Are Strict Cycle Effects Derivable?

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Derived environment effects, in which a rule fails to apply in non-derived environments that otherwise satisfy its structural description, are generally attributed to the Strict Cycle Condition (Kean 1974, Mascaró 1976). Kiparsky (this volume) proposes to eliminate the Strict Cycle Condition, arguing that derived environment effects "... are the result of structure-building rules applying to underspecified representations." The purpose of this note is to present a case that appears to pose serious problems for Kiparsky's attempt to eliminate the Strict Cycle Condition.

To illustrate Kiparsky's approach, consider his analysis of the well known Finnish rule that takes /t/ to /s/ before /i/, which applies only in derived environments. Relevant forms, along with the proposed underlying representations, are given in (1).

(1) Finnish Forms

	Nom	Essive	UR	Gloss
(a)	lasi	lasina	laTi	glass
(b)	koti	kotina	koti	home
(c)	vesi	vetenä	veTE	water
(d)	kuusi	kuusena	kuusE	fir

The derived environment effect is illustrated by the contrast between (b) and (c). In (b) /t/ precedes /i/ in the underlying representation and is unaffected. In (c) /t/ underlyingly precedes /e/, and it is only when /e/ raises to /i/ in word-final position that the preceding /t/ becomes /s/.

On Kiparsky's analysis there are two underlying non-low front vowels, /i/, which is [+high], and /E/, which is [0high]. There is no distinctively [-high] non-low front vowel as this is forbidden by principles of radical underspecification. The archisegment /E/ may receive a value for [high] either by the E-Raising rule (2):

(2) Final E-Raising

[] ⇒ [+high]/ ___ #

or by the default rule (3).

(3) High Default

[] ⇒ [-high]

For [t] and [s] we have three underlying possibilities, /s/ ([+cnt]), /T/ ([0cnt]), and /t/ ([-cnt]). /s/ is permitted only before underlying /i/, while /t/ is permitted only when not preceding /i/, so that in no single environment is there an underlying distinction between [+cnt] and [-cnt]. Before /i/ we can have either /t/ or /T/; elsewhere we can have /s/ or /T/. The default rule supplies the value [-cnt], producing [t]. The rule that takes /t/ to /s/ before /i/ is a purely feature-filling rule and so applies to /T/, filling in the value [+cnt], but not to /t/, which is already specified [-cnt].

The derived environment effect results from the fact that derived [i] (that is, /E/) may be preceded either by /s/, which is always realized as [s], or by /T/, which is realized as [t] when /E/ is realized as [e], and as [s] when /E/ is realized as [i], while underived [i] (/i/) may be preceded either by /t/, which is always realized as [t], or by /T/, which before /i/ is always realized as [s].

The problematic example involves two rules of Chumash, a now extinct language of California. The data presented here are from the Ineseño dialect, described by Applegate (1972) on the basis of the field notes of John P. Harrington. The situation in the Ventureño dialect, described in the posthumously published Harrington (1974), is very similar. The analysis given here recapitulates that of Poser (1982), which may be consulted for additional examples and details omitted here.[1]

The first of the two relevant rules is Sibilant Harmony, which causes all sibilants (including affricates) to agree in laminality with the rightmost sibilant in the word.[2] (4) illustrates the fact that the third person subject prefix surfaces as [s] when no other sibilant follows. But when the past tense suffix /waš/ is added as in (5), /s/ becomes /š/.

(4) hasxintila / ha + s + xintila/ his gentile

(5) hašxintilawaš /ha + s + xintila + waš/ his former gentile

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[1] Let me take this opportunity to correct an error in Poser (1982), where I glossed *hašxintilawaš* as "his former Indian name". Actually, this form is the adjective meaning "his former gentile" and has the given meaning only when combined with the noun *mastɨ* "name". *xintila* is a loan from Spanish *gentil* "gentile, heathen".

[2] In Poser (1982) I treated the distinction between Chumash /s/ and /š/ as a distinction between [+ant] and [-ant]. Here I adopt the proposal of Lieber (1987;147) that it should be characterized as a distinction between [-dist] and [+dist], that is, as a distinction between apical and laminal.

Sibilant Harmony also causes underlying /š/ to surface as /s/. (6) shows that the dual subject prefix is underlyingly /iš/ since that is the form in which it appears when no other sibilant follows. In (7), where the rightmost sibilant is /s/, the dual prefix harmonizes and surfaces as /s/.

