ON ESTABLISHING LINGUISTIC UNIVERSALS:
A CASE FOR IN-DEPTH SYNCHRONIC ANALYSIS

JAMES E. CATHEY and RICHARD A. DEMERS
University of Massachusetts University of Arizona

Although important insights have been gained by comparing small amounts of data
from disparate sources, linguistic generalizations are unlikely to prove valid when
based on data whose synchronic status is not well-defined. As a case in point, the recent
proposal by Koutsoudas, Sanders & Noll 1974 for universal principles of grammatical
rule ordering is here shown to be insufficient, from their own data and on the basis of
phonological rules derived from a thorough synchronic analysis of Old Icelandic.
It is maintained that a proposal can have positive empirical consequences only if it
imposes no conditions to eliminate extrinsic ordering from a grammar.*

Many valuable theoretical insights have been gained by comparing linguistic
processes obtaining in various dialects and/or languages. Generalizations drawn
from such diverse sources can be fruitful; but it must not be imagined that univer-
sals or even useful generalizations can always be derived from the comparison of
isolated phenomena. Any putative generalization must be carefully checked against
a deep analysis of the linguistic data. Even the very processes taken from various
languages for comparative purposes cannot be established without a thorough
understanding of the languages in question.

It is obvious that the proper description of data will proceed as linguistic theory
develops. One of the features of a developing science is that the theory must often
precede total description. Theories are proposed, and predictions made, to be
confirmed by later investigations. In the case of linguistic science, however, many
linguists have neglected the available internal facts of a particular language, and
thus many theoretical principles are based on tenuous statements from individual
languages.

We maintain that some recent attempts at establishing universals are flawed by
just this internal weakness. We demonstrate this point by showing the consequences
of the recent proposal by Koutsoudas, Sanders & Noll 1974 to amend linguistic
theory by a set of principles which, they claim, have universal validity. We contend
that KSN’s principles are intractable when applied to a complex and cohesive body
of data. Their putative universals are derived from the comparison of small por-
tions of various languages: phenomena from the Schaffhausen and Kesswil dialects
of Swiss German, Southern Paiute, English, French, Low German, Finnish,
Uruguayan Spanish, and others. Such selective and shallow gleanings do not
necessarily contribute to the proof of universality.

In §1, below, we investigate KSN’s claim that their proposal on ordering renders
all extrinsic ordering statements unnecessary. In §2, we evaluate the arguments
presented in their article, and conclude that KSN offer insufficient evidence for the
inclusion of their principles in linguistic theory. In §3, we demonstrate the degree

* We would like to thank Jay Keyser, Robin Cooper, and Emmon Bach for helpful comments
arising from discussion concerning aspects of this paper. We alone, however, are responsible
for any errors in fact or analysis.
to which their principles are unworkable when rather extensive parts of a phonology are dealt with. Using an analysis of Old Icelandic (OI) as a basis, we show that any attempt to write a phonology of OI which conforms to KSN's conditions on ordering will lead to an unacceptable loss of generality.

1. The KSN Proposal. In order for any proposal to be accepted as a valid addition to linguistic theory, it must have positive empirical consequences. For purposes of discussion, we divide the criterion of empirical adequacy into two parts: restrictedness and descriptiveness. A gain in restrictedness in linguistic theory will accompany a constraint which limits the number of grammars that can be written. Valid constraints advance linguistic theory in a positive manner by limiting the number of grammars which, in theory, can be constructed by the child who acquires language. A gain in descriptiveness will account for additional data, or will relate known facts in a more insightful manner; e.g., the ongoing revision and refinement of distinctive features in phonology have been justified by an accompanying gain in descriptiveness.

A condition on grammars which is consistent with both aspects of the criterion of empirical adequacy is the evaluation metric (sometimes referred to as the simplicity criterion or the conciseness condition). This metric satisfies the condition of restrictedness, in that it provides a basis for limiting potentially equivalent descriptive systems to the most concise. When combined with an adequate system of distinctive features, the evaluation metric goes beyond the condition of descriptiveness by predicting natural classes which occur in the phonological processes of natural language. But we find that the KSN conditions on ordering satisfy neither the condition of restrictedness nor that of descriptiveness.

To facilitate our discussion, we now briefly summarize KSN's proposal. Central to their discussion are the feeding, bleeding, counterfeeding, counterbleeding, and non-affecting relationships which may obtain between rules. Following KSN, we summarize these relationships below:

(1) Feeding: Rule A feeds rule B if and only if the application of A increases the number of forms to which B can apply.

Bleeding: Rule A bleeds rule B if and only if the application of A decreases the number of forms to which B can apply.

Counterfeeding: Rule B counterfeeds rule 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.

Counterbleeding: Rule B counterbleeds rule 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.

Non-affecting: Rule A does not affect rule B if and only if A neither feeds nor bleeds B, and B does not affect A if and only if B neither counterfeeds nor counterbleeds A.

KSN maintain that, given any two rules, there will be only nine possible ways in which they can be related in terms of these ordering relationships. For example, with the order (A,B), a feeding order is specified when A feeds B, but B does not affect A. A feeding–counterbleeding relationship for the order (A,B) occurs when...
A feeds B, but B counterbleeds A. KSN list seven remaining combinations: bleeding, counterfeeding, counterbleeding, mutually non-affecting, bleeding and counterfeeding, bleeding and counterbleeding, and feeding and counterfeeding. These relationships, they claim, exhaust the theoretical possibilities for ways in which the members of any pair of phonological rules potentially affect each other.

