The Empirical Scope of the Strict Cycle Condition in Phonology

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Abstract

This paper examines four influential proposals to introduce the Strict Cycle Condition (SCC) from syntax to phonology, namely Kean (1974), Mascaró (1976), Kiparsky (1982), and Kiparsky (1985); and compares the empirical predictions each version makes. As has been noted previously (e.g. Kiparsky 1993, Rubach 2003), the two patterns that have been accounted for by the SCC, cyclic counterfeeding and derived environment effects, are both problematic for the SCC: cyclic counterfeeding might not exist, and derived environment effects are not general enough to be handled with such a rigid tool. One set of data that can be accounted for with (some versions of) the SCC remains: sandhi that are restricted to word boundaries. These can, however, also be accounted for by different, representational means. Still, there is a difference in predictions: representational analyses of these sandhi either predict a feeding relationship with other phrasal processes or make no predictions; the SCC predicts a counterfeeding relationship.

1. Introduction

The Strict Cycle Condition (SCC) was first adopted to phonology by Kean (1974), and, in its definitions by Mascaró (1976) and Kiparsky (1982, 1985) remained a staple of phonological theory during the seventies and eighties until it was abandoned, most prominently by Kiparsky (1993).

Historically, the SCC played an important role in accounting for derived environment effects, and to such an extent that it has often been confounded as solely a tool to account for those; however, the original empirical argument for the SCC is cyclic counterfeeding.

The precise empirical scope and predictions of the SCC in phonology have varied depending on the precise definition of the SCC itself and related

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concepts, importantly 'cyclic rules'. The table in (1) gives an overview of the four implementations of the SCC discussed here and the empirical predictions they make.[1]

(1)

	Cyclic cntrfeeding	DEE	Rules bleed SCC
Kean 1974	Yes	No	No
Mascaró 1976	Yes	Yes	Yes
Kiparsky 1982	Yes	Partial	Yes
Kiparsky 1985	Only within stems	Yes	Yes

Deriving cyclic counterfeeding[2] is the core property of all versions of the SCC. A rule S that applies on a cycle i cannot, due to the SCC, feed a rule R that could apply on a cycle j.

(2)

ABC		Input cycle i	
—	Rule R	A → E __ D	*counterfed due to rule ordering*
ADC	Rule S	B → D __ C	
$[[ADC]_i Z]_j$		Input cycle j	
—	Rule R	A → E __ D	*blocked by SCC*
—	Rule S	B → D __ C	
ADCZ			

A second property of the SCC, introduced by Mascaró (1976), is that it derives derived environment effects (DEE): the failure of phonological processes to apply within roots. The mechanism that conjoins the derivation of DEEs and the SCC may differ in the exact implementation; this is the reason why Kiparsky (1982) enforces DEEs only partially. The last crucial difference of implementation in the SCC lies in whether a phonological rule R on a cycle j, which changes some material belonging to cycle i, can feed a rule S that only uses material contained in i (3).

[1] DEE = Derived environment effects.

[2] Cyclic counterbleeding, on the other hand, follows directly from cyclic rule application and is thus not reliant on the SCC.

(3)

AB		Input cycle i	
—	Rule R	B → D __Z	
—	Rule S	A → E __ D	
$[[AB]_iZ]_j$		Input cycle j	
$[[AD]_iZ]_j$	Rule R	B → D __Z	
??	Rule S	A → E __ D	*blocked by the SCC?*

The core empirical questions regarding the SCC and its versions are thus the following: 1) Does cyclic counterfeeding exist, and if so, is it restricted to stems? The cases of cyclic counterfeeding that were important for the discussion have been reanalysed without cyclic counterfeeding or can be reanalysed along the same lines (e.g. Kiparsky 2000, 2015, Rubach 2003, Bermúdez-Otero 2006, 2011, 2018). These reanalyses, however, make a prediction for phrasal phonology that differs from versions of the SCC that extend to phrasal phonology: namely, whether general sandhi rules can or cannot feed sandhi rules restricted to word boundaries. 2) Do DEEs exist, and if so, are they obligatory? Here the answer seems to be well substantiated: DEEs do exist but are in no way obligatory. A mechanism like a DEE-inclusive SCC that enforces DEEs is thus undergenerating. 3) Are there rules applying in an inner cycle fed by a rule applying in an outer cycle? This question seems settled as well – such patterns do exist. I am not aware of a counterfeeding case, as would be predicted by Kean. This constitutes a crucial difference between the SCC in phonology and in morphosyntax, where the absence of precisely such a feeding interaction is a core argument for the SCC, compare e.g. Perlmutter and Soames (1979) or, in this volume, Müller (2023).

