The Ordering of Postlexical Rules in English
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THE ORDERING OF POSTLEXICAL RULES IN ENGLISH

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0. Introduction*

The hypothesis I argue for in this paper is given below in (1).

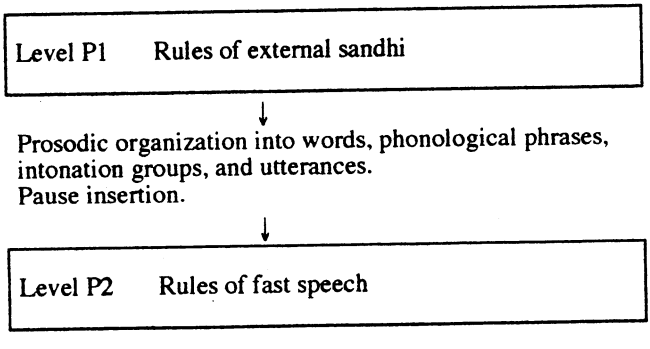
(1) P2 Ordering Hypothesis (P2OH): Phonological rules of the postlexical P2 level cannot apply sequentially; pairs of ordered rules must contain at least one lexical or P1 rule.

In Section 1, I define what I mean by the postlexical P1 and P2 levels, concepts taken from Kaisse (1985). In Section 2, I motivate the P2 Ordering Hypothesis (henceforth, P2OH) by arguing that it follows directly from three common assumptions about how phonological rules are processed psychologically. In the remainder of the paper I examine apparent counterexamples to the P2OH and show that they are not in fact genuine counterexamples. Due to space limitations, I only examine three cases, all from English; readers are referred to my dissertation (Myers in prep 1992) for discussion of further cases in English and other languages. In Section 3, I consider two cases of genuine ordering among apparent P2 rules and show that the earlier rules are not really P2 rules. In Section 4, I consider a case of apparent ordering among genuine P2 rules and show that the rules are better analyzed as applying simultaneously. Finally, in Section 5 I provide a summary.

1. P1 and P2 levels

The view of postlexical phonology argued for at length in Kaisse (1985) is represented schematically in (2) below.

(2) Postlexical Phonology [after (3) in Kaisse (1985:23)]



Both P1 and P2 rules are postlexical because both types may apply across word boundaries or be sensitive to structures larger than the word. However, they

differ in several ways; some relevant differences are listed below in (3). Roughly speaking, P1 rules are argued to be "more lexical" than P2 rules.

(3) Some properties distinguishing P1 and P2 rules [after Kaisse (1985)]

	P1 rules	P2 rules
1.	May have exceptions	May not have exceptions
2.	Syntactic units relevant	Across-the-board
3.	Inserted pauses irrelevant	Blocked by pauses

A paradigm example of P1 rules is the set of rules in Tiberian Hebrew discussed by Dresher (1983). These rules apply to the last word in a phrase, a structure larger than a word, and so must be postlexical. Many of the rules have lexical exceptions. Moreover, the concept of "phrase" is defined at least partly syntactically. Hence these rules fit the description of P1 rules.

A paradigm example of a P2 rule is Flapping in English. As far as I know, this rule is exceptionless and applies across-the-board. It is also blocked by pauses. Thus the underlined /t/ in *Joe found the bat alarming* may be flapped, while in *Joe found the bat -- mm -- alarming* it may not be.

2. Motivation for the thesis

The P2OH follows automatically from three common assumptions about the processing of phonological rules. The first of these is given below in (4).

(4) Premise 1: Lexical and P1 rules typically do not apply on-line during speech processing, but instead represent patterns across forms in memory.

One researcher who suggests something like this is Kiparsky (1975). He notes that the failure of experimental subjects to apply SPE-style rules properly when asked to produce nonwords does not mean that these rules are not psychologically real. Such "partially productive" rules "might very well be psychologically real without for all that being always 'run through' in speech production or perception" (Kiparsky 1975:203). He suggests that the reality of such rules be tested through memory experiments; thus if Velar Softening is a real rule, a nonword like *toxicism*, if taught with a [k], should tend to be recalled later with an [s]. Experiments like this conducted later validate Kiparsky's (1975) suggestion (Jaeger 1984). Shattuck-Hufnagel (1986:145) has made a similar suggestion:

> ...the output of earlier strata might correspond to the forms stored in the production lexicon that is accessed during phonological planning, while the operations described in later strata might correspond more closely to processing mechanisms.

