avoid merger with o. In order to prevent such a merger, ɔ strengthened itself by developing an on-glide agreeing in backness and rounding.

$$(4) \quad \begin{bmatrix} V \\ - \text{ high} \\ - \text{ low} \\ + \text{ back} \\ 1 \end{bmatrix} \rightarrow \begin{bmatrix} G \\ + \text{ back} \end{bmatrix} \quad 1$$

ɔ diphthongizes to wo

This strengthening process was soon extended to the corresponding low front vowel, e, which diphthongized to je probably the sixth century (Romeo 1968: 64). The change can thus be viewed as a generalization of (4), i.e. (5).

$$(5) \quad \begin{bmatrix} V \\ - \text{high} \\ - \text{low} \\ \text{back} \\ 1 \end{bmatrix} \rightarrow \begin{bmatrix} G \\ \text{back} \end{bmatrix} \quad 1$$

This extension could be accounted for by appealing to the notion of 'symmetry' or 'pattern congruity'. This is the position taken, for example, by Romeo (1968, 71), who suggests that: "As a correlative partner of the former /ɔ/, the front mid-open vowel phoneme /ɛ/ is now subjected to the pressure of equipollence, and by a similar process utilizes the highest vowel in the front series, i.e. /i/, as an initial glide, resulting in /iɛ/".

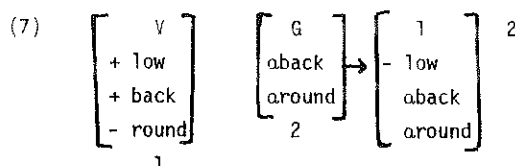
It is possible, however, to advance an alternative, or additional explanation for the diphthongization of /ɛ/. In Spanish, the Romance diphthong aj was in the process of reduction to e (eventually ə) at this time, a process which can be regarded as an extension of (3), i.e. (6).

$$(6) \quad \begin{bmatrix} V \\ + \text{low} \\ + \text{back} \\ - \text{round} \\ 1 \end{bmatrix} \rightarrow \begin{bmatrix} G \\ \text{around} \\ 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 \\ \text{around} \end{bmatrix} \quad \emptyset$$

aw and aj monophthongize to ɔ and ɛ, respectively

Since the newly derived instances of ɛ would have exerted pressure on the already existent /ɛ/ just as the earlier ɔ (<aw) did on Romance /ɔ/, it seems plausible to assume that the diphthongization of /ɛ/ can also be viewed as a means of avoiding merger with the incoming ɛ's (<aj).

The push chain effect observed in Spanish, triggered by the monophthongization of aw and aj which eventually resulted in the diphthongization of ɔ and ɛ, did not take place in Portuguese. Instead, aw and aj underwent an assimilatory process and changed to ow and ej, respectively, around the ninth century (Huber 1933, 50).



aw and aj become ow and ej, respectively

The symmetrical development of Romance au and ai has persevered in the Portuguese reflexes ou and ei. It is the purpose of this paper to examine the behaviour of these two falling diphthongs during the history of the language. We shall first give summary of the sources of ei and ou in Old Portuguese. The following section (2) will attempt to explain the tendency of these diphthongs to disappear in the early stages of the language by appealing to a constraint on the phonotactic patterning of Portuguese. Section 3 examines the ramifications on the vowel system as a result of a tendency toward monophthongization of ei and ou, a situation not unlike that observed in Spanish arising from the simplification of Romance ai and au. Section 4 traces the evolution of ei and ou, first in the dialect of Lisbon, and second, in that of Monsanto. The notion of competing changes is employed to account for two processes of differentiation interfering with that of monophthongization and for the split of Old Portuguese /ow/ into ^{ol and} /oj/. The method of latitudinal reconstruction is also resorted to in an attempt to infer from the synchronic reflexes of /ej/ and /ow/ existing in Monsanto and in more archaic dialects, the stages that they must have passed through before reaching their present realization in Monsanto.

2. Diphthongs in Old Portuguese

The diphthong ai had several different sources in Old Portuguese. These are given in (8). In addition to arising from Romance ai the diphthong can also be traced to the attraction of a jod from the following syllable, or the vocalization of c ([k]).

- (8) (a) amai > amei 'love (1sg. pret.)'
 laicu > leigo 'lay. secular'
 (b) basiu > beijo 'kiss'
 primariu > primeiro 'first'
 (c) lacte > leite 'milk'
 factione > feição 'aspect'

The Old Portuguese diphthong au, in addition to its source in (a) Romance au, also derived from (b) a+vocalized l and (c) a+w attracted from the following syllable, e.g.:

- (9) (a) causam > cousa 'thing'
 taurum > touro 'bull'
 audire > ouvir 'to hear'
 laurariu > loureiro 'bay (tree)'
 (b) falce > fouce 'scythe'
 calce > couce 'kick'
 (c) sapui > soube 'know (1sg. pret.)'
 habui > houve 'have (1sg. pret.)'

