Chapter 6

Compensatory Diphthongization in Majorcan Catalan

Joan Mascaró

1.

A consequence of the organization of phonological representations in different levels or tiers is that processes can apply to a subset of these tiers, the rest remaining unaffected. In particular, the stability of the skeleton under deletion at other levels has provided a more abstract explanation for the phenomena referred to by the descriptive term "compensatory lengthening". It is worthwaile to explore cases of tier stability that are akin to compensatory lengthening, and determine whether the same, or similar, abstract mechanisms are involved. In the cases that I will discuss here there is, like in typical cases of compensatory lengthening (e.g. Ingria (1980)), deletion of one segment and the compensating appearance of another segment. The new segment is not identical, however, to an adjacent segment which is consequently "lengthened"; it keeps segmental properties of the segment deleted and shows up as a glide on a "diphthongized" adjacent vowel. Thus underlying /tróncs/ 'logs' deletes the voiceless palatal stop c, develops a compensating palatal glide j, and surfaces as tróins. Although apparently a new segment appears, and hence a lengthening effect seems to be at stake, the length of the diphthong is the same as that of the vowel alone (e.g. in the sg. trónc). Diphthongization compensates for the loss of the palatal stop by keeping stable, not the tier representing units of timing, but the tier that specifies properties of point of articulation. In other cases that I will also discuss, diphthongization doesn't compensate for deletion of a segment, but for the loss of point of articulation features (án 'year', pl. ájns). I will use the descriptive labels "segment loss compensation" and "property loss compensation", respectively, to refer to these two cases.

I will show that this phenomenon follows from independent processes of assimilation and consonant deletion when they are formulated within an adequate theory of phonological representations where phonological properties are organized into different levels (tiers).

The dialectal distribution of compensatory diphthongization seems to be entirely (or almost entirely)¹ dependent on two parameters: the phonological nature of nonanterior stop (k in most dialects, palatal c in

the dialects under study) and the degree or extension of consonant assimilation (the set of consonants affected by assimilation in point of articulation is extended or not extended to palatals). This gives the distribution shown in (1) where I give the four possible parameter combinations and their compensatory effect with an example (pl. of *tronc* 'log' and pl. of *any* 'year').

(1)	D		Dominio della della	2 4
Dialect	Parameters Extended assimilation	2 <i>k</i> or <i>c</i>	Parametric eff Segment loss compensation	
Central, Western, etc.	NO	k	NO tróŋs	NO áɲs, án∫²
Nonexisting	NO	c	(NO)³ (tróɲs)	(NO) (áns)
k-Mallorcan (e.g. Sóller)	YES	k	NO tróns	YES ájns
c-Mallorcan (e.g. Felanity	YES	С	YES trójns	YES ájns

The analysis presented here is based on the last group of dialects⁴, the one presenting both segment loss and property loss compensation. Examples are taken from Alcover (1908), Alcover-Moll (1929-1933), Alcover-Moll (1930-1962), Moll (1934), Veny (1962), and personal observations.

2.

Compensatory diphthongization takes place whenever a palatal nasal preceded by a vowel is followed by two consonants. This happens most typically within words⁵ in plurals. The singular shows a homorganic pc cluster. In the plural the c deletes, p assimilates to the following s, and the compensating glide p appears after the vowel⁶:

(2)	Sg.	Pl.	
()	trónc	trójns	'log'
	bánc	bájns	'bank'
	sánc ⁷	sájns	'blood'
	bləvənc	bləvəjns	'bluish'
	tránc	trájns	'gash, cut'
	r ónc	r óins	'hoarse'

All other similar cases of consonant deletion don't develop a glide or any other compensating element:

(3)	Sg.	Pl.	
	ált	áls	'high'
	vént	véns	'wind'
	mórt	mó r s	'dead'
	pá r c	pá r s	'park'
	λámp	λáns	'lightning'
	vérp	vérs	'verb'
	sólc	sóls	'furrow'

In particular, the examples with final c delete this consonant without any compensation $(p\acute{ar}c - par\dot{s}, s\acute{o}lc - s\acute{o}ls$ in (3), as opposed to $tr\acute{o}pc - tr\acute{o}jns$ in (2)).

In fact, the only other case where there is a similar V-Vj alternation, namely property loss compensation, involves no deletion at all. The environment is similar to the environment of segment loss compensation: Vp and Vf or Vtf before consonant turn into Vp^8 and Vj(s). The second case is more limited, and I will restrict myself to the more regular cases involving the palatal nasal. I illustrate the process with sg. – pl. and 3rd sg. –2nd sg. indicative present alternations 10 .

