Aspects of Basque lexical phonology *
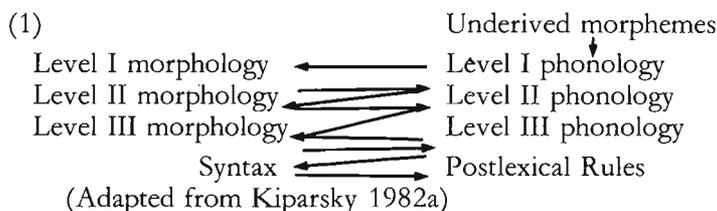
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L EXICAL phonology claims that the set of phonological rules can be divided up into those rules that apply in the lexicon, associated with morpho-logical word-formation processes (*lexical* rules), and those that affect strings of fully formed words, put together after lexical insertion in syntactic structures (*postlexical* rules). The idea that some phonological processes are restricted to certain morphologically defined domains (composition, derivation, inflection) was already present in traditional grammarians. Thus, Azkue, in his *Morfología Vasca* [1], points out explicitly several characteristic phonological rules that apply in Derivation or Compounding as opposed to Inflection and Determination. Le-xical phonology, in conjunction with level-ordered morphology, attempts to for-malize the internal structure of the lexicon in terms of «levels». It is assumed that there is a hierarchical organization in the word formation mechanisms: affi-xation would precede composition, and both would precede inflection. More in-terestingly, not all affixes belong to the same level. It is claimed that there is a correlation between the relative order of affixes with respect to other affixes and their phonological properties. Affixes closer to the stem form one Level, charac-terized by a set of phonological rules whose domain of application is restricted to that Level. These are opposed to other, more peripheral affixes characterized by another set of rules and belonging to a different Level. Thus, in English, an affix like *-ity* forms a unit with the stem it is attached to: stress is assigned to the whole unit, and therefore the stress pattern of the stem by itself may differ from the pattern of the stem+ity unit, as in *stúpid, stupídity*. On the other hand, an affix like *–hood* or *-ness* never «changes» the stress of the stem to which it is attached: *síster, sísterhood*. Similarly, the phonological material added to the stem by *-ity* «counts» for a rule like Trysyllabic Shortening, which shortens a long

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1. See especially sections 42 through 61

(tense) vowel in antepenultimate syllable; thus *divīne* by itself has a long/tense *i* in penultimate position, and the rule cannot apply, since its environment is not met. However, in *divīnity*, after the affix has been added, the rule can apply, shortening *ī* to *i*. In the phonetic representation, tense *ī* will diphthongize, but not lax *i*, accounting then for the difference [div*ai*n], [div*i*niti]. On the other hand, *-hood* or *-ness* never count as syllables for this rule: tense *ā* diphthongizes in *nation* [neišn] and it does not become lax in *nationhood* [neišanhod], even though it occurs in antepenultimate position, since the material of this suffix is not «seen» by Trysyllabic Laxing. This is formalized by assigning *-ity* lo Level I and *-hood* and *-ness* to Level II. Stress is assigned at Level I, and therefore it is not affected by Level II affixes like *-hood*, but it is by Level I *-ity*. Trysyllabic Shortening also applies at Level I, where Level II affixes have not been added to the stem, explaining why they don't «count» for the rule. This model of organization of the lexicon is represented in (1):

(1)   Underived morphemes
   Level I morphology ←————— Level I phonology
   Level II morphology ⇄————→ Level II phonology
   Level III morphology ←——→ Level III phonology
            Syntax ⇄————→ Postlexical Rules
      (Adapted from Kiparsky 1982a)

Level X affixes will be attached prior to Level X+1 affixes, and will be submitted to the relevant Level X phonological rules. The output of each level is in itself a possible lexical item. Whether there is a fixed number of levels remains an empirical question, as does the question of how many levels are motivated in a particular language.

Thus, a word like *itotsemaletxoa* «the little ox driver» would be formed at that level of the Basque lexicon where compounding takes place. The underived morphemes *id-* «ox» and *ots* «sound» are compounded. Basque compounds are right dominant; the head of

(2) [[id] [ots]]

is *ots*. A rule of this level will change -d to -t, or, following the more traditional analysis, -d will be deleted and epenthetic *t* will be inserted, giving the item *itots* «sound made to the ox». This will be compounded with the verbal root *ema* (cfr. *eman* «to give»), as in (3):

(3) [[itots] [ema]].

If *-le*, agentive suffix, is not in the same level as compounding, the output of this level will be *itotsema-*, after, by convention, internal brackets have been erased. This is done at the end of every level, making its morphological structure opaque to subsequent rules. At the relevant level, *-le* will be affixed to this lexical item, its category feature [+N] percolating up to the whole structure, which

now becomes a noun, as its head. At the inflectional level, both the diminutive suffix -*txo* and the absolutive Case ending -*a* will be attached:

(4) [[[itotsemale] txo] a]

A phonological rule of inflection will raise *o* preceding *a* to *u*. This item is inserted in the string with other elements, and is subject to postlexical rules. The final outcome is the item *[itocemalečua]*.