Based on the above relationships, KSN propose a set of principles of universal validity, intended to specify the order of application between any pair of rules found in natural language. We summarize these principles below:

(2) a. In general, rules apply whenever their structural descriptions are met, subject to the following conditions.

b. PROPER INCLUSION PRECEDENCE. For any representation R, which meets the structural description of each of two rules A and B, A takes applicational precedence over B if and only if the structural description of A properly includes that of B.

c. COUNTERBLEEDING PRECEDENCE. For any representation R, which meets the structural description of each of two rules A and B, A takes applicational precedence over B if there is some string that is included in the inputs of both A and B, but not in the output of B.

Principle 2a requires rules to apply whenever their structural descriptions are met. All rules are tested for application; and after applicable rules have been found, the structural changes are made simultaneously. KSN present an example from contemporary Low German, which has a rule devoicing final obstruents (Devoicing) and a rule of postvocalic spirantization (Spirantization). The underlying form /ta:g/ satisfies the structural description of both rules, so the changes occur simultaneously to produce [ta:x]:

\[
\begin{align*}
\text{Rules} & \quad (\text{Spir}) \quad (\text{Devoic}) \\
& \downarrow \quad \downarrow \\
\text{Surface} & \quad [t \quad a: \quad x]
\end{align*}
\]

After all rules which can apply do so, the remaining rules are all retested for application, and they apply if their structural descriptions are met.\(^1\) Thus all cases of rules which apply in a feeding order are accounted for by KSN’s principle 2a.

Principles 2b–c are proposed to account for those cases where simultaneous application will lead to contradictory results. Principle 2b specifies an order of application between two rules whose structural descriptions are such that one is properly contained in the other. In this case, the less general rule will take precedence. Principle 2c is proposed to block rules from applying in a bleeding order.

The KSN proposal consists of possibilities for ordering which have been discussed in earlier papers on generative phonology. What is new here is KSN’s unique grouping of principles 2a–c, which they claim will allow grammars containing no

\(^1\) KSN do not discuss the possibility of a rule’s re-applying to its own output (iterative application). They evidently leave this question open.
statements of extrinsic ordering. The claim that all rules must apply simultaneously has been considered (and rejected) by many linguists working within the generative framework: Chomsky & Halle 1968, McCawley 1968, and Postal 1968. Principle 2b, Proper Inclusion Precedence, is related to the condition by which disjunctive ordering is defined in Chomsky & Halle, and it is similar to the Elsewhere Condition proposed by Kiparsky 1973. Principle 2b is clearly the most interesting one, since it makes a special case of the parenthesis and angle-bracket notation proposed by Chomsky & Halle. KSN do not discuss, however, whether their principle will also require disjunctive ordering. Principle 2c, Counterbleeding Precedence, is similar to one originally proposed by Anderson 1969; in his system, however, bleeding orders are allowed, but require special statements to override his proposed unmarked conditions on ordering.

The proposal in 2, then, consists of hypothesized principles of rule application which are set forth by KSN to justify the following statements on the application of phonological rules (p. 1):

All restrictions on the relative order of grammatical rules are determined by universal rather than language-specific principles. It follows from this hypothesis that no grammatical rules are extrinsically ordered...

From this brief summary, we can project three major points of conflict with standard generative phonologies: cases in which rules are ordered extrinsically to prohibit simultaneous application, cases in which rules occur in counterfeeding order, and cases in which rules occur in bleeding order. KSN are aware, of course, that phonological descriptions exist in which rules are ordered in violation of principles 2a–c; but they claim that for every traditional analysis which violates these principles, there will also exist an analysis consistent with their principles which is at least equally well-motivated. They assert (14):

We have attempted to show that a theory which prohibits extrinsic ordering, simply requiring that all phonological rules be applied according to a very small number of universal principles, is capable of explaining with equal or greater generality all natural language data which can be accounted for by means of rules extrinsically ordered in feeding, counterbleeding, bleeding and counterfeeding, counterfeeding and bleeding relations.

Thus their proposal amounts to amending generative phonology, as presented most recently by Chomsky & Halle, by adding the ordering conditions in 2 which will allow the writing of grammars without extrinsic ordering. But we will show that the conditions in 2 are not empirically valid from the standpoint of restrictedness and descriptiveness. From this demonstration, it must follow that KSN's claim is false, and that the extrinsic ordering of phonological rules must remain a part of generative phonology.

2. DESCRIPTIVE ADEQUACY. We wish to consider first the conditions under which KSN's proposal might warrant inclusion in linguistic theory from the standpoint of restrictedness; and we propose to show that, in every possible case, they fail to provide the necessary motivation for their proposal. In a superficial sense, KSN's ordering conditions appear to restrict the possibilities for grammar construction. For a set of \( n \) rules, \( n! \) orderings (and therefore grammars) are theoretically possible; and the set of potential grammars could be reduced if certain orderings were prohibited by conditions like KSN's. Their ordering condi-
tions, in fact, directly prohibit the occurrence of simple bleeding orders from among the nine possibilities mentioned earlier. The lack of counter-feeding orders is a direct consequence of their algorithm. Three other orders (feeding and counter-bleeding, bleeding-counterfeeding, feeding-counterfeeding) are claimed not to exist in natural language. The remaining four possibilities are allowed by their proposal: mutually non-affecting, feeding, counterbleeding, and bleeding-counterbleeding. The mere prohibition of certain ordering types, however, is not sufficient to restrict the number of grammars. Only if the most highly-valued descriptions conformed to their proposal would the number of grammars be restricted. A more limited number of grammars would then constitute a strong form of the predictive power of their proposal.