This paper is structured as follows. First, I discuss the four proposals by Kean, Mascaró, and Kiparsky in historical order. This discussion should suffice to answer the empirical question 3). In section 3, I will briefly deviate and discuss some conceptual problems regarding the SCC in phonology before, in section 4, coming back to the two remaining empirical questions. In this paper I sketch re-analyses without the SCC for Mascaró's Catalan and Kiparsky's Spanish case studies, but nor for Kean's Klamath case study since the original analysis with the SCC is actually not successful.[3]

[3] See Müller (2023) and Trommer (2023), both this volume, for reanalyses.

2. Versions of the SCC

2.1. Kean

The first work to introduce the SCC into phonology was Kean (1974). Her definition is the closest to the one of Chomsky (1973) for the SCC in morphosyntactic structure building and reprinted in (4).

(4) On any cycle A no cyclic rule may apply to material within a previous cycle B without making crucial use of material uniquely in A. (Kean 1974: 179)

There are two important differences between Kean's SCC and later iterations: (a) it does not derive derived environment effects, and (b) it is blind to phonological changes.Neither property is explicitly mentioned, which is unsurprising since her version precedes the others. The first property is crucial for her core case study of Klamath; a monomorphemic form such as /dewy/ must undergo the cyclic rule 'Sonorant Cluster' (6), in a first cycle, because otherwise it would not be able to undergo vowel deletion (7)[4] in a second cycle, as seen in the derivation in (8).

(5) /de-dewy/ → dedwiː 'shoot a bow and arrow'

(6) Sonorant cluster
Ø → ə / C__ [+son]{C,#}

(7) Vowel deletion
a. V → Ø / prfx [C__.CV
b. V → Ø / prfx [__

(8)

[dewy]		
—	Vowel deletion	
[dewəy]	Sonorant Cluster	*not blocked by SCC!*
[de[dewəy]		
[de[dwəy]]	Vowel Deletion	
—	Sonorant Cluster	
[de[dwiː]]	Postcyclic rules	
dedwiː		

[4]Rules are slightly simplified with respect to Kean.

The second difference follows directly from the definition of the SCC. Every change of a string PQ in an inner cycle is blocked unless its direct context is outside that cycle. Let us assume the structure in (9) and the rules in (10) in the given order.

(9) $[[PQ]_iZ]_j$

(10) a. $Q \rightarrow Y$ /__Z
b. $P \rightarrow X$ /__Y

On cycle i, there is no context for any of the rules, so none can apply. On cycle j, the first rule can and does apply, changing Q into Y, but this cannot feed the second rule since both the new Y and P are properly contained within cycle i.

Kean assumes that this property is crucial for her analysis. Her principal argument comes from the underapplication of Sonorant Cluster in Consonant-Sonorant-Sonorant-Consonant sequences, where the rule applies only once. Consider the underlying form in (11).

(11) [nt'iw-[otn-[el'g-a]]] → nt'iwtəllga 'falls against something'

Here, vowel deletion on cycle j feeds Sonorant Cluster twice. However, Sonorant Cluster (SC) applies only once.[5]

(12)

[otn[el'ga]]		
[otn[l'ga]]	VD	
[otən[l'ga]]	SC	*applies only once*

What needs to be blocked is the iteration of Sonorant Cluster on one cycle j, not the application of Sonorant Cluster on cycle k. Kean's formalisation of the SCC is not capable of doing so. The entire context for Sonorant Cluster is there in cycle j, so it is not an instance of a phonological rule triggered

[5]Müller (2023; this volume) tries to repair Kean's analysis by referring to morphological affiliation; Sonorant Cluster must insert the schwa inside a morpheme, that is, non-adjacent to a bracket. Therefore, SC is possible in the first cluster, but not in the second; the schwa would be (left or right) adjacent to the bracket. Bracket Erasure applies after SC, counterfeeding it. On the next cycle then, the SCC blocks SC. This works for the data at hand, but it fails to account for data such as (i), where we do find the epenthetic vowel directly at the morpheme boundary, both between the root and the suffix and the root and the prefix.

