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Morph Insertion and Allomorphy in Optimality Theory

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ABSTRACT

The goal of this paper is to compare two different hypotheses about the insertion of morphs and allomorphy in Optimality Theory. One of them, the Morphs through Constraints Hypothesis (MCH) claims that the phonological realization of morphemes (morphs) is introduced through language-particular constraints. The other hypothesis, the Morphs in the Input Hypothesis (MIH) claims that the inputs to GEN contain all the relevant phonological information. It is shown that the MIH is clearly superior to the MCH in accounting for voicing neutralization in languages like Catalan. The two hypotheses seem to fare even in dealing with other phenomena, such as phonologically-conditioned allomorphy or OCP-triggered epenthesis vs. haplology in English possessives and plurals. Finally, although the MCH seems to be a simpler hypothesis for lexical exceptions, it is shown that, when certain aspects are taken into account, it runs into problems.

KEYWORDS: Morph Insertion, Morphemic Constraints, Allomorphy, Voicing, OCP, Catalan, Dyirbal, English.

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I. INTRODUCTION[1]

Within Optimality Theory (OT), the most traditional view is that the input to the phonology contains the underlying form of a given string; in other words, the input to GEN contains all the relevant phonological information (see Prince and Smolensky 1993 and much later work). Let us call this view the Morphs in the Input Hypothesis (MIH). A less traditional view is that the phonological realization of morphemes, the morphs, can be introduced through (language-specific) morphemic constraints (see, for instance, Hammond 2000, Russell 1995, Yip 1998); the input then contains only morphosyntactic information (as well as some phonological information, depending on the author). Let us call this second view the Morphs through Constraints Hypothesis (MCH). In its pure version, the MCH implies a separationist view of the grammar, that is the idea that no phonological information is present in the syntax; morphs are introduced in a separate component or module. This idea is not a new one (see, for instance. Otero 1976, or Pranka 1983), and can be found in several morphology models, such as Anderson's A-morphous Morphology (Anderson 1992), Distributed Morphology (see Halle and Marantz 1993, for instance), or Lexeme-Morpheme Base Morphology (Beard 1995). The MIH is not compelled to this view of the grammar, but it is not incompatible with it.

The following simplified tableaux illustrate the basic differences between the MIH and the MCH. The example chosen is the Spanish masculine plural noun *gatos* 'cats'. Under the MIH, the input contains all the morphs, and the constraints that force the acceptable output [gátos] to become the optimal candidate are universal constraints, in this case the faithfulness constraints MAX and DEP.[2]

(1) Spanish *gatos* 'cats'. Input: /gat + o + s/ (MIH)

/gat+o+s/	MAX	DEP
☞a. gatos		
b. atos	*!	
c. gatosa		*!

As mentioned earlier, for the MCH the input contains only morphosyntactic information (here GAT+MASC+PL). The morphs are introduced through morphemic constraints specific to Spanish. Adapting the notation in Russell (1995), in the morphemic constraint that inserts the morph corresponding to the stem in (2), small caps indicate the abstract content of the root or stem; the single '>' sign indicatcs the precedence relation between the different phonological segments of the morph ([g] precedes [a], which precedes [t]). As usual, a segment like [g] is a shorthand for the phonological features corresponding to a velar voiced stop.

(2) Spanish *gatos* 'cats'. Input: GAT+MASC+PL (MCH)

GAT+MASC+PL	GAT: g > a > t	MASC: o	PL: s
☞ a. gatos			
b. atos	*!		
c. gatosa			*!

For most of the paper it is assumed that each morph is introduced by a single morphemic constraint. Following the suggestion by an anonymous reviewer, in section 2 and in the conclusions (section 6), the possibility is considered of having a single morph be inserted by different morphemic constraints (one could assume, for instance, that for the morpheme GAT. the first segment,[g], is introduced by a constraint that is different and ranked differently from the one that introduces the second segment, [a], etc.).

The goal of this paper is to compare the MCH and the MIH with respect to several phenomena, the overall conclusion being that the MIH is more adequate than the MCH. Given that in Russell (1995) the MCH is very explicitly stated and explored, most of the assumptions I make about this view come from his paper. The organization of this paper is as follows: section II focuses on one type of phenomenon, voicing neutralization in Catalan, for which it is shown that, within the MIH, resorting to positional faithfulness contraints is unavoidable; the MCH, which cannot resort to faithfulness constraints because of the absence of a phonological input, is confronted with serious problems in trying to account for the same data. Section III contains a discussion of exceptions to phonological processes, which the MCH can account for, apparently very easily, by resorting to differences in ranking of certain morphemic constraints. It is shown, however, that the fact that many lexical exceptions cease to exist in derived environments raises some difficulties for the MCH, more than for the MIH. Section IV focuses on three different types of phonologically-conditioned allomorphy. It is shown that they can be accounted for under both hypotheses, in spite of the apparent advantage of the MCH. Section V contains a discussion of the realization of plurals and possessives in English. A mixed MCH-MIH account (Yip 1998) is compared to a pure MIH account (based on Russell 1997), and it is shown that both approaches are equally suited to account for the facts. The paper ends with a summary and some further comments, in section VI.

II. THE MCH, UNDERLYING FOHMS AND FAITHFULNESS CONSTRAINTS

In a radical version of the MCII the input does not contain any phonological information and, therefore, no underlying forms, as emphasized in Russell (1995). A further consequence of this move is that there can be no faithfulness consiraints, precisely because there are no underlying representations, no phonological input to be faithful to.[3] An OT grarnrnar without underlying forms and without faithfulness constraints could in principle be a simpler gramrnar. and Russell (1995) does argue that several types of faithfulness constraints proposed in the literature can be elirninated or replaced with other constraints. In this section, devoted to sorne aspects of voicing neutralization in Catalan, it is shown that, within the MIH, a positional faithfulness approach is superior to a positional rnarkedness approach, as argued in Beckrnan (1998) or Lornbardi (1999), and that the MCH cannot account for the facts in a satisfactory way; the reference to IO-faithfulness constraints is unavoidable.

Although Catalan presents a voicing contrast in obstruents in onset position (both word-initially and word-internally), codas do not show such contrast: in word-final position there is final devoicing, (3); and there is regressive voicing assirnilation of an obstruent in coda position to a following consonant, both across words, (4), and within words, (5). Spirantization of voiced stops, present in sorne of the examples, is irrelevant to the issue being discussed. (3) and (4) include the underlying representation of the relevant segrnents; in (5) it has been ornitted because, due to Richness of the Base, several possibilities are available.

(3)	*Final devoicing*		*UR*
	clu[p]	'club' (cf. clu[β]et 'srnall club')	/b/
	ta[p]	'cork' (cf. ta[p]et 'small cork')	/p/
	po[t]	'(s/he) can' (cf. po[ð]en '(they) can')	/d/
	po[t]	'pot' (cf. po[t]et 'srnall pot')	/t/
	gro[k]	'yellow (rnasc.)' (cf. gro[ɣ]a 'yellow (fern.)')	/g/
	po[k]	'little, few (rnasc.)' (cf. po[k]a 'little, few (fern.)')	/k/
	cu[s]	'(s/he) sews' (cf. cu[z]en '(they) sew')	/z/
	tu[s]	'(s/he) coughs' (cf. tu[s]en '(they) cough')	/s/
	lle[t͡ʃ]	'ugly (rnasc.)' (cf. lle[d͡ʒ]a 'ugly (fern.)')	/d͡ʒ/
	despa[t͡ʃ]	'office' (cf. despa[t͡ʃ]os 'offices')	/t͡ʃ/

(4)	*Voicing assimilation across words*		*UR*
	clu[p p]etit	'srnall club'	/b p/
	clu[b g]ran	'big club'	/b g/
	ta[p p]etit	'srnall cork'	/p p/
	ta[b g]ros	'big cork'	/p g/
	gro[k p]àl·lid	'light yellow'	/g p/
	gro[g b]erdós	'greenish yellow'	/g b/
	tu[s p]oc	'(s/he) coughs little'	/s p/
	tu[z β]astant	'(s/he) coughs quite a bit'	/s b/

(5) ***Voicing assimilation within words***

a[p.t]itud	'aptness'
a[b.d]icar	'to abdicate'
a[k.s]ioma	'axiom'
e[g.z]amen	'exam'
e[s.t]àndard	'standard'
e[z.ɣ]rima	'fencing'

These facts are explicitly discussed in Beckman (1998).[4] The constraints she proposes appear reproduced in (6), together with their interpretation; the relative ranking of the constraints is given in (7).