(4)	án	'year'	ájns <i>pl</i> .	
	bón	'protuberance'	bójns <i>pl</i> .	
	pún	'fist'	pújns <i>pl</i> .	
	plán	'he pities'	plájns	'you pity'
	mún	'he milks'	mújns	'you milk'
	əcé∫	'this, that'	əcéjs <i>pl</i> .	
	dəzítj	'wish'	dəzijs <i>pl</i> .	
	mərá J	'he merits'	mərəis	'vou merit'

The relevant generalization seems thus to be that the compensating j shows up whenever at some stage n has lost its point of articulation properties as a result of assimilation. If this generalization is correct, segment loss and property loss call for a common explanation; in fact after consonant deletion the representations are identical (e.g. $b\acute{a}ncs \rightarrow b\acute{a}ns \rightarrow b\acute{a}jns$ 'banks' and $b\acute{a}ns \rightarrow b\acute{a}jns$ 'baths'; the sg. is $b\acute{a}nc$ and $b\acute{a}n$, respectively).

These Vn - Vjn alternations might suggest a diphonemic treatment of palatals, [n] deriving from underlying jn with the historical yod still present. This would explain the j in \dot{ajns} , but in order to derive the palatal nasal in the sg. \dot{angle} , some rules of assimilation of n to j and deletion of j would be needed that have no independent justification.

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The cases in (2) show also that this solution is untenable. The nasal in $tr\acute{o}nc$ is palatal only because it has assimilated to c. Even a theory that would impose underlyingly fully specified nasals, with morpheme structure conditions accounting for the homorganicity of clusters like the one in $tr\acute{o}nc$, would get into difficulties. The diphonemic solution would impose an underlying form with nonhomorganic cluster for $tr\acute{o}nc$ as opposed to, e.g. $tr\acute{o}nc$ ifield', $tr\acute{o}nc$ underlyingly. We would thus need, not only two different statements to account for homorganicity, a morpheme structure condition and an assimilation rule, but also two kinds of morpheme structure condition, one covering homorganic clusters like $tr\acute{o}nc$ and the other homorganic segments across nasals like $tr\acute{o}nc$.

Another complication would be introduced by forms with phonetic *jn*. Compare (5a) and (5b):

(5)	a.	әлси́лә	'he coins'	b. kújnə	'kitchen'
		pá nə	'cliff'	fájnə	'work'
		bánə	'horn'	bájnə	'sheath'
		λéɲə	'firewood'	r éjnə	'queen'

The opposite solution would involve insertion of j and depalatalization of n when preceding a consonant. We will see that these changes follow automatically from independent processes framed in an autosegmental theory. I will analyze first the cases of property loss compensation.

3.

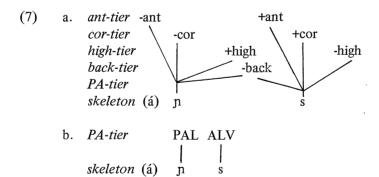
Assimilation in point of articulation is rather complex, at least observationally. Here we will only need to deal with assimilation of nasals. A nasal assimilates the point of articulation of a following consonant. In the dialect under study all nasals (m, n, n) assimilate; in other dialects, the ones termed 'nonextended' above, only nonhigh nasals, or just the coronal nasals change their (major) point of articulation. Only in the case of the palatal nasal n a glide n appears on the vowel

(6)	plóm	plóns	plòm bá	plón cá
` '	'lead-sg.'	lead-pl.	'good'	'expensive'
	trén	tréns	trèm bó	trèn cá
	'train-sg.'	train- <i>pl</i> .'		
	án	ájns	àjm bó	àjn cá
	'year-sg.'	'year <i>-pl</i> .'		

The nasal is never in the syllable onset. It is either syllable final, in which case the assimilator is a syllable initial consonant, or it precedes a syllable

final consonant which acts as the assimilator (plòm $b\acute{\sigma}$ and plóns, respectively).

