

**On Two Apparent Counterevidences
against KSN Hypothesis in English Phonology***

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0. Introduction

Koutsoudas, Sanders and Noll (1974) claim that all restrictions on the relative order of application of grammatical rules are determined by universal rather than language-specific stipulations (henceafter the KSN Hypothesis). In other words, they claim that no grammatical rules are extrinsically ordered.

The following two pairs of rules appear to be counterevidences against the KSN Hypothesis.

- (1) a. CiV Lengthening vs. Trisyllabic Shortening
- b. Pair of rules which account for inflectional endings.

This paper, however, attempts to show that, by reformulating rules, we can obtain pairs which confirm the KSN Hypothesis. This paper is organized as follows. In section 1, theoretical backgrounds will be discussed. The KSN Hypothesis and the theory of Lexical Phonology will be introduced. In section 2, the two pairs of rules mentioned in (1) will be discussed. We will get a conclusion that these rules can be formulated as pairs compatible with the KSN Hypothesis. In section 3, some concluding remarks will be made.

1. Theoretical Backgrounds

We will begin by introducing two theoretical points. First, we will review KSN Hypothesis in some detail. Second, we will survey the basic assumptions of the general framework of the Lexical Phonology.

1.1. KSN Hypothesis

Koutsoudas, Sanders and Noll (1974) classify the possible relations holding between extrinsically ordered rules into nine possible relations. Within theories assuming that rules are extrinsically ordered, any ordered pair of rules A and B stand in one and only one of the following relations (2), given the definitions of the notions *feed*, *bleed*, *counter-feed* and *counter-bleed* in (3).

- (2) a. **Feeding:** A feeds B; B does not affect A.
- b. **Bleeding:** A bleeds B; B does not affect A.
- c. **Counter-feeding:** A does not affect B;
 B counter-feeds A.
- d. **Counter-bleeding:** A does not affect B;
 B counter-bleeds A.
- e. **Mutually non-affecting:** A does not affect B;
 B does not affect A.
- f. **Feeding and Counter-feeding:** A feeds B;
 B counter-feeds A.
- g. **Bleeding and Counter-bleeding:** A bleeds B;
 B counter-bleeds A.
- h. **Feeding and Counter-bleeding:** A feeds B;
 B counter-bleeds A.

- i **Bleeding and counter-feeding: A bleeds B;
B counter-feeds A.**
- (3) **When rule A is extrinsically ordered before B, rule A will necessarily stand in one and only one of the following relations to rule B.**
- a. **A feeds B if and only if the application of A increases the number of forms to which B can apply.**
 - b. **A bleeds B if and only if the application of A decreases the number of forms to which B can apply.**
 - c. **A does not affect B if and only if A neither feeds nor bleeds B.**
- (4) **When rule A is extrinsically ordered before B, rule B will stand in one and only one of the following relations to A.**
- a. **B counter-feeds A if and only if the application of B would increase the number of forms to which A could apply if B were to apply before A.**
 - b. **B counter-bleeds A if and only if the application of B would decrease the number of forms to which A could apply if B were to apply before A.**
 - c. **B does not affect A if and only if B neither counter-feeds nor counter-bleeds.**

Among the relations listed in (2), (2e), (2h), (2i) and (2f) are irrelevant. (2e) is compatible with any theory of ordering. No attested pair of rules of phonology of natural language stands in the relation (2h) or (2i). The relation (2f) is observed between the subrules of so called ' α - Switching rule'. The subrules of α -Switching rule require

disjunctive ordering (cf. SPE, p. 367). This requirement must be stipulated in anyone's theory, therefore irrelevant to the discussion here.

Among the remaining five relations, three relations, namely (2a), (2d) and (2g) is compatible with KSN Hypothesis (5):

(5) KSN Hypothesis

Every obligatory rule must be applied to every representation to which it can be applied, unless its application is precluded by universal principle of proper inclusion precedence.