(6) IDENT-ONSET(voice): Onset segments and their input correspondents must agree in voicing.
AGREE(voice): Obstruents in a cluster must agree in voicing.
*VDOBSTR: Obstruents must not be voiced.
IDENT(voice): Segments and their input correspondents must agree in voicing.

(7) IDENT-ONSET(voice), AGREE(voice) » *VDOBSTR » IDENT(voice)

The effects of this constraint ranking on the distribution of voicing in obstruents is shown in (8) (final devoicing) and (9) (voicing assimilation).

(8) Final devoicing (MIH)

/gɾɔg/	IDENT-ONS(voice)	AGREE(voice)	*VDOBSTR	IDENT(voice)
a. gɾɔ́g			**!	
☞ b. gɾɔ́k			*	*
c. kɾɔ́k	*!			**

(9) Regressive voicing assimilation (MIH)

clu/b p/etit	IDENT-ONS(voice)	AGREE(voice)	*VDOBSTR	IDENT(voice)
a. b p		*!	*	
☞ b. p p				*
c. b b	*!		**	*
clu/b g/ran	**IDENT-ONS(voice)**	**AGREE(voice)**	***VDOBSTR**	**IDENT(voice)**
☞ d. b g			**	
e. p g		*!	*	*
f. p k	*!			**
ta/p g/ros	**IDENT-ONS(voice)**	**AGREE(voice)**	***VDOBSTR**	**IDENT(voice)**
g. p g		*!	*	
h. p k	*!			*
☞ i. b g			**	*

The higher ranking of IDENT-ONS(voice), which is never violated, together with the lower ranking of IDENT(voice), with respect to *VDOBSTR, forces final devoicing, (8b), but never devoicing in onset position, (8c). The high ranking of IDENT-ONSET(voice) and AGREE(voice) causes regressive assimilation, (9b,i), never progressive assimilation, (9c,h). The companson between (9g) and (9i) justifies the ranking AGREE(voice) » *VDOBSTR. Due to the constraint ranking in (7), in Catalan a contrast between voiced and voiceless obstruents can only be found in onset position. These generalizations regarding neutralization are obtained with the constraints and the constraint ranking in (6) and (7) irrespective of the voiced or voiceless underlying specification of the segments involved.

Positional faithfulness approaches to neutralization present some limitations that have been discussed by several authors, like Zoll (1998) or Kager (1999), who see in positional markedness approaches an alternative. However, as pointed out by Kager (1999), for instance, positional markedness cannot simply replace positional faithfulness. Beckman (1998) explicitly argues against positional markedness (or positional licensing) for voicing neutralization in Catalan. Under a positional markedness approach there will bc a single general faithfulness constraint for voicing, IDENT(voice). The asymmetry bctwcen onscts and codas can bc obtaincd by the markedness constraint CODACOND (see Itô 1986, 1989, and latcr work). Lct us assumc that, in whatever formulation, CODACOND bans a [voice] feature from appearing on an obstruent associated solely to a coda position (therefore a voiced obstruent is allowed in onset position, and in coda position only when that feature is also associated to an onset position, that is in cases of voicing assimilation). The constraints AGREE(voice) and CODACOND, which can never be violated, are ranked above the faithfulness constraint IDENT(voice). Moreover, IDENT(voice) will have to be ranked above *VDOBSTR in order to get a more faithful assimilated output in cases with two input voiced obstruents, as shown in (10).

(10) Regressive voicing assimilation with positional markedness, from voiced-voiced.

clu/b g/ran	CODACOND	AGREE(voice)	IDENT(voice)	*VDOBSTR
☞ a. b g				**
b. p g		*!	*	*
c. p k			*!*	
d. b k	*	*!	*	*

However, none of the possible rankings of these constraints will provide the right results for sequences of an underlying voiceless obstruent followed by a voiced consonant, as shown in (11) (the bomb indicates the candidate selected by the constraint ranking; a sad face appears next to the actual form).

(11) Regressive voicing assimilation with positional markedness, from voiceless-voiced.

ta/p g/ros	CODACOND	AGREE(voice)	IDENT(voice)	*VDOBSTR
a. p g		*!		*
☹ b. b g			*	*!*
💣 c. p k			*	
d. b k	*	*!	**	*

The optimal candidate provided by this ranking, (11c), only violates the general faithfulness constraint IDENT(voice), which is also violated by the only acceptable form, (11b); the decision is then left to the markedness constraint *VDOBSTR, which favors the sequence with voiceless obstruents. It is difficult to imagine what additional constraint would favor (11b) over (11c). These problems do not arise with a positional faithfulness approach.

The constraints IDENT-ONS(voice) and IDENT(voice) are faithfulness constraints and, therefore, have no place in a theory that assumes the MCH. In this type of approach, all the work has to be done by markedness constraints, like AGREE(voice), CODACOND and *VDOBSTR, and by morphemic constraints, the constraints that introduce the morphs corresponding to particular morphemes. As we shall see in what follows, the MCH can easily account for final devocing and can also deal with voicing assimilation cases when the relevant morphemic constraints are unranked with respect to each other. However, in cases in which the ranking between morphemic constraints becomes crucial (in voiceless-voiced sequences, which were the problematic cases for the positional markedness approach), the MCH runs into serious problems precisely because the ranking has to be fixed.

Although Russell (1995) is not too clear with respect to the form morphemic constraints should have, we can assume that the constraint introducing the morph corresponding to the morpheme *groc*, for instance, is schematized as GROG{[+vo(ice)] >...> [+vo(ice)]}, where '>' reads 'precedes', as mentioned earlier. This constraint captures only the segments relevant to this discussion (obstruents), which are specified here only with respect to voicing ([+voice]). I assume that *groc* must have a final voiced obstruent, because this is what we find (spirantized) in a contrastive position (cf. gro[ɣ]a 'yellow (fem.)', in (3)). The small caps in the morphemic constraint represent the morpheme and appear in an adapted orthographic form that reflects the "underlying" value for voicing of the relevant segments, which appear underlined. For clarity I have positioned violation marks of this constraint under the relevant feature.[5]

(12) Final devoicing (MCH). **Groc** [grɔ́k] 'yellow'.

	CODACOND	GROG{[+vo] >...>[+vo]}	*VDOBSTR
☞ a. grɔ́k		*	*
b. grɔ́g	*!		**
c. krɔ́k		* *!	
d. krɔ́g	*!	*	*

CODACOND has to be crucially ranked above GROG{[+vo] >...>[+vo]} in order for the candidate with final devoicing to be the optimal candidate (otherwise candidate (12b), with no devoicing, would be the optimal candidate). The morphemic constraint GROG{[+vo] >...>[+vo]} has to be ranked above *VDOBSTR to prevent candidate (12c), with devocing in all obstruents, to become the optimal candidate. Notice that all the morphemic constraints of the language introducing morphs that can be subject to final devoicing must be ranked below CODACOND and above *VDOBSTR.

For assimilation cases we can assume that AGREE(voice) is highly ranked because, like CODACOND, it is never violated. So the general schema for constraint ranking within the MCH is as given in (13).

(13) CODACOND, AGREE(voice) » morphemic constraints » *VDOBSTR

As it will be shown below, in all the possible combinations of voicing specifications, the high ranked AGREE(voice) will force assimilation and the decision will pass to the morphemic constraints. For clusters with the same "underlying" specification for voicing in the relevant segments, the surface form does not violate any of the morphemic constraints, which makes it the optimal candidate. In voiced-voiceless clusters. AGREE(voice) forces a violation of the morphemic constraints and the decision can be left to *VDOBSTR, which selects a voiceless output (regressive assimilation to a voiceless specification). However, in voiceless-voiced sequences, a voiced output must surface, and this can only be done by a crucial ordering of the morphemic constraints, which motivates an ordering paradox in the model.