She observes that Mohanan (1982) has also implied this when he claims that the output of the lexical phonology is what undergoes segmental permutation errors; these errors may then trigger the application of postlexical rules.

Stemberger (1986) shows that Mohanan's (1982) claim is not true in the strong form he gives; speech errors may sometimes trigger the on-line application of lexical rules as well. However, it still seems to be true that in general lexical rules do not apply on-line. This is not surprising, since by definition lexical rules

apply solely within forms which must be memorized anyway. Superficially at least, it seems more efficient to retrieve a form like *electricity* from memory with the [s] already present than to derive this [s] from an underlying /k/ every time the word is spoken or heard.

The reason for including P1 rules with lexical rules in Premise 1 can be seen if one considers what properties a rule would have to have in order for us to conclude that it *necessarily* applies on-line. One such property would be sensitivity of the rule to the environment beyond word boundaries. Words are unquestionably concatenated into word sequences on-line (except perhaps for very frequent word combinations like *in the* or idiom chunks like *kick the bucket*), so processes that are sensitive to elements beyond word boundaries must apply on-line as well. This property is, of course, one of the defining properties of postlexical rules; lexical rules cannot apply across word boundaries. However, not all rules argued to be postlexical meet this criterion. For example, Halle and Mohanan (1985) discuss several apparently ordered rules in English which they argue to be postlexical because the rules seem to lack characteristics of lexical rules, such as sensitivity to morphology. These rules do not necessarily apply on-line, though, since by their very nature they are insensitive to the environment outside of the word.

Another property of an on-line phonological rule is that its effect must be distinguishable from an on-line selection among allomorphs which are themselves *not* derived on-line. Traits that might distinguish phonological rule application from mere allomorph selection include the number of allomorphs involved; on-line allomorph selection becomes implausible if there are a large number of potential allomorphs for any given word. The existence of lexical exceptions is also relevant, if exceptions to a rule are understood as indicative of the rule's status as merely "partially productive", that is, not typically applying on-line.

Thus the process of a/an allomorphy in English clearly applies on-line, since the choice of *a* versus *an* depends on properties of the following word. It is unlikely, however, that the allomorphs *a* and *an* are themselves derived by an on-line phonological rule from some shared underlying form because any such rule would be riddled with lexical exceptions (*a* and *an* being in fact the only words it would apply to). The fact that there are only two allomorphs involved makes it reasonable to suppose that a/an allomorphy is truly just allomorphy.

This criterion implies that the postlexical rules of Tiberian Hebrew discussed by Dresher (1983) do not necessarily apply on-line, since for any given word these rules have the effect of choosing between only two allomorphs, one that appears at the end of a phrase and one that appears elsewhere. As with a/an allomorphy, the choice of allomorph must occur on-line, but not the phonological derivation of the allomorphs themselves. Given this observation, it is not surprising that the postlexical rules of Tiberian Hebrew have lexical exceptions. A similar point can be made about rules of phrase-boundary-triggered tone sandhi, such as in Taiwanese, which are notoriously difficult to characterize with autosegmental formalism (see, eg Yip 1980, Tsay 1992).

These cases may be contrasted with a rule like postlexical nasal place assimilation in English. For any given word ending in a nasal consonant, there are as many allomorphs potentially generated by nasal place assimilation as there are places of articulation; thus *ten* can end in a bilabial nasal before *books*, in a labiodental nasal before *vanes*, and so forth. It would be implausible to suppose that all of these allomorphs are stored separately and then merely chosen on-line.

Thus rules that apply on-line should be exceptionless. Moreover, rules triggered by the presence of a phrase boundary will produce only two allomorphs

for any given word, while one that applies across-the-board may produce a large number of allomorphs. These two properties are of course two of the properties distinguishing P2 rules from P1 rules. This leads directly to Premise 2, given below in (5).

(5) Premise 2: P2 rules typically apply on-line.