The principle of Proper Inclusion Precedence is formulated as follows:

(6) Proper Inclusion Precedence

For any representation R, which meets the structural description of each of the two rules A and B, A takes applicational precedence over B with respect to R and B cannot be applied to any (direct or indirect) product of the application of A, (that is A is disjunctively ordered before B. added by HT), if and only if the structural description of A properly includes the structural description of B.

This principle is equivalent of the Elsewhere Condition proposed in Kiparsky (1982a,b).¹

Given KSN Hypothesis, rules standing in the feeding relation (2a) are properly accounted for. Each rule in this relation simply applies to every forms that can apply.

All the attested pairs of rules standing in the counter-bleeding relation (2d) can also be accounted for by permitting rules to be applied simultaneously. KSN Hypothesis permits or rather requires the simultaneous application of rules, if the structural descriptions of rules are met by representation simultaneously.²

The correct mode of application of the rules standing in the bleeding and counter-bleeding relation (2g) is predicted by Proper Inclusion Precedence (5).

In the studies of phonology, pairs of rules standing in the relations other than these three relations have been proposed. However, pairs of rules standing in the relation other than (2a), (2d) and (2g) can be reduced to these three.³

To sum up, among the nine possible ordered pairs, the four pairs are irrelevant. Among the remaining five pairs, three are readily compatible with KSN Hypothesis, while the other two can be reformulated as the pairs compatible with the KSN Hypothesis.

1.2. Lexical Phonology

In this section, I will discuss the basic assumptions of theory of Lexical Phonology. One of the basic insights of the theory of Lexical Phonology is that some phonological rules interact with morphological rules, while some other rules may not. In order to account for these behaviors of rules mentioned, the model of Lexical Phonology assumes that the phonological component of a grammar consists of (at least) two subcomponents or strata, namely the stratum of lexical phonology and that of lexical phonology. Phonological rules may apply after every morphological operation such as affixations or compounding. Morphological operations, on

the other hand, may apply to the outputs of phonological rules once again in a cyclic fashion. The notion of the stratum is first developed in the series of morphological studies, such as Siegel (1974), Aronoff (1976) and Allen (1978). The notion of the lexical stratum will be discussed immediately below.

Another point of agreement is that a certain set of properties can be attributed to the lexical application of (phonological) rules, but can not to the post-lexical application of rules. These diagnostic properties are called as the Lexical Syndrome (7).

(7) Lexical Syndrome

Lexical	Post-lexical
a. Word-bound	not word-bound
b. access to word-internal structure	access to phrase structure
c. precede all post-lexical rules	follow all lexical rules
d. cyclic	noncyclic
e. may not apply across words	may apply across words
f. structure-preserving	need not structure preserving
g. may have lexical exceptions	cannot have lexical exceptions

The properties in (7) characterize each component of the phonology. For further detail, the readers are referred to Borowsky (1986) among others. The clarification of each property will be given below in some detail, if necessary.

Despite the general agreement among the lexical phonologists on the distinction between lexical and post-

lexical rule application, they have not reached the agreement on the numbers of the lexical strata. Kiparsky (1982a,b) proposes three lexical strata as well as a post-lexical stratum for the English phonology. Mohanan (1982) and Halle and Mohanan (1985) distinguish four lexical strata besides a post-lexical stratum for the English phonology. Borowsky (1986), on the other hands, proposes two lexical strata for the English phonology. In this paper, I will adopt the proposal of Borowsky (1986) without discussion. The readers are referred to Borowsky (1986) and Honma (1988) for detail.

Borowsky (1986) proposes a universal principle which he calls The Strong Domain Hypothesis (8).

(8) The Strong Domain Hypothesis

- a. All rules are available at the earliest level of the phonology.
- b. All rules are marked for particular domain of application apply at level 1.

The Strong Domain Hypothesis (8) provides the most restricted account for the problem of stratum assignment of phonological rules. This Hypothesis allows a phonological rule only to be assigned to the stratum 1 by stipulation. Any phonological rule may not be assigned to the stratum (or strata) other than stratum 1 by stipulation.

However, some rules seem to be assigned to the stratum other than stratum 1. Borowsky (1986) claims that any such rule can be explained by independently motivated principles of phonology.