In (14) to (16) I illustrate the unproblematic cases, which include sequences with an "underlying" voiced-voiced sequence, /b g/, in (14), a voiceless-voiceless sequence, /p p/, in (15), and a voiced-voiceless sequence, lb p/, in (16). In all three examples, the morphemic constraints only show the relevant segments.

(14) Regressive voicing assimilation (voiced-voiced) (MCH). ***Club gran:*** [klubgrán].

	AGREE(voice)	CODACOND	CLUB{[+vo]}	GRAN{[+vo]}	*VDOBSTR
☞ a. b g					**
b. p g	*!		*		*
c. b k	*	*!		*	*
d. p k			*	*!	

In (14) the crucial ranking of the morphemic constraints above *VDOBSTR favors the candidate with the "underlying" specifications, (14a), as opposed to the candidate with the more unmarked structure, (14d). The morphemic constraints need not be ranked because neither of them is violated by the optimal candidate. In (15) the optimal and only acceptable form does not violate any constraints; therefore any ranking of the constraints yields a [pp] sequence as the optimal candidate. In (16) the morphemic constraints have been left unranked, which forces a tie between the two constraints; the markedness constraint *VDOBSTR favors then the candidate with the voiceless sequence [pp]. Alternatively, the constraint inserting ***club*** could be ranked below the constraint insertingpetit, mimicking the effects of the positional faithfulness constraint IDENT-ONS(voice). The opposite ranking of the morphemic constraints (CLUB{[+vo]} » PETIT{[–vo]}) would force progressive assimilation (*[bb], candidate (16d)), as can be easily seen by drawing a straight line between the two morphemic constraints in (16).

(15) Regressive voicing assimilation (voiceless-voiceless) (MCH). ***Tappetit:*** [tàppətít].

	AGREE(voice)	CODACOND	TAP{[–vo]}	PETIT{[–vo]}	*VDOBSTR
☞ a. p p					
b. p b	*!			*	*
c. b p	*	*!	*		*
d. b b			*	*!	**

(16) Regressive voicing assimilation (voiced-voiceless) (MCH). ***Clubpetit:*** [klùppətít].

	AGREE(voice)	CODACOND	CLUB{[+vo]}	PETIT{[–vo]}	*VDOBSTR
☞ a. p p			*		
b. p b	*!		*	*	*
c. b p	*	*!			*
d. b b				*	**!

As mentioned earlier, the serious problems for the MCH appear when the ranking between morphemic constraints becomes crucial. And this ranking is in fact crucial in sequences in which an "underlying" voiceless obstruent is followed by an "underlying" voiced obstruent. These are sequences in which regressive assimilation will cause a change to a marked specification ([+voice]), the same kind of context that was problematic for positional markedness, under the MIH. This type of configuration appears exemplified in (17), below, with ***baix gras*** [baʒɣɾás] 'short (and) fat' (examples like [báʃə] 'short (fem.)' and [grása] 'fat (fem.)' confirm the "underlying" voicelessness of the sibilants). In (17) the morphemic constraints capture only the relevant obstruents of each word for this particular example. The non-relevant obstruents are represented by a dash, _. The crucial ranking is GRAS{[+vo]..._} » BAIX{_...[–vo]}. In (17) the morphemic constraint introducing *gras* has to be ranked above the constraint introducing ***buix*** in order to get the same effect that, within the MIH, is obtained by the positional faithfulness constraint IDENT-ONS(voice) (the initial voiced obstruent of ***gras*** has to be kept).

But now a problem arises when the intended sequence is not ***haix*** *gras*, as in (17), but *gras baix* [ɡɾazβáʃ] 'fat (and) short', which contains the same morphemes but in a different order. The ranking of the morphemic constraints introducing the two adjectives which was needed in (17) has now fatal consequences, as shown in (18), where the candidate with progressive assimilation to a voiceless value becomes the optimal candidate, (18c). Notice that in this case the "underlying" configuration is also voiceless-voiced. As in (17), only the relevant values for voicing are expressed in the morphemic constraints.

(17) Regressive voicing assimilation (voiceless-voiced) (MCH). Baix *gras*: [baʒɣɾás]

	AGREE(VO)	CODA COND	<u>G</u>RAS{[+vo]..._}	BA<u>IX</u>{_...[−vo]}	*VDOBSTR
a. ʃ ɣ	*!				*
☞ b. ʒ ɣ				*	**
c. ʃ k			*!		
d. ʒ k	*	*!	*	*	*

(18) Regressive voicing assimilation (voiceless-voiced) (MCH). *Gra<u>s</u> <u>b</u>aix* [ɡɾazβáʃ].

	AGREE(VO)	CODACOND	GRA<u>S</u>{_...[−vo]}	<u>B</u>AIX{[+vo]..._}	*VDOBSTR
a. s β	*!				*
☹ b. z β			*!		**
💣 c. s p				*	
d. z p	*	*!	*	*	*

In order to account for this particular case the morphemic constraints involved should have the opposite ranking that was needed to account for the example in (17), causing the ranking paradox mentioned earlier.

One could think that a possible way out of this problem is to assume underspecification, which Russell (1995) uses to account for the haplology cases he discusses. Here we could assume that voicelessness is absent in the morphemic constraints, or, alternatively, that [voice] is a monovalent feature. The morphemic constraint corresponding to the initial consonant of *pal* 'stick', for instance, is then specified for [labial] and maybe for the lack of continuancy, but nothing is said about voicing. Following Russell (1995), crucially, then, the presence of a voiced segment in a candidate does not constitute a violation of the morphemic constraint in this respect. This modification solves the problem found previously with the example *gras huix* in (18), which is repeated in (19). The lack of any voicing specification in the relevant segment in the morphemic constraints is represented as O.

(19) Tableau corresponding to *gras baix* [grazβáʃ] (MCH), revised.

	AGREE(vo)	CODACOND	GRAS{[vo]...Ø}	BAIX{[vo]...Ø}	*VDOBSTR
a. s β	*!				*
☞ b. z β					**
c. s p				*!	
d. z p	*	*!		*	*

As the reader can easily check, baixgras (cf. (17)) can be dealt with in the same fashion, because the morphemic constraints need not be ranked with respect to each other.

However, now the problems arise when sequences of an "underlying" voiced obstruent followed by a voiceless obstruent are taken into account. This type of sequence is exemplified in (20) with *groc* clar: [grɔkklá] 'light yellow'.

(20) Voiced-voiceless (MCH), revised. Groc clar: [grɔkklá]

	AGREE(vo)	CODACOND	GROG{[vo]...[vo]}	CLAR{Ø...}	*VDOBSTR
a. g k	*	*!			*
💣 b. g g					**
☹ c. k k			*!		
d. k g	*!		*		*

The morphemic constraint CLAR{Ø...} is not violated by any of the candidates because this constraint does not mention voicing, but the morphemic constraint GROG{[vo]...[vo]} does require the final obstruent to be voiced, and it is violated by candidates (20c) and (20d); the candidate with progressive voicing assimilation is thus wrongly favored. Reranking *VDOBSTR above the morphemic constraint GROG{[vo]...[vo]} would seem to be the only way to save the situation, since *VDOBSTR is the only constraint violated by the undesired candidate. *[gg], while GROG{[vo]...[vo]} is the only constraint violated by the acceptable candidate, [kk]. But such a modification would again have fatal consequences, which can be seen in this very same example. The ranking *VDOBSTR » GROG{[vo]...[vo]} would actually force the initial obstruent of *groc* to surface as a voiceless obstruent as well (*[krɔkklá]).

The only technical solution to the problems faced by the MCH in accounting for voicing neutralization in Catalan, pointed out by an anonymous reviewer, is to assume that morphemic constraints can be dismembered, and that different parts of a morph can be introduced by different morphemic constraints. Then one could say that all the morphemic constraints introducing obstruents that should end up in onset position have to be ranked above all the constraints introducing obstruents that should end up in coda position (the higher ranking of AGREE(voice) would still favor assimilation). So, fora word like *groc* (/grɔg/: [grɔ́k]), the initial obstruent (which is never devoiced) would be introduced by a very high ranked constraint, while the constraint inserting the final obstruent would occupy a lower position in the ranking (because it is neutralized in many contexts). Of course, this type of solution turns totally predictable processes into completely arbitrary facts. Some other undesirable implications of this rnove are considered in the conclusions of the paper (section VI).