A weaker form of the predictive power of their proposal would be the claim that, for any language, there is a writable grammar conforming to their proposal. The relaxation of the condition that the KSN proposal be consistent with the most highly-valued grammar would open the possibility of tailoring a grammar to conform to their proposal. But the tailoring of a grammar reopens the possibility of n! grammars—thus obviating any claim of greater restrictedness. We demonstrate below that KSN's analysis of the Schaffhausen dialect of Swiss German satisfies merely the weaker form of their proposal, and is thus not sufficiently motivated to warrant inclusion in a theory about human language.

To justify their proposal, then, KSN must show that it has additional descriptive consequences. That is, some descriptive insight must be gained beyond the satisfaction of their principles per se; or they must show that their conditions allow for a more restricted number of grammars. We will return below to these two criteria of descriptive adequacy, first considering in some detail the consequences of KSN's re-analysis of Schaffhausen and Kesswil data.

3. THE SWISS GERMAN CASE. In responding to the standard analyses (grammars containing extrinsic ordering) which had been proposed earlier and which contained orderings violating their conditions, KSN are required to show not only that these earlier descriptions are incorrect, but also that grammars are constructable which satisfy one of the two conditions of descriptive adequacy. As KSN point out, the synchronic grammar of the Schaffhausen dialect requires two rules: Umlaut and Back Vowel Lowering. These rules were first discussed in the generative framework by Kiparsky 1965, and are given below using Chomsky & Halle's features:

(4) a. Umlaut: \[V \rightarrow [-\text{back}] / \ldots \text{[umlaut context]}\]
   b. Back Vowel Lowering:
      \[
      \begin{bmatrix}
      V \\
      -\text{high} \\
      +\text{back}
      \end{bmatrix} \rightarrow [+\text{low}] / \quad \begin{bmatrix}
      +\text{cor} \\
      -\text{lateral}
      \end{bmatrix}
      \]

KSN directly discuss only two of the major points of conflict between their theory and the standard theory with extrinsic ordering, namely the occurrence of bleeding and counterfeeding orders which have been proposed in earlier analyses. They do not discuss cases in which simultaneous application of rules will cause relatively large increases in structural complexity of phonological descriptions; but judging by their re-analyses of the bleeding and counterfeeding cases, they will be forced to accept the more complex rules. We discuss this point in more detail in §4.3.
Kiparsky 1965 discusses these two rules in the context of a phonological change between the Schaffhausen and Kesswil dialects of Swiss German. He argues that the rules are ordered (a,b) in the conservative Schaffhausen dialect, but appear re-ordered (b,a) in the innovative Kesswil dialect. For the example /boda/, note the difference in the plural forms in the two dialects:

(5) Schaffhausen: Sg. /boda/ /boda + PL/
   Rule 4a —— bőda
   Rule 4b boda ——
   Surface boda bőda

(6) Kesswil: Sg. /boda/ /boda + PL/
   Rule 4b boda boda + PL
   Rule 4a —— bőda
   Surface boda bőda

The order (4a,4b) is bleeding because rule 4a fronts certain back vowels, thus altering underlying o’s so that they are no longer an input to rule 4b. The innovation is a re-ordering into the counterbleeding order (4b,4a), and the underlying o’s then undergo both rules. The revised Kesswil grammar was presented at that time by Kiparsky as evidence for his hypothesis that innovative re-ordering will conform to the general principle that children tend to construct grammars (at the expense of the primary data) which utilize rules maximally.³

Kiparsky’s explanation is not available to KSN, since they cannot accept the Schaffhausen dialect with two rules in a bleeding order. Instead, they claim that the Schaffhausen grammar actually contains Back Vowel Lowering and Umlaut in the order (4b,4a)—the Kesswil order—but with an additional rule of Raising:

(7) Raising: \[
\begin{array}{c}
V \\
-\text{back} \\
+ \text{rnd}
\end{array}
\rightarrow [-\text{low}]
\]

The addition of this rule will now allow the correct surface forms to appear:

(8) Schaffhausen:
   /boda/ /boda + PL/
   ↓ (Lowering) ↓ (Lowering, Umlaut)
   ↓ ↓
   Stage 1 bőda bőda
   ↓
   Stage 2 bőda

Thus there are two contrasting derivations for the Schaffhausen facts, 5 and 8; and in order to justify 8, the KSN analysis must satisfy at least one of the two conditions for descriptive adequacy. If rule 7 can be independently motivated, then derivation 8 will be justified, and the description will be consistent with the strong form of the predictive power of their proposal.