(6) pišananʔ/p + iš + al + nanʔ/ don't you two go

(7) sishuleqpeyus /s + iš + sili + uluaqpey + us/ they two want to follow it

These examples demonstrate that Sibilant Harmony is feature-changing, since it causes underlying /s/ to surface as /š/ and underlying /š/ to surface as /s/. For a harmony system to be purely feature-filling, it must be the case that harmonizing segments are unspecified for the harmony feature. Therefore, segments subject to harmony will all take on the same value, whatever value is supplied by the relevant default rule, when they lie outside the domain of a harmony trigger. In a case like the one at hand, in which the value of the harmony feature is unpredictable when not in the domain of a trigger, the value cannot be attributed to a default rule and therefore must be part of the representation of the segment, that is, must be specified. Since both /s/ and /š/ undergo harmony, the harmony rule must change underlyingly present feature values.

In addition to Sibilant Harmony, Chumash has a second rule affecting the laminality of sibilants, which I will call Pre-Coronal Laminalization (PCL). This rule, stated in (8), makes a sibilant laminal when it immediately precedes one of the non-strident coronals /t/, /l/, or /n/. The operation of the rule is illustrated by the examples in (9). In each case the third person subject prefix /s/ (apical) becomes [š] (laminal) before a non-strident coronal.

(8) Pre-Coronal Laminalization (PCL)

[+cor, +stri] ⇒ [+dist] / ___ [+cor, -stri]

(9) Examples of Pre-Coronal Laminalization (PCL)

šnanʔ	/s + nanʔ/	he goes
štepuʔ	/s + tepuʔ/	he gambles
šloxitʔ	/s + loxitʔ/	he surpasses me

Pre-Coronal Laminalization creates a systematic class of exceptions to the generalization that all sibilants in a word agree in laminality with the rightmost. Sibilants whose laminality is determined by PCL are opaque to Sibilant Harmony. In (10a) we see that the /š/ created by PCL fails to harmonize with the /s/ of /us/. In (10b)

not only does the /š/ created by PCL fail to harmonize with the two /s/s of /sisin/, but it serves as a trigger with respect to the /s/ that precedes it.

(10) Examples of Pre-Coronal Laminalization (PCL)

(a) štiyepus	/s + ti + yep + us/	he tells him
(b) šišlusisin	/s + iš + lu + sisin/	they two are gone awry

In Poser (1982) I argued that the opacity of /š/ created by PCL is incompatible with theories in which feature-changing rules directly change feature values. In such theories, if PCL applies before Sibilant Harmony, /š/ created by PCL should harmonize just like underlying /š/ since Sibilant Harmony has no way of distinguishing between underlying /š/ and those derived by PCL. If PCL applies after Sibilant Harmony, /š/ created by PCL will fail to harmonize, but they will not be opaque, for sibilants to their left will harmonize with the rightmost sibilant in the word, and will not harmonize with the /š/ created by PCL. In other words, if PCL applies after Sibilant Harmony, PCL will create islands not opaque segments.

The same problem arises in the putatively non-feature-changing analysis of Avery & Rice (1989). In their discussion of Chumash (pp. 193-4) they do not directly address the evidence that Chumash is feature-changing, and describe their analysis as not feature-changing. In one sense their analysis is not feature-changing, for it does not make use of explicit delinking or deletion rules, or directly change one feature-value into another. Their analysis is, however, feature-changing in another sense, namely in that the harmony rule deletes underlyingly present information, and it is only for this reason that it can accomodate the evidence presented above that Chumash harmony is feature-changing. Their harmony rule fuses the Place node of the rightmost sibilant with those of the sibilants to its left. They explain the operation of fusion as follows (pp. 181):

> Fusion is an operation which takes identical primary content nodes and fuses them provided that the nodes are non-distinct; i.e. both nodes do not dominate different secondary nodes. We assume that fusion is headed in that the secondary features of the triggering segment are maintained.

As the examples discussed on p.182 make clear, not only are the secondary features of the trigger maintained, but the secondary features of the harmonizing segment are deleted. Thus, fusion of a [+dist] trigger with a [-dist] undergoer makes both [+dist], which is the equivalent of a feature-filling spreading operation, but fusion of a [-dist] trigger with a [+dist] undergoer causes deletion of the secondary features of the

undergoer, making both segments [-dist], the equivalent of spreading accompanied by feature deletion. In the relevant sense, then, their analysis is feature-changing, and like more traditional feature-changing analyses, cannot account for the opacity of /š/ created by PCL, which they do not discuss.

The opacity of /š/ created by PCL can be accounted for in a theory like that of Poser (1982) in which feature-changing is the result of two distinct rules, one delinking or deleting feature specifications, the other inserting new feature specifications or spreading existing ones.[3] The proposed two-stage analysis of Chumash Sibilant Harmony orders PCL between Distributed Delinking, which delinks non-rightmost specifications of the feature [dist], and Distributed Spreading, which spreads the remaining rightmost specification of [dist] leftwards.