I will adopt here the theory of assimilation developed in Mascaró (1983). Phonological properties are organized in n-ary branching trees whose roots are linked to the skeleton. Terminal nodes of the tree are individual phonological features (back, high, continuant, spread glottis, etc.), and intermediate nodes are relevant sets of features. In particular, there will be a node, the PA node, that will dominate features of point of articulation, and will be dominated by an element of the skeleton. A phonological tier is a sequence of nodes of the same type (e.g., back-tier, PA-tier). Here we will operate on PA-skeleton projections. I will use, for the skeleton, transcription symbols and cover symbols (N=nasal, V=vowel, C=(stop) consonant) in order to make representations more comprehensible; it should be kept in mind that the skeleton represents only units of timing, (and perhaps, some major class features). Autosegments of the PA-tier will be represented by traditional place designations. Thus PAL (palatal) will stand for a node dominating the terminal elements [-ant], [-cor], [-back], [+high], and, similarly, LAB (labial), ALV (alveolar), VEL (velar). Thus the more complete structure of (7a) will be represented as in (7b); the example corresponds to Central Catalan.



Some of the examples of (4) and (6) will have the following underlying representation (X stands for whatever place features correspond to the attached vowel; I don't indicate the PA tier properties of elements of the skeleton that are irrelevant)

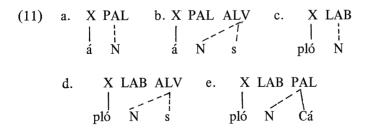
(a) 10

I hold that assimilation is the result of two different phonological processes, one eliminating the link to the lost features, the other spreading the assimilated features¹¹.

1) Deassociation. In the syllable rhyme consonants lose their association to the PA-tier. This turns the representation of a simple case like (8e), /plóm cá/ into (9):

2. Regressive Reassociation. Autosegments in the PA-tier reassociate to any available element in the skeleton, from right to left¹². Now (9) will be converted by R Reassociation into (10), PAL being the rightmost autosegment that can be linked to free elements in the skeleton.

Application of both processes to the structures in (8) will have the following effect:



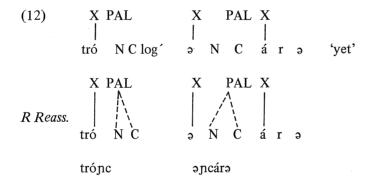
The application of *Deassociation* and *R Reassociation* to (8a) and to (8c) is straightforward; the resulting structure (11a) and (11c), respectively, is the same as the initial one. In (8b) and (8d) both syllable final autosegments lose their association line to the PA-tier by *Deassociation*, and *R Reassociation* links the rightmost floating autosegment ALV to both delinked segments, leaving a floating autosegment (11b, d). In (8e) only the nasal is syllable final and loses its association to the PA-tier. *R Reassociation* spreads the rightmost PAL autosegment on the nasal leaving a floating LAB (11e).

The spreading of PA autosegments to the right of the consonant following the nasal is impossible. Following vowels will be already associated to the PA-tier, and following consonants will be syllable initial and won't lose therefore their association to the PA-tier by *Deassociation*. On the other hand, regressive spreading from a vowel to the consonant (e.g.

PAL * VEL

plóp cá = (11e) vs. plom unik 'only lead') is also ruled out. In this case the word final consonant is resyllabified with the following vowel and being syllable initial *Deassociation* cannot apply to it (under cyclic application the consonant will deassociate and reassociate in the inner cycle; in the following cycle, resyllabification will apply, bleeding *Deassociation*).

Notice that in a theory that allows for underspecification, homorganic clusters will be represented with an unassociated (floating) autosegment; association will be carried out by *R Reassociation*:



This provides an argument for the independence of R Reassociation since Deassociation hasn't applied in these cases¹³.

It is interesting to note that some standard underspecification theories show some remnants of the typical drawback of a full specification theory, namely the duplication of regularities in the lexical representation and in the rules of the grammar. If p and p in trópc have the same PA specifications in underlying structure, we are duplicating an independently needed rule of assimilation. But if we underspecify the nasal, omitting its PA features, and specify the following stop as a palatal, we are indeed still duplicating part of the independently needed assimilation rule, namely its regressive character. It is not lexically accidental that the specified consonant is the rightmost one, given the form of the phonological component.

We still have unexplained the appearance of the compensating glide. In (11b,d,e,) a floating autosegment is left after the operation of the assimilation rules. It will be left unassociated, except for some crucial cases, at the end of the derivation, and it will receive no phonetic interpretation. The floating PA autosegment cannot associate to the nasal, because the

nasal is already associated to some element in the same tier. The fact that in (11b, d, e) the nasal is not available for association with the floating PA autosegment follows from (partly language particular) conditions on one-to-many associations. A language selects, for a given feature, specific feature-bearing units among possible ones, and also specific configurations (long vowels, diphthongs, affricates, geminates, etc.). In our case, gliding points of articulation will be excluded for consonants. But vowels do present complex points of articulation (glides). It is therefore possible for the present floating autosegments to associate with the vowel preceding the nasal:

(13a), which would be interpreted as \hat{apns} , will be ruled out by whatever mechanisms account for the language particular inexistence of gliding point of articulation in consonants¹⁴. (11b), on the other hand, will be interpreted as \hat{ajns} , with a short diphthong aj.