(i) /has-way'asg'-ys/ → hasəwy'asg'əys 'loincloth'

in a later cycle that feeds a rule in an embedded cycle, as Kean alleges. It is also not an instance of counterfeeding that needs to be preserved since vowel deletion is needed to feed Sonorant Cluster. Kean's analysis works if we amend the Sonorant Cluster rule with a diacritic which states that this rule applies non-iteratively only to the leftmost cluster. In this way, epenthesis to the second cluster on cycle i is blocked by the diacritic and on cycle j by the SCC.

(13)

[otn[el'ga]]		
[otn[l'ga]]	VD	
[otən[l'ga]]		*non-iterative version*
[nt'iw[otən[l'ga]]]		
[nt'iw[tən[l'ga]]	VD	
—	SC	*blocked by SCC*
[nt'iw[təl[lga]]]	Postcyclic rules	
nt'iwtəllga		

However, forcing a non-iterativity requirement on a non-spreading rule is highly unusual or even unheard of.[6] Such a mechanism predicts typologically unwanted patterns galore, e.g. final devoicing only in the first voiceless coda that is new in each cycle.

(14) a. /kad/ → kat
b. /kadmad/ → katmad

The second case study in Kean, Welsh main stress, is not an undergeneration argument against theories without the SCC, but an argument of parsimony: if the SCC is accepted, it allows for a simpler and more elegant derivation of the Welsh facts.

Summarised, Kean gives an empirical argument against the SCC as a tool for derived environment effects, but she gives no convincing argument for the SCC itself since the Klamath case does not stand further scrutiny.

[6]Trommer (2023; this volume) derives the non-iterativity as an epiphenomenon by referring to some sort of antifaithfulness formalised in containment theory: epenthesis is blocked in positions where an underlying vowel is deleted. This derives the data at hand but fails to account for cases such as (i), where the loci of deletion and insertion accidentally align.

(i) bah-el'g'-a → bahəlg'a *bahlg'a 'dries up'

2.2. Mascaró

Mascaró's definition of the SCC builds on Kean's and both restricts and extends its application.

(15) Strict Cycle Condition (Mascaró 1976: 9)
A cyclic rule R applies proverly [*sic*] on cycle j if either a, b or c is met:
a. R makes specific use of information uniquely in cycle j. That is, it refers specifically to some A in [$_{j}$XAY[$_{j-1}$ ...]Z] or [$_{j}$Z [$_{j-1}$...]XAY].
b. R makes specific use of information within different constituents of the previous cycle which cannot be referred to simultaneously until cycle j. R refers thus to some A, B in [$_{j}$ X[$_{j-1}$ ...A...] Y [$_{j-1}$ ...B...]Z].
c. R makes specific use of information assigned on cycle j by a rule applying before R.

He claims two crucial differences with respect to Kean, encapsulated in his clauses b. and c. Clause c. is indeed a crucial difference: Kean's SCC explicitly excludes phonological rules from being able to circumvent the SCC. There is, however, no data in Kean (1974) that necessarily needs the SCC to apply under such circumstances. On the other hand, it is a necessary weakening of the SCC for Mascaró given the data he analyses. In Catalan, vowel reduction changes unstressed non-high vowels to either *ə* or *u*. This change is fed by (lexical) de-stressing. The de-stressing rule itself does not violate the SCC according to Kean. The vowel reduction rule, however, does: It does not refer to any element outside of the inner circle. Under Mascaró's definition, its application is not blocked by the SCC because of the change from [+stress] to [–stress], information that was not available in the previous cycle.

(16) [[[triómf]ál]ízm] → triumfəlízmə'triumphalism'

(17)

[[triómf]ál]		
[[triomf]ál]	De-stressing	
[[triumf]ál]	V reduction	*not blocked by SCC*
[[[triumf]ál]ízm]		
[[[triumf]al]ízm]	De-stressing	
[[[triumf]əl]ízm]	V reduction	*not blocked by SCC*
[[[triumf]əl]ízmə]	Other rules	

The second difference that Mascaró claims to have from Kean is assuming that the SCC does not hold over two previous cycles i which were not accessible together before a cycle j.

While such a structure is not explicitly discussed in Kean's definition, it becomes obvious from her discussion of Welsh stress that she does not intend her SCC to block such cases. In Welsh compounds and certain phrases, stress is shifted to the penult if the second member is monosyllabic. (18) shows the mapping that Kean assumes for a cycle j.