I have been vague in stating the precise level membership of each suffix involved, an empirical question which, as will be seen, is not clear in many cases. This organization makes a whole range of predictions. It predicts that level X suffixes precede level X$_{+1}$ suffixes, and the opposite order is not possible. Thus, a «low» level suffix like the diminutive -*txo* can follow agentive -*le*, but it cannot precede affixes from previous levels: **menditxotsu* «full of little mountains», **landatxare* «vegetable produced in a small yard» (cfr. *menditsu* «mountainous» and *landare* «vegetable»).

In this paper, I will show some of the problems that arise in trying to apply this theoretical framework to the description of Basque lexical morphology and phonology. The discussion will be quite preliminary, trying to point out the most obvious problems that the structure of Basque morphology presents to a level-oriented theory of the lexicon.

Most of the data come from Kintana et al. *Hiztegia 80,* a dictionary of the standard literary language. It should be noticed that exceptions are quite common in the less productive and «deeper» levels. In some cases, a decision has to be made with respect to the significance of deviant forms. The problem is rather acute due to the nature of the literary language: a «union language» with elements coming from different dialects which do not always coincide in their morphological structure or phonological rules. To this, one has to add the existence of many neologisms that are being created continuously to meet the needs of the new situations to which Basque is being exposed in the process of normalization of the language. Some of them may have been coined without respecting less productive lexical rules whose violation is not perceivable even to the native speaker.

1. THE MORPHOLOGICAL EVIDENCE

One criterion that may be used to classify affixes susceptible of being added to verbal bases is whether they are attached to the root or to the participle. The latter is formed in Basque by adding one of the following affixes to the root: -*i*, -*n*, -*tu*. Which one a particular root will take is arbitrary, non-predictable, and has to be lexically indicated as part of the information about the item. Only the last suffix, -*tu*, is productive: verbs derived from independent roots by affixation of derivational or inflectional morphemes (like modal -*ka* or the allative Case marker -*ra*) never take -*i* or -*n*; loan words and neologisms also take -*tu* [2]. -*i*

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2. This applies only to organic neologisms, rather than to the ones that were formed almost «out of the blue» and which were often shaped in the form of old verbs. One example of these ending in -i is *idatzi* «to write», which is perfectly integrated in the language.

and -*n* verbs form an isolated layer of verbs, most of which are characterized by having both this participial suffix and an *e/i*- prefix [3]. One would expect that derivational suffixes attached to verbal stems are attached either to the bare verbal root or to the participial form. However, this is not the case. Some affixes motivate a distinction between -*tu* and -*i* on the one hand and -*n* on the other. I will call «A suffixes» those that are affixed to the root in all three types of verbs, and «B suffixes» those that distinguish -*tu* -*i* verbs from -*n* verbs: they are added to the root in the first group and to the root *plus* -*n* in the second. I list some of them in (5) and (6):

(5) A SUFFIXES

-*PEN*

-tu verbs		-i verbs		-n verbs	
aska-tu	aska-pen	isur-i	isur-pen	eroa-n	eroa-pen
barka-tu	barka-pen	erabil-i	erabil-pen	eragi-n	eragi-pen
labur-tu	labur-pen	eragotz-i	eragoz-pen	irau-n	irau-pen
irudi-tu	irudi-pen	adieraz-i	adieraz-pen	entzu-n	entzu-pen
senda-tu	senda-pen	igorr-i	igor-pen	itxaro-n	itxaro-pen

-*TE/TZE*

-tu verbs		-i verbs		-n verbs	
aska-tu	aska-tze	ikus-i	ikus-te	ema-n	ema-te
barka-tu	barka-tze	jezarr-i	jezar-tze	ego-n	ego-te
labur-tu	labur-tze	erabil-i	erabil-tze	iza-n	iza-te
irudi-tu	irudi-tze	jarr-i	jar-tze	irau-n	irau-te
senda-tu	senda-tze	egos-i	egos-te	egi-n	egi-te

-*ERA*

-tu verbs		-i verbs		-n verbs	
eska-tu	eska-era	ibil-i	ibil-era	iza-n	iza-era
gerta-tu	gerta-era	itzul-i	itzul-era	irte-n	irte-era
amai-tu	amai-era	erabil-i	erabil-era	entzu-n	entzu-era
buka-tu	buka-era	jarr-i	jarr-era	ihardu-n	ihardu-era

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3.   There is some evidence that the final -i of some nouns and adjectives may not be part of the stem but, rather, at least originally, morphemic. We find alternations like *ugari* «abundant» *ugaldu* «to multiply»; *neurri* «measure» *neurtu* «to measure»; *gari* «wheat» *galburu* «wheat ear»...

-KIZUN [4]

-tu verbs		-i verbs		-n verbs	
eska-tu	eska-kizun	ibil-i	ibil-kizun	egi-n	egi-kizun
itaun-du	itaun-kizun	ikus-i	ikus-kizun	esa-n	esa-kizun
senda-tu	senda-kizun	igarr-i	igar-kizun	erantzu-n	erantzu-kizun
ospa-tu	ospa-kizun	etorr-i	etor-kizun		

(6)   includes some of the «B» suffixes, which seem to outnumber those belonging to the «A» group:

(6) B SUFFIXES

-GARRI

neka-tu	neka-garri	ikus-i	ikus-garri	jasa-n	jasa-n-garri
sinis-tu	sinis-garri	oneritz-i	oneriz-garri	eragi-n	eragi-n-garri
oroi-tu	oroi-garri			jaki-n	jaki-n-garri