The fact that compensation is restricted to palatals also calls for explanation. Other possible candidates would be η or m, which are related to the glide w. η does not occur in the appropriate contexts in the dialects under study, since c is palatal. Other dialects with k, η , and similar assimilation rules don't develop a w diphthong $(tr\acute{o}\eta k, pl.\ tr\acute{o}ns, *tr\acute{o}wns;$ see section 1.). As we have already seen (3), (6), m does not cause compensatory diphthongization either (in any dialect): $\lambda \acute{a}mp$, $pl.\ \lambda \acute{a}ns$, * $\lambda \acute{a}wns$; $pl\acute{o}m$, $pl.\ pl\acute{o}ns$, * $pl\acute{o}mns$. The obvious reason is that the floating velar or labial autosegment (e.g. in (11d)) is only partly identical to the glide w, whereas c or p and p have the same place properties: VEL = [-ant, +back, +high, -lab], LAB = [+ant, -back, -high, +lab], w = [-ant, +back, +high, +lab]; but PAL, p = [-ant, -back, +high, -lab].

The resulting diphthong is different phonologically from underlying diphthongs, which have an associated element in the skeleton. Word final sequences V-glide-sonorant don't appear in phonetic form; they develop an epenthetic ∂ with which the sonorant is syllabified: *fáwns, fáwn ∂ s 'fauns', but trójns, our example of (2), *trójn ∂ s. Glides derived from vowels have undergone most probably only changes in syllabic structure and keep their previous associations to the skeleton, thus also differing from compensating glides ($\partial \beta r \acute{a}jc$ 'hebraic', cf. $s\partial \beta \acute{a}tik$ 'sabbatical'). On the other hand, whereas jns is possible, as a result of compensatory diphthongization, an underlying jCs representation is simplified to js, as a result of the rule of consonant deletion to be discussed in the next section. Thus $v\acute{u}jt$ 'eight', séns 'hundreds', and $v\acute{u}js\acute{e}ns$ 'eight hundred', *vujts\acute{e}ns,

(cf. $s\acute{e}t$ 'seven' $sets\acute{e}ns$ 'seven hundred') show that the vowel-glide representations in $v\acute{u}jt$ and in $\acute{a}jns$ (pl. of $\acute{a}p$) must be different.

As we have seen, whenever a palatal loses its point of articulation, this loss is compensated by the appearance of a glide on the preceding vowel, a consequence of the stability of the PA-tier. The stability of the PA-tier itself derives from the fact that what is referred to descriptively as assimilation is not a single deletion-adjunction, or substitution process, but two processes, deassociation and reassociation.

We will now return to our initial case, segment loss compensation.

4

In examples like sg. $tr\acute{o}pc - pl. tr\acute{o}jns$, the loss of a segment, the palatal stop c, seemed to be compensated at a distance by the appearance of a glide on the preceding vowel. The loss, according to the generalization presented in section 2., is compensated only when the deleted segment has triggered assimilation of a preceding nasal.

The loss of a syllable final consonant when preceded and followed by consonant is normal in Mallorcan (examples from Moll (1934: 20, 36):

(14)	sənt	'saint'	pérə	'Peter'	səmpérə
	téns	'you have'	méw	'mine'	temméw
	cámp	'field'	rás	'open, bare'	can r ás
	sánt	'being'	3 óvə	'young'	sən ʒ óvə
	mólt	'very'	bén	'well'	molβén

The first consonant, as can be seen in (14), assimilates to the consonant immediately following once deletion has applied. *Sant Pere* will hence have the following derivation¹⁵:

Deass.

Again, a floating ALV autosegment on the PA-tier will remain unattached at the end of the derivation and will not be interpreted phonetically. Let us now consider the case of nasal followed by palatal, i.e., the case of compensation by segment loss:

Deass.