(18) $[[\text{cánhwyll}]_i[\text{brén}]_i]_j \rightarrow [[\text{cànhwýll}]_i[\text{brèn}]_i]_j$ 'candle-stick'

Both members have undergone previous cycles and have been assigned main stress. If Kean intended her SCC to work the way Mascaró seems to suppose she does, the stress shift would not be derivable because all information is in (separate) previous cycles i. One can thus conclude that Mascaró's clause b. is not so much a modification of Kean's SCC, but rather a more precise formulation.

The most compelling evidence for the SCC that Mascaró gives comes from the interaction of vowel reduction, mentioned above, and gliding. In Catalan, an unstressed high vowel is realised as an off-glide after another vowel. However, gliding is not fed by vowel reduction due to de-stressing *inside words.* Across word boundaries, however, gliding does apply to reduced vowels.

(19) a. /álʒebɾa-ik/ → əlʒəbrájk 'algebraic'
b. /raím-ɛ́t/ → rəimɛ́t *rəjmɛ́t 'raisin'
c. /prudúírá ɔ́ksidásjó/ → pruduiráwksidasjó 'produces oxidation'

(20)

[[pruduí]rá]		
—	Gliding	*counterfed due to rule ordering*
[[prudui]rá]	De-stressing	
—	V reduction	
[[pruduirá][uksidəsjó]]		
[[pruduirá][wksidəsjó]]	Gliding	*applies across word boundary, but blocked inside: *ui→uj*

There is another important difference between Mascaró and Kean: Mascaró's version does account for derived environment effects. This is not explicitly stated in his definition, and this is the reason why authors such as Scheer (2010: 168) credit Kiparsky with the introduction of an SCC that aims to derive derived environment effects – unlike Kiparsky himself, who cites Mascaró as the originator. He does that by assuming that a so-called 0th cycle, which contains only the root, has two properties: no phonological rules apply, so the root is mapped onto its underlying form, and the 0th cycle suffices to count as a cycle, so the SCC will protect its output at later cycles (Mascaró 1976: 13).

2.3. Kiparsky 1982 and 1985

Kiparsky, arguably the author whose conception of the SCC was most influential in phonology, had actually proposed various versions of the constraint before abandoning it in Kiparsky (1993) and subsequent work. I will focus on Kiparsky (1982) and Kiparsky (1985).

Kiparsky (1982) redefines Mascaró's SCC so that it formally includes the derivation of derived environment effects.

(21) Strict Cycle Condition (Kiparsky 1982: 41)
a. Cyclic rules apply only to derived representations.
b. A representation Φ is *derived* w.r.t. rule R in cycle j iff Φ meets the structural analysis of R by virtue of a combination of morphemes introduced in cycle j or the application of a rule in cycle j.

In 1982, he derives the SCC from another principle, the Elsewhere Condition, and the assumption that for every entry in the lexicon, there is a rule that returns its underlying representation. This very specific rule blocks all other less specific rules that could manipulate the underlying representation. This system, unlike Mascaró's, cannot employ vacuous rules (see section 4 for a discussion of vacuous rules) in order to circumvent the SCC. Kiparsky claims that the data follow nonetheless, though it is not clear how. Another difference is that in Kiparsky (1982), phonology applies to roots – it is just blocked by the Elsewhere Condition in most cases. Syllable structure and stress , however, may be assigned on the root-only cycle so long as they do not conflict with pre-specified stress and syllabification and, in return, may feed the application of cyclical rules. This is exemplified with the Spanish example in (22). Final de-palatalisation turns a palatal sonorant into a coronal sonorant at the end of a

word, as seen in (22a). It is bled by certain affixes, namely derivation and verbal inflection (22b), but counterbled by others, namely nominal inflection such as the plural (22c).

(22) a. /desdeɲ/ → desden ‘disdain’
b. /desdeɲ-es/ → desdeɲes ‘you disdain.SUBJ’
c. /desdeɲ-es/ → desdenes ‘disdains’

Kiparsky 1982 assumes that syllabification happens on the first cycle, which is only *desdeɲ* in the case of the plural but *desdeɲ+a* in the case of the verb form.[7]

(23)

[desdeɲ]	
[des.deɲ.]	Syllabification
[des.den.]	De-palatalisation
[[des.den.]es]	
[[des.de.n]es.	Syllabification
—	De-palatalisation
des.de.nes	

(24)

[desdeɲ+a]	
[des.de.ɲa.]	Syllabification
—	De-palatalisation
[[des.de.ɲa.]es]	
[[des.de.ɲ.]es.]	Vowel deletion
[[des.de.ɲ]es.]	Syllabification
—	De-palatalisation
des.de.ɲes	

Data of this type are problematic under Mascaró’s approach, where we would expect the SCC to block de-palatalisation until a boundary is merged or a postcyclic rule applies, in any case yielding the output *desdeɲes* for both the noun and the verb.