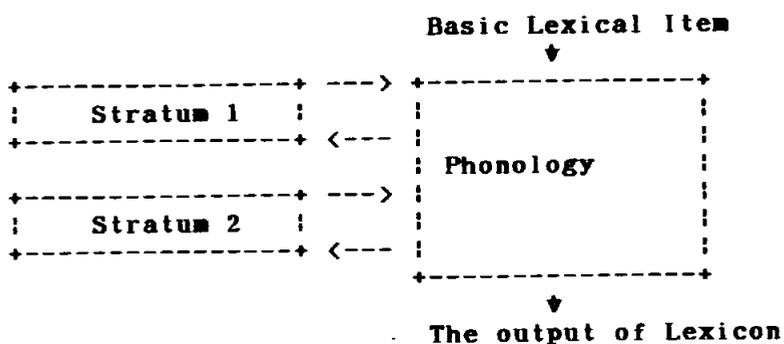
Borowsky proposes that Universal Grammar should contain the principles in (9). I will introduce some of these principles where they are relevant.

- (9) Principles in Phonology
- a. Strict Cycle Condition
 - b. Structure Preservation
 - c. Theory of Underspecification
 - d. Elsewhere Condition
 - e. Obligatory Contour Principle
 - f. Geminate Constraint.

As for the numbers of strata, Borowsky (1986) proposes only two lexical strata in the English phonology. At level 1, the + boundary affixes (in the sense of SPE) are attached, whereas other morphological operations such as the # boundary affixations (in the sense of SPE), the regular inflections and compound formation, take place at level 2.

To sum up, the model of phonology proposed in Borowsky (1986) is schematically shown in (10).

(10) The Model of Borowsky (1986)



2. Discussion

In this section, we will discuss the following two

pairs of rules. These pairs appear to be counterevidences against the KSN Hypothesis.

- (11) a. CiV Lengthening vs. Trisyllabic Shortening
 b. Pair of rules which account for inflectional endings.

First, the ordering relation between CiV lengthening and Trisyllabic Shortening will be discussed. At a glance, they seem to stand in the counter-feeding relation. However, reformulating each rule, we will get the pair which can be treated by Proper Inclusion Precedence. Second, the set of rules which collectively describe the phonological behaviors of inflectional endings can be reduced to the pair of rules which stand in the feeding relation.

2.1. CiV Lengthening vs. Trisyllabic Shortening

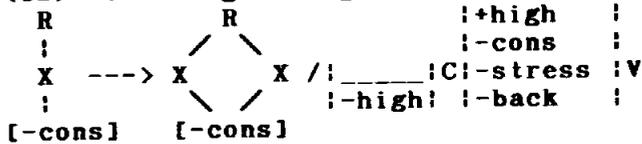
Both CiV Lengthening and Trisyllabic Shortening can be considered to be assigned to the same stratum, namely stratum 1. Since they are assigned to stratum 1, they are likely to interact each other. Some evidences show that they do interact. Their interaction will be predicted by universal principles rather than by language-specific stipulations.

2.1.1. CiV Lengthening

English grammar contains a rule called CiV Lengthening. CiV Lengthening (12) is intended to account for lengthening in such words as those in (13). CiV lengthening (12) lengthens an underlying short vowel, if the vowel is nonhigh and fol-

lowed by CiV. For further detail, readers are referred to SPE, Rubach (1985), Halle and Mohanan (1985), Honma (1988) and the references cited therein.