³ Kiparsky has now abandoned the idea that rules will be re-ordered so as to apply to additional forms (see Kiparsky 1972).
KSN offer two kinds of evidence, synchronic and diachronic, for the validity of their analysis. The synchronic argument is derived from the fact that short [5] does not occur at the surface in the Schaffhausen dialect. KSN write (12–13):

Since it is true that the Schaffhausen dialect has no low front rounded vowels at all (Stickelberger 1881:18–19), rule 20c [our rule 7] accounts for a significant fact about this dialect which needs to be stated in its grammar, independently of any facts about umlauting and back vowel lowering. A grammar including the extrinsically unordered rules 20a–c [our rules 4a–b and 7], therefore, is clearly more adequate with respect to the language as a whole than a grammar including only the extrinsically ordered rules 20a–b.

However, KSN do not seek justification for rule 7 on the basis of surface considerations alone. In fact, there are two possibilities for the status of the Raising rule: it is either a regular phonological rule, ordered late in the set of rules, or it represents a different type of rule (sometimes referred to as an ‘anywhere’ rule) which would express a constraint at all points in the Schaffhausen phonology. If rule 7 is an ‘anywhere’ rule, then this single generalization will account for a morpheme-structure constraint, as well as function to undo the effects of the order (b,a). The independent motivation for rule 7 in this case would presumably arise from the fact that it would not have to be stated twice in the grammar of Schaffhausen—one at the MS level, and again within the phonological rules. That KSN intend to remove the distinction between MS rules and phonological rules (at least under certain conditions) is shown by their fn. 10 (p. 12):

Like all other phonological rules, a segment-structure rule like 20c [our rule 7] will apply to all representations to which it is (non-vacuously) applicable. It will thus serve the functions of a morpheme-structure rule or constraint with respect to underlying lexical representations, as well as serving the functions of a phonological rule or phonetic redundancy rule with respect to derived representations.

But KSN’s attempt to establish independent motivation for rule 7 in this manner is vitiated by two factors. First is the error of allowing rules to apply both as MS rules and as regular phonological rules. It is unacceptable to ignore the distinction between MS rules and phonological rules, because identical generalizations do not always hold at both the underlying and surface levels of all languages. KSN are forced to increase the power of the grammar and claim that some rules are ‘anywhere’ rules. This tripartite division of rule types (MS rules, ‘anywhere’ rules, and regular phonological rules) is an undesirable consequence of their re-analysis.

The second factor which vitiates their argument is the untenability of their diachronic explanation. Kiparsky 1965 argues that the Kesswil dialect resulted from a re-ordering of the Umlaut and Back Vowel Lowering rules. KSN, on the other hand, explain the change in the Kesswil dialect as the result of the loss of rule 7. They maintain that the change between Schaffhausen and Kesswil is consistent with an established mode of phonological change, since rule loss has been proposed for other languages (e.g. Yiddish, Kiparsky 1965; Belorussian, Kiparsky 1968; Delaware, Kiparsky 1972).

KSN’s argument is critically weakened, however, by the status of rule 7. As an ‘anywhere’ rule, it cannot be ‘lost’, since it is still a valid statement about morpheme structure. That is, in their framework the ‘anywhere’ rule would have to

4 Long [a] does occur, however; this is presumably overlooked by KSN.

undergo a shift in status from a phonological rule, but would still remain as a morpheme-structure rule which must be ordered (extrinsically?) before the two rules of Umlaut and Back Vowel Lowering. The normal case of rule loss involves a rather late phonological rule whose absence in a subsequent grammar accounts for the observed changes in surface forms. In short, KSN's motivation for the change between the Schaffhausen and Kesswil dialects involves a contradiction. If the independent motivation for the Raising rule (7) is that it is also a morpheme-structure rule, then the grammar of the Kesswil dialect cannot result from an attested type of phonological rule loss. Rather, the change is in status, from an 'anywhere' rule to an MS rule; and this is a type of adjustment which has no precedent in the theory of phonological change. On the other hand, if the Kesswil grammar results from the loss of rule 7 as a regular phonological rule, then the independent motivation for the rule is weakened critically, since regular phonological rules cannot receive independent motivation by consideration of MS conditions. The standard grammar of the Schaffhausen dialect will require the extrinsic ordering of Back Vowel Lowering and Umlaut, whereas the grammar required for consistency with the KSN proposal will require the additional rule of Raising.

Although the weak form of the predictive power of KSN's proposal can be met in the Schaffhausen example, satisfaction of this weaker form is insufficient to require a complication of linguistic theory with their proposal. First, by allowing grammars to be altered to accommodate their principles, KSN cannot argue for their proposal from the standpoint of restrictedness. We have seen that a bleeding order, disallowed in the Schaffhausen dialect, is simply rewritten into a descriptively equivalent grammar containing an extra rule. Second, if grammars can be arbitrarily complicated to accommodate proposed universals, then there is no limit to the number of 'universals' which can be proposed. Linguistic theory must not allow universals to be adopted which have no empirical content other than the satisfaction of the universals themselves, or which conflict with the generality of the rest of the grammar. Our case against vacuous universals is formally identical with the argument originally proposed by Halle 1959 against the taxonomic phonemic level. As he demonstrates for Russian, an obstruent devoicing rule must be split into two complementary parts in order to satisfy the following putative universal: all languages have a (taxonomic) phonemic level. The KSN proposal on ordering leads to a loss of generality fully analogous to the loss of generality arising from a taxonomic phonemic level.

The case against KSN's proposal becomes even stronger when we consider their incorrect understanding of the status of extrinsic ordering within generative phonology. Consider the following quote (p. 1):

Specifically, we will attempt to show that any phonological fact that can be accounted for by means of a theory with the power of extrinsic ordering can be accounted for with equal or greater generality by means of a theory without this power.