In *Some Consequences of Lexical Phonology*, Kiparsky (1985) divorces the SCC from the Elsewhere Condition again, creating an SCC that is more similar to Mascaró’s version, cf. (25).

[7]The thematic vowel -a is deleted preceding the subjunctive -e.

(25) Strict Cycle Condition (Kiparsky 1985: 89)
If W is derived from a lexical entry W', where W' is nondistinct from XPAQY and distinct from XPBQY, then a rule A→B / XP __ QY cannot apply to W until the word level.

This version rescinds the assumption from 1982 that stress or syllabification may feed rule application in monomorphemic domains – there are both empirical arguments of undergeneration and overgeneration against it. Its major innovation is a theory about which rules are cyclic and obey the SCC and which rules are non-cyclic and do not obey the SCC, via the introduction of a second lexical level: the word level. All stem level rules are cyclic whereas all word-level and all postlexical rules are non-cyclic. This connects cyclic effects and obeyance of the SCC with independent aspects of stem vs. word-level morphophonology. A similar proposal with minor differences was made by Booij and Rubach (1987). In order to analyse the aforementioned Spanish data under these new assumptions, de-palatalisation must be considered a word-level rule, the plural *-es* needs to be a word-level affix, and de-palatalisation must precede re-syllabification on the word level.

(26)

[desdeɲ]		Stem level
[des.deɲ.]	Syllabification	
—	De-palatalisation	*Blocked by SCC*
[[des.deɲ.]es]		Word level
[[des.den.]es]	De-palatalisation	*SCC does not hold*
[[des.de.n]es.	Syllabification	
des.de.nes		

It follows that the empirical scope of Kiparsky's (1985) SCC is much smaller than Mascaró's (1976); the SCC is expected to hold only in stem-level phonology and does not affect word- or phrase-level phonologies. Mascaró's Gliding across word boundaries, for example, falls outside the scope of this SCC.

3. Conceptual Issues with the SCC

3.1. Modularity

The major conceptual issue with the SCC is that which part of the phonological or morphological representation triggers the SCC remains ill-defined. If we assume that the morphological brackets are an object which the phonological computation refers to, we run into one conceptual and one empirical problem. First, such a system would be grossly non-modular since the morphological bracketing is non-phonological information; under the assumption of modularity, phonological computation should not have access to this type of information. This is a problem that will accompany most or even all potential implementations of the SCC. The empirical problem lies with Mascaró's clause c., which exempts from the SCC a process applying in a smaller cyclic domain i on a cycle j, iff it is fed by a process that applies on cycle j. It is not immediately clear how the mechanism that checks for SCC violations could be circumvented if all it sees are brackets. Consider the structure and the rules in (27). According to Mascaró, rule R must be able to feed rule S. However, if the SCC is (informally) defined as 'On cycle j, do not apply a rule if focus and context are uniquely between the brackets labelled j-1', rule S will necessarily be blocked as well.

(27) a. $[[AB]_iZ]_j$
b. Rule R: B $\rightarrow$ D / __ Z
c. Rule S: A $\rightarrow$ E /__ D

An alternative to brackets would be some sort of index or feature attached to some part of the phonological representation. Let us assume this cycle index is attached to features, and every feature-change deletes the index. This would help us to avoid Mascaró's problem, but the conceptual issue remains: these indices are not genuine phonological material but rather a way for phonology to track morphological structure building and thus violate modularity. If, on the other hand, we assume them to be true phonological elements, we would expect them to be lexicalised (Chung 1983, Bermúdez-Otero 2012, Scheer 2020) into underlying representations. Such features predict two things: 1) affixes or words that idiosyncratically block processes because they are marked with the index and b) lexically specific non-derived environment effects. The latter might seem like a desirable result, but since the

applicability of the process is tied exclusively to the underlying element, it is potentially still problematic. Take the Catalan root /kaɔs/, for example. This root undergoes vowel reduction but not gliding ([kaus] not *[kaws]), showing a derived environment effect for one process but not for the other. An approach along these lines, that is a modularity compatible SCC with indices, has recently been proposed under the name Harmonic Layer Theory (Trommer 2019, Zimmermann and Trommer 2021, 2022).