-KOR

alda-tu	alda-kor	egos-i	egos-kor	irau-n	irau-n-kor
mugi-tu	mugi-kor	erabil-i	erabil-kor	egi-n	egi-n-kor
sar-tu	sar-kor	eror-i	eror-kor	ema-n	ema-n-kor

-ERAZI [5]

alda-tu	alda-erazi	erauz-i	erauz-erazi	itxaro-n	itxaro-n-erazi
sal-du	sal-erazi	ikas-i	ikas-erazi	joa-n	joa-n-erazi
zabal-du	zabal-erazi	etorr-i	etorr-erazi	ema-n	ema-n-erazi

-TZA

lagun-du	lagun-tza	iraul-i	iraul-tza	jaki-n	jaki-n-tza
ezagu-tu	ezagu-tza			erei-n	erei-n-tza
ezkon-du	ezkon-tza			eki-n	eki-n-tza

Similarly, in compounds, the first verb usually retains the -*n*, but appears without -*i* or -*tu* (I will limit the examples to -n verbs):

(7)

Compounds with *ezin* «inability»

ja-n	ja-n-ezin
iraga-n	iraga-n-ezin
ego-n	ego-n-ezin

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4.   This is clearly an A suffix in the Biscay dialect but not so clearly in others, since words like *emankizun, eginkizun* also exist.

5.   I am using the criterion that treats as affixes elements that obligatorily subcategorize for other morphemes: thus *mendi* «mountain» can occur by itself, but not -*pen* or -*erazi*. The criterion is not very satisfactory for Basque, for reasons that are not relevant here.

Compounds with *aldi* «turn» [6]

ema-n	ema-n-aldi
irau-n	irau-n-aldi
igo-n	igo-n-aldi
iraki-n	iraki-n-aldi

Other compounds: In compounds with two verbs, the second will receive the participial form (such form is the citation one for Basque verbs); the first element will be the root if it is a *-i* or *-tu* verb, and the root *plus -n* if it is a *-n* verb:

(8)

-tu verbs	-i verbs	-n verbs
(har-tu) *harr*-ema*n*ak	(ikus-i) *ikus*-entzuteko	(jan) *jan*-txakur
(sal-du) *sal*-eros*i*	(ibil-i) *ibil*-toki	(joan) *joan*-etorr*i*ak
(sal-du) *sal*-neurri	(ikas-i) *ikas*-gela	(ego-n) *egon*-gela

In addition, some affixes have to be added after both *-tu/-i* and *-n* have been attached; this is the case with inflectional affixes like the locative genitive and future marker *-ko*, the absolutive *-a* of «passive» morphology, *-egi* «too», *-ago* «more», *-en* «the most», participial *-ta*, etc., as shown in the following examples:

(9)

hel-du	hel-du-ko	ikus-i	ikus-i-ko	entzu-n	entzu-n-go
	hel-du-a		ikus-i-a		entzu-n-a
	hel-du-egi		ikus-i-egi		entzu-n-egi
	hel-du-ago		ikus-i-ago		entzu-n-ago
	hel-du-en		ikus-i-en		entzu-n-en
	hel-du-ta		ikus-i-ta		entzu-n-da

Here, I will show some problems that a morphological or phonological treatment of these data within the assumptions of lexical phonology will entail.

By itself, whether a particular affix is attached to the root of *-n* verbs or to the *root+n* form only divides affixes into two classes: those that are affixed prior to *-n* affixation and those that are affixed later. It is compatible with any level order: it does not imply that pre-*n* affixes belong to one level and post-*n* affixes to another. It is also compatible with one single level, in which some ordering between the morphemes might be superimposed. However, the hypothesis that linear order is a reflex of level-ordering in the morphological word-formation component immediately makes some predictions. Thus, it is predicted that while A suffixes may precede B suffixes if both are combined in one single word, B suffixes will not be able to precede A ones. That is, if a verbal suffix is attached to a *-n* verb with the *-n*, that affix cannot precede another one which is added to a *-n* verb without the *-n*. This is difficult to test because, since we are necessarily limited to affixes that are attached to verbal bases and the A suffixes exa-

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6. But *egotaldi, esaldi...*

mined here all have the categorial specification [-V], they produce lexical items to which B suffixes cannot be affixed. However, there is another prediction made by the theory: if any suffix follows a B suffix in the linear ordering of complex expressions, then it will have to be added to -*n* stems; furthermore, it will never precede an A suffix. Thus, a word like *irudikortsu* shows the sequence *kor+tsu*. Since, as shown above, the suffix -*kor* is one of the B suffixes, it is predicted that, since-*tsu* follows it, *tsu* wil also be added to -*n* stems. This seems to be the case, as shown in the few words I have found where -*tsu* is attached to verbal stems: *jakintsu (jakin-n), iharduntsu (ihardu-n)*. The prediction is confirmed by cases where -*tsu* appears with another A suffix: in those cases, it follows it, as in *iraupentsu (pen+tsu)* and *entzutetsu (te+tsu)*. Similarly, words like *ekintzakor* show that -*kor* follows a B suffix. It is correctly predicted that -*kor* is a B suffix itself, as shown in (6).