(12) CiV Lengthening



(13) Relevant Alternations

Caucasian/Caucasus	Horation/Horace
regalia/regal	Arabia/Arabian/Arab
Panamanian/Panama	Canadian/Canada
mendacious/mendacity	courageous/courage
simultaneous/simultaneity	
contemporaneous/contemporary	
remedial/remedy	comedian/comedy
Abelian/Abel	managerial/manager
custodial/custody	colonial/colony
Scotia/Scots	Babylonia/Babylon
felonious/felony	harmonious/harmony
Mongolia/Mongol	
Lilliputian/Lilliput	studious/study

We can get a conclusion that CiV Lengthening (12) is a lexical rule (see Halle and Mohanan (1985), Borowsky (1986) and Honma (1988)), since this rule displays some of the Lexical Syndrome discussed above. For example, this rule has lexical exceptions, as shown in (14)⁴:

Trisyllabic Shortening (15) also displays some of the Lexical Syndrome. First, this rule observes the principle of Strict Cycle Condition (See Kiparsky (1982a,b) and Borowsky (1986)). This principle requires that a lexical rule may not change structure when it applies in non-derived environment, while it can change structure when it applies in derived environment. In (16), Trisyllabic Shortening (15) applies to derived environment in a structure changing-fashion.

In addition to these cases in (16), Trisyllabic Shortening (15) covers the surface distribution of short vowels in non-derived environment. In English, a vowel tends to be short if it is followed by two syllables or more. Forms in (17) illustrate this point:

- (17) alibi, sycamore, camera, pelican, enemy, Amazon, Pamela, calendar etc.

In (17), I suppose that the relevant vowels are not specified for length in underlying representations, and become specified by Trisyllabic Shortening (15). In this case, Trisyllabic Shortening (15) applies in non-derived environment as a feature-filling rule.

Second, this rule has some lexical exceptions. The forms in (18) have a long vowels in the environment to which Trisyllabic Shortening (15) is supposed to apply. As for the forms in (18a), we can obtain desired result by assuming that the relevant vowels in these forms are specified for length (i.e. [+long]) in underlying representations, since Trisyllabic Shortening is a lexical rule, and therefore cannot apply to non-derived forms in a structure-changing fashion. The forms in (18b) are somewhat problematic, since to these forms Trisyllabic Shortening does not apply, even

though these are derived forms. I have no principled way to accommodate this exceptionality, other than to mark them as pure exceptions to Trisyllabic Shortening (15). Clearly further study is awaited.

(18) Exceptions to Trisyllabic Shortening

- a. ivery, nightingale, stevedore, Goolagong, Averall, Oberon, etc.
- b. agency regency potency vacancy

Summarizing the discussion so far, we can safely conclude that Trisyllabic Shortening (15) is a lexical rule which is assigned to stratum 1. Since it is a lexical rule, it applies to non-derived forms in a structure-preserving fashion and to derived forms in a structure-changing fashion.

2.1.3. CiV Lengthening vs. Trisyllabic Shortening

We are now in a position to consider the interaction between CiV lengthening (12) and Trisyllabic Shortening (15). In the previous sections, we see that CiV Lengthening (12) and Trisyllabic Shortening (15) are both lexical rules which are assigned to stratum 1. Since they are assigned to the same stratum, they are likely to interact with each other. Alternations observed in (17) reveal the way they interact with each other.

- (17) Jordan/Jordanian Newton/Newtonian
Mendel/Mendelian

These forms are supposed to have short vowels as the forms without suffix suggest. (The vowels must be [æ, ɔ, ɛ] respectively, although Vowel Reduction obscures the fact.) On the other hand, these vowels are surface as long vowels ([ey, ow, iy] respectively), if they are attached with a suffix *-ian*.

Based on the observation above, Halle and Mohanan (1985) claim that Trisyllabic Shortening (15) must be extrinsically ordered before CiV Lengthening (12). If the rules are ordered otherwise, forms in (17), for example, *Jordanian* can not surface with long vowel, since a vowel lengthened by CiV Lengthening (12) would be shortened by means of Trisyllabic Shortening (15).

The claim that Trisyllabic Shortening (15) is extrinsically ordered before CiV Lengthening (12) is based on an implicit assumption that suffix *-ian* is bisyllabic, that is, [iVn]. (V stands for an appropriate vowel whose exact value is irrelevant to the discussion here.⁶) However, this assumption is not well-motivated, as Rubach (1984) points out. Rubach claims that the suffix *-ian* has three allomorphs, namely [æn], [iæn] and [yæn].⁷ Data in (18) are cited from Rubach (1981). Clearly, we need further study to settle the problem. I will not go into this problem here.