It can be concluded that the MCH is unable to account for the distribution of voicing in languages like Catalan, either assuming underspecification or not assuming it.[6] The MCH will presumably run into problems with the distribution of nasals in many languages, parallel to the distribution of voicing in Catalan (for instance, in most dialects of Spanish, nasals are subject to neutralization of place in word-final position and to regressive place assimilation); the MCH might have problems more generally with any kind of assirnilation effects, and might also be unable to account for vowel reduction, present in so many languages. These other cases should be examined in detail to see if this is in fact the case.

III. PHONOLOGICAL PROCESSES AND EXCEPTIONS

Russell (1995) discusses some of the faithfulness constraints that could be dispensed with, and thus would solve a potential problem for the MCH. According to him, faithfulness constraints like PARSE can be eliminated when accounting for cluster simplification, if the markedness constraint *COMPLEXCODA outranks the morphemic constraint that introduces the morph containing the complex coda. The example he uses to illustrate this point is reproduced in (21) (see Russell 1995: 41, (81); 1 modify slightly the schematic representation of the morphemic constraint). In this example the morphemic constraint introduces what would be called the underlying form in other approaches, /mult/, and the optimal candidate is the one that surfaces with a simple coda, [mul].

(21)

	*COMPLEXCODA	*m* > *u* > *l* > *t*
a. mult	*!	
☞ b. mul		*
C mu		**!

Assuming that candidates not included in the tableau, like [mut], would be eliminated by other constraints, such a proposal would account for the facts. However, processes like cluster simplification are usually systematic. which would mean that all lexical items of the language with a final complex cluster should be introduced by morphemic constraints ranked in all cases below *COMPLEXCODA. A similar observation can be made with respect to word-final devoicing, discussed in the previous section. Leaving aside the problems found with voicing assimilation, we saw that the ranking CODACOND » morphemic constraint » *VDOBSTR forces word-final devoicing, a completely systematic process. This systematicity means that all morphs ending in a voiced obstruent should be introduced by morphemic constraints ranked between the two markedness constraints.

Going back to the example in (21), imagine that in this hypothetical language there is a lexical item that constitutes an exception to cluster simplification, something like [kalt]. Accounting for lexical exceptions in this model seems easy: [kalt] does not undergo cluster simplification because the morphemic constraint introducing it is ranked above the markedness constraint *COMPLEXCODA, as shown in (22).

(22)

	k > a > l > t	*COMPLEXCODA
☞ a. kalt		*
b. kal	*!	
c. ka	**!	

So, one advantage of the MCH seems to be that it can account for the degree of systematicity of phonological processes in a fairly straightforward fashion. As a matter of fact, it can account for more degrees of systematicity than one can actually find in a given language. Within the MIH an account of lexical exceptions is not so straightforward, but several proposals have been made in the literature. Inkelas, Orgun & Zoll (1997), for instance, propose a prespecification approach, while rejecting previous approaches based on co-phonologies. Under the prespecification approach, lexical exceptions are specified for a given feature, and highly ranked faithfulness constraints prevent it from being modified. It is crucial for this approach to work that regular cases are underspecified; the constraints that trigger the relevant phonological process are then of the feature-filling type. It is not clear, though, to what extent this approach is consistent with Richness of the Base (see, for instance, the discussion of this concept in McCarthy 2002), and it is not clear either that it is applicable to all types of lexical exceptions. Itô & Mester (1999), in a study of the Japanese phonological lexicon, concentrate on systems of exceptions. They propose that each lexical item is classified as belonging to a sublexicon (Yamato, established loans, assimilated foreign, and unassimilated foreign), and this information is present in inputs.

There are also four blocks of faithfulness constraints ("Faith/Yamato", etc.), each block being ranked crucially with respect to certain markedness constraints. Then, for example, all four blocks will be subject to syllable-structure constraints, but only Yamato words will surface systematically without clusters of a nasal followed by a voiceless obstruent.

One aspect related to lexical exceptions that *aprivri* does not seem to receive an adequate treatment from either perspective (MCH or MIH) is the observation that lexical exceptions usually cease to be lexical exceptions when the stem appears in a derived environment. For instance, as observed in Mascaró (1976), even though in Central Catalan unstressed /a/, /ɛ/, and /e/ are reduced to [a] and unstressed /ɔ/ and /o/ are reduced to [u], there are some lexical exceptions, which appear exemplified in (23a). As shown in (23b), these exceptional vowels do appear reduced in derivatives (examples from Mascaró 1976). The relevant vowel appears underlined in the examples.[7]

(23) a.	[bɔ́st<u>o</u>n]	'Boston'	b. [bust<u>u</u>njá]	'Bostonian'
	[kát<u>e</u>ðɾə]	'chair'	[kət<u>ə</u>ðɾátik]	'chair person'
	[ɔ́p<u>e</u>ɾə]	'opera'	[up<u>ə</u>ɾístik]	'operatic'

In Mascaró (1976) the lack of vowel reduction in (23a) is essentially attributed to the Strict Cycle Condition. In Mascaró (2003) this explanation is rejected for empirical reasons, and other cases are discussed, such as the presence in Catalan of the dental voiceless fricative [θ] only in borrowings from other languages, mostly Spanish (cf. *Cervantes* [θerβántes] or *Zamora* [θəmóɾə]), and its systematic absence in derived environments (cf. *cervantí* [sərβəntí], *[θərβəntí] 'concerning Cervantes'. or *zamorà* [samurá], *[θəmuɾá] 'from Zamora'). In an approach assuming the MCH , items like [bóston] can be introduced by morphemic constraints ranked above the markedness constraints responsible for vowel reduction. The problem is what to do with derivatives, like [bust<u>u</u>njá], which contain the same root. Ranking the whole derivative below the constraints responsible for vowel reduction would mechanically account for this particular fact, but one would expect that other words would go the other way around (one should expect pairs like *[kát<u>ə</u>ðɾə]-*[kət<u>e</u>ðɾátik], which are never found). In an approach assuming the MIH , following the insights of Itô and Mester (1999), one could have *Boston* classified as foreign. The fact that derivatives cease to be exceptional could be attributed, for instance, to some (refined) version of the Righthand Head Rule, RHR (see Williams 1981): the 'foreign' specification of the root /boston/ would either be absent in the input of the derivative. because of a previous application of the RHR, or some universal constraint related to the RHR would force that embedded specification to be ignored. Whatever the best solution to lexical exceptions turns out to be, it seems that it will have to go beyond simple constraint reranking.

IV. PHONOLOGICALLY-CONDITIONED ALLOMORPHY"

In this section, I present three different types of phonologically-conditioned allornorphy and discuss how altemative allomorphs can successfully be selected under the two hypotheses being exarnined. Even though one could think that the MIH rnight have serious difficulties in accounting for the three types, it is shown that both hypotheses succeed equally well. The simplest case of allornorphy with phonological conditioning concems cases in which the choice of allornorph depends *solely* on phonological factors. This case is exemplified in (24) with the ergative morph, /k/ or /ek/, found in proper narnes in Basque.

(24) a. Jon: Jon<u>ek</u>, *Jon<u>k</u> b. Patxi: Patxi<u>k</u>, *Patxi<u>ek</u>
Igor: Igor<u>ek</u>, *Igor<u>k</u>

The choice of the allornorph k in (24a) (cf. **Jonk*) would cause a violation of *COMPLEXCODA, a violation avoided with the choice of the allomorph ek (cf. Jonek); in (24b), the choice of the allornorph ek would cause a violation of ONSET (cf. **Patxiek*), problem avoided by the other allomorph, k (cf. *Patxik*). In both cases, (24a,b), the allornorph chosen is whichever is more harrnonic with respect to syllable structure rnarkedness constraints. Lexically the two allomorphs have equal status. It must be taken into account that in other contexts Basque does allow cornplex codas and onsetless syllables.