More indirect evidence is available for other suffixes. Thus, the affix -*koi* usually subcategorizes for nominal stems. When it is attached to verbal stems, it behaves like a B suffix:

(10)

ikas-i	ikas-koi
ga-n	ga-n-koi
sar-tu	sar-koi

Affixes ordered after it will then be B suffixes. Even if this is not directly provable by seeing to what stem they are attached, an indirect proof will be that they follow other affixes which we know are B suffixes. -*tasun* follows -*koi* in words like *elkarkoitasun, sukoitasun, erdikoitasun, oldarkoitasun*, etc. Then, it should be a B suffix. This is confirmed by the fact that if follows other B suffixes or compounds that we know are B-type. -*tasun* follows -*kor (emankortasun, erabilkor-tasun), -tza (ekintzatasun), ezin (ikastezintasun), kide (elkarkidetasun, adiskidetasun)*, etc. Also, a word like *jareintasun* (from the verb *jarei-n*) provides further evidence about the correct classification forced by the theory, since -*tasun* is shown to be affixed to a stem with -*n*, like B suffixes.

Notice that if a given affix precedes a B suffix, it does not follow that is should be an A suffix: it might simply be an affix which precedes a B suffix in the word formation rules but which belongs to the B group itself. That some ordering is needed inside each group or level is shown by the inexistence of words with combinations like *-tasungarri*, although -*garritasun* is possible. An apparent counter-example to this generalization might be a word like *osasungarri* «healthy», where -*tasun* without the (originally) epenthetic -*t*- has been attached to the stem *osa-*(cfr. *osa-tu* «to heal») and the new item has been affixed -*garri*. However, while historically -*asun* in this word might be identified as modern -*tasun*, they are not synchronically relatable. This is shown by the existence of a word like *osasungarritasun* «salubrity», where -*tasun* has been attached to the stem following the regular order. Such «doubly affixation» does not occur in other words, as far as I know. This indicates that *osasun*, the stem to which -*garri* is affixed in the word we are considering, has been reanalyzed as one single, unbreakable word. This would also explain why we have a word like *osasunkaitz*

«anti-hygienic», where *-kaitz (-gaitz)*seems to follow *-tasun,* while the normal order between the two affixes is *-gaiztasun.*

(11) elkargaiztasun
   hezgaiztasun
     irakurgaiztasun
     managaiztasun

As for the second prediction (that B affixes will not precede A affixes), one apparent counterexample is the existence of combinations like *-tzapen.* *-tza* is a B suffix; however, it precedes an A suffix in the following words, despite the predictions of the theory:

(12) igertzapen
     ikertzapen
     izentzapen
   egokitzapen
     erditzapen

However, there is evidence that *-tzapen* has to be analyzed not as a combination of two distinct affixes *-tza* + *-pen,* but as one single complex unit. The evidence comes from the subcategorization frames of the composing affixes. *-tzapen* subcategorizes for verbs. This is compatible with the subcategorization of both *-tza* and *-pen.* In *garbitzapen* «cleaning», the adjective *garbi* «clean» will have been turned into a verb by zero affixation, as we will justify later, giving an entry like (13):

(13) $[[\text{garbi}]_A \emptyset]_V$

If the structure of *garbitzapen* is as in (14), *-pen* is not inserted in the correct frame,

(14)
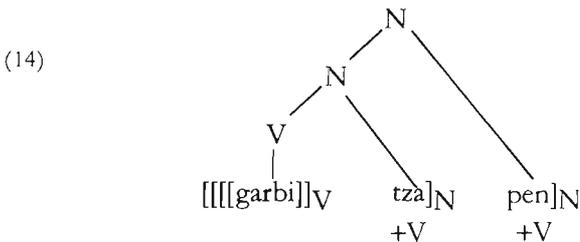
since *-pen* does not subcategorize for nouns, and after the categorial feature of *-tza* percolates up, *garbitza* is an N. However, if the structure is one where *-tzapen* has been reanalized as a single suffix, it will be well-formed, as in (15):

(15)
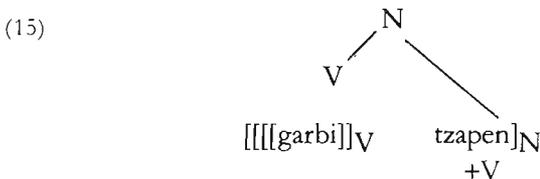
-tzapen would subcategorize for verbs itself.

Forms like *adierazpen, adierazle* (from *adi-tu* «understand, hear») where the causative *erazi* precedes A suffixeslike *-pen* and *-le* (for this suffix's member-ship in the A group, cfr. *entzu-le* from *entzu-n; egi-le,* from *egi-n,* etc.), present problems within this proposal. Obviously, *-pen* and *-le* can be attached because *-erazi* is a verb itself with the -i participial suffix. Thus, by themselves, *-erazpen -erazle* are well-formed (if attached to some other base form, since the causative morpheme is bound), since they show A suffixes attached to the bare verbal root. However, when we observe the whole forms, an ordering paradox seems to arise: *-eraz* is a B suffix, attached to verbal roots with -n, as ahown in (16):

(16)

ema-n	ema-n-eraz-i	*ema-eraz-i
joa-n	joa-n-eraz-i	*joa-eraz-i
irau-n	irau-n-eraz-i	*irau-eraz-i
jaki-n	jaki-n-eraz-i	*jaki-eraz-i