The process whereby ai and au changed to ei and ou (i.e. (7)) must have ceased to operate early (perhaps around the beginning of the tenth century (Huber 1933, 49)), since we find residual forms with ai and au which developed later than those in (8) and (9) and which did not become ei and ou. The opacity of the process is manifest in forms such as:

- (10) (a) Late attraction of jod from the following syllable:
 apiu > aipo 'celery'
 rabia > raiva 'rage'
 (b) Loss of intervocalic consonants:
 amatis > amais 'love (2pl. pres. indic.)'
 quales > quais 'which (pl.)'
 palu > pau 'stick'
 vadu > vau 'ford'

The outputs of rule (7) merged in Old Portuguese with instances of ei and ou arising from other sources. The diphthong ei also developed from Romance e+i or ɛ+i which can be traced to the attraction of jod from a following syllable or vocalization of c. The diphthong ou also evolved from Romance tonic o in hiatus with final u, e.g.:

- (11) (a) e+i: (i) *feria* > *feira* 'fair'
 eclesia > O.P. *igleija* 'church'
 (ii) *strictu* > *estreito* 'narrow'
 implic(i)ta > *empreita* 'give a contract for
 work (3sg. pres.
 indic.)'
 directione > O.P. *direiçom* 'direction'
 (b) e+i: (i) *materia* > *madeir* 'wood'
 ceresia > O.P. *cereiça* 'cherry'
 (ii) *tectu* > O.P. *teito* 'roof'
 pectu > *peito* 'chest'
 (c) o+u: (i) *duus* > *dous* 'two'
 (ii) **gruu* > *grou* 'crane'

3. Monophthongization

Beginning perhaps as early as the thirteenth century, the diphthongs ei and ou began to disappear. As to why such a change should have been implemented, it would appear that a plausible explanation is available if one examines the phonotactic structure of the language at the time this change was actuated. As Naro (1971, 387) points out, medieval Portuguese did not possess the diphthongs ej and ow. This fact might be expressed in a negative sequential constraint having the form (12).²

$$(12) \quad \sim \begin{bmatrix} V \\ +low \\ a_{back} \\ a_{round} \end{bmatrix} \begin{bmatrix} G \\ a_{back} \\ a_{round} \end{bmatrix}$$

The existence of this constraint explains, for example, why all instances of Romance ei show up as ej in Old Portuguese (cf. 11b). It also accounts for why we find pé [pe] and dó [do] instead of *[pej] and *[dow] as the reflexes of Latin pedem > pée and dolum > dow after the rule of mid vowel raising (13) was added to the grammar around the thirteenth century.

$$(13) \quad \begin{bmatrix} V \\ - \text{stress} \\ - \text{low} \end{bmatrix} \rightarrow [+ \text{high}] \quad / \quad V$$

An unstressed mid vowel becomes high when next to another vowel (Naro 1971, 385).

Glide Formation, a rule in existence since the earliest stages of the language, would have derived the expected *[pej] and *[dow], i.e.:

$$(14) \quad \begin{array}{ccc} V & \begin{bmatrix} V \\ + \text{high} \end{bmatrix} & \rightarrow \begin{array}{cc} 1 & 2 \\ & [- \text{syll}] \end{array} \\ 1 & & 2 \end{array}$$

A high vowel immediately following a vowel becomes the corresponding glide.

In light of the existence of the constraint (12), it seems plausible to assume that the disappearance of ei and ou resulted from the generalization of (12) to include the mid vowels e and o, as in (15).³

$$(15) \quad \begin{bmatrix} V \\ - \text{high} \\ \text{aback} \\ \text{around} \end{bmatrix} \quad \begin{bmatrix} G \\ \text{aback} \\ \text{around} \end{bmatrix}$$

What is interesting about this constraint is that, although it appears to hold pandialectically in continental Portuguese, different dialects have not always adopted the same means of preventing its violation.

One of the most typical processes which was introduced to avoid violation of (15) was monophthongization of ei and ou to e and o, respectively.

$$(16) \begin{array}{c} \left[\begin{array}{c} V \\ - \text{ high} \\ - \text{ low} \\ - \text{ back} \end{array} \right] \begin{array}{c} G \\ [- \text{ back}] \rightarrow 1 \quad \emptyset \\ 2 \end{array} \\ 1 \end{array}$$

ej monophthongizes to e

$$(17) \begin{array}{c} \left[\begin{array}{c} V \\ - \text{ high} \\ - \text{ low} \\ + \text{ back} \end{array} \right] \begin{array}{c} G \\ [+ \text{ back}] \rightarrow 1 \quad \emptyset \\ 2 \end{array} \\ 1 \end{array}$$

ow monophthongizes to o

Although (16) and (17) could be easily collapsed, we have not done so since, as we shall see, it is sometimes the case that a dialect possesses one of the rules to the exclusion of the other.

According to Cintra (1970, 126), this tendency toward monophthongization spread from the south of Portugal northward. From the isoglosses on map 1 taken from Boléo 1951, for example, it is possible to trace the extent of lexical diffusion of e (<ej) in the forms figueira 'fig tree', ameixa 'plum', azeite 'olive oil' and azeitona 'olive'.