3.2. Bracket Erasure

Pesetsky (1979) noted that the SCC is at odds with the Chomsky-Hallean notion of Bracket Erasure, a mechanism employed to enforce the blindness of phonology to morphological structure.

(28) Chomsky-Hallean Bracket Erasure (Pesetsky (1979) based on Chomsky and Halle (1968: 15))
Given the nested constituents
$[\ldots [\ldots]_{n-1} \ldots]_n$
the first rule of cycle j is: Erase brackets j-1.

Under this definition of Bracket Erasure and the conception that the SCC is enforced by reference to brackets, the SCC cannot hold because it has no brackets to operate on.

In order to reconcile Bracket Erasure and the SCC, Pesetsky redefines the former in (29).

(29) Pesetskian Bracket erasure (Pesetsky 1979)
Given the nested constituents
$[\ldots [\ldots]_{n-1} \ldots]_n$
the last rule of cycle j is: Erase brackets j-1.

However, as Scheer (2010: 144ff) notes, the bracketing itself gives the power to restrict many processes to new cycles. In this way, cyclic counterfeeding can be accounted for without the SCC. If brackets and bracket erasure are combined with the SCC, the job of the SCC decreases: it is not needed for cyclic counterfeeding, and since Mascaró's clause c. is necessary, it is not useful for blocking a rule fed by another rule. Its remaining purpose is

consequently to derive DEEs, which is, as will be discussed in the next section, also undesirable.

4. Predictions of the SCC

4.1. Derived Environment Effects

As discussed above, the first version of the SCC in phonology, Kean's transferral, does not make any statement about derived environment effects. On the contrary, in her analysis of Klamath, it is necessary to apply a process to a non-derived root prior to further affixation, compare the derivation in (8).

Mascaró modifies Kean's definition by adding two clauses, neither of which addresses monomorphemic domains. However, he assumes that phonology does not apply to bare roots, which he calls the 0th cycle. In the first cycle, which minimally contains two morphemes, the output of the 0th cycle (which, given that no phonology has applied, is identical to the input of the 0th cycle) is protected by the SCC. Thus, for Mascaró (1976), derived environment effects fall out from the combination of the SCC and the 0th cycle assumption. This effect is put to use for two processes in his analysis of Catalan: idiosyncratic failure of vowel reduction and underlying stressed tense mid vowels. The first concerns monomorphemic words which appear with unstressed full vowels [a, e, o], which normally reduce to [ə] or [u] depending on their roundness.

(30) a. bóston *bóstun 'Boston'
b. kólerə *kólə[…]rə 'cholera'

In the 0th cycle, phonology does not apply: ergo, there is no vowel reduction and /bóston/ is mapped to $[\text{bóston}]_i$. In any subsequent cycle, the SCC protects the unstressed /o/.[8] The second process regards stressed tense ó and é. Mascaró assumes that there is a rule that turns mid vowels lax if stressed.

(31) [–high, –low, +stress] → [–tense]

This is argued for because if pre-stressing affixes shift the stress to otherwise tense vowels, they surface as mid.

[8]This derivation is, however, problematic for the root /kaɔs/, which has an underlying unstressed mid vowel that surfaces reduced: [kaus].

(32) a. /númər/ → núm**ə**r ‘number’
b. /númər-ik/ → num**é**rik ‘numeric’
c. /séntr/ → sentr**ə** ‘centre’
d. /séntr-ik/→ s**é**ntrik ‘centric’

Mascaró assumes that the rule in (31) can apply to the root séntr in /séntr-ik/ because of the (vacuous) stress shifting induced by the pre-stressing affix. If the underlying stress is replaced by a stress assigned by a rule, the laxing rule is free to apply. In forms like ‘séntrə’ on the other hand, the underlying stress and underlying vowel quality have been fixed by the 0th cycle, so under the absence of new information (even if vacuous), laxing is blocked from applying by the SCC.[9]

Kiparsky (1982, 1985) formally integrates derived environment effects into his definition of the SCC. Since then, the discussion of the SCC and derived environment effects has become more and more overlapping, whereas the other clauses of the SCC have found less discussion.[10] While the evidence for the existence of derived environment effects is overwhelming, the conjecture that no phonology applies to monomorphemic domains prior to concatenation must be considered obsolete (Kiparsky 1993). For this reason, Kiparsky abandoned the SCC in 1993. However, most of the evidence against the SCC came from the untenability of a generalised derived environment effect. The evidence against the Keanian core of the SCC with the relevant modifications by Mascaró seems to be much weaker.