The final premise required for the derivation of the P2OH is given in (6).[1]

(6) Premise 3: Rules that apply on-line cannot apply in sequence.

Ideas like Premise 3 have been discussed ever since the concept of rule ordering was first proposed. A recent example is Lakoff (1989:1): "Neural processes occur in real time.... All those intermediate stages of long derivations of sentences simply cannot be realized in the brain." As is seen in this quotation, the argument typically given for Premise 3 is roughly as follows. Speech processing occurs extremely rapidly, and yet phonological systems often contain many rules. If these rules were to apply in sequence on-line, each rule would have to apply at an unrealistic, perhaps even neurologically impossible, speed. Moreover, each intermediate representation would only last for a fraction of an instant before being immediately modified again. Note that this argument rules out intrinsic ordering of on-line rules as well as extrinsic ordering.

However, the argument only concerns rules that apply on-line; rules that characterize forms stored in memory are under no such time constraint. The question then naturally arises why rules that rarely if ever apply need to be ordered sequentially at all.[2] One answer is that ordered rules in the lexical and P1 levels are ordered purely through historical accident, the ordering preserving either the order of their addition to the language or the order of their lexicalization, the later rule perhaps having remained a P2 rule longer than the earlier rule. The ordering of lexical and P1 rules, that is rules that typically do not apply on-line, is thus not necessarily part of a speaker's knowledge of her language.

Implicit in Premise 3 is the assumption that parallel processing is always faster than sequential processing, an assumption that might reasonably be questioned, since the computational demands of parallel processing often make it slower in practice than sequential processing. However, at most this can be taken to be an argument that phonological rules typically do not apply simultaneously; the argument against sequential processing of long derivations still stands. What the observation about parallel processing implies, though, is that interacting phonological rules, where the processing demands are relevant, should tend to apply in sequence. If both this and Premise 3 are true, then we should find that in pairs of interacting rules at most one of them should apply on-line; the ordering would then be an automatic consequence of the fact that the earlier one simply represents a pattern in memory.

As we will see below, this expectation is fulfilled: true cases of interacting P2 rules are extremely rare. In virtually all of the cases I have looked at so far, apparent ordering of apparent P2 rules actually involves genuine ordering of rules where at least the earlier one is not a P2 rule; I know of only one case of simultaneous interacting P2 rules, discussed in Section 4, and in this case it appears that the two rules may be aspects of a single process.

3. Genuine ordering among apparent P2 rules

So far in my search for counterexamples to the P2OH (see Myers in prep 1992) I have examined the following cases, listed with some relevant sources: coronal deletion and nasal place assimilation, coronal deletion and glottal reinforcement, flapping and flap deletion, vowel reduction and sonorant syllabification (Selkirk 1972); palatalization and y-deletion (Kaisse 1985); h-deletion and ə-deletion (Zwicky 1970, Kaisse 1985, Pérez 1991); stop glottalization and fricative stopping in the Applegate subdialect (Applegate 1961); tone sandhi rules in Ewe (Clements 1978); and the cases discussed in this paper.

These cases fall into three classes. The first and least interesting is the class of rule pairs where there is insufficient motivation that the rules are truly distinct; an example of such a rule pair is postlexical palatalization and y-deletion.

The second class consists of cases where genuinely distinct rules genuinely seem to be ordered, but where at most the later rule is in the P2 level, the other being a P1 or even a lexical rule. Two cases like this will be discussed in this section. The third class consists of genuine interacting P2 rules where it turns out the two rules may apply simultaneously to derive the same output; the one case of this I know of will be discussed in Section 4.

3.1 Raising and Voicing in Canadian English

The first case I will discuss is that of Raising and Voicing in Canadian English. The primary sources for these rules are Joos (1942) and Chambers (1973); Halle (1962) provided the classic analysis involving rule ordering.

The rule of Voicing is essentially identical to the rule of Flapping, neutralizing underlyingly distinct /t/ and /d/ as [d]; the specific environment for the rule is not relevant to a discussion of its ordering with Raising. Examples of this rule in action are given below in (7).