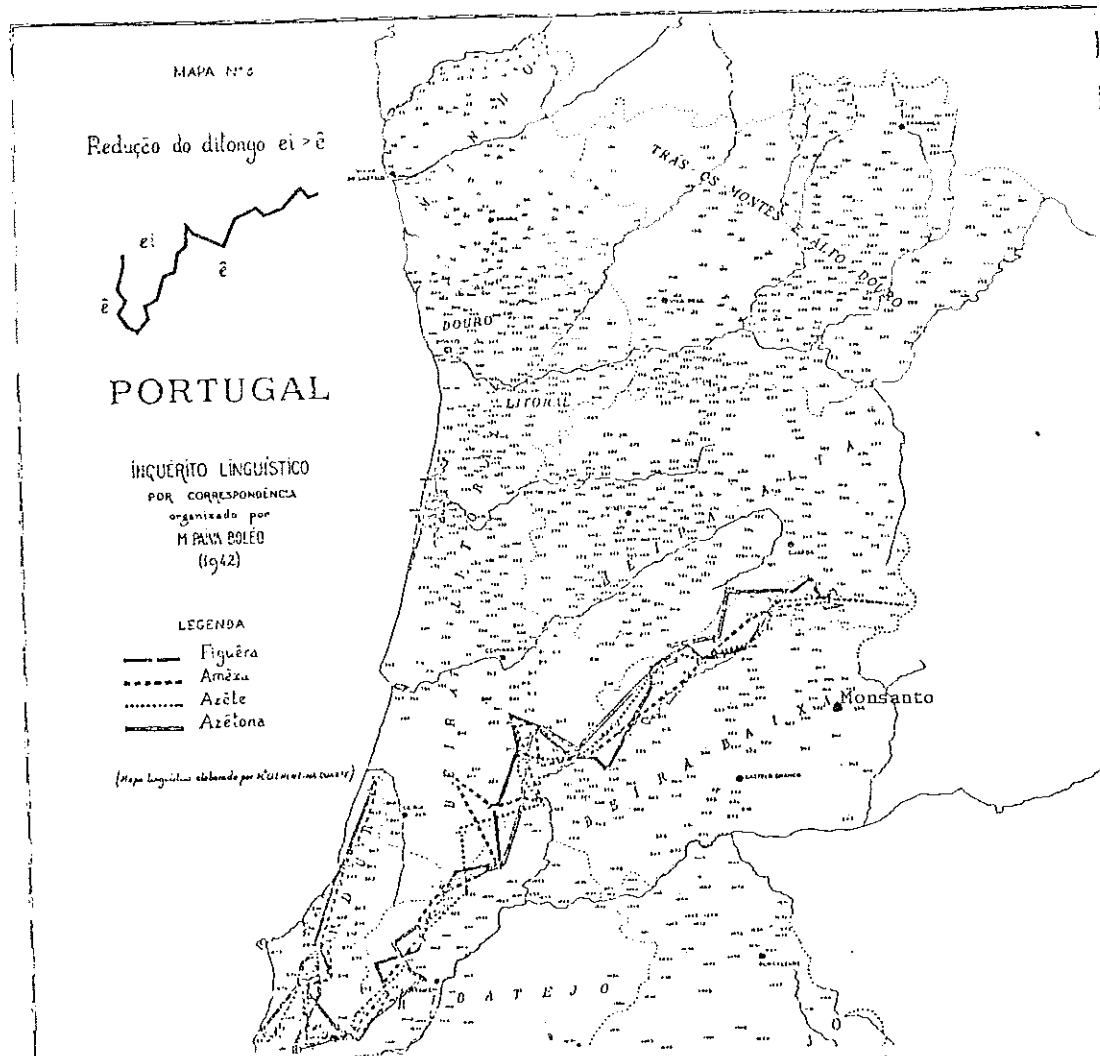
4. The effects of Monophthongization

As a result of the tendency to monophthongize /ej/ and /ow/, the derived [e] and [o] merged on the surface with the already existent /e/ and /o/. Compare, for example, the homophonous pairs in (18).

- (18) (a)

esteiro/estero	'inlet/marsh'	[esteru]
preito/preto	'esteem/black'	[pretu]
seibo/sebo	'coral bean/suet'	[sebu]
seira/cera	'wicker basket/wax'	[sera]
- (b)

bouba/boba	'bubas/silly woman'	[boba]
poupa/popa	'hoopoe (bird)/stern'	[popa]
pousa/poça	'stop/puddle'	[posa]
louco/loco	'mad/locoweed'	[loku]

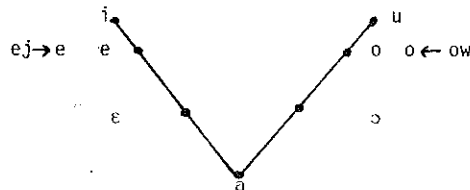


The monophthongization of ei and ou is generally not reflected in the orthography. One may, nevertheless, cite the following example (Nunes 1960, 48, 80-1):