(18) Allomorphs of *-ian*

- a. [æn]: Republican, Mexican, suburban, Augustan, Tibetan
- b. [iæn]: Baconian, Iranian, reptilian, Canadian, Kantian, Joycean, Malthusian
- c. [yæn]: Christian, Egyptian, Martian, Venetian, Pennsylvanian

Now, I tentatively assume that the suffix *-ian* is bisyllabic. As we have discussed above, it is clear that theories assuming that all rules are linearly ordered

proper way of the interaction of these two rules. Since the structural description of (19) properly includes that of (20), Proper Inclusion Precedence requires that the former be disjunctively ordered before the latter. Then, the derivation of *Jordanian* is roughly (21):

(21) Derivation of *Jordanian*

- a. Jord[æ̃n+iæ̃n] ... underlying representation
by CiV Lengthening (19)
- b. Jord[æ̃:niãn]
by other irrelevant rules
- c. Jord[feyniæ̃n] ... surface representation

In the derivation of *Jordanian* (21), only CiV Lengthening (19) can be applied, because CiV Lengthening (19) disjunctively ordered before Trisyllabic Shortening (20) and the underlying form of *Jordanian* satisfies the structural description of the former.

2.2. Inflectional endings

The most familiar paradigms in the English phonology would be those in (22). (22a) shows that the plural ending has three allomorphs, namely [-əz, -z, -s]. The ending of the third person singular of the present tense displays the same phonological behavior, as illustrated in (22b). The possessive ending is not generally considered to have the allomorph [-əz], (some speakers accept the forms like *Rose's*, *Fries'*, etc. with [-əz],) but otherwise similar, as shown in (22c). (This fact have a relation to the stratum assignment of this ending.) The regular preterite ending has the similar series of allomorphs, namely [-əd, -d, -t] in (22d).

(22) a.	-əz	-z	-s
	gases	doves	hikes
	roses	bells	pops
	churches	bees	cats
	judges	beads	cuffs
	bushes	combs	
	rouges		
b.	-əz	-z	-s
	passes	gives	takes
	gazes	tells	tips
	catches	sees	eats
	judges	feeds	laughs
	pushes	comes	
c.		-z	-s
		Eve's	Mike's
		Bill's	Pope's
		Mary's	knight's
		Ted's	wife's
		Tom's	
d.	-əd	-d	-t
	hated	loved	liked
	kidded	bobbed	popped
		allowed	hissed
		failed	
		mimed	

As is clear from these alternations, we need two kinds of rules in order to account for these allomorphs. One rule is responsible for the assimilation of [α voice], while the other is responsible for the existence of a schwa [ə]. The former rule can be formulated as either a voicing rule or a devoicing rule. If we formulate a voicing rule, the underlying representation of the suffixes must have a voiceless segment, otherwise, the suffixes must have a voiced segment. On the other hand, the latter rule (a schwa related rule) can be formulated as either a schwa insertion rule or a schwa deletion rule. If we choose an insertion rule, a schwa must not exist in the underlying representation of suffix, otherwise, a schwa must exist in the underlying representation. Since these two rules are mutually indepen-

sentations /-z/ and /-əz/, respectively.

(26) Schwa Insertion
 $\emptyset \rightarrow \text{ə} / \begin{matrix} \text{!+strident!} \\ \text{!+coronal!} \end{matrix} + \text{---} \begin{matrix} \text{!+strident!} \\ \text{!+coronal!} \end{matrix}$

(27) Schwa Deletion
 $\text{ə} \rightarrow \emptyset / \begin{matrix} \text{!}\alpha \text{ strident!} \\ \text{!}\beta \text{ coronal!} \\ \text{!}\gamma \text{ cont!} \end{matrix} + \text{---} \begin{matrix} \text{!-}\alpha \text{ strident!} \\ \text{!-}\beta \text{ coronal!} \\ \text{!-}\gamma \text{ cont!} \end{matrix}$

Schwa Insertion (26) inserts a schwa, if the stem ends with one of the following segments, [s, z, č, ĵ, š, ž]. On the other hand, Schwa Deletion (27) deletes a schwa, if the stem final segment is not a member of the following set of segments, [s, z, č, ĵ, š, ž]. The derivations of *gases*, *doves*, *hikes* in terms of both Schwa Insertion (26) and Schwa Deletion (27) are shown in (28) and (29) respectively.