[9]This analysis is, however, not compatible with the entire data given in Mascaró (1976). If this analysis were correct, all affixes containing a mid stressed vowel should undergo laxing as they are not protected by the SCC – the affix has not undergone a 0th cycle. This is, however, not the case. We find both affixes with tense vowels such as -és (IMPF.SUBJ) and lax vowels such as -ém (1PL).

[10]There are, of course, exceptions. Kaye (1992) adopts Kean’s definition of the SCC and explicitly excludes DEEs from its scope. It is somewhat unclear how it fits conceptually in his framework of ‘minimalist phonology’ because he forbids processes from having access to the derivational history. It is also unclear which data the SCC should derive or exclude under his wider assumptions: cyclic counterfeeding cannot be derived, because there is no counterfeeding on a given cycle in the first place. It could still block a process from applying if its context is created by a proces in an outer cycle. Just like Kean, Kaye does not offer an example for such an interaction.

4.2. Cyclic Counterfeeding

The SCC as defined in Mascaró, without the assumption that derives derived-environment effects, makes predictions only in systems that have either intra- or intercyclic counterfeeding opacity. If the system allows for intracyclic opacity, the SCC effect is created in the following fashion: A rule R and a rule S apply cyclically. On the first cycle, rule R cannot apply because its context is not met. Rule S applies and creates the context for rule R, counterfeeding it. On the second cycle, rule R is blocked by the SCC from applying in the context previously created by rule S. This is Mascaró's analysis for the de-stressing – gliding interaction in Catalan. De-stressing counterfeeds gliding on a cycle i, the SCC blocks gliding on a cycle j; compare the derivation in (20).

However, according to Cabré and Prieto (2004), the characterisation of the data by Mascaró is not entirely accurate: The affixes they discuss never undergo gliding. Mascaró and Cabré and Prieto (2004) do not discuss the same affixes. So if the data of both are correct, we have to conclude that a) gliding across affix boundaries is morpheme specific and b) these morpheme classes are not obviously stratally organised (33).

(33) a. /korne-u/ → kornew 'cultivated land'
b. /korne-u/ → korne.u 'I cultivate'

If we adopt a reasonable analysis with two different underlying shapes for gliding vs. hiatus formation, the intra-stratally opaque aspect of gliding in Catalan disappears.

(34) a. /korne-w/ → kornew 'cultivated land'
b. /korne-u/ → korne.u 'I cultivate'

Thus, in a form like *rəimét* thus, there is no blocking of gliding, because there is no gliding in the first place.

The interstratal counterfeeding aspects, however, remain. Across word boundaries, there is gliding of unstressed high vowels. This gliding only applies at word boundaries; other vowel-high vowel sequences are not affected.

If the claim of the absence of intrastratal opacity (e.g. Kiparsky 2000, 2015, Bermúdez-Otero 2018) is correct, the empirical domain of the SCC is restricted drastically. Kiparsky's (1985) version loses all meaning since it was restricted to the stem level, which is one stratum. But the scope of the more

general versions is also reduced: the SCC's purpose would basically be to block sandhi that apply across word boundaries from applying inside words. Of course, other rules of phrasal phonology, such as flapping in English, do not care about word boundaries. This has always been acknowledged, and frameworks that employ a version of the SCC have two ways of deriving them. One is that the process in question is declared postcyclic and, as such, outside the scope of the SCC. Any attempt to categorise rules as either cyclic or postcyclic by some general mechanisms has failed (e.g. Kiparsky 1993, Scheer 2010). Another option is explored in Mascaró (1976). He employs fully vacuous rules that take an element X and return an identical element X, with the difference being that the new X is new and, thus, does not fall under the SCC. As mentioned above, the unstressed *o* of *bóston* does not undergo vowel reduction. In an affixed form, however, it reduces. Mascaró (1976) assumes a vacuous rule that turns an unstressed vowel into an unstressed vowel preceding a stressed vowel, enabling reduction to apply.