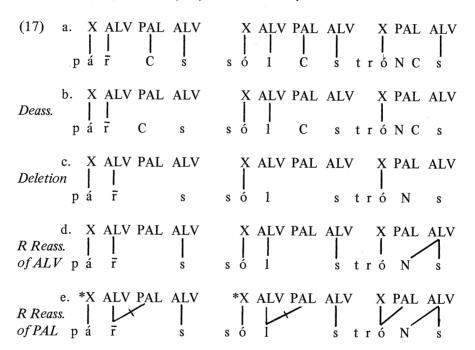
$$\begin{array}{cccc} & & X \ PAL \ ALV \\ \textit{Deletion} & & \Big| & & \Big| \\ & t \ r \ \ \acute{o} \ \ N & s \end{array}$$

After Deletion the representation parallels the representation of cases of property loss compensation, like $\dot{a}ns$ (see (11b)). Consequently application of R Reassociation will yield the same result in both cases. The nasal will take the place autosegment of the final s, and the PAL autosegment originating in the nasal itself in the case of property loss, and in the deleted stop in the case of segment loss, will spread on the preceding vowel giving rise to the diphthong.

We may now turn to the question why this is the only case in which a diphthong arises by deletion of a consonant. Segment loss compensation is, as we saw in the first section, a very restricted phenomenon. It affects only a small area of Catalan, and there it appears only in a very narrow set of cases. In particular, deletion of c after a liquid doesn't result in diphthongization. As said before, the descriptive reason for this fact is that diphthongization correlates with assimilation of the segment adjacent to the diphthongizing vowel. Thus parc, sólc (see (3)) don't assimilate r and l, respectively, and, correspondingly, the plurals pars, sóls do not present a diphthongized vowel. Similarly, we do not get diphthongization with λs : $ba\lambda$ 'dance', $e\lambda$ 'he', $e\lambda$ 'neck' have the plurals $e\lambda$ $e\lambda$ ' $e\lambda$'s, $e\lambda$'s, and not * $e\lambda$ 'dance', $e\lambda$ 'he', $e\lambda$ 'neck' have the plurals $e\lambda$ $e\lambda$ ' $e\lambda$'s, and not * $e\lambda$ 'báils, * $e\lambda$'s, since $e\lambda$ does not assimilate to $e\lambda$'s.

The explanation of this correlation lies in the fact that assimilation is a deassociation – reassociation process between different phonological levels, and in the last examples there is no representation with unasso-

ciated PA autosegments that can be linked to the vowel, a fact that derives from the nonassimilating character of the liquids \bar{r} , l, λ . These consonants retain their association to the PA-tier and block spreading of the PAL autosegment on the vowel. Thus the final representation of the plurals $p \dot{a} \bar{r} s$, $s \dot{o} l s$ is (17c), but it is (17e) for $tr \dot{o} ncs \rightarrow tr \dot{o} jns$.



In other dialects it is the change in one of the parameters mentioned in the first section — existence of palatal c, degree of assimilation — that accounts for the nonappearance of the compensating diphthong. In most dialects palatals don't undergo assimilation. $\acute{a}n$ has the plural $\acute{a}ns$ or $\acute{a}nf$. The PAL autosegment of palatal n will not spread on the vowel, if only floating autosegments undergo R Reassociation (see note 12), and PAL is never deassociated from the skeleton. Exactly the same happens with final n which doesn't assimilate n, however, doesn't cause a diphthong even in assimilating dialects because of the different feature specifications of n and n. The following derivation corresponds to n anys, troncs in nonextended n-dialects:

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In (18b) VEL is associated in the first cycle, thus giving an intermediate representation parallel to the initial representation in (18a); since PAL and VEL don't deassociate in this dialect and they cannot be interpreted as glides, there is no further spreading.

The cases parallel to $tr\acute{o}pc - tr\acute{o}jns$ in dialects with extended assimilation, but without palatal c will have the structure in (19a):

and VEL will not associate to the vowel for the same reasons as in (18b).

NOTES

- 1 There is at least one k-dialect, however, presenting both types of diphthongization ($tr\acute{o}vk tr\acute{o}jns$, $\acute{a}n \acute{a}jns$). A morphologization of the phonological alternation after a phonetic change $c \to k$ is an obvious explanation, but I have no additional evidence in favour of it. See Veny (1962) for a presentation of the relevant facts.
- 3. I give in parentheses the effect predicted by the present analysis.
- 4. c-dialects and k-dialects don't share any other common features; they appear scattered in Mallorca without defining any homogeneous area. c-dialects include Manacor, Felanitx, Pollença; k-dialects are spoken in Sóller, Alcúdia, Campos, Llucmajor, Inca, etc.
- 5. See note 10.
- 6. For the articulatory properties of c, see Barnils (1915).
- 7. This example has underlyingly final \dot{j} , the voiced counterpart of c, which devoices word-finally. The voiced or voiceless character of the stop doesn't affect the phenomenon analyzed here.