A second type of allornorphy concerns cases in which one allornorph is generally preferred over another one, except when this preferred allornorph would cause a violation of a specific constraint; here there is a lexical preference. This case is illustrated with masculine gender allornorphy in Catalan. In this language, the unrnarked rnasculine rnorph is O, as shown in (25a), even though there are sorne words that end in a more rnarked allornorph *-o*, pronounced [u] in Central Catalan, as shown in (25b). In both cases the plural is obtained by simply adding *-s*. However, when a noun or an adjective ends in a sibilant, the plural shows up with the rnarked rnasculine rnorph instead of the unrnarked one, (25c).

(25)	a.	*sg.*			*pl.*	
		noin	[nɔ́m]	'name, noun'	noms	[nɔ́ms]
		foc	[fɔ́k]	'fire'	focs	[fɔ́ks]
		vell	[béñ]	'old'	vells	[béʎs]
		turc	[túrk]	'Turkisli'	turcs	[túrks]
	b.	inico	[míku]	'moiikey'	micos	[iníkus]
		guerxo	[gɛ́rʃu]	'crooked'	guerxos	[gɛ́rʃus]
	c.	cas	[kás]	'case'	casos	[kázus]
		feliç	[fəlís]	'liappy'	feliç<u>o</u>s	[falísus]
		peix	[peʃ]	'fish'	peix<u>o</u>s	[péʃus]

The constraint that forces the choice of the masculine marked morph only in the plural in (25c) is the OCP referred to sibilants, OCP(s), which appears also in the discussion in section V. When there is no conflict with sibilants. that is in the singular, the unmarked O morph is chosen.

Before moving on to the third type of cases, let us see how the MCH and the MIH can deal with the cases exemplified in (24) and (35). For the MCH the difference between these two cases lies on the relative ranking of the relevant morphemic constraints. For the Basque examples in (24) the morphemic constraints have to be ranked together and left unordered, which causes the candidates to fare even with respect to them. Then the choice is left to markedness constraints. This is illustrated in (26).

(26) Tableaux corresponding to Jonek and *Patxik* (MCH)

JON+erg	ERG{*ek*}	ERG{*k*}	*COMPLEXCODA	ONSET
☞ a. jonek		*		
b. jonk	*		*!	
PATXI+erg	ERG{*ek*}	ERG{*k*}	*COMPLEXCODA	ONSET
a. patxiek		*		*!
☞ b. patxik	*			

Under the MIH, we can assume, following Mascaró (1996a,b), that the input contains both morphs, for instance, /jon+{ek, k}/. In many cases of allomorphy there is some lexical or morphological conditioning; for instance, in English the choice of the past participle morph -en is lexically determined, and therefore the input to the form tuken will contain only this allomorph, and not the allomorph *-ed.* But in the Basque case, the choice of allomorph is made by the phonology; for this reason the two allomorphs appear in the input.' Given that the two allomorphs appear in the input, the candidates with either allomorph (e.g., [jonek] and [jonk]) satisfy all faithfulness constraints. It is assumed that faithfulness constraints, like MAX or DEP, are satisfied by all candidates that coincide with the stem plus one of the allomorphs (but a candidate like [jontek] will violate DEP). The decision is then left to markedness constraints, as in (26).

(27) Tableaux corresponding to *Jonek* and *Patxik* (MIH)

/jon+{ek, k)/	*COMPLEXCODA	ONSET
☞ a. jonek		
b. jonk	*!	
/patxi+{ek, k}/	*COMPLEXCODA	ONSET
a. patxiek		*!
☞ b. patxik		

For the Catalan cases in (25), the MCH has to assume that the morphemic constraint introducing the unmarked masculine morph O is ranked above the constraint introducing the marked morph -o. A more highly ranked OCP(s) forces the presence of the marked morph in the plural. This is shown in (28). For simplicity, the morphemic constraints introducing the singular and the plural are omitted.

(28) Tableaux corresponding to *cas* (sg.) and *casos* (pl.) (MCH)

KAS+masc+sg	OCP(s)	MASC{Ø}	MASC{u}
☞ a. kás			*
b. kázu		*!	
KAS+masc+pl	OCP(s)	MASC{Ø}	MASC{u}
a. kass	*!		*
☞ b. kázus		*	

A solution for this type of cases assuming the MIH is proposed in Bonet, Lloret and Mascaró (2003). It is proposed that both allomorphs are present in the input of all masculine items, but in this case, with a preference relation; the input corresponding to the masculine morheme is {Ø > u), where '>' indicates the preference of 'O' over 'u'. A universal constraint called PRIORITY ensures that this preference relation is obeyed. This is shown in (29).

(29) Tableaux corresponding to *cas* (sg.) and *casos* (pl.) (MIH).

/kaz+{Ø > u}/	OCP(s)	PRIORITY
☞ a. kás		
b. kázu		*!
/kaz+{Ø > u}+s/	OCP(s)	PRIORITY
a. káss	*!	
☞ b. kázus		*

As can be seen in (25b), above, there are some nouns and adjectives that idiosyncratically choose the marked allomorph /u/, like *mico* 'monkey'; the choice is lexically determined. In Bonet, Lloret and Mascaró (2003) it is claimed that items like *mico* have the gender allomorph specified in the lexical entry: /mik_u/.[10] A universal faithfulness constraint called RESPECT ("respect idiosyncratic lexical specifications". or, more accurately, "respect subcategorization requirements") ranked above PRIORITY ensures that *mico* surfaces with the marked morph. This is illustrated in (30).

(30) Tableau corresponding to *mico* (MIH analysis)

/mik_u+{Ø > u}/	RESPECT	PRIORITY
☞ a. miku		*
b. mik	*!	

Under the MCH, the way to encode items like *mico* is to introduce both the stem and the marked morph through a single morphemic constraint ranked above MASC{Ø}. The same results are obtained.[11]

There is a third type of case that does not seem to have a straightforward solution under any of the two hypotheses being examined. This third type can be illustrated with the Dyirbal ergative suffix (discussed, for instance, in McCarthy and Prince 1993, and Russell 1995). This suffix has two allomorphs, *-ŋgu* and *-gu*. The variant *-ŋgu* appears only with disyllabic V-final nouns; with trisyllabic and longer stems, the allomorph *-gu* is inserted instead. A couple of examples, adapted from McCarthy and Prince (1993), appear in (31). These examples also show that stress in Dyirbal is trochaic; it falls on the initial syllable and every second syllable.

(31) a. yáɽa-ŋgu 'man' *yáɽa-gu
b. yámani-gu 'rainbow' *yámaní-ŋgu

McCarthy and Prince (1993) account for the systernatic appearence of *-ŋgu* as a suffix and never as an infix (a possibility found in Ulwa, for instance), but do not include the other allornorph -gu into the account. because according to them thc alternative choice of the -gu allomorph and other issues "are outside the purview of Prosodic Circurnscription theory (and perhaps of linguistic theory more generally, to thc extent that they reflect functional rathcr than formal factors)" (McCarthy and Prince 1993: 110). Russell (1995) criticizes their approach to this case but does not offer an alternative account. However, the allornorphy found in Dyirbal can be seen as a subcase of the second type of phonologically-conditioned alloniorphy discussed here, which was illustrated with the choice of masculine allornorph in Catalan. Under the MIH, the allornorph *-ŋgu* has a lexical specification (a subcategorization requirement), in the same way that words like mico (or, rather. stems like mic-) are lexically specified for the marked allomorph *-u* (/mik$_u$/). In the case of Dyirbal it is one of the allomorphs which is lexically specified, and requires the stem it attaches to to end in a foot $()_{\Phi}$). Moreover, the allomorph *-ŋgu* has preference over the allomorph *-gu*. The lexical cntry corresponding to the ergative suffix is then: /$)_{\Phi}$ŋgu > gu/. With this lexical entry and the presence of RESPECT and PRIORITY in the set of constraints, the grammatical surface forrns are obtained without any problems. as in (32).