- (19) vendeita (<vindicta) > vendeta [vədəta] 'vendetta'
 cerija (<*ceresia) > cereja [sereža] 'cherry'
 cerveija (<cervesia) > cerveja [serrveža] 'beer'
 correição (<correctione) > correção [korresāw] 'correction'
 direiçon (<directione) > direção [diresāw] 'direction'
- apousentar (from pousar < pausare) > aposentar [apozētarr]
 'to retire'
- apouquentar (from pouco < paucu) > apoquentar [apokātarr]
 'to worry'

At the stage, then, when the phonotactically motivated rules (16) and (17) entered the grammar, a situation developed not unlike that observed in the Romance stage (cf. (1)) where the monophthongization of /aw/ and /aj/ to [ɔ] and [ɛ] led to the diphthongization of /ɔ/ and /ɛ/ in Spanish so as to maintain phonemic distinctions and restore equilibrium to the system. Analogous to the system in (1), we thus have in Portuguese the evolving situation represented in (20):

(20)



4.1. In view of the merger threatening /e/ and /o/, it is to be expected that the system would react by adopting some means to prevent this from taking place. This is, in fact, what one appears to find. Barbosa (1965, 65) reports, for example, that in Algarve, where ei and ou have become e and o, the original /e/ is now manifested as [ɛ].

4.2. Lisbon. Within the area of monophthongization, the dialect of Lisbon presents a unique situation. Rather than simplifying the diph-

thong /ej/, it has instead avoided violation of the constraint (15) by backing the nucleus of the diphthong to \underline{a} , e.g.:

- (21) meigo [m Λ jgu] 'mild'
 madeira [mad Λ jra] 'wood'
 seis [s Λ jš] 'six'
 beijar [b Λ jžarr] 'to kiss'
 madeixa [mad Λ jša] 'lock (of hair),

Instead of (16), therefore, we must posit rule (22) to reflect the correspondance /ej/ \rightarrow / Λ j/ in the Lisbon dialect.

$$(22) \begin{bmatrix} \text{V} \\ - \text{high} \\ - \text{low} \\ - \text{back} \\ 1 \end{bmatrix} \begin{bmatrix} \text{G} \\ - \text{back} \\ 2 \end{bmatrix} \xrightarrow{1 \sim 2} [+back]$$

The fact that all surrounding dialects show how monophthongization to \underline{e} leads one to suspect that Lisbon must also have experienced this tendency at an earlier stage. Before restructuring of /ej/ to /e/ had a chance to occur, however, the process of monophthongization was lost when the 'competing' change (22) was initiated.⁴ Such a state of affairs seems very plausible, in fact, since the substitution of (22) for (16) can be viewed as a means of avoiding merger with original /e/. Moreover, one cannot overlook the potential influence of the orthography in this particular case. Since the level of literacy in the capital can be assumed to be considerably higher than that in most other areas of the country, one could perhaps suppose that the orthographic sequence -ei- associated with /ej/ was a significant factor in preventing its monophthongization.

Turning to the diphthong /ow/, its evolution in Lisbon corresponds to that found in all dialects in the southern part of the country. For the most part, it is now realized as [o], e.g.:

- (23) pouco [poku] 'little'
 roupa [rropa] 'clothing'
 outono [otonu] 'autumn'
 ousar [osar] 'to dare'

However, there is also a tendency for [o] to alternate with [oj] in certain lexical items, the extent of this alternation varying according to dialect. This alternate pronunciation is sometimes reflected in the orthography, e.g.:

- (24) [o] / [oj]
 ouro/oiro 'gold'
 fouce/foice 'scythe'
 louro/loiro 'yellow'
 touro/toiro 'bull'
 dous/dois 'two'
 doudo/doido 'crazy'

The alternation [o/oj] has apparently been in existence for several centuries and its origin has been the subject of a considerable amount of debate. Williams (1962, 85) supposes, for instance, that the oscillation between ou and oi was due to the fact that the Romance sequence -oct- [-okt-] vocalized in some regions to -oit- and in others to -out-, and that subsequent dialect mixture produced the alternation. He refers to a fourteenth century example of route which was used instead of noite (<noctem) 'night'.

As a result of this early confusion, the use of oi spread in the sixteenth century to words which originally had ou, e.g. coisa (for cousa (<causam)) and the use of ou spread to words which originally had oi not coming from oc(t), e.g. couro (for coiro <corium), with the result that ou and oi became generally interchangeable, although ou is more literary, oi more colloquial (85-6).

Huber (1933, 15) attributes the oscillation between ou/oi to the sporadic change of -oiro (<-orriu) to -ouro which he assumes was due to the influence of the labial vowel (e.g. he cites pousadouro 'resting place', aradouro 'working day', occurring in place of pousadoiro, aradoiro). Although he does not provide definite sources

for these variants, he adds that this development (probably of a dialectal nature) occurred only in a small area of Portugal.

Nunes (1960, 77) and Bourciez (1923, 379) both consider that the substitution of oi for ou was due to Jewish influence.