(7) Voicing [after (5) in Chambers (1973:118)]

bitter - bidder = [bɪdər] beetle - beadle = [biydəl]

The rule of Raising raises an underlying /a/ to [ʌ] when followed by /y/ or /w/ and a voiceless consonant, as illustrated below in (8a). Paradis (1980) argues convincingly that the voiceless consonant must appear in the same syllable as /a/ after the application of Kahn's (1976) ambisyllabicity rules, specifically his Rule III whereby an onset consonant of a syllable becomes the coda consonant of the previous syllable as well if the previous syllable is not greater in prominence. This analysis accounts for the contrast in (8b), where Raising only applies if the following syllable does not have more prominence than the syllable containing /a/.

(8) Raising [after Chambers (1973)]

a.	house	[hʌws]	houses	[hawzɨz]
	knife	[nʌyf]	knives	[nayvz]
b.	ícòn	[ʌ́ykàn]	ìcónoclàst	[àykánəklæ̀st]

Joos (1942) observed that speakers of Canadian English could be divided into two groups depending on how they used these two rules. According to his description, both groups pronounced words like those in (7) and (8) as given above but differed in their pronunciation of words where *both* Raising and Voicing could apply. In what he called Group A, speakers ignored the voicing derived by rule in their application of Raising, so that the vowels in *writer* and *rider* remained distinct. In Group B, by contrast, speakers treated the derived [d] like an underlying voiced consonant, so that the diphthongs in *writer* and *rider* were neutralized as [ay]. Halle (1962) analyzed Joos's description as following from dialect-dependent rule ordering. In both groups, he argued, *writer* and *rider* were underlyingly identical in their vowels and distinct in their consonants; in Group A, however, Raising was applied first so that the vowels could become distinct before Voicing could neutralize the consonants, while in Group B Voicing fully neutralized the two words before Raising could apply.

On the face of it, this example seems to be a serious problem for the P2OH: not only do Raising and Voicing seem to be ordered P2 rules, but apparently different dialects can order them any way they please. It turns out, however, that Raising and Voicing are not in fact both P2 rules; moreover, there is no evidence that their ordering is dialect-dependent.

First of all, Group B no longer exists in Canada (Chambers 1973). Secondly, other North American dialects with rules like Raising and Voicing always seem to order the rules with Raising first (Chambers 1973, Vance 1987). Rudes (1976) cites Black English and dialects spoken in Buffalo and the Adirondack Mountains in New York as examples of dialects where *writer* and *rider* seem to be pronounced the same, but she shows that these cases can be analyzed without resorting to extrinsic rule ordering. Finally, even if it appeared to Joos in 1942 that words like *writer* and *rider* were fully neutralized in Group B, it is likely that he was mistaken. Research into the phenomenon of *near merger* (eg, Dinnsen 1985, Harris 1985) has shown that forms that appear to a casual listener or even a native speaker to be fully neutralized often remain measurably (and thus presumably articulatorily and psychologically) distinct. Thus Dinnsen (1985) cites a variety of studies showing that the underlying distinction between /t/ and /d/ always remains after flapping in the temporal or spectral properties of the preceding vowel. If Group B was not fully neutralizing, as seems likely given what we know about dialects for which we have data, Halle's analysis of the distinction between Group A and Group B as due solely to rule ordering must be at least modified. In any event, the lack of data does not make his argument as convincing as first appears.

The only ordering we are left to deal with, then, is that in Group A, where Raising precedes Voicing. This ordering is not at all problematic for the P2OH, however, since in this dialect Raising is at best a P1 rule; only Voicing applies in the P2 level. One non-P2 property possessed by Raising is the existence of lexical exceptions. Chambers (1973) noted that some of his Group A informants pronounced *Cyclops* with the /a/ unraised; this word is phonologically identical in all the relevant ways (stress pattern, syllable structure, even in the segment following /ay/) to a word like *micron*, where Raising does apply.