(32) Allomorphy in Dyirbal (MIH)

/yara+{$()_{\Phi}$ŋgu > gu}/	RESPECT	PRIORITY
☞ a. (yára)-ŋgu		
b. (yára)-gu		*!
/yamani+{$()_{\Phi}$ŋgu > gu}/	RESPECT	PRIORITY
c. (yáma)(ní-ŋgu)	*!	
☞ d. (yáma)(ní-gu)		*

ln the first example, /yara+{$()_{\Phi}$ŋgu > gu}/, RESPECT is not violated by any candidate, so the decision is left to PRIORITY. In the second exarnple, /yamani+{$()_{\Phi}$ŋgu > gu}/, with a trisyllabic stern, RESPECT is violated by the candidate with the *-ŋgu* allomorph, (32c), because this allomorph is not adjacent to a foot (it is inside one); then, the ***-gu*** allomorph, which violates PRIORITY. is chosen instead." The analysis of this case under the MCH would essentially be identical. Here, though, each allomorph would be inserted by a different morphemic constraint. crucially ranked; the more highly ranked constraint, the one introducing *-ŋgu*, would have to specify the prosodic requirement of the allornorph (the fact that it has to attach to a disyllabic foot).[13]

V. ENGLISH POSSESSIVES AND PLURALS, AND OTHER OCP-RELATED ISSUES

Yip (1998) offers a very interesting discussion of several cases in which morphology plays a crucial role in determining output forms, and pays special attention to phenomena that can be related to the OCP. One of the main points she makes is that at least some inputs to the Optimality Grammar (to use her wording) must contain only morphosyntactic features, their phonological content being inserted through morphemic constraints. Her mixed approach combines the MIH (most morphs appear in the input) with the MCH (at least some inflectional morphemes, clitics or particles are introduced through constraints). Here I summarize her account of English *'s*, but I also refer to an account of the same facts, in Russell (1997), that. contrary to Russell (1995), can be considered a pure MIH account, in which all morphs are present in the input; it is not necessary to introduce morphs through morphemic constraints.

In English. when a stem ends in a sibilant and is followed by the plural or the possessive morph, also a sibilant, an epenthetic vowel ([ɪ] in British English, [a] in American English) is inserted to avoid the contact between the two sibilants, as shown below (the epenthetic vowel appears underlined in the phonetic transcription).

(33)	fence	fences (pl):	[fensɪz]
	mouse	mouse's (poss):	[maʊsɪz]
	Katz	Katz's (poss. sg.):	[kætsɪz]

However. when the plural morph and the possessive morph would appear in the same word only one sibilant surfaces; there is no epenthesis.

(34)	cats (pl):	[kzts]
	cat's (sg. poss.):	[kæts]
	cats' (pl. poss.):	[kæts], *[kætsɪz]

Katz 's (sg. poss.), with epenthesis, [kætsɪz], and *cats'* (pl. poss), with a single *s*, [kæts], is the minimal pair used by Yip to illustrate her account. Below 1 reproduce the constraints used by her to explain the different outcomes. together with their ranking relations (Yip 1998: (11))[14]

(35) a. PLURAL (PL=s): Plurals must consist of a stem plus an *-s* affix
b. POSS (POSS=s): Possessives must consist of a phrase plus an *-s* affix
c. OCP (s): OCP (feature), where feature=[strident]
d. FILL: Do not insert
e. MORPHDIS: Distinct instances of morphemes have distinct contents, tokenwise

PLURAL, POSS, OCP(s) » FILL » MORPHDIS
(Epenthesis as last resort)

The two tableaux below, which reproduce her (12) and (13), illustrate how the different outputs for the minimal pair *cats'* and *Katz's* are obtained.

(36)

cat$_{\text{PLPOSS}}$	PL=s	POSS=s	OCP(s)	FILL	MORPHDIS
a. cat$_{\text{PLPOSS}}$-s-s			*!		
☞ b. cat$_{\text{PLPOSS}}$-s					*
c. cat$_{\text{PLPOSS}}$-s-ɪ-s				*!	

(37)

Katz$_{\text{POSS}}$	PL=s	POSS=s	OCP(s)	FILL	MORPHDIS
a. Katz$_{\text{POSS}}$-s			*!		
b. Katz$_{\text{POSS}}$		*!			
☞ c. Katz$_{\text{POSS}}$-ɪ-s				*	

Leaving aside some rninor questions that arise as to the rnorphological affiliation of output segrnents like [s] or [ɪ], and also to the voiced or voiceless value of the suffixes, this approach can account for the facts in a fairly straightforward way.[15] However, it is not necessary to resort to rnorphernic constraints and to rnorphosyntactic inputs to account for the behavior of the possessive and the plural morphs in English. Russell (1997) offers an account of the sarne type of data compatible with the MIH. In his account there are no constraints like PL=s or POSS=s. Two Alignrnent constraints do part of the sarne work. These constraints are repeated in (38) (where (38a) is his (4.38), and (38b), his (4.59)).

(38) a. PL-AFTER-N: ALIGN (Plural. Left; Noun-stem, Right)
b. POSS-AFTER-STEM: ALIGN (Poss, Left; Stern, Right)

According to (38), the plural, not linearized in the input, has to be suffixed to a Noun stern, while the possessive, not linearized in the input either, can be suffixed to any stern. In addition, Russell posits two constraints, LEFT-ANCHOR,,,,,,,and LEFT-ANCHOR,,,, which penalize candidates with an epenthetic vowel that appears as the initial segrnent of the plural or the possessive suffix ((39a) corresponds to his (4.39) and (39b) to his (4.50)).

(39) a. LEFT-ANCHOR,,,,,: The leftmost segment of the plural morph corresponds to the leftmost segment of its UR.

b. LEFT-ANCHOR,,,: The leftmost segment of the possessive morpheme corresponds to the leftmost segment of its UR.

The tableaux in (40) and (41), adapted from tableaux in Russell (1997), illustrate how the proposal works, with the same examples that appear in (36) and (37), respectively. The constraint OCP(s), used here, is named *SIB-SIB in Russell (1997). The brackets reflect rnorphological affiliation. It has to be assumed that constraints like DEP (FILL, in the Containment model of OT) and MORPHDIS, used in Yip (1998) but not in Russell (1997), are low in the constraint ranking. I abstract away from the voicing complications (which are addressed, in the same type of approach, in Roca and Johnson 1999, and in Lombardi 1999).

(40) Tableau corresponding to *cats'* (plural possessive) (MIH).

/kæt, z_1, z_2/	OCP (s)	PL-AFTER-N	POSS-AFTER-STEM	L-ANCHOR,,,,	L-ANCHOR,,
a. $[kæt]_N$ $[s_1][s_2]$	*		*!		
b. $[kæt]_N$ $[s_1][əz_2]$			*!	*	
☞ c. $[kæt]_N$ $[[s_{1,2}]]$					
d. $[kæt]_N$ $[[əz_{1,2}]]$				*	*!

(41) Tableau corresponding to *Katz's* (singular possessive) (MIH).

/kætz$_1$, z_2/	OCP(s)	POSS-AFTER-STEM	L-ANCHOR,,,,
a. $[kæts_1]_N$ $[s_2]$	*!		
☞ b. $[kæts_1]_N$ $[əz_2]$			*
c. $[kæt\ [s_{1,2}]_N]$		*!	

In (40), the candidates (40a) and (40b), leaving aside the OCP problem in (40a), are discarded because they fail to have the possessive suffix next to the stem (because of the intervening plural suffix), and thus violate POSS-AFTER-STEM.[16] The effects of the two ANCHOR conslraints blocking unnecessary epenthesis can be seen in (40d). In (41), the fusion solution chosen in (40) is not available because the possessive morph in (41c) fails to be adjacent to the stem (it appears inside it) and thus violates the constraint POSS-AFTER-STEM. Epenthesis is then the only strategy to avoid a violation of the higher ranked constraint OCP(s).