Since in order for these data to be accomodated within this theory it is necessary to attach *adi* to *erazpen* and *erazle* (we cannot affix first-*eraz* and then *-pen* or *-le*), one might claim that these are cases of composition, rather than derivation. To the root *eraz* at level X where A suffixes are located, the two suffixes are attached:

(17)

LEXICON eraz	eraz
LEVEL X [[eraz]pen]	[[eraz]le]

Since the result of each level is a lexical item itself, these new derived forms can serve as input to the compounding level:

(18) [[adi] [erazpen]] [[adi] [erazle]]

From the point of view of composition, the structures are well-formed: the head is premodified in Basque compounds (*harretxe* from *harri* «stone» and *etxe* «house», is a type of house, not a type of stone). Here the head would be *erazle, erazpen.* However, an alternative structure would be either (19) or (20), both of which seem more plausible than (18) and are nevertheless not possible given the assumptions we are making:

(19) [[[adi][eraz]]pen] [[[adi][eraz]]le]
     [[[sofri][eraz]le]
(20) [[[adi]eraz]pen] [[[adi]eraz]le]

The analysis of *adierazpen* in (18) will be possible if in composition -i and *-tu* verbs still present their radical, while *-n* verbs have already been affixed the verbal suffix; otherwise the behavior of *eraz* would not be explained: in order for this analysis to go through, *eraz* in compounds must be attached to exactly the same type of stems that *erazi* as a verb forming suffix is attached to. In fact, this seems to be the case, as shown in (8), and in these further examples:

(21) -n verbs [7]

    jan-edana (jan-n)
    jakin-iturria (jaki-n)
    egontoki (ego-n)
    jakingura (jaki-n)

    -i verbs

    erakust-azoka (erakuts-i)
    ikuspuntu (ikus-i)
    ikusgura (ikus-i)

    -tu verbs

    sal-neurri (saldu)
    galbide (gal-du)
    hartezin (har-tu)
    sendabelar (senda-tu)

However, the analysis in (17) is counterintuitive. Since -*i* verbs appearing in compounds do not show the participial ending and appear in their root form (as observed in (21)), -*i* has to be attached after compounding of this type has taken place. This forces us to assume that the verbal -*i* is added to the whole compound, as in (22), rather than to *eraz* itself. While this is possible, treating these causative related words as cases of compounding implies a change in the type of criterion that we have been assuming throughout to distinguish derivation from composition. This was based on the obligatoriness of subcategorization for other morphemes. *erazi* is a bound morpheme, and unless it is treated as an exception to this criterion, it will be classified as a derivational morpheme.

(22) [[[adi] [eraz]]i]

One possible alternative to this problem, and a different way of looking at the -*n*/Ø alternation, might be to interpret it as a case of phonological deletion of -*n* (which would then belong to the stem itself, rather than being a verbal participial morpheme like -*tu* and -*i*). -*n* would be deleted preceding certain affixes, but not others. Some evidence for this approach comes from the consideration of the verbal form appearing in non-indicative tenses. Subjunctive, potential and imperative auxiliaries are combined with the verbal root without -*i* or -*tu* but with -*n*, as shown in (23):

(23) a. Eman iezaiozu! (ema-n)
        Give it to him

        Jan dezakezu. (ja-n)
        You can eat it.

    b. Ikus dezan (ikus-i)
        So that he sees

        Ibil daiteke (ibil-i)
        He can walk

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7. Some important exceptions are words derived from *jan* «to eat», like *jatordu* «Mealtime», *jaletxe* «restaurant».

c. Har ezazu (har-tu)
   Take it.

   Zabal dezaten (zabal-du]
   So that they open it

If the form appearing in these contexts is identified as the verbal root, -*n* would be part of it, and the previous discussion would not be relevant. However, this only shifts the problem to the phonological rules. First, following the assumptions of lexical phonology concerning the association of different levels of morphology with particular rules and affixes, we would assign -*n* deleting suffixes like -*pen*, -*le* etc. to one level, and non deleting suffixes to a different one. Since level X affixes are attached before level X_{+1} affixes, and given the order between the two classes of affixes discussed in the previous pages, then -*n* deleting affixes would belong to a level prior to non-deleting ones. Then forms like *adierazle* etc. would not be accounted for, since a Level I affix (*eraz*) is preceded by a Level II one (-*le*). Second, a deletion rule applying to -*n* would have to be limited to just those -n's that occur in verbs that don't take any of the participial endings -*i* or -*tu*, since n-deleting suffixes do not delete the -*n* of verbal roots like *ipin-i* (cfr. *ipin-tze*, *ipinte) *ezkon-du* (*ezkontze*, *ezkote, *ezkongarri*, **ezkogarri...*) etc. And third, there is also some evidence that indicates that -*n* is a verbal morpheme of its own, rather than part of the root of a special type of verbs. Thus, some Basque verbs (usually called «synthetic») do not require the auxiliary to be conjugated in the present and past: they have their own conjugation incorporating all the inflectional information. Such verbs present the root without initial *i/e* and without final -*i*. Crucially, -*n* final synthetic verbs appear without -*n* in these cases, indicating the morphemic status of both -*i* and -*n;* some of them are shown in (24):

(24)

	-i verbs			-n verbs	
etorr-i	: d-a-*tor*	ego-n	:	d-a-*go*	*dagon
ibil-i	: n-a-*bil*	joa-n	:	n-*oa*	*noan
ekarr-i	: d-a-*kar*	jaki-n	:	d-a-*ki*-t	*dakint

Thus, causatives present a problem for the lexical account of word formation in Basque. Otherwise its predictions seem to be fairly accurate, as observed in the ordering properties examined above.