(28) Derivations in terms of Schwa Insertion

<i>gases</i>	<i>doves</i>	<i>hikes</i>	
<i>gæs+z</i>	<i>dAv+z</i>	<i>hayk+z</i>	... underlying forms
<i>gæs+əz</i>	d.n.a.	d.n.a.	..Schwa Insertion (26)
d.n.a.	d.n.a.	<i>hayk+s</i>	... Devoicing (25)
<i>gæsəz</i>	<i>dAvz</i>	<i>hayks</i>	... surface forms

(29) Derivations in terms of Schwa Deletion

<i>gases</i>	<i>doves</i>	<i>hikes</i>	
<i>gæs+əz</i>	<i>dAv+əz</i>	<i>hayk+əz</i>	... underlying forms
d.n.a.	<i>dAv+z</i>	<i>hayk+z</i>	...Schwa Deletion (27)
d.n.a.	d.n.a.	<i>hayk+s</i>	... Devoicing (25)
<i>gæsəz</i>	<i>dAvz</i>	<i>hayks</i>	... surface forms

Hereafter, I refer to a grammar which utilizes Schwa Insertion (26) as *Insertion Grammar*, and a grammar which utilizes Schwa Deletion (27) as *Deletion Grammar*.

Empirically, we cannot distinguish *Insertion Grammar* from *Deletion Grammar*, since they can account for the same set of data as we have observed in (28) and (29). A solution to this indeterminacy will emerge from the consideration about the restriction on the relative ordering.

Within theories assuming that all rules are linearly ordered, four grammars in (30) would be possible, among which only *Insertion Grammar 1* and *Deletion Grammar 1* are compatible with actual data. It is important to note that there are no principled way to distinguish between *Insertion Grammar 1* and *Deletion Grammar 1*.

- (30) Four possible grammars.
- a. *Insertion Grammar 1*
Vowel Insertion (26) > Devoicing (25).
 - b. *Insertion Grammar 2*
Devoicing (25) > Vowel Insertion (26).
 - c. *Deletion Grammar 1*
Schwa Deletion (27) > Devoicing (25).
 - d. *Deletion Grammar 2*
Devoicing (25) > Schwa Deletion (27)

Where 'A > B' = 'A is extrinsically ordered before B'.

One might claim that we can mark *Deletion Grammar 1* as less marked than *Insertion Grammar 1* by means of the Principle of Bleeding Avoidance¹¹ (31) proposed in Kiparsky (1968).

- (31) Bleeding Avoidance
Bleeding order tends to be minimized.

Bleeding Avoidance (31) would mark *Deletion Grammar 1* is less marked than *Insertion Grammar 1*, since the ordering of the rules in *Insertion Grammar 1* is a bleeding order, while that of the rules in *Deletion Grammar 1* is not a bleeding order.

Nevertheless, Bleeding Avoidance (31) can not provide any principled answer to the question why the bleeding order is marked. It is only a stipulation about ordering. Proponents of Bleeding Avoidance (31) have to present some principled reason(s) why bleeding order is marked.

Next, I will discuss the treatment of the problem in theories incorporating KSN Hypothesis. In theories with KSN Hypothesis, it is predicted that only *Deletion Grammar 1* and *Insertion Grammar 2* are possible. We can easily select *Deletion Grammar 1* over *Insertion Grammar 2* empirically, since the former, but not the latter, is compatible with the actual data. We need no proviso like Bleeding Avoidance (31), other than the universal principle (namely KSN Hypothesis) on the rule application requiring that every obligatory rule must be applied to every representation to which it can be applied.