Tableaux like (40) and (41) are missing sorne important candidates that, nevertheless. do not jeopardize Russell's account. I discuss them here for the sake of completeness. As illustrated in (40b,d) and (41b), Russell (1997) assumes that the epenthetic vowel is rnorphologically affiliated with the suffix, to its left. But, given Freedom of Analysis, this is not necessarily the case. For a phonetic form like [kætsəz], corresponding to *Katz's*, one could also assume that the schwa is affiliated to the stem, [kæts$_1$ə]$_N$ [z$_2$], or that it has no morphological affiliation, [kæts$_1$]$_N$ a [z$_2$]. The latter candidate would easily be discarded because it violates POSS-AFTER-STEM, given that the epenthetic vowel interrupts the adjacency relation, the alignment, between the stem and the suffix. For the case in which the epenthetic vowel is affiliated to the stem, an ANCHOR constraint should be invoked which refers to the right segment of the stem; this constraint could occupy the same position in the ranking as the other ANCHOR constraints. The other relevant candidates missing in (40) and (41) are candidates with deletion of one of the morphs, like [kæts$_1$]$_N$ or [kæt]$_N$ [s$_2$], corresponding to *Katz's*. The second case (with deletion of the last segment of the stem) can be ruled out by a high ranked constraint MAX. As for the first case, with deletion of the possessive morph, [kæts$_1$]$_N$, in Yip's analysis it violates the morphemic constraint POSS=s. Under the MIH approach this candidate can be discarded either by the high ranked MAX or by the constraint REALIZE-MORPHEME, which requires every morpheme in the underlying representation to have some phonological exponent in the output (see Kurisu 2001 for an extended discussion of this constraint type). Notice that candidates with fusion, like [kæt]$_N$ [[s$_{1,2}$]] in (40c) do not violate MAX or REALIZE-MORPHEME, because no segment has been deleted.

Yip (1998) analyzes other cases in which the OCP seems to be responsible for the ungrammaticality of sequences containing identical elements. For instance, in Mandarin Chinese sequences of le (representing a verbal suffix) immediately followed by another le (a sentence-final particle) are avoided and a single le surfaces instead (haplology). A basic difference between English *'s* and Mandarin le. is that the latter does not consist of a single segment but has a CV structure. A third type of case can be illustrated again in English: this language avoids sequences with two *-ing* morphemes. like **John was starting reading the* book. In this case Yip suggests that the optimal candidate is the null parse; speakers resort to alternative syntactic constructions (like John *was starting to read* the hook, mentioned by Yip; fn. 11). This latter type of cases cannot be accounted for within thc MII-I because there is no string adjacency between the problematic morphs and therefore the OCP as traditionally understood cannot be invoked. The MII-I has to assume that this problem and its solution lie elsewhere, not in the phonology. And this might very well be the case, given that the syntactic context is crucial for the grammaticality or ungrammaticality of *-ing* sequences. As for the Mandarin le-type cases, with morphs longer than a single segment, it seems that in principle they could be accounted for within the MIH (although this might not be the best way to tackle the problem): the morphs would be adjacent and GEN would provide a candidate with fusion (/l$_1$e$_2$ l$_3$e$_4$/: [l$_{1,3}$e$_{2,4}$]); this candidate would not violate IDENT-F constraints, precisely because of the phonological identity between the segments of the scquence, and it would not violate REALIZE-MORPHEME either; it would violate LINEARITY, though (because the precedence relation between segment 2 and segment 3 in the input and in the output is different). A more important problem is how the OCP should be restricted to apply to specific morphs of some languages; for instance, according to Stemberger 1981, in Swedish there is an -en morpheme that can cause liaplology, and another -en morpheme with no modifications. An additional potential problem with the extension of the OCP to (phonologically identical) affixes consisting of two or more segments that both the MIH and the MCH should face. is related to the following prediction: there should be languages like Mandarin Chinese in which the conflict is resolved through epenthesis (it would be just a matter of reranking the relevant constraints). But as far as I know epenthesis is only available in cases where the old phonological OCP can be invoked, like English *'s*, with a sequence of identical sibilant segments." Here I have sumniarized some of the problems that an approach to OCP-related issues should address, but niost of them go beyond the debate between the two hypotheses being discussed.

VI. CONCLUSIONS

In this paper I have compared two hypotheses about the insertion of morphs: what 1 have called the Morphs through Constraints Hypothesis (MCH), and the Morphs in the Input Hypothesis (MIH). For the MCH, the input contains only morphosyntactic information, phonological information being introduced through morphemic constraints. For the MIH, based on more traditional ideas, the input contains all the relevant phonological information. Within the MCH, the absence of underlying forms in the input implies the impossibility of resorting to faithfulness constraints (there is no phonological input to be faithful to). It has been shown, with the example of voicing neutralization in Catalan. that positional faithfulness constraints (Beckman 1998, Lombardi 1999) are necessary; the sole combination of morphemic constraints and markedness constraints is unable to account for assimilation facts. In other respects, including phonologically-conditioned allomorphy and OCP effects in English plurals and possessives, both hypotheses seem to obtain similar results. There is one area in which the MCH seems to be u ***priori*** fairly well suited, namely lexical exceptions to phonological processes. By ranking the morphemic constraints introducing specific lexical items above the markedness constraints that force the process, and not below them, several degrees of exceptionality can be obtained (actually more degrees of exceptionality than one usually finds). However, this simple reranking is unable to account for the fact that many exceptions become regularized, that is they cease to be lexical exceptions, in derived environments. In this regard, thc more complex system needed by the MIH seems more promising.

In examining positional faithfulness constraints thc focus was only on onset faithfulness, nceded to account for voicing neutralization in Catalan. However, other prominent positions have been claimed in the literature to require positional faithfulness constraints, like roots as opposed to affixes. Under the MCH, the effects of the ranking root-faithfulness » markedness » faithfulness can only be obtained, as noticed by an anonymous reviewer, by ranking all the morphemic constraints that refer to roots above all the morphemic constraints that introduce all affixes, which would give rise to even more redundancy than was pointed out in other sections of the paper.

In section II it was mentioned that a possible view within the MCH is to have a specific morph dismembered into different morphemic constraints. It was shown that a possible solution to the problems that the MCH has in accounting for voicing neutralization in Catalan is to have all the morphemic constraints introducing obstruents that would end up being in onset position higher ranked than the ones that would end up in coda position. That means that for the morpheme meaning 'yellow' /grɔg/ there should be one morphemic constraint inserting the initial consonant, and a different one inserting the final one (it is not clear how the information about medial obstruents should be encoded in a specific morphemic constraint in order to end up Iiaving the right niorph surface). But notice that for other phenomena we would need information on prosodic structure. for exaniple, which means that we would want to have at least several segments of a morph in a given morphemic constraint. For instance, we saw in section III that the MCH can account for cluster simplification by having the niarkedness constraint *COMPLEXCODA ranked above the morphemic constraints that insert all the morphs that undergo this process in a given language (*COMPLEXCODA » morphemic constraints); lexical exceptions arise because sonie relevant morphemic constraint is ranked above *COMPLEXCODA (morphemic constraint » *COMPLEXCODA). These facts can be accounted for only if the relevant morpheniic constraints contain the whole morph or the relevant part of the morph (in the cases exemplified in section III, the whole syllable or the last two segments). So, different parts of each morph of a language would be inserted by different morphemic constraints depending on the processes they might be subject to. Moreover, having parts of morphs scattered throughout the constraint hierarchy might cause problems in trying to account for facts attributable to the faithfulness constraint family CONTIGUITY, for instance, because it is difficult to see what would ensure the integrity of a morph. It is easy to imagine that such view of morph insertion might run into lots of problems when trying to account for all the phonology of a given language and not just one process.

The conclusion of the paper is that. in spite of some difficulties the MIH might face, it still seems a better hypothesis (recall the very serious problems the MCH has with respect to voicing neutralization, discussed in section 2 and in this section). And this is so in spite of the fact that, as pointed out by Russell (1995), for instance, the MIH is niost likely bound to have to posit redundant information in the input and in some constraints (this might be the case for OCP-related phenomena or reduplication, for cxamplc).