I tend to find more plausibility in the explanation given by Cintra (1970) who suggests that oi appears more to be the result of a process of differentiation in order to avoid monophthongization of ou to o:

Mas o factor decisivo na expansão de oi teria sido a tendência a evitar a fusão dos elementos do ditongo, exercendo-se principalmente no falar popular de zonas ameaçadas pela aproximação de uma corrente monotongadora. Só essa tendência me parece susceptível de explicar a extraordinária frequência de oi por ou em certas linguagens regionais, que é certamente a causa da abundante penetração do fenómeno da linguagem literária (129-30).

In other words, it seems most likely that differentiation of ou to oi developed as a means of preventing merger of o < ou with original o. This possibility seems all the more convincing when one considers the geographical distribution of the oi alternant. According to Cintra (1970, 123), it predominates in central Portugal, in the zone between the Douro and the Tejo Rivers, the very zone which has experienced during the past few centuries a marked tendency toward monophthongization of ou.

The synchronic alternation between [o] and [oj] in forms such as those in (24) thus seems to be a prime example of the result of a situation involving competing changes. Overlapping with the process of monophthongization (17) there must have existed an additional process of differentiation, which can be formalized as (25).

(25)

$$\begin{bmatrix} V \\ - \text{high} \\ - \text{low} \\ + \text{back} \end{bmatrix} \begin{bmatrix} G \\ + \text{back} \\ 2 \end{bmatrix} \rightarrow \begin{matrix} 1 & 2 \\ & [- \text{back}] \end{matrix}$$

ow become oj

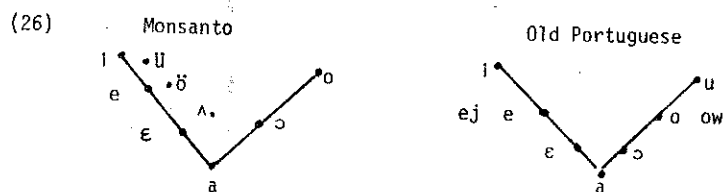
This situation of overlapping rules had the effect of producing a split in the Old Portuguese /ow/. Before the addition of (25) to the grammar, the process of monophthongization had diffused through a large part of the lexicon and had restructured many instances of /ow/ as /o/. Those /ow/'s which still remained at the time the differentiation process was implemented, on the other hand, have the synchronic reflex, /oj/. The postulation of relexicalization in the cases of alternation between [o] and [oj] is necessary, since no lexical items containing original /o/ (e.g. *nome* < *nomen* 'name') manifest a variant with [oj] (*[nojmil]). The [o] in the alternation [oj]/[o], can be derived by a rule which is in some sense the 'composite' inverse of (25) and (17, i.e.:

$$(26) \begin{bmatrix} V \\ - \text{high} \\ - \text{low} \\ + \text{back} \\ 1 \end{bmatrix} \begin{bmatrix} G \\ - \text{back} \\ 2 \end{bmatrix} \longrightarrow 1 \quad \emptyset$$

oj becomes o

Just as in the case of the Lisbon change of /ej/ to / \wedge j/, the differentiation of /ow/ to /oj/ can be viewed as functioning both to counteract a on-going merger in the system (i.e. /ow/ \rightarrow /o/) and to prevent violation of the constraint (15) against diphthongs whose components agree in backness and rounding.

4.3. Monsanto. In the dialect of Monsanto, situated in Beira Baixa, the modern reflexes of /ej/ and /ow/ are /e/ and / δ /, respectively. Original /e/, on the other hand, has backed to / \wedge /, while original /o/ has remained unchanged. In (26) we have presented the Old Portuguese and Monsanto vowel systems for comparison:



The correspondances to be accounted for here are thus:

Old Portuguese:	ej	e	ow	u
Monsanto:	e	Λ	ö	ü

If we looked at these correspondances in isolation and attempted to establish a set of rules to account for the observed changes, we would in all probability proceed in the following manner. In order to formally capture the changes in Old Portuguese /ej/ and /e/, one could proposed the two linearly ordered rules in (27) and (28).

$$(27) \begin{bmatrix} V \\ - \text{high} \\ - \text{low} \\ - \text{back} \end{bmatrix} \rightarrow [+ \text{back}]$$

e becomes Λ

$$(28) \quad (16) \begin{bmatrix} V \\ - \text{high} \\ - \text{low} \\ - \text{back} \\ 1 \end{bmatrix} \begin{bmatrix} G \\ - \text{back} \\ 2 \end{bmatrix} \rightarrow \begin{matrix} 1 \\ \emptyset \end{matrix}$$

ej becomes e

The counter-feeding order holding between (27) and (28) would be necessary since the opposite order would result in all /ej/'s ending up as /Λ/. We know, however, that the change of e to Λ must have been chronologically later and is assumed to be the result of a push chain effected by the monophthongization of ej to e. Additional evidence for this chronology can be established by resorting to the method of latitudinal reconstruction proposed by Chen (1973). This method involves cross-dialectal comparison

[in an attempt] to infer from the nature of the reflexes that coexist synchronically in closely related languages or dialects the temporal sequence of events that must have taken place between the proto-form and each of its modern derivatives...