We have already seen that this statement is invalid because the Schaffhausen grammar consistent with KSN's principles is, in fact, less general than the standard analysis with extrinsic ordering. In addition, another interpretation of the statement has undesirable consequences. That is, KSN might claim that grammars conforming to their principles are not more restrictive, but rather equally restrictive—and therefore, because 'the power of extrinsic ordering' is not required, grammars
conforming to their principles should be preferred. In order to see the fallacy in this reasoning, let us review again the competing analyses 5 and 8. In 5, we have the two extrinsically-ordered rules originally proposed by Kiparsky. The ordered rules \((a,b)\), plus the fact that there are no additional sources of \([5]\), explain completely the lack of surface short \(\tilde{a}\). In 8, we have the three-rule analysis offered by KSN which, although more complex in terms of the evaluation metric, has the ‘advantage’ that extrinsic ordering is not necessary. We are thus faced with an apparent choice between two conflicting principles: extrinsic ordering on the one hand, and the ordering proposal of KSN on the other.

The choice between the two can be made by the following consideration: the extrinsic ordering of phonological rules is not something extra, but rather is a consequence of a condition which has independent motivation—the evaluation metric. Since extrinsic ordering follows from an independently motivated principle, KSN must show either that such ordering leads to incorrect empirical consequences (and would therefore have to be blocked with a constraint on the evaluation metric), or that the metric itself is not valid. KSN have not shown that extrinsic ordering is empirically incorrect, nor that the evaluation metric is invalid. Because their proposal does not follow from any independently motivated principle(s), we are forced to choose the analysis in 5 with extrinsically-ordered rules. In this light, we see that the Raising rule (7) is actually a specious generalization, since its 'advantage' that extrinsic ordering is not necessary. We are thus faced with an apparent choice between two conflicting principles: extrinsic ordering on the one hand, and the ordering proposal of KSN on the other.

From the standpoint of restrictedness, then, the KSN proposal does not warrant inclusion in linguistic theory. The strong form of the predictive power of the conditions in 2 is not satisfied (i.e., optimal grammars will violate KSN's principles); nor is the weak form of the predictive power of their principles tenable—since in cases of conflict with the evaluation metric, grammars with extrinsically-ordered rules must be chosen over grammars which conform to the KSN principles.

4. AN INVESTIGATION OF OI PHONOLOGY. Our thorough analysis of the productive phonology of OI appears elsewhere (Cathey & Demers, ms). This analysis is a valid testing ground for KSN's claims, because it offers a sufficiently complex interplay of a small number of straightforward rules. We will first summarize our rules briefly and show some sample derivations.

4.1. THE ORDER OF PHONOLOGICAL RULES IN OI can be stated as follows:

(9) Syllabification (Syll):
\[ j \rightarrow i / [+\text{cons}] [-\text{syl}] \]

(10) Stress Shift:
\[
\begin{align*}
\frac{+\text{syl}}{-\text{back}} & \Rightarrow [-\text{stress}] [+\text{stress}] \\
\frac{+\text{stress}}{-\text{back}} & 1 2
\end{align*}
\]

(11) Internal Syncope (Intsync):
\[ V \rightarrow \emptyset / \frac{-\text{stress}}{(j) C_{\emptyset} [-\text{stress}] [-\text{stress}]} \]
TABLE 2. Derivation of the nom. sg., nom. pl., and gen. sg. of the masc. noun *vollr* 'plain'.

1. Derivations of the Isg. past ind.

<table>
<thead>
<tr>
<th>/talj + δ + aa/</th>
<th>/vak + j + δ + ee/</th>
<th>/talaa + uum/</th>
</tr>
</thead>
<tbody>
<tr>
<td>tal + δ + aa</td>
<td>vak + j + δ + ee</td>
<td>tal + uum</td>
</tr>
<tr>
<td>tal + δ + aa</td>
<td>vek + j + δ + ee</td>
<td>i-Mutation</td>
</tr>
<tr>
<td>tal + δ + a</td>
<td>vek + j + δ + i</td>
<td>α-Raising</td>
</tr>
<tr>
<td>tal + uum</td>
<td>tolo + uum</td>
<td>u-Mutation</td>
</tr>
<tr>
<td>tal + um</td>
<td>tal + um</td>
<td>VE</td>
</tr>
<tr>
<td><em>talda</em></td>
<td><em>vekdi</em></td>
<td><em>tuulum</em></td>
</tr>
<tr>
<td><em>vollr</em></td>
<td><em>vellir</em></td>
<td><em>vallar</em></td>
</tr>
<tr>
<td><em>vollr</em> + r</td>
<td><em>vell + ir</em></td>
<td>Termsync</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>/vallu + r/</th>
<th>/vallu + iir/</th>
<th>/vallu + aar/</th>
<th>/vallu + iir/</th>
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<tr>
<td>vall + iir</td>
<td>vall + iir</td>
<td>vall + aar</td>
<td>Intsync</td>
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<td>vall + iir</td>
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<td>vell + iir</td>
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<td>α-Raising</td>
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<td>vell + iir</td>
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<td>u-Mutation</td>
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<tr>
<td>vell + ir</td>
<td>vell + ir</td>
<td>Termsync</td>
<td></td>
</tr>
<tr>
<td><em>vollr</em> + r</td>
<td><em>vellir</em></td>
<td><em>vallar</em></td>
<td>Surface</td>
</tr>
</tbody>
</table>