Vance (1987) discusses some dialects of US English that also have a rule like Canadian Raising, the sole difference being that in the US Raising only affects /ay/, but not /aw/; as noted above, in these dialects Raising is ordered before Voicing, as in Group A. In these dialects, too, Raising has lexical exceptions. Some examples (of Vance's own judgments) are listed below in (9).[3]

(9)	nice	[náys]	{cf:	like	[lʌ́yk]}
	icon	[áykàn]	{cf:	psyche	[sʌ́ykɨ̀y]}
	bison	[báysn̩]	{cf:	vital	[vʌ́yDl̩]}

The existence of lexical exceptions means that Raising cannot be a P2 rule. What about Voicing, ordered after Raising in all known dialects? According to Chambers (personal communication), Voicing, like Flapping, does not have any lexical exceptions and apparently applies across-the-board. Thus it has the hallmarks of a P2 rule, and its ordering after Raising is to be expected.

To summarize: of the orderings of Raising and Voicing argued for in Halle (1962), only the ordering where Raising precedes Voicing seems to be found. This ordering poses no problem for the P2OH because only Voicing may be a P2 rule.

3.2 Coronal Deletion and Coronal Assimilation

The second case of genuine ordering of apparent P2 rules in English is that of Coronal Deletion (called Post-Obstruent Elision and Post-Nasal Elision in Selkirk 1972, and *-t,d* deletion in Guy 1991a,b) and Coronal Assimilation (called Coronal Assimilation-Fricative in Selkirk 1972).

For a detailed discussion of the proper formalization of Coronal Deletion, see Guy (1991a); for my purposes it suffices to note that the rule deletes [t] and [d], depending in a gradient way on the sonority of the adjacent segments, as in (10).

(10) Coronal Deletion [after Selkirk 1972:193-4]

draft-dodger → draf-dodger	thefts → thefs
exact sciences → exac sciences	lend money → len money

Coronal Assimilation changes an underlying /s/ and /z/ into [ʃ] and [ʒ], respectively, when followed by [ʃ] or [ʒ], as in (11).

(11) Coronal Assimilation [after Selkirk1972:189]

I gave Chris show tickets → I gave Chri[ʃʃ]ow tickets

Buzz shrieked → Bu[ʒʃ]rieked

As observed by Selkirk (1972:194), these rules seem to be ordered with Coronal Deletion preceding Coronal Assimilation. This is illustrated by the derivation in (12) of the pronunciation of *lost shampoo* as [lɔʃ ʃæmpu]. This pronunciation cannot arise if Coronal Assimilation precedes Coronal Deletion, or if the two rules apply simultaneously.

(12)

	lost shampoo
UR:	lɔst ʃæmpu
Coronal Deletion	lɔs ʃæmpu
Coronal Assimilation	lɔʃ ʃæmpu

Again, this seems to be a clear counterexample to the P2OH. Both Coronal Deletion and Coronal Assimilation seem to be variable (ie, optional) fast speech rules, which would mean they apply in Level P2. Moreover, Coronal Assimilation has one of the specific properties of P2 rules, being blocked by an inserted pause; thus it may not apply in a context like *I gave Chris -- mm -- show tickets.*

However, as sociolinguists have known for a while, Coronal Deletion is sensitive to morphology; specifically, the deletion of a word-final [t] or [d] depends on the use of this segment as an inflectional suffix. Thus Coronal Deletion cannot be a P2 rule. Guy (1991a,b) goes further, showing that Coronal Deletion not only appears before the postlexical stratum, but in fact appears in both Lexical Level 1 and Lexical Level 2; it then appears a third time as a postlexical rule.

There are two independent arguments for this claim. First, Guy (1991a) shows that the rate of retention of [t] and [d] in monomorphemic (M) forms like *lift* is very close to the cube root of the rate of retention p_r in the past tense forms of regular verbs like *laughed* (P forms); for many speakers, the rate of retention in semiweak verbs like *left* (S forms) is very close to the square root of p_r. Thus, as was already known, Coronal Deletion is more likely to apply in M forms than in S forms, which in turn drop [t] and [d] more often than P forms. This specific exponential relation, however, can be best understood, Guy (1991a) argues, if it is supposed that Coronal Deletion has three chances to apply in M forms, two times in S forms and only one time in P forms, each time with a retention rate of p_r. This makes sense if one recalls that [t,d] is present for a Level 1 application of Coronal Deletion only in M forms; for S forms [t,d] only appears in time for an application of this rule in Level 2, and P forms only get the opportunity to lose [t,d] postlexically. This conception is illustrated schematically in (13).