[thus] given A, B, C as the modern reflexes of a common ancestral from X in dialects D1, D2, and D3, respectively, one can assume that A, B, and C reflect three different stages of evolution from X - provided, of course, that A, B, and C represent three degrees of distancing (on one or several phonetic dimensions) away from the point of departure (Chen 1973, 53, 55).

With respect to the evolution of Old Portuguese /ej/ and /e/ in Monsanto, we observe, for example, that in the more archaic northern dialects of Trás-os-Montes, original /e/ still survives, whereas /ej/ oscillates in its realization between [ej] and [e], e.g. *sombreiro* [söbrejru] [söbreru] 'broad brimmed hat' (v. Santos 1964-5: 197). If (28) was added to the grammar before (27), therefore, we would naturally expect that the e's resulting from monophthongization of /ej/ would have merged with the original /e/'s and undergone backing. However, such a merger never took place. How, then, are we to account for this apparent paradox? The solution, it would seem, is to be found once again by looking at the situation in the Trás-os-Montes dialects where there is synchronic alternation between [ej] and [e]. If we assume that this same state of affairs existed in Monsanto at the time rule (27) entered the grammar setting up an alternation between [e] and [ʌ], and that backing was still an active process after monophthongization had run to completion, then we can hypothesize that both /ej/ and /e/ preserved their original identity during the period of time that the two processes overlapped. Schematically, the situation can be represented as follows:

	Rule
ej → ej ~ e → e	(27)
e → e ~ ʌ → ʌ	(28) (=16)

This type of argumentation, recognizing the importance of synchronic variants during the transition phase of such a sound change, has been used by Chen to account for the avoidance of merger in the push chain movement which resulted in the Middle Chinese 'Great Vowel Shift'. According to Chen (1976, 228),

In the oversimplifying view of linguistic change $A \rightarrow B$, we often ignore an important intermediate stage, namely, $A \rightarrow A \sim B$ ('A ~ B' = 'A alternating with B'). This means that before

the definitive switch-over from A to B, the lexical items undergo a period of fluctuation between the conservative A and the innovative B. As long as this A ~ B alternation persists, both the 'underlying' A and the phonological rule $A \rightarrow B$ must be retained. Only after the definitive switch-over is A relexicalized as B --at which point B loses its original A-identity, and the corresponding rule is then dropped from the phonological component, unless, of course, morphophonemic alternations required its continued existence.

In the present case, we believe that both (27) and (28) have been dropped from the phonological component of Monsanto, i.e. that /ej/ and /e/ have been restructured as /e/ and /ʌ/, respectively. We shall attempt to justify this assumption below.

In order to account for the /ow/ → /o/ correspondence observed in Monsanto, one could proceed in one of two ways. The first would be to assume that a single process had applied, whereby /ow/ simultaneously underwent fronting of its nucleus and deletion of its off-glide, as in (29).

$$(29) \begin{array}{c} \left[\begin{array}{c} V \\ - \text{high} \\ - \text{low} \\ + \text{back} \end{array} \right] \begin{array}{c} \left[\begin{array}{c} G \\ + \text{back} \end{array} \right] \end{array} \rightarrow \begin{array}{c} 1 \quad \emptyset \\ [- \text{back}] \end{array}$$

1

ow becomes ö

Alternatively, one could consider the change to have been effected in two stages, one during which o fronted to ö before w, the other wherein w was deleted in the environment of a preceding ö as in (30) and (31).

$$(30) \begin{array}{c} \left[\begin{array}{c} V \\ - \text{high} \\ - \text{low} \\ + \text{back} \end{array} \right] \begin{array}{c} \left[\begin{array}{c} G \\ + \text{back} \end{array} \right] \end{array} \rightarrow \begin{array}{c} 1 \quad 2 \\ [- \text{back}] \end{array}$$

1

ow becomes öw

$$(31) \quad \begin{bmatrix} V \\ - \text{back} \\ + \text{round} \end{bmatrix} \begin{bmatrix} G \\ + \text{back} \\ 2 \end{bmatrix} \rightarrow \begin{matrix} 1 \\ \emptyset \end{matrix}$$

1

ow becomes ö

There seems to be no way, from an examination of the synchronic situation in this dialect, to reconstruct what the actual diachronic progression from ow to ö might have been.

Fortunately, however, it is once again possible to reconstruct latitudinally the progression of the sound change by examining the synchronic situation in the dialects of Trás-os-Montes. What we find is that the diphthong /ow/ is now realized alternatively as either [ow] or [öw] (Santos 1964-5, 197), e.g. pouco [powku] / [pöwku] 'little'.

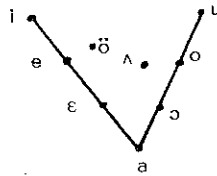
On the basis of this evidence, therefore, which points to the existence of rule (30) in Trás-os-Montes, we can hypothesize that (31) represents a more recent process in Monsanto, added after the change of ow to öw and that (29) represents a telescoping of the two processes.