(12) *i*-Mutation:

\[
\begin{array}{c}
\text{[syll]} \text{[stress]}_2 \text{C}_0 \text{[son]} \text{[back]}_2, 2, 3 \\
\text{1} \text{2} \text{3} \text{1}
\end{array}
\]

(13) α-Raising:

\[α \rightarrow e \] # # \[C_0 \] C

(14) u-Mutation:

\[a \rightarrow [ + \text{round}] \] # # X \[C_0 \] a C_0 u

(15) Terminal Syncope (Termsync):

\[V \rightarrow \emptyset / [\text{stress }] \text{C}_0 \] # #

(16) Unstressed Vowel Raising (UVR):

\[
\begin{array}{c}
\text{[syll]} \text{[stress]}_1 \text{a back} \text{around} \\
\text{1} \text{2} \text{3} \text{1}
\end{array}
\]

(17) Glide-drop:

\[j \rightarrow \emptyset / (C X) \] # #

(18) Vowel Elision (VE):

\[V \rightarrow \emptyset / [\text{stress }] + V \]

(19) Glide Formation:

\[i \rightarrow j / \] V
4.2. OI DATA AND THE KSN PROPOSAL. The empirical data of OI disconfirm the KSN proposal in two major ways. First, the most general OI grammar is shown to conflict directly with KSN’s conditions on ordering, since OI phonology contains rules which violate every aspect of the KSN proposal. As we will show, our rules must be ordered to block simultaneous application (§4.3), and they must also apply in counterfeeding (§4.4) and bleeding orders (§4.5). Thus the strong form of the predictive power of KSN’s proposal is violated in all possible ways. Second, the KSN proposal is shown to be incorrect because it does not allow for two rules which are mutually analysable. In §4.6 we offer an argument from Old English involving two well-motivated rules which cannot be ordered by the KSN proposal: an extrinsic-ordering statement is required.

4.3. SIMULTANEOUS APPLICATION. The principle of simultaneity plays a central role in KSN’s algorithm of rule application. Consider the following quotes from their article (5):

Thus if rules are allowed to apply simultaneously, no language-specific restriction on the relative application of these rules can be justified ... There are a number of well-known arguments presenting empirical evidence against the hypothesis that all rules must be applied simultaneously, and hence that all derivations must consist of exactly two lines ... But these arguments obviously do not rule out the assumption that some rules are applied simultaneously,
and hence that the number of lines in a derivation may be greater than two but less than the number of rules that are applied in determining that derivation. The most natural initial hypothesis about simultaneous and sequential application would seem to be simply that those rules that can apply simultaneously to a given representation do apply simultaneously; those that can't, don't. Evidence against complete simultaneity is of no value at all, of course, for deciding between this hypothesis of predictable simultaneity and sequentiality and the more commonly accepted hypotheses that all rules are applied sequentially, regardless of whether they could or could not be applied simultaneously.

KSN do not respond to the 'well-known arguments' presenting empirical evidence against the hypothesis that all rules are applied simultaneously. The consequence of those arguments is that rules must be extrinsically ordered. From their quotes, however, it is clear that KSN believe that, in most cases, rules can apply simultaneously. Our analysis of OI shows, to the contrary, that most rules in that language stand in highly constrained direct and indirect ordering relationships and cannot be allowed to apply simultaneously. However, as a consequence of writing the most general grammar, a small number of our rules fall into blocks such that, within a block, no rules intersect; therefore these rules could be allowed to apply simultaneously. Every rule in each block is critically ordered with respect to a rule in an adjacent block. We display this division in Table 6 with numbered blocks, where rules within a block stand in arbitrary order and are designated alphabetically.

Syllabification

Stress Shift

Internal Syncope

i-Mutation

x-Raising

u-Mutation

Terminal Syncope

UV-Raising

Glide-drop

Vowel Elision

Glide Formation

Table 6. Ordering relationships of OI rules.

Syllabification and Stress Shift do not follow any other rule here, and are not ordered with respect to each other. They are therefore assigned to Block 1. But Internal Syncope, e.g., is in Block 2, because it is ordered after Syllabification but before i-Mutation. Similar statements can be made about each rule. Within certain blocks, then, rules could be allowed to apply simultaneously. But this is uninteresting, since nothing of empirical consequence follows from such simultaneity.

Let us now observe what would happen if, following KSN, all rules were to apply simultaneously in OI. There are cases in OI where such application of phonological rules would yield a correct surface form, e.g. the nom. sg. form \poverl\ar{pr} 'plain' from underlying /\poverl\ar\l+\r/:
(20) Underlying /v a 1 u + r/

Rules u-Mutation Termsync
d

Surface vo1lr

For a majority of the underlying representations, however, the simultaneous application of rules must be prohibited. Several examples are discussed below under the heading of each form type which conflicts with the KSN proposal concerning simultaneity.