(13)

	M lift	S left	P laughed
LEXICAL	lɪft	lɛf	læf
LEVEL 1	/ \		
Cor Del	lɪf lɪft		
LEXICAL	lɪft	lɛft	læf
LEVEL 2	/ \	/ \	
Cor Del	lɪf lɪft	lɛf lɛft	
POST-	lɪft	lɛft	læft
LEXICAL	/ \	/ \	/ \
LEVELS	| |	| |	| |
Cor Del	lɪf lɪft	lɛf lɛft	læf læft

The second argument in support of this view concerns the sensitivity of Coronal Deletion to adjacent segments. Guy (1991b) finds that the relevance for word-final deletion of [t,d] of a preceding, ie word-internal, segment is greater in M forms than in P forms. By contrast, the relevance of a following segment, ie the first segment of the following word, is equal for M and P forms. This makes sense, Guy (1991b) argues, if one assumes that Coronal Deletion only gets a chance to apply in P forms at a level where the word-external environment is

relevant, while in M forms Coronal Deletion can apply before this level as well. This is just what one would expect if the picture in (13) is correct.

Guy (1991a,b) does not consider the question of whether the postlexical application of Coronal Deletion applies in the P1 or the P2 level. If it applies at the P2 level, the P2OH predicts that it applies simultaneously with Coronal Assimilation. The pronunciation of *lost shampoo* as [lɔʃ ʃæmpu] would still be derivable, however, since Coronal Deletion also applies lexically. The same is of course true if the postlexical application of Coronal Deletion only occurs in the P1 level. Hence the ordering of Coronal Deletion before Coronal Assimilation is a natural consequence of the fact that the former rule is "more lexical" than the latter.

One final point should be made before moving on. The finding that variable rules can appear within lexical phonology might seem to be problematic for Premise 1 in (4) above, whereby lexical rules are supposed typically not to apply on-line. This is because it seems reasonable to suppose that rule variability arises out of on-line processing factors; it is not immediately clear how rules instantiated primarily in memory could sometimes fail to apply.

The response to this objection becomes clear, however, when one considers how the process whereby a P2 rule becomes a P1 or lexical rule may occur within the view expressed by Premisses 1 and 2. If an on-line rule R is opaque enough, the forms that it derives may be learned by the next generation as underlying and be stored in memory as such. If the pattern in these stored forms becomes psychologically real at a later stage of acquisition, the rule R will have effectively changed from the P2 level to P1 or the lexicon. Now, if R is a variable rule, this variability can still be recorded in memory if one assumes that lexical items can have multiple representations in memory. This is in fact what one would expect with a variable P2 rule undergoing the above process; since the rule is initially opaque, the alternate forms for any given word produced by the application or nonapplication of rule R would have to be learned initially as unanalyzable allomorphs. The frequency of retrieval of these allomorphs would naturally reflect the frequency of their occurrence in the speech around the learner. Hence the rate of application of rule R would be the same in both its lexical and postlexical incarnations even though the psychological status of these incarnations are very different.

4. Apparent ordering among genuine P2 rules

The final case I will consider here is that of Vowel Nasalization and Nasal Reduction (often incorrectly called Nasal Deletion) in English; Malécot (1960) is the original source, with Kaisse (1985) and Bourgeois (1990), among many others, providing analyses. Vowel Nasalization nasalizes a vowel preceding a nasal consonant. Nasal Reduction, as described by Malécot (1960), shortens the duration of a nasal consonant before a voiceless consonant to various degrees, depending on the quality of the preceding vowel. After [æ] the nasal consonant often seems to delete completely. Kaisse (1985:29) shows that the rule only applies if both nasal consonant and following voiceless consonant are in the same syllable.

It is typically assumed (eg, Kaisse 1985:28-29) that Vowel Nasalization must precede Nasal Reduction, as in a derivation like that in (14). This is because if the rules were to apply in the opposite order, the nasal consonant would be deleted before the preceding vowel could be nasalized.