As to the fronting of /u/ to /ü/ in Monsanto, it would appear that it was chronologically posterior to the other changes discussed so far. It does not exist in Trás-os-Montes; however, it is reported to be found in an extensive zone extending at least from Fundão and Certã (Beira Baixa) as far as Portalegre (Alto Alentejo). /ü/ also exists in the Portuguese dialects of the Azores (where /ow/ has also evolved to /ö/) (Buescu 1961, 103, Haudricourt & Juilland 1970, 116). Moreover, in the dialects of the Azores, as well as in Monsanto, it is reported that the realizations of both /o/ and /u/ are characterized by a very closed articulation, that is, they tend to be closer to [o] and [u], respectively, in their phonetic realizations of (cf. Haudricourt & Juilland 1979, 116, Buescu 1961, 102).

In light of this situation, an explanation for the fronting of /u/ would appear to be based on articulatory phonetic facts. As Haudricourt and Juilland (1970: 116) point out, the margin of allophonic variation for the series of back vowels is only about one-half

that of the front series. In a system with four or more degrees of vowel height, the back vowels are thus under more pressure to maintain phonetic distinctness. The situation in Monsanto prior to the change of u to ü can be visualized as in (32).

(32)



where the back series, with two unrounded and three rounded vowels outnumbered the front series. According to Haudricourt and Juilland,

Les dangers créés dans la série postérieure par le manque d'espace articuloire peuvent être évités en élargissant cet espace ou, plus précisément, en distribuant les phonèmes sur une surface articuloire plus étendue, permettant de mettre entre eux la distance nécessaire pour éviter les confusions. Pour les postérieures, un tel gain d'espace articuloire ne saurait être réalisé qu'en centralisant ou en palatalisant le point d'articulation (1970, 116-7).

In the Monsanto case, the problem was solved by the second means, that is, by fronting the high back vowel, thus leaving more space for the remaining back vowels.

The question now to be addressed is whether Old Portuguese /ej/, /ow/ /e/ and /u/ have been restructured in Monsanto to /e/, /ö/, /ʌ/ and /ü/, respectively, or whether the historical processes which account for their evolution can still be motivated in the synchronic grammar. All evidence would seem to point in the direction of restructuring, or more precisely, 'transphonemization'. This latter term is used, for instance, by Alarcos Llorach (1961, 128) to characterize a change $A:B \rightarrow A':B'$, where both relations, $A:B$ and $A':B'$ are distinctive and where A' and B' maintain the same distinctions they did before the change. This type of proportional change seems appropriate to describe the situation resulting from a push chain, in the sense that, although the original segments experience a change in

their feature make-up, they continue to function the same in their new identity. Applying this notion in the case under examination, we can say that the proportion O.P. /ej/::/e/::/ow/::/u/::Mon./e/::/Λ/::/ø/::/ü/, that is, no phonemic distinctions have been lost or created as a result of the change; all that has occurred is a reorganization of the system's structure.

The fact that /e/ (</ej/) is realized as [e] in stressed and unstressed position is evidence enough to reject the assumption that its underlying form should be anything but /e/: cf. maneira/maneirinha [mané'ra]/[manerĩ'na] 'manner/manner (diminutive)'.
 The same type of evidence can be used to support the assumption

that original /e/ has been restructured to /Λ/, whose realization alternates between [Λ] in stressed position and [ə] in unstressed position; cf. cabeça/cabecinha [kabɛ'sa]/[kabesĩ'na] 'head/head (diminutive)'.

Likewise, since /ø/ (</ow/) has only the allophone [ø], when stressed, and [ɔ], when unstressed (cf. louro/loureiro [lóru]/[loréru] 'bayleaf/bay tree'), a more concrete alternative would be to consider /ø/ to be underlying.

The fact that /ü/ is realized as [u] in unstressed position might lead one to suppose that the underlying should be /u/, with stressed [ü] derived by rule; cf. maduro/madurinho [madúru]/[madurĩ'pu] 'ripe/ripe (diminutive)'.

This possibility is eliminated, however, in light of a process of assimilation observed in this dialect. This process has the effect of fronting stressed /a/ to [e] when the preceding syllable contains a front vowel:

$$(33) \begin{bmatrix} V \\ + \text{ low} \\ + \text{ back} \\ - \text{ round} \\ + \text{ stress} \end{bmatrix} \rightarrow [- \text{ back}] \quad / \quad \begin{bmatrix} V \\ - \text{ back} \end{bmatrix} C_0 \text{ ---}$$

So, for example, we find fronting in:

- (34) i. ficar /fíkar/ [fəkér] 'to stay'
 ii. ceifar /sefar/ [sefér] 'to harvest'
 iii. poupar /pöpar/ [pöpér] 'to spare'
 iv. fumar /fümar/ [fumér] 'to smoke'

but not in:

- v. fechar /fæçar/ [fəçár] 'to close'
 vi. arrolar /arrolar/ [arrolár] 'to enroll'

The only way to maintain the naturalness and generality of the fronting rule is to assume that the underlying representation are as given in (34), i.e. with /ü/ (</u/), /e/ (</ej/), /o/ (</ow/) and /ʌ/ (</e/). As can be seen from the phonetic forms, the fronting rule must apply before the underlying vowels assume their unstressed allophonic shape, since not only do /ü/ and /ö/ have [+back] allophones in unstressed position, but also both unstressed /i/ and /ʌ/ merge on the surface to back [ə], thus obscuring the motivation for the fronting observed in (34i) as opposed to its absence in (34v).