(11) Order of Rules

(a) Distributed Delinking;

(b) Pre-Coronal Laminalization

(c) Distributed Spreading

/š/ created by PCL fail to undergo Sibilant Harmony because Distributed Delinking gets no opportunity to delink them and Distributed Spreading is purely feature-filling.[4]

We now come to the crux of our argument, namely the fact that Pre-Coronal Laminalization is subject to a derived environment condition. As illustrated in (12), it fails to apply in tautomorphemic clusters.

(12) Failure of PCL in Tautomorphemic Clusters

stumukun	mistletoe
slowʔ	eagle
wastuʔ	pleat

Of course, it is possible for [š] to appear before non-strident coronals morpheme-internally, as in the morpheme /wašti/ "of a flow, of liquid in motion". Unlike instances of /š/ derived by PCL, which as we have seen are opaque to Sibilant

[3] Lieber (1987) mistakenly credits herself with this proposal and attributes to Poser (1982) the metrical view of which it is a critique.

[4] A full formalization of this analysis requires a decision as to how to handle the transparency of the non-strident coronals, which fortunately does not appear to be relevant to the points at issue here. For discussion of the transparency issue see Shaw (1991).

Harmony, such underlying /š/, which are not created by PCL, undergo Sibilant Harmony, as illustrated in (13) and (14). (13) illustrates the underlying /š/ that surfaces when no /s/ follows. (14) shows that this /š/ is not opaque to Sibilant Harmony.

(13) waštinanʔ/wašti + nanʔ/ to spill

(14) swastilokʔinus /s + wašti + lokʔin + us/ the flow stops on him

This is precisely what our analysis predicts: since underlying [+dist] specifications are wiped out by Distributed Delinking, unless PCL applies these sibilants remain unspecified for [dist] and therefore undergo Distributed Spreading.

The derived environment condition on Pre-Coronal Laminalization is predicted by the Strict Cycle Condition, since it applies only when its environment is satisfied as the result of morphological composition. But it cannot be derived from constraints on underlying feature specification since, on our analysis of Sibilant Harmony, at the point at which PCL applies, both the sibilants that undergo PCL and those that fail to undergo PCL are unspecified for the feature [dist] as a result of the prior application of Distributed Delinking. It therefore appears to be impossible to derive strict cycle effects in all cases from underspecification.

This leaves open the question of whether the Strict Cycle Condition must be maintained in its entirety, for it has two clauses. One clause classifies an environment as derived if the structural description of the rule comes to be satisfied as a result of morphological composition. The other classifies an environment as derived if the structural description comes to be satisfied as a result of prior application of a phonological rule. Kiparsky's proposal appears to derive successfully the known cases of derived environment effects due to prior application of a phonological rule. The force of the Chumash example may be that it is necessary to retain the first clause of the Strict Cycle Condition, by which derived environments result from morphological composition, while dispensing with the second. This is a natural distinction, for this latter criterion requires information about the derivation of a sort not present in the representation, in contrast to information about morphological structure, which arguably is present in the representation.

REFERENCES

Applegate, R. B. (1972) *Ineseño Chumash Grammar.* Doctoral dissertation, University of California, Berkeley, California.

Avery, P and Rice, K. (1989) Segment structure and coronal underspecification. *Phonology* **6,**179-200.

Harrington, J. P. (1974) Sibilants in Ventureño. *International Journal of American Linguistics* **40,**1-9.

Kean, M.-L. (1974) The Strict Cycle in Phonology. *Linguistic Inquiry* **5,**179-203.

Kiparsky, P. (this volume) On deriving strict cycle effects.

Lieber, R. (1987) *An Integrated Theory of Autosegmental Processes.* State University of New York Press, Albany, New York.

Mascaró, J. (1976) *Catalan Phonology and the Phonological Cycle.* Doctoral dissertation, Massachusetts Institute of Technology. (Published as *La Fonologia Catalana i el Cicle Fonològic*, Bellaterra, Barcelona, 1983).

Poser, W. J. (1982) Phonological Representation and Action-at-a-Distance. in *The Structure of Phonological Representations. (Part II).* (H. van der Hulst and N. Smith, eds.) pp.121-158. Foris, Dordrecht.

Shaw, P. A. (1991) Consonant harmony systems: The special status of coronal harmony. In *Phonetics and Phonology*, Vol. 2, (C. Paradis and J.-F. Prunet,eds.), pp.125-157. Academic Press, New York.