NOTES:

1. I am very grateful to Joan Mascaró for helpful discussion of many aspects of this paper and for a revision of the second version of the inanuscript. and to Maria-Rosa Llorct and two anonymous reviewers who carefully read the first version. I also wish to thaiik Donca Steriade for a clarifying discussion on issues related to voicing. All their comments led to substantial iinprovements. Any reniaining errors and omissions are my own. This work has been supported by tlie Spanisli Ministerio de Ciencia y Tecnología (BFF2003-06590) and by the Departament d'Universitats, Recerca i Societat de la Informació, Generalitat de Catalunya (Research Groups 2001SGR00150).

2. For simplicity, I ignore here thc possibility tliat the morphs do not appear linearized in the input.

3. Burzio (1996). and later work, claims that underlying representations are unnecessary but, contrary to the MCH, does not claim that the input contains only morphosyntactic features; the input contains something identical orclose to the phonetic form instead (thanks to Luigi Burzio for clarifications on this point). Anevaluation ofthe predictions that this approach makes as compared to the others (the MIH and the MCH) is far beyond the scope of this paper and will not be explored here.

4. The facts concerning voiciiig in Catalan are, in fact, a bit more complex than what is presented here or in Beckman (1998). For instance, voicing assimilation also applies before sonorant consonants, and devoiced word-final stops stay devoiced when the following word begins with a vowel. while this is not the case for sibilants. Here, for simplicity, I abstract away from such facts because they are orthogonal to the point being made in this section. More complete discussions of voicing neutralization and contrast in Catalan can be found in Jiniénez (1999) and, especially, in Wheeler (2003), who also discusses the P-map approach to voicing in Steriade (2001).

5. Here I aiii assuiniiig that [voice] is a binary feature (contra Lombardi 1999, but following Wetzels and Mascaró 2001. for instance). Later we will see that conceiving [voice] as a monovalent feature does not improve matters.

6. Becknian (1998) meiitions that the problems posed by positional licensing constraints in accounting for the distribution of voiciiig in obstruents could be solved niechanically with the use of an Alignment constraint. ALIGN([voice], L, PWd, L): "For all *x*, *x*= [voice], there exists a *y*, *y* a PWd, such that the left edge ofx and the left edge of *y* coincide" (Beckman 1998: 49). As used in Beckman (1998), this constraint would need to have access to segmental iiiformation in the input, soniething usually not accepted for Alignment constraints. Under the MCH, this access would be impossible, given the inexistence of underlying forms in the input.

7. Even though in most ofthe examples in (23) the exceptional vowel appears in post-tonic position, there are some exaniples in which there is an exceptional vowel in pretonic position: [sopráno] 'soprano': but [suprənétə] 'soprano' (diin.)'; [nəpoleón] 'Napoleoii', but [nəpuleɔ́nik] 'iiapoleonic' (tlie lack of reduction of [e] iii this example is due to independent factors).

8. I use the term 'allomorphy' in its most restrictive sense; there is allomorphy when the differences between two forms cannot be derived from any phonological regularities of the language.

9. A different issue is that, following the reasoniiig in Yip (2003), by Lexicon Optimization the learner will end up selecting tlie morph *-ek* for a stem like *Jon* for the input. A discussion of different types of allomorphy along these lines can be found in Lapoiiite (1999). Several papers within OT have dealt with phonologically-conditioned allomorphy, but often it is not clear whether they would fall under the MIH or the MCH because of lack of explicitness about the nature of the input.

10 The subscript is a shorthand for a subcategorization frame, parallel to those used for syntax (transitive verbs subcategorize for an object NP) or morphology (in the Romance languages, specific verbal stems subcategorize for specific conjugations). Here the stem mic- subcategorizes for a gender class -u (or for a specific form class, using the terminology in Harris 1991a,b for Spanish).

11. It has to be taken into account, though. that the morph -u does not appear in derivatives (e.g. miquet [mikɛ́t] 'monkey (dim.)'). That means that a different morphemic constraint should insert the root alone.

12. When a disyllabic stem ending in a consonant is followed by the ergative suffix, the facts are more complex. According to Dixon (1972: 42), in these cases the ergative involves the addition of (a) "a homorganic stop plus-u to a stem ending in a nasal or y" (e.g., *midin* 'possum', *midindu*; *walguy* 'brown snake', *walguyḍu*); (b) "-ṛu, together with the deletion of the stem-final consonant, when the stem ends in -*l*, -*r* or *ṛ*) (e.g., *ḍugumbil* 'woman', *ḍugumbiṛu*; gubur 'native bee', *gubuṛu*). Although giving an account ofsuch cases is far beyond the scope of this paper, one should study the possibility that the -*ŋgu* allomorph is prevented from appearing because ofhighly ranked constraints related to sonority, or maybe due to *COMPLEX; constraints causing different types of assimilation and deletion would force the allomorph -*gu* to surface with a modified (or deleted) initial consonant.

13. As pointed out by an anonymous reviewer, the lexical requirement posited in the text (the attachment to a foot) does not account for cases in which the stem has four syllables, and not three. If the stem has four syllables, two feet can be built and therefore the -*ŋgu* allomorph would have preference over the otherallomorph, which is not the case. A possible solution to this problem is to have the lexical requirement refer to the Head-PrWd instead, which would be the leftmost foot of the stem (the deepest embedded PrWd in a recursive structure). The Head-PrWd is a constituent argued for in Kager (1996) to account for the strict disyllabic requirement present in the phonology and morphology of Guugu Yimidhirr, another Australian language from Queensland. The attachment to a Head-PrWd could be satisfied only by disyllabic stems, not by three or four syllable stems.

14. In Yip's (1998) paper, FILL and MORPHDIS appear unordered, which must obviously be a mistake, as can easily be checked in tableau (36), in this text (if the two constraints were unordered, candidates (36b) and (36c) would fare even and more constraints would be needed in order for the desired candidate, (36b), to become the optimal candidate). In (35)-(37) these two constraints appear ordered.

15. Given that the plural and the possessive suffix surface as voiceless after a voiceless consonant, and are voiced in all other contexts (also after a vowel), it is usually assumed that the sibilant, for both suffixes, is underlyingly voiced. The progressive assimilation effect (present in *cats* [kæts]) is analyzed in Lombardi (1999), for instance, within an MIH approach. It is not easy to see how this phenomenon would be dealt with in Yip's approach (if the morphemic constraints referred to the voiced character of the morphs, they would be violated in (36) and (37) by the acceptable output).

16. The constraint POSS-AFTER-STEM is violated in sequences with irregular inflectional morphology, liketaken *'s*, where the possessive suffix is not adjacent to the stem. Constraints like REALIZE-MORPHEME (requiring morphemes in the underlying representation to have some phonological exponent in the output) or IDENT-F could be invoked to prevent a candidate satisfying POSS-AFTER-STEM (a candidate with deletion of the inflectional suffix) from becoming the optimal candidate.

17. Catalan provides other examples ofsibilant-triggered OCP. In this language, sequencesofsibilants never surface (except in some cases in very slow speech). Epenthesis is found in verbs before ans inflectional suffix (e.g., /kuz+z/: [kúzəs] 'you sew'). and it is also found with pronominal clitics ending in a sibilant when the verb starts with a

sibilant (e.g., /s#sab/: [səsáp] 'one knows', or /ləs#sab/: [ləzəsáp] 'knows them (fem.)'; see Bonet and Lloret 2002). In nominal environments, the repair strategy is gender allomorphy (e.g., [kɔ́s] 'body' but [kɔ́sus] 'bodies'; see section IV). Interestingly, sequences of identical /s/ clitics (for instance, an impersonal plus a reflexive) cannot occur, epenthesis not being an available repair strategy, in spite of the fact that epenthetic vowels are inserted between other clitics, for syllabification purposes (cf. /s#m#parlə/: [səmpárlə] 'one speaks to me'). In this case fusion or deletion is not possible either, even though this is actually the most common repair strategy in the language (e.g. *cas secret*: [kasakrét] 'secret case'). The only alternative is to resort to a different syntactic construction. This suggests that the problem between identical clitics is not phonological but morphological (cooccurrence restrictions between clitics are found with all phonologically identical clitics. but also with clitics that are not identical; see, for instance, Bonet 1995). This could mean that in the phonology there is no such input to GEN with two *s* clitics.

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