2. THE PHONOLOGICAL EVIDENCE

The data considered so far come from morphological properties of different suffixes. The other source of evidence to construct a level ordered description of the lexicon comes from the consideration of different domains of rule application. I will consider here some data related to voiceless stop voicing after nasal. After -*n* (usually also after -*l*, but not -*r*, subject to more interdialectal variation) voiceless initial stops may or may not become voiced. The rule does apply

to inflectional affixes: *-ko* «of» (*hemen-go; esan-go,* but *hor-ko...*), *-tik* «from» (*hemen-dik, han-dik;* but *hor-tik...*). It also applies to other intuitively inflectional morphemes, such as participial *-ta* (*egon-da, irten-da,* but *ikusi-ta...*). It applies to the verbal suffix *-tu* (*ezkon-du, ahalegin-du;* but *eska-tu...*). It does not apply to other non-derivational affixes: *-tasun* (*gizon-tasun, zorion-tasun, lehen-tasun, osasun-tasun...*) *-kor* (*eman-kor, egin-kor, iragan-kor, sumin-kor*). However, it does apply to the origin suffix *-tar: baztan-dar, Azkain-dar, eskuin-dar.* A natural way of incorporating this distinction into the system is to assign voicing suffixes to the same level. Let us assume that in fact, voicing is one of the rules that define the inflectional level, say Level III of our grammar. The rule will apply to all inflectional morphemes. Morphologically, if these suffixes are attached to verbal stems, they are attached after *-i, -n* and *-tu* have been suffixed (which might indicate that *-i* and *-tu* both are Level III affixes, although there is no direct evidence for *-i* and *-n* has to be assigned to a prior level, given the properties discussed above [8]). Since *-egi* «too», *-ago* «more» and *-en* «the most» are affixed after *-i* and *-tu* they can be included as Level III affixes on the basis of morphological evidence independent of voicing [9].

Another rule which might be criterial in determining level membership for particular morphemes is the Vowel Lowering rule which lowers mid vowels to *a*. The rule applies to the stem-final vowel of some morphemes when attached some affixes. As this description indicates, this is a very general and pervasive but idiosynchratic rule. It applies only to some stems, which have to be marked in the lexicon. Since it is triggered by some affixes but not by others, one might try to assign the rule a particular domain and group triggering affixes in one level. Since rules may apply on several levels, provided that they are adjacent, there is also the possibility of breaking this group up into different levels; in fact, it applies both to A and B suffixes, which suggests that the rule has several Levels as its domain. Here I will examine the interrelation of Vowel Lowering with voicing, with respect to two modal suffixes: *-ki* and *-ro,* both equivalent to English *-ly. -ki* does not trigger the voicing rule. It does not trigger Vowel Lowering either, even in stems which ordinarily undergo it, as shown in the following data:

(25)

obe	obe*ki*	(ob*a*-tu)
luze	luze*ki*	(luz*a*-tu; Juz*a*era)
maite	maite*ki*	(mait*a*garri)
sendo	sendo*ki*	(send*a*-tu)

This contrasts with *-ro,* which does trigger Vowel Lowering. Often, there are pairs of the same root with either morpheme, with the corresponding difference in the stem vowel:

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8. A problem for this hypothesis comes from words like *eroritasun* and *jareintasun.* In the first one, *-tasun* which, since it does not get voiced, cannot be a Level III affix, is shown to be attached *after -i* which would be at such level.

9. The rule of Voicing also seems to classify the toponymic *-tegi* «place» as inflectional, which seems rather counterintuitive.

(26)

maite	maitaro	maiteki
eme	emaro	emeki
luze	luzaro	luzeki
zehe	zeharo	zeheki
sendo	sendaro	sendoki

Furthermore, there are cases where both -*ki* and -*ro* appear, merged into one single morpheme, usually -*kiro*. If attached to -*kiro*, lowering of a relevant morpheme does not take place: compare the above forms with *maitekiro* and *emekiro*. The final wrinkle is that, judging from words like *maitaroki*, when the order is -*roki*, lowering takes place. Since -*ki* and -*ro* may appear in any order with respect to each other, they must belong to the same level, and their order must not be fixed. Given the fact that Vowel Lowering applies to -*ro*, then it must include in its domain of application whichever level it is that we include modal affixes in. However, the description gains nothing by this move: we still have to indicate for each stem whether it can undergo lowering or not and for each suffix whether it' triggers the rule (-*ro*) or not (-*ki*). The same conclusion seems at first to be necessary when the interaction of Vowel Lowering with Voicing is considered. As mentioned above, -*ki* is not a voicing suffix. The only case where it voices is in the word *ongi* «well». The remaining examples don't show it:

(27) sakon-ki
      gizon-ki
      zuzen-ki
      zeken-ki
      bigun-ki
      komun-ki
      leun-ki