3. Concluding Remarks

The discussion presented in this paper shows that two apparent counterevidences against the KSN Hypothesis are not real counterevidences. Rather, the discussion shows that they can be accounted by the KSN Hypothesis.

Then, a basic question that we must ask is as follows: Why does a phonology of a language tends to contain pairs of rules which confirm KSN Hypothesis. There would be no prin-

cipled answer to this question, if we are in a framework which assumes that rules are linearly ordering. Since, within that theory, all the nine possible relations must be of the same value. In order to get a more principled answer to this question, we must go outside of the framework.

KSN Hypothesis directly answers to this question. the answer is: Yes, the component of phonology is so organized that only some restricted possibilities are permitted. The restricted theory makes more rigid predictions. In this sense, KSN Hypothesis is interesting.

NOTES

* This paper is a slightly revised version of my MA thesis. The materials are mainly taken from section 2.4. of chapter 2. I would like to thank Masatake Muraki, Masao Okazaki and Shi'nichi Tanaka for their useful comments and discussions. Of course, sole responsibility for errors is my own.

¹ Kiparsky's definition of the Elsewhere Condition is given below:

Elsewhere Condition

Rules A,B in the same component apply disjunctively to a form ϕ if and only if

(i) The structural description of A (the special rule) properly includes the structural description of B (the general rule)

(ii) The result of applying A to ϕ is distinct from the result of applying B to ϕ .

In that case, A is applied first, and if it takes effect, then B is not applied.

---Kiparsky (1982a,b)

² For another possible alternative, see Koutsoudas, Sanders and Noll (1974).

³ Honma (1988) argues that the relative ordering among the major rules in English phonology confirm the KSN Hypothesis. In English phonology, the following pairs of rules are in the feeding relation (2a). In each pair, the left hand rule feeds the right hand one:

- (i) a. CiV Lengthening vs. S-Voicing
- b. Prenasal *g*-Deletion vs. Vowel Shift
- c. *y*-insertion vs. Palatalization
- d. Palatalization vs. *y*-Vocalization and
 Palatalization vs. *y*-Deletion
- e. Diphthongization vs. Long Vowel Tensing
- f. Vowel Tensing vs. Stem-final Lengthening

The following pairs of rules are in the counter-bleeding relation (2d).

- (ii) a. *s*-Voicing vs. *i*-Shortening
- b. Nasal Assimilation vs. Noncoronal Deletion
- c. Velar Softening vs. Vowel Shift
- d. Vowel Shift vs. Diphthongization
- e. *y*-Insertion vs. *ɪ*-Rounding

The principle of Proper Inclusion Principle accounts for the following pairs of rules standing in the bleeding and counter-bleeding relation (2g).

- (iii) a. *y*-Vocalization vs. *y*-Deletion

b. Centering Diphthong formation vs.
Diphthongization.

⁴ In these examples, we assume that suffixes are bisyllabic. In some cases, the suffix-initial [i] becomes [y] or is deleted by some irrelevant rules.

⁵ Utsumi (1985) claims that the relevant vowels in these forms listed in (16) have a short vowels in the underlying representations. His analysis is based on the notion 'extrasyllabicity'.

⁶ This vowel might possibly be /æ/. This conclusion would be supported by alternation such as *Christian/Christianity*

⁷ This problem of allomorphs is not restricted to the suffix *-ian*. Suffixes *-ious*, *-ial*, and *-ia* present similar problems.

- (i) a. *-ious*: poisonous, melodious, spacious
- b. *-ial*: palatal, dictatorial, official
- c. *-ia*: propaganda, marginalia, Scotia

⁸ These rules are equivalent to (i) and (ii) respectively. (i) and (ii) are formulated in segmental terms. In this pair, it is more clear that the structural description of (i) properly includes that of a subset of) (ii).

(i) CiV Lengthening

V ---> [+long]/ |_____!C!+high !V
 |-high! |-back !
 |-cons !
 |-stress!

(ii) Trisyllabic Shortening

V ---> [-long]/ ____ Co! V !CoV
 |-stress!

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