4.31. Talda (cf. Table 1): there is abundant evidence that this form derives from underlying /talj + δ + a a/. Note, however, the result of applying our rules simultaneously to this form:

(21) Underlying /t a 1 j + δ + a a/  

Rules i-Mutation Glide-drop Termsync
d  

Stage I  

Rules æ-Raising
d

Surface *telða

The rule of i-Mutation must apply to this form because the structural description is met under the KSN proposal, and a non-contradictory but incorrect surface form is generated. As we have shown, the correct surface form talda requires the application of Intsync before i-Mutation, thus bleeding i-Mutation of a potential application. Since the structural descriptions of Intsync and i-Mutation are disjoint, KSN’s Proper Inclusion Precedence principle is not applicable. Moreover, the only remaining principle, Counterbleeding Precedence, would require the application of Intsync before i-Mutation, thus bleeding i-Mutation of a potential derivation as would simultaneous application. This example runs counter to the claim that the only cases involving bleeding orders will be those consistent with the Proper Inclusion Precedence principle.

This important example shows that the solution into which KSN were forced in the Schaffhausen dialect cannot be applicable here: namely, there is no way to add an additional rule which will ‘undo’ the effects of the empirically correct bleeding order. If we were to follow KSN’s model used in the Schaffhausen dialect, we would need a rule to change *telða to talda, e.g.,

(22) Anti-i-Mutation: e → a / in some environment.

Such a rule is the analog to KSN’s raising rule in the Schaffhausen dialect (rule 7 above). But 22 is not a possible rule in OI, since there are many surface e’s, occurring in many environments. In fact, the KSN-type Anti-i-Mutation rule would
need to apply only to undo the effect of the improper simultaneous application of i-Mutation and Intsync. Furthermore, the subjunctive form is \textit{tel\textipa{d}a}, identical to the result of 21 before the application of a KSN-type Anti-i-Mutation rule. Some provision would have to be made to insure that the subjunctive form did not undergo 22 to become \textit{*tal\textipa{d}a}. The difficulties inherent in the derivation of the indicative \textit{tal\textipa{d}a} and the subjunctive \textit{tel\textipa{d}a} thus constitute sufficient evidence for the general lack of feasibility of the approach involving additional rules.

\textbf{4.32. Vek\textipa{d}i:} We have additional evidence that the order (Intsync, i-Mutation) is indeed correct in OI. It was this order which allowed us to explain the \textbf{presence} of i-Mutation in the past subj. \textit{vek\textipa{d}i} from underlying /vake\textipa{+}j\textipa{+}\delta\textipa{+}ee/. We saw in Table 1 that Intsync removed the stem-final e, which placed the subj. marker j in a position to satisfy the structural description of the i-Mutation rule. For \textit{vek\textipa{d}i} the order (Intsync, i-Mutation) is feeding. But this type of feeding order also escapes KSN when they permit rules to apply simultaneously:

\begin{align*}
(23) \text{Underlying} & \quad /v a k e + j + \delta + e e/ \\
\text{Rules} & \quad \text{Intsync Glide-drop UVR Termsync} \\
\text{Surface} & \quad *vak\textipa{d}i
\end{align*}

This is the reverse of the previous problem: in \textit{tal\textipa{d}a}, KSN would have to create some method of blocking i-Mutation (so as not to derive \textit{*tel\textipa{d}a}); here, they would have to block Glide-drop so that i-Mutation could apply. We have argued elsewhere (1975) that i-Mutation cannot be allowed to apply over an intervening e, since the lack of i-Mutation in \textit{vak\textipa{i}} from /vake+i/ is explained by the presence of the intervening e.

\textbf{4.33. Vaki:} we have noted (1975) for the paradigm \textit{vaka} \textquote{be awake} that lsg. pres. ind. \textit{vaki} seems to be exceptional in two ways. First, it appears that the ind. ending \textit{i} is present (as opposed to \textit{gref} \textquote{I dig}, where the lsg. pres. ind. marker is not present); second, even though an \textit{i} is present, the stem vowel \textit{a} does not undergo i-Mutation. Both of these apparent anomalies are explained in terms of the stem /vake\textipa{-}/, to which the regular lsg. \textit{i} is added. The underlying form /vake+i/ undergoes Termsync, and stem-final e is raised to \textit{i}. Thus the \textit{i} which appears on the surface is not the indicative ending, but a reflex of the stem-final e. This simple and straightforward explanation would not be available to KSN:

\begin{align*}
(24) \text{Underlying} & \quad /v a k e + i/ \\
\text{Rules} & \quad \text{VE Termsync} \\
\text{Surface} & \quad *vak
\end{align*}

Again, the simultaneous application of phonological rules leads to an incorrect result. We have already seen in Table 1 that Termsync must be ordered prior to VE, thus bleeding the latter of a potential application. As in the case of \textit{tal\textipa{d}a}, we cannot appeal to the other remaining principles, 2b–c. The structural descriptions
of the two rules are disjoint, and 2c would REQUIRE the incorrect order (VE, Termsync). To undo this incorrect derivation in a way analogous to KSN’s treatment of the Schaffhausen example, a rule of Terminal i-Epenthesis would be needed. But as in the case of Anti-i-Mutation, it is impossible to formulate a phonologically conditioned rule to accomplish this: there are many #CVC# stems which do not allow an extension to #CVCi#.