This indicates that -*ki* is not a Level III affix. On the other hand, a Level III affix like -*tu*, which does become voiced alter nasal, seems to trigger Vowel Lowering, as shown in words like *maitatu, ematu, luzatu, zehatu* and *sendatu* (compare the base adjectives in (26)). It seems then that in Level III the rule of Vowel Lowering has to be idiosyncratically specified for -*tu* but not for the remaining affixes, which don't trigger it. However, it is possible to exclude Level III as part of the domain of application of the Vowel Lowering rule. Basque grammars usually assume that -*tu* can create verbs. It would be added to stems of any category, and the resulting word would receive its category V by percolation up of its categorial feature. On the other hand, we might analyze -*tu* as an inflectional morpheme which does not change category membership and which is attached to stems already marked as V. This is in line with analyses of -*tu* as a perfective marker (as in Goenaga (1978)). Evidence for it comes from moods where the perfective suffixes -*i* and -*tu* do not appear and only the verb root shows up. For a verb like *luza-tu* (remember that this is the citation form for Basque verbs), what shows up as verbal root in those cases is *luza*, as in «*Luza ezazu!*», which suggests that the category of *luza* is already V. In this analysis, we can treat *[luza]* as a verb, and the process from its original adjective base would be one of conversion or zero derivation. Since lexical phonology does not ena-

ble direct «conversion» of one category into another, the two possibilities we have, as pointed out by Kiparsky (1982b), are multiple category membership and zero affixation. In this case, zero affixation would be the type of word-formation process involved. Notice that Vowel Lowering is not restricted to verbal -*tu*, but it occurs with other affixes, even those that are not attached to verbs:

28

-tsu	zorne	zorna-tsu
	ospe	ospa-tsu
-pe	hosto	hosta-pe
	zulo	zula-pe
-keria	baso	basa-keria
	asto	asta-keria
-ti	maite	maita-ti
	baso	basa-ti

If this were a case of double membership, we would have the following two items:

(29) [luze]$_A$ [luze]$_V$

But in this case, stating the domain of application of Vowel Lowering becomes a problem, since the rule will have to be associated with some affixes (-*tsu*), but not others (-*ki*) *and* with some categories (verbs) so that *luze* becomes *luza*. But the category is irrelevant for the process. On the other hand, if this is treated as a case of zero affixation, we would have at Level X a Ø suffix, and this suffix is among the set of morphemes that trigger Vowel Lowering in stems lexically marked for it. The derivation of *luzatu* would then be:

(30)

Lexicon	[luze]$_A$
LEVEL X	[[luze]$_A$Ø]$_V$
LEVEL III	[[[luze]$_A$Ø]$_V$ tu]

In this way, Vowel Lowering would not have as its domain Level III. However, returning to the original problem, outside this level, it is still necessary to mark for each affix whether it triggers the rule or not. It is not possible to claim that triggering affixes belong to one level and that Vowel Lowering is restricted to that level in its domain, since some non-triggering affixes must both precede and follow other triggering suffixes. Thus, -*garri* is a triggering morpheme [10], as shown by words like *luzagarri (luze), sendagarri (sendo), nekagarri*

___

10.   Alternatively, -*garri* is attached in these cases to verbal stems, that is, to stems which habe been affixed in some cases Ø, after which Vowel Lowering has taken place. This does not affect the analysis, since in any case, -*garri* would follow a triggering affix, here Ø.

(neke) etc. It can be followed by a non-triggering suffix such as *-ki: miresgarriki, liluragarriki* etc. And, as shown above, *-ki* can be followed by a triggering affix such as *-ro.* Thus, it seems that, at least for some rules, it is still necessary to lexically mark some suffixes as triggering them, and some others as not doing so, since in this case it is not possible to derive this property by gathering triggering affixes into one single level. Given this situation, adscribing Vowel Lowering to several levels as its domain is arbitrary: for each suffix it would have to be shown that if it does not trigger a given rule, it is because the affix is so marked or, on the other hand, because it belongs to a level not included in the domain of the rule. The predictive power of the theory is null in these cases.

There are also problems with some empirically wrong predictions made by the theory with respect to the order of affixes. Level III affixes like *-tu* are predicted to occur at the right margins of lexical items. This is usually the case. However, there are some counterexamples. The affix *-tar* belongs to this level, since, as shown above, its dental stop is voiced after nasal. However, we find words like

(31) bizkai*t*arkeria
hiri*t*artasun
hiri*t*argo
mendi*t*artu
eliz*t*artu

While it might appear preceding other Level III affixes like *-tu,* it cannot appear preceding previous level affixes like *-keria* and *-tasun.* That these are not Level III is shown by the fact that their stops don't get voiced after nasal:

(32)

sakon-tasun	likin-keria
leun-tasun	leun-keria
lehen-tasun	gizen-keria
gizon-tasun	lizun-keria
jarein-tasun	gizon-keria

A similar case is that of graduative morphemes that we have identified as belonging to Level III, such as *-ago, -en* and *-egi.* In the following words, they are shown to be able to appear before affixes which our criteria show are not inflectional or Level III:

(33)

zeingehi*ago*ka	«disputing (doing who more)»
on*egi*tasun	«patience (being too good)»
gehi*egi*keria	«abuse, excess»
gehi*en*go	«majority (as a group of elements)»
gehi*en*tasun	«majority (as a quality)»
gutxi*ago*tasun	«inferiority»
gutxi*egi*tasun	«insufficiency (being too little)»
gutxi*en*go	«minority»