5. Conclusion.

The development of the falling diphthongs /ej/ and /ow/ constitutes a fascinating study in Portuguese historical phonology. From their sources (principally in Romance aj and aw) they showed an early tendency to disappear from the language, a tendency which we have ascribed to the generalization of a phonotactic constraint against sequences of VG wherein the vowel and glide agree in backness and rounding.

In order to avoid violation of this constraint, certain dialects began to show monophthongization of /ej/ and /ow/ to e and o, respectively. However, since this reduction established a situation wherein these incoming e's and o's threatened the original /e/'s and /o/'s with merger, the system reacted. In the Lisbon dialect, this reaction took the form of a differentiation whereby /ej/ changed to /ʌ/. The competing change differentiating /ow/ to /oj/ in Lisbon and most of the central dialects can also be explained as a means to prevent merger with /o/, while at the same time avoiding violation of

the phonotactic constraint. Before the latter process was implemented, however, monophthongization had already diffused through a part of the lexicon, restructuring some /ow/'s to /o/. Consequently, the interfering change, whereby the remaining /ow/'s evolved to /oj/, produced a split in the Old Portuguese diphthong.

In Monsanto, where monophthongization of /ej/ to /e/ did occur, original /e/ has been restructured to /ʌ/ so as to maintain its distinctiveness. The diphthong /ow/, on the other hand, did not follow the same evolution in Monsanto as it did in Lisbon. In this dialect, it has been restructured as /ö/ after passing through an intermediate stage: öw, the existence of which we have established on the basis of latitudinal reconstruction by comparing the synchronic reflex of /ow/ in Monsanto with that found in the more archaic dialects of Trás-os-Montes. Cross-dialectal comparison has also been used to account for the avoidance of merger between /e/ (</ej/) and original /e/. The existence of the synchronic alternation [ej] ~ [e] (/ej/) and [e] ~ [ʌ] (/e/) during the period in which the processes of monophthongization and backing overlapped in Monsanto accounts for the avoidance of merger in the push chain situation triggered by the former process.

In the dialects we have considered, the synchronic reflexes of the Old Portuguese diphthongs /ej/ and /ow/ can be schematically represented as follows:

Old Portuguese:	ej	ow	e
Trás-os-Montes:	[ej ~ e]	[ow ~ öw]	e
Monsanto:	e	ö	ʌ
Lisbon:	ʌj	o	oj

Although the set of rules which account for these correspondances differ in each dialect, they can be considered to form what Chen (1973) terms a coherent 'rule system'. That is to say, even though no two dialects show the same synchronic reflexes of Old Portuguese /ej/ and /ow/, all the various rules they underwent "can be regarded as the various steps in the implementation of a functionally or teleologically defined 'rule system'. The concept of 'rule system' is akin to that of 'conspiracy' and 'the functional unity of phonological rules'" (Chen 1973, 52). In

the particular case we have examined, the historical rules affecting /ej/ and /ow/ can be viewed as a conspiracy to avoid violation of the phonotactic constraint (15). Moreover, the subsequent changes triggered by the monophthongization of /ej/ and /ow/ to e and o, though totally unrelated formally to these latter modifications are teleologically related, since their implementation was actuated so as to maintain functional distinctions in the system threatened with merger.

NOTES

¹This rule represents a persistent process, whose effect is observed in earlier Vulgar Latin forms, e.g., Clodius, Plotius, alosa, clostrum, coda, plostrum beside the Classical Latin forms, Claudius, Plautius, alausea, claustrum, cauda, plaustrum (Nunes 1960, 77).

²Although the feature [+ high] would be redundant in the specification of the glide here, it seems that it is precisely this feature of the glide, in opposition to the [+ low] specification of the vocalic nucleus which accounts for the tendency of languages to avoid this type of diphthong marked by such an extensive transition between the points of articulation of its two components.

³It should perhaps be pointed out here that (15) applies only to underlying diphthongs and not to derived diphthongs, since we find, e.g., instances of [ej] arising from the loss of intervocalic i in plural formations such as cruel/cruéis [krueɪ]/[kruejʃ]. Instances of [ow] also surface due to vocalization of i in, e.g., volto [vowtu] 'turn (1sg. pres. indic.)' (c.f. voltamos [voltamuʃ] 'ibid. (1pl.)').

⁴Cf. Wang (1969), Chen (1972) for a detailed discussion of the notion of 'competing changes'. The few forms noted in (19) showing the orthographic change from ei to e perhaps indicate that monophthongization had diffused through a very small portion of the lexicon before the process was supplanted by (22). According to Teyssier (1966, 175), the pronunciation [ʌj] goes back only to the nineteenth century.

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