(35) a. bóston 'Boston'
b. bustuɲá 'Bostonian'

An approach that uses such means makes very few predictions, of course, so I will not further discuss this alternative.

The SCC approach to sandhi is surely not the only one. One can just as easily refer to the word boundary itself in the rule in order to make it only apply across boundaries. The rule in (36) would only affect /produirá##uksidasjó/ but not /rəimét/ simply because the latter does not meet its context.

(36) [+high +syll] → [–syll] / V##__

The similarity between these types of sandhi and derived-environment effects is, of course, striking; the process can apply in an environment derived in syntax, but not in a morphologically derived environment. Accordingly, approaches to blocking in non-derived environments that do not rely on the SCC can also be transferred to these cases. Take for example the underspecification approach, developed in Kiparsky (1993) and developed further in Rasin (2016). Here, a segment at a morpheme edge is underspecified for some certain feature, whereas it is fully specified morpheme-internally. Under concatenation, the underspecified segment may undergo a process that is blocked for the fully specified one. Transferred to phrasal phonology, this

means that a word-edge segment has been underspecified in a previous cycle of phonology. Returning to the Catalan example 'pruduiráwksidajó', this entails that /ɔ́ksidásjó/ has become *Uksidasjó* by some rule like (37) by the time it enters phrasal phonology.

(37) u → U #__

This underspecified U is then either mapped to the glide *w* if it precedes a vowel or to *u* elsewhere (38).

(38) a. U → w /V__
b. U → u

If we now consider the derivation for the phrase in (39), it becomes obvious why these rules lead to gliding of the *u* but not of the *i*: the latter has never become underspecified and, thus, does not meet the rule's description.

(39)

[ɔ́ksidásjó]	
[ɔksidasjó]	De-stressing
[uksidəsjó]	V reduction
[Uksidəsjó]	Initial underspecification
[[pruduirá][Uksidəsjó]]	
[[pruduirá][wksidəsjó]]	U/I-Gliding
pruduiráwksidəsjó	

Very similar data from Ecuadorian Spanish and Catalan – voicing of intervocalic s across words, but not inside – has been analysed by Bermúdez-Otero (2006, 2011) along exactly these lines. Another representational alternative for Catalan gliding could refer to the prosodic structure: the gliding could be triggered by a constraint that forces prosodic word initial unstressed syllables to have an onset, but not word-internal ones. These approaches shift complexity from the computation to the representation. However, they do not introduce representational mechanisms that have not been introduced for independent reasons such as underspecification or prosodic structure.

The predictions of the SCC and representational alternatives are however divergent with respect to process interactions in phrasal phonology. Generally, in SCC approaches, rules that do not obey the SCC, such as English flapping, are taken to apply after cyclic rules and appropriately called 'postcyclic'. Sandhi rules that are sensitive to word boundaries – i.e. that obey the SCC –

are cyclic and must thus precede non-cyclic rules. Therefore, they must be counterfed or counterbled by postcyclic sandhi rules that are insensitive to word boundaries.

Depending on the mechanism that is employed to account for opacity, representational approaches would either make no predictions or predict the exact opposite, namely only transparent interactions in phrasal phonology. Imagine a structure like the one in (40) and the two phrasal processes in (41).

(40) $[[ABC]_i[DEF]_i]_j$

(41) a. G → D /__ D *across a word boundary*
b. C → G /__ B *irrespective of morphosyntactic structure*

With the SCC, process b. must counterfeed process a., because it is postcyclic, and process a. is cyclic (since it obeys the SCC). If we employ representational means to derive the restriction on process a. together with the adoption of a framework that does not allow for opacity on the phrase level, such as Stratal OT, process b. must feed process a. If opacity on the phrase level is allowed, both a feeding and a counterfeeding order of processes a. and b. is derivable.

5. Summary

The Strict Cycle Condition in phonology is a tool that has served to account for and predict the existence of two patterns: cyclic counterfeeding and derived environment effects. Due to its inviolability, at least in the cyclic part of phonological grammar, it also excludes the opposite patterns: feeding of a rule R by a rule S from a previous cycle and cyclic rules applying to underived structures. The SCC, therefore, seems to be both too strong and too weak: While DEEs exist, they are not general, and on the other hand, the evidence for cyclic counterfeeding seems to be increasingly scarce.

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