(14)

	can't
UR	kænt
Vowel Nasalization	kæ̃nt
Nasal Reduction	kæ̃t

This time it appears that both rules truly do apply in the P2 level, since both are apparently exceptionless and insensitive to morphological information. It is true that Nasal Reduction only applies within word boundaries (eg, *He can take it* cannot be pronounced **He* [kæ̃] *take it*). However, as Kaisse (1985:29) shows, this is just because Nasal Reduction is fed by Kahn's (1976) Rule III of syllabification, which does not apply across word boundaries. As Kaisse (1985:28) observes, this merely means that Rule III is not a P2 rule, but it still may feed P2 rules. Thus Rule III cannot make the /t/ following *can* in the example above become tautosyllabic with the /n/ in *can*, so that Nasal Reduction cannot apply. Hence both Vowel Nasalization and Nasal Reduction appear to be genuine P2 rules, and their apparent ordering seems to pose a real problem for the P2OH.

As pointed out by Bourgeois (1990), however, the ordering of these rules may only be apparent, since if they apply simultaneously the same result is achieved. This is demonstrated by the derivation in (15).

(15)

	can't
UR	kænt
Vowel Nasalization+Nasal Reduction	kæ̃t

Such an analysis is not only possible but actually appears to be preferable to the ordering analysis, since nasal deletion with concomitant vowel nasalization is an extremely common and phonetically natural process; one random example is diachronic change in nasal finals in many Chinese dialects (Zee 1985). That is, although vowels can be nasalized without the deletion of the following nasal consonant, processes like Nasal Reduction probably do not occur very often without the preceding vowel being simultaneously nasalized. The naturalness of the cooccurrence of vowel nasalization with nasal deletion seems difficult to explain with any principle of rule ordering. Rather, it seems to follow from phonetic constraints on the form of individual rules.

Thus in this, the sole case of interacting P2 rules I am aware of, it appears that the rules actually form aspects of a single process, not truly independent rules at all. This is further support for the claim, mentioned above in Section 2, that simultaneous application of interacting rules may be computationally costly and therefore avoided. One way of avoiding it is to shunt one of the rules off into an earlier level, which is what may have happened with Raising and Coronal Deletion. Another way is to avoid separating a single process into its two obvious subparts, as seems to be the case with Vowel Nasalization and Nasal Reduction.

5. Conclusion

In this paper I have argued essentially for two points. The first is that the P2OH follows automatically from some plausible premisses, already found in the literature, about how phonological patterns are instantiated psychologically. These premisses can be questioned in various ways, but at this point there seems to be no

strong evidence forcing us to reject them. The second point is that all apparent counterexamples to the P2OH examined so far have turned out not be counterexamples at all. On the contrary, the particulars of some of the cases seem to support the thesis in unexpected ways. For example, the fact that the postlexical rules of Tiberian Hebrew are both ordered and have exceptions is not a coincidence in light of the P2OH, as is the fact that the true interacting P2 rules of Vowel Nasalization and Nasal Reduction seem more like aspects of a single process than independent rules.

Of course there is no way to prove the P2OH conclusively, since such a proof would require the examination of *all* apparent counterexamples in *all* of the world's languages. It remains to be seen if the P2 Ordering Hypothesis will hold up in the long run. The strength of the psychological motivation and its empirical payoff up to this point, however, should make future researchers more cautious about taking apparent cases of ordered P2 rules at face value.

NOTES

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[1]Although acceptance of Premisses 1, 2 and 3 forces one to accept the P2OH, it should be noted that researchers who believe Premisses 1 and 2 do not necessarily believe Premise 3. For example, Kiparsky (1975:194) explicitly denies the P2OH, citing Selkirk (1972) as providing examples of rule ordering in phrase phonology; these examples are shown to be irrelevant below and in Myers (in prep 1992).

[2]I am indebted to a member of the audience at BLS (whose name I neglected to ask) for both this question and the one that follows.

[3]In addition to lexical exceptions, the dialects that Vance discusses contain examples of raised [ʌy] which could not have been derived by Raising. For example, Vance (1987:203) reports that in his idiolect /ay/ is raised in *idle*. In fact, this word forms a minimal pair with *idol*, which contains an unraised [ay] in Vance's idiolect. As Vance points out, then, it appears that the distinction between [ay] and [ʌy] has become phonemicized in these dialects.

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