Sang has some interesting derivatives: sagnar 'to bleed', sagnia 'bloodletting' sajna and sajna in Mallorcan, sajna and sajna in other dialects. The evolution $sajng^{W}$ in are > sajna in are > sajna in sajna suggests that compensatory diphthongization is rather old, since it must have begun to operate before consonant deletion (here $jnn \rightarrow jn$, see section 4). This would mean, given the present analysis, that c existed before consonant deletion, and that it was general in the island.

- 8. Properly speaking, π assimilates to the following consonant (see note 10), s in all the examples of (4), hence it becomes n in all of them.
- 9. See Alcover Moll (1930-1962) s.v. boig, desig, goig, puig, and Alcover-Moll (1929-1933), 2nd sg. ind. pres. of verbs ending in sibilant.
- 10. Although the examples I use for this paper involve final s, other consonants have the same effect: àjncivé 'next year', tròjmpətit 'small log'.
- 11. This is the analysis in Mascaró (1983). A standard analysis of assimilation in (Central) Catalan can be found in Wheeler (1979) and Mascaró (1978).
- 12. There are still some inadequacies left in 1) and 2), some of which were pointed out to me by James Harris. First, the motivation for having two independent processes is not strong enough. Second, I assume throughout the paper that a PAL autosegment does not spread on the preceding vowel unless it has been deassociated. The problem is here, I think, a factual one. Since the j in ajns is a very short glide it is difficult to tell whether there is any difference between, e.g. ajn and an; because in the transition from a vowel to a palatal consonant a short gliding segment is likely to occur. Leo Wetzels has drawn my attention to the fact that the regressive character of 2) can be considered the unmarked case, and might be dispensed with in the formulation of the rule; see Poser (1982), 124-125, Clements and Sezer (1982), 218-219.
- 13. The independence of *Deassociation* could be argued for with a possible analysis of Final Obstruent Devoicing (e.g. $k\acute{u}zu$ 'I sew', $k\acute{u}s$ 'he sews'). Voicing assimilation works very much like PA assimilation. Thus after deassociation of the voicing autosegment in syllable final position, regressive spreading takes place. In word final position there is no element to the right that can spread, and the deassociated element of the skeleton gets the unmarked voiceless value. In this case, therefore, only Deassociation applies.
- 14. Several possibilities can be suggested. Rules can be left some freedom of application yielding structures that will be filtered out by general or particular conditions on representations. Rules can also be prevented from applying if some conditions are not met.
- 15. The result would be the same if the autosegment were associated to the word final stop. It is possible that for some examples this has to be the case. Cf. $v \neq n/c$ 'I sell', $v \neq n$ 'he sells'; the final c appears in the same form in verbs where there is no assimilation to c, e.g., $v \neq n/c$ 'I am worth', $v \neq n/c$ 'he is worth'.

Cyclic application would give the same results also. I don't know of any argument for this dialects, but other dialects need cyclic application (see Mascaró (1978: 54-58)).

16. The Catalan of Alguer (Sardinia) has fils, sg. $fi\lambda$, $kab\acute{e}ls$, sg. $kab\acute{e}\lambda$, etc., and also $\acute{a}ns$, sg. $\acute{a}p$, etc. This is only apparently a counterexample to the present analysis. Alguerés seems to have a rule of deletion of the assimilating autosegment, rather than (or in addition to) the rule of *Deassociation*. This cannot be seen in nasals, because they always assimilate in point of articulation, but f and h lose their point of articulation and take the unmarked value ALV before any consonant: $ak\acute{e}f$, 'that', $ak\acute{e}f$ $imv\acute{e}l$ 'that winter', $ak\acute{e}s$ $par\acute{a}w$ 'this palace', $ak\acute{e}s$ $galb\acute{o}$ 'that coal'; $\acute{e}\lambda$ 'he', $\acute{e}l$ $di\acute{e}va$ 'he was saying', $fi\lambda$ 'son', fil de $r\acute{e}j$ 'king's son', $kav\acute{a}\lambda$ 'horse', $kav\grave{a}l$ $b\acute{o}$ 'good horse'. Examples are from Kuen (1932).

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Universitat Autònoma de Barcelona, Spain