4.34. Tala is the 1sg. pres. ind. of tala ‘talk’. As we have argued elsewhere (MS), it derives from the root /talaa-/ to which the indicative ending /-i/ is added: /talaa+i/. But note how this string would fare under a KSN derivation:

\[
\begin{array}{c|c|c|c|}
\text{Underlying} & /\text{talaa}+i/ \\
\text{Rules} & \text{Intsync VE Termsync} \\
\text{Surface} & \text{*tal} \\
\end{array}
\]

I.e., if the rules were allowed to apply simultaneously, the final three vowels would be deleted. The correct derivation requires VE to be ordered after Termsync and thus be bled of an application.

4.35. Teljum ‘we tell’: we have shown (1975) that this form derives from underlying /talj+uum/. If we were to allow the i-Mutation and u-Mutation rules to apply simultaneously, the following incorrect derivation would result:

\[
\begin{array}{c|c|c|c|}
\text{Underlying} & /\text{talj}+u u m/ \\
\text{Rules} & i-\text{Mutation u-Mutation Termsync} \\
\text{Surface} & \text{[+ back]} [+\text{round}] 0 \\
\end{array}
\]

We have not represented the output of this derivation with a surface form in OI orthography, since OI has no symbol for a low, front, rounded vowel. KSN could derive a form /tælju:m/ as an intermediate stage, and then posit an additional rule to raise and unround /æ/ to e. But the raising and unrounding rule would be a specious ‘generalization’, subject to the same criticisms presented in our discussion above of the Schaffhausen dialect. As we have shown, the i-Mutation rule must be ordered prior to u-Mutation, thus bleeding the latter rule of a potential application.

The analyses we have given for talda, vekdi, vaki, tala, and teljum are typical of our phonology. We claim that any restatement of our rules to accommodate the KSN proposal on ordering will lead to an unacceptable loss in generality. For example, KSN could handle vekdi by restricting the domain of Glide-drop such that it would not apply after unstressed e:

\[
\begin{array}{c|c|c|c|}
\text{Underlying} & /\text{va ke}+j+\delta+e e/ \\
\text{Rules} & \text{Intsync UVR Termsync} \\
\text{Surface} & \text{0 i 0} \\
\end{array}
\]

This complication will now allow the correct surface form to emerge:

\[
\begin{array}{c|c|c|c|}
\text{Underlying} & /\text{va ke}+j+\delta+e e/ \\
\text{Rules} & \text{Intsync UVR Termsync} \\
\text{Surface} & \text{0 i 0} \\
\end{array}
\]
Stage I  
\[ \text{va}k + j + \delta + i \]  
Rules  
- \text{i-Mutation Restricted Glide-drop}  
\[ \downarrow \quad \downarrow \]  
\[ \varepsilon \quad \emptyset \]  
Stage II  
\[ \text{væk} + \delta + i \]  
Rules  
- \text{æ-Raising}  
\[ \downarrow \]  
\[ e \]  
Surface  
\[ \text{vekdi} \]

But this ad-hoc restriction to the Glide-drop rule is unnecessary in a grammar which permits extrinsic ordering.

4.4. IMPROPER FEEDING ORDERS. If rules are allowed to apply whenever their structural conditions are met, the following incorrect derivations will also result.

4.41. \text{Grafid} 'you (pl.) dig':

(29) Underlying /g raf + e e \delta/  
| |  
Rules  
- UVR Termsync  
\[ \downarrow \downarrow \]  
\[ i \emptyset \]  
Stage I  
\[ \text{graf} + i \delta \]  
Rules  
- \text{i-Mutation}  
\[ \downarrow \]  
\[ \varepsilon \]  
Stage II  
\[ \text{graf} + i \delta \]  
Rules  
- \text{æ-Raising}  
\[ \downarrow \]  
\[ e \]  
Surface  
\[ \text*grefid\]

The intermediate form /graf+i\delta/ satisfies the structural conditions of \text{i-Mutation} and should, according to KSN, become \text*grefid. Note that it is impossible to mark the root /graf-/ as minus \text{i-Mutation}, since the present-tense forms are all characterized by the effects of this rule (cf. \text{gref} and \text{grefr}). The restriction would have to be even more specific in the form of a re-adjustment rule of the form 'Minus \text{i-Mutation} in the indicative plural'. This unwarranted restriction does not, of course, have to be mentioned in a grammar which extrinsically orders \text{i-Mutation} before UVR.

4.42. \text{Gqmul} (cf. Table 3):

(30) Underlying /g amal + w/  
| |  
Rules  
- \text{u-Mutation Glide-drop}  
\[ \downarrow \downarrow \downarrow \]  
\[ \circ \circ \emptyset \]
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Stage I  
g  o  m  o  l

Rules  
Termsync  
↓  
∅

Surface  
*goml

It is the loss of the final glide in a KSN-style derivation which would allow the Termsync rule to apply to this form to delete the final vowel of the bisyllabic stem. The order of Termsync BEFORE Glide-drop in a conventional phonology accounts for the maintenance of the final vowel.

4.5. BLEEDING ORDERS. We have already discussed the forms talba and vaki in which the correct derivations require bleeding order. In the case of talba, Syllabification must apply before Intsync, which subsequently bleeds i-Mutation. In the case of vaki, Termsync applies before VE, thus bleeding the latter rule. There are other cases in OI in which rules apply in bleeding relationships. For example, in the derivation of trjá (Table 5), the Stress Shift rule applies,  and the final double /aa/ is preserved because a stressed vowel does not truncate by Termsync. KSN's algorithm of rule application would require Termsync