Since words like the ones appearing in (32) and (33) do exist in the language, special mechanisms have to be incorporated to account for them. It should be noticed that most of these cases involve Level III affixes; apart from the problem with causatives, derivational morphemes behave pretty much as expected. The most salient case of ordering problems involving Level III affixes is that of Case endings. I have assumed above that the inflectional system occupies the «lowest» level of the lexical structure, the one immediately preceding lexical representation. As such, it is the most productive and with transparent semantic properties. However, there are many words in Basque which show inflectional Case markers preceding derivational suffixes; most of them involve the directional Case -ra, but genitive locative -ko and instrumental -z also occur quite frequently [11]. (34) lists some of these words [12]:

(34)

-ra «to»	-ko «of»	-z «with»
etxeratu	legezkotasun	larruztatu
eskurakoi	noizkotasun	zilarreztatu
mendirakoi	horkotar	lastoztatu
atzerakuntza	nolakotasun	marraztu
gogoramen	ohizkotasun	orozgaintasun
eskuraezinezko	menpekotasun	
norberaganatu	eskerrekotasun	
zenbakitaratu		
mendiraro		
atzerabide		
honantzaldi		
oneratsu		
itsasalderatu		
inorenganagarri		

While -ko and -z appear with an apparently smaller range of possible affixes, -ra is more flexible. It occurs in its definite singular form -ra, in the indefinite -tara, in the animate form -gana, and as -a attached to the irregular stem hon-(for «to here», as opposed to hemen «here»). To account for this displacement of Level X affixes to Level X_{-1}, Mohanan (1982) introduced the mechanism of the «loop». A word like mendirakoi «with a tendency to go to the mountain», would have the following derivation:

11.   More isolated cases where other Case endings appear embedded in a lexical item also occur, as genitive in berekoi.

12.   Where -tu follows -ra there is no violation of the ordering predictions per se, since both affixes belong to the same level. However, these words can usually show -ra to be followed by other verbal suffixes which have been classified as belonging to other levels. See (36) for some examples. It would be interesting to check whether the same range of affixes is allowed after -ko -ra and -z. In the randomly selected ones in (34) -ko is followed by a Level III affix (-tar) and by -tasun an affix for whose classification some problems were noted in footnote 8. There some evidence indicated that it might be a Level III affix itself. If these data are significant, some generalization may emerge from further study. -z usually appears as part of the complex affix -zta which might not be analizable.

(35)

Lexical item	[mendi]
LEVEL I	——
LEVEL II	——
LEVEL III	mendi-ra
LEVEL II	mendira-koi

With such mechanism, lexical items generated at the end of a cycle can serve as input to a previous cycle. This mechanism must be restricted as much as possible, since otherwise it would make the system unable to make any predictions: any claim about the level membership of a given affix would become untestable. Mohanan proposes to limit loops to adjacent levels. We can restrict their power more by limiting them to special affixes, rather than to all affixes of a particular level. But in the case of -*ra* it seems that most affixes can be preceded by it; in particular, pre-*n* (Level I) affixes like -*pen* and -*te* may be so, as shown in (36):

(36)

-pen	-te
lehorrera-pen	lehorrera-tze
gogora-men	gogora-tze
burura-pen	burura-tze
barrura-pen	barrura-tze

In these cases, the loop would have to be set for two non-adjacent levels. This is certainly feasable, but not desirable, since it weakens the lexical proposal considerably. An alternative solution could be to place inflection as a whole as the first level; our previous Level III would now become Level I. This would explain why it is inflectional affixes that sometimes occur n the «wrong»order. However, then we would have to explain why only -*ra*, and to a lesser extent, -*ko* and -*z* may precede other affixes of the derivational component. Given the theoretical assumptions of lexical phonology, the unmarked case for Level I affixes would be to be able to precede Level II and III affixes, while in fact it seems to be a marked characteristic of some inflectional Cases to do so. It cannot be claimed that affixation with other Cases is ruled out by some semantic incompatibility: no natural mechanism in the semantic component of word formation will allow *etxeratu* «to go home» while filtering **etxetiktu/etxetitu* «to come from home».

Given the lack of definite evidence for Level divisions that can be posited for Basque, the above discussion on inflectional problems for the theory is not conclusive in any sense. However, it does suggests that, although this phenomenon deserves more careful study, inflection may not fit as assumed in this level-ordered morphological and phonological model.

In this paper, I have examined some of the problems that arise in trying to provide a lexical account of word formation in Basque. Given the preliminary nature of this paper, there are many open questions, and in this sense some of the problems I have outlined may be found a natural solution within the framework once more data are brought to consideration and a more thorough study

is undertaken. Aside from its final validity as a model of the lexicon, perhaps the most interesting aspect of lexical phonology is the new range of questions that it poses about the structure of the lexicon: the «evidence» I have been presenting is only evidence once its significance is brought to light by a particular prediction of the overall system. It is a merit of this model and of recent phonological and morphological research that they provide new and theoretically interesting ways of looking at data which have been rather intensively studied by traditional grammarians. In the case of Basque, while the basic descriptive work was carried out in Azkue's *Morfología Vasca*, the study of the internal organization of that mass of data remains largely undone.

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