The limits of the free ride in morphophonemic learning. Evidence from Catalan

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1. Theories about the UR of nonalternating items. Optimality Theory (OT) has developed various (competing) theories and hypothesis about the nature of URs and their process of acquisition, construction, storage, and access when no dynamic morphophonemic alternations are available. Probably due to OT's output-oriented character, the one that has been applied the most is the Richness of the Base hypothesis (ROTB), according to which the analyst must project all possible URs for every surface form (Prince & Smolensky 1993/2004: 205, 225). The grammar, that is, the constraint hierarchy, is ultimately responsible for selecting the actual surface form in a given language, no matter which UR is taken. However, in the process of storage and access to URs, the principle Lexicon Optimization is assumed to be at play (Prince & Smolensky 1993/2004: 205, 225). This principle establishes that when there is no morphophonemic evidence bearing on the choice of URs, phonological representations are stored identically to their surface form, leading to a direct economization of input-output mappings (given that the map from underlying to surface representations is accomplished more faithfully). More lately, some other hypotheses about the URs have been developed that still need further exploration. These are the Free ride approach to morphophonemic learning (FRML) (McCarthy 2005) and the principle of Archiphonemic Prudence and the related concept of paretooptimal input (Bermúdez-Otero 2003, 2006, forthcoming). According to the FRML, «when alternation data tell the learner that some surface [B]s are derived from underlying /A/s, the learner will under certain conditions generalize by deriving *all* [B]s, *even nonalternating ones*, from /A/s», so that «an adequate learning theory must […] incorporate a procedure that allows nonalternating [B]s to take a "free ride" on the /A/ → [B] unfaithful map.» (p. 19). The conditions under which learners take the free ride strategy in nonalternating forms are the following: when, by generalizing the unfaithful map, a *a*) «consistent» and *b*) «more restrictive» grammar than the one obtained by an identity map is achieved (p. 21). Following Prince & Tesar (2004: 252), «[t]he r[estrictiveness]-measure for a constraint hierarchy is determined by adding, for each faithfulness constraint in the hierarchy, the number of markedness constraints that dominate that faithfulness constraint», so that a grammar that grants «more power to markedness constraints» is «more restrictive» (p. 32). In a different vein, Bermúdez-Otero (2003, 2006) proposes the principle of Archiphonemic Prudence, «designed to deal with possible instances of neutralization in nonalternating environments» and a specific version of input optimization which requires input representations to be paretooptimal. An input representation is paretooptimal «if, and only if, it has no competitor that (i) generates *all* output alternants no less efficiently and (ii) generates *some* output alternant more efficiently.». In this case, unlike the FRML, efficiency is measured in terms of the violation of ranked faithfulness constraints. The free ride strategy has proven to be true, for instance, for cases of coalescence in Sanskrit, Choctaw and Rotuman (McCarthy 2005), for cases of hyperrhoticity in some varieties of English (Krämer 2008, 2009), or for vowel epenthesis in Majorcan Catalan, for which there is independent evidence based on its interaction with underapplication of vowel reduction, that learners generalize the unfaithful map /∅/ → [ə], derived from dynamic morphopohnemic alternations, to nonalternating cases (Pons-Moll & Lloret 2014, Lloret & Pons-Moll 2016). **2. Our claim.** Our claim, though, is that the free ride strategy is challenged when the input-output mapping(s) derived from dynamic alternations and which are potentially generalized to nonalternating items are not *univoque*, that is, when the alternating [B]s are derived from more than one underlying representation. Eastern Catalan vowel reduction constitutes an example of this kind of situation. In this varieties, surface [ə]s can correspond either to an underlying /a/, /ɛ/, or /e/ (e.g. *c*[ə]*seta* 'house dim.'~ *c*[á]*sa* 'house'; *m*[ə]*lós* 'honey-like'~ *m*[ɛ́]*l* 'honey'; *p*[ə]*saré* 'I will weigh'~ *p*[é]*sa* 's/he weighs'), and in some cases they do not alternate (*c*[ə]*vall* 'horse', *c*[ə]*rvell* 'brain', p[ə]rsona 'person', etc.). Leaving aside the ROTB hypothesis, which would posit URs with all four vowels (i.e. /a/~/ɛ/~/e/~/ə/) in nonalternating cases, and LO, which would posit the UR that entails a faithful mapping (i.e. /ə/), an inmediate

question is whether the learner has the chance to take a free ride in these cases, and, if this case, which of the vowels is selected. Following the r-measure, there is no mechanism to prefer one mapping over another: all them equally imply the ranking of a M constraint above a F constraint (i.e. *UNSTRESS/a >> IDENT(F) = *UNSTRESS/ɛ >> IDENT(F) = *UNSTRESS/e >> IDENT(F)) (see 1 & 2). It seems, instead, it is rather a matter of efficiency, measured in terms of the violation of ranked faithfulness constraints, along the lines of Bermúdez-Otero (2003, 2006). We argue that, among the vowels that entail an unfaithful map (i.e. /a/~/ɛ/~/e/), the one selected would be the less offensive in faithfulness terms, and this one is /ɛ/. The mapping /ɛ/ → [ə], indeed, is the less offending in this respect, given the featural similarity between both vowels and given the constraint ranking of Catalan (see 3). A similarity that it is independently supported by patterns related to sound change in some Eastern Catalan varieties (where the stressed /ə́/ has evolved to /ɛ́/) and by data relative to the quality of the epenthesis in situations of stress shift in Minorcan Catalan (where the unstressed [ə] alternates with a stressed [ɛ́]; see Moll 1934, Torres-Tamarit & Pons-Moll 2015). Summarizing our proposal: when *restrictiveness* (M >> F) leads to a non-consummated free ride and it is no longer exploitable, *efficiency* (F >> F, etc.) comes into play to consummate, conclusively, the free ride.

(1) First stage: alternations not discovered yet, identity map stage

/fəlisitat/	*UNSTRESSED/a	*UNSTRESSED/ɛ	*UNSTRESSED/e	FAITHFULNESS
☞ a. [fəlisitat]				
b. [falisitat]	*!			*
c. [fɛlisitat]		*!		*
d. [felisitat]			*!	*

(*Phonotactic learning. The learner just discovers that* [a], [ɛ] *and* [e] *are not allowed in unstressed position, and that* [ə] *is allowed in this position.*)

(2) Second stage (first depuration of the URs): alternations discovered → input surgery → restrictiveness achieved → identity map stage abandoned → free ride "quasi-accomplished"

/fa~e~ɛlisitat/	*UNSTRESSED/a	*UNSTRESSED/ɛ	*UNSTRESSED/e	FAITHFULNESS
☞ a. [fəlisitat]				***
b. [falisitat]	*!			**
c. [fɛlisitat]		*!		**
d. [felisitat]			*!	**

(*The learner has discovered the alternations of* [ə] *and has generalized them to nonalternating items. The learner has enough information to rank M >> F.*)

(3) Third stage (second depuration of the URs): looking for efficiency… → free ride "accomplished"

less efficient	/fəlisitat/	IDENT(low)	IDENT(close)	IDENT(pal)
	[fəlisitat]	*		
	/fɛlisitat/			
	[fəlisitat]		*	*
	/fɛlisitat/			
more efficient	[fəlisitat]			*

(*From all faithfulness rankings provided by Wheeler (2005: 57-61) to account for Catalan dialects, we resort to the one which is more informative in terms of ranking arguments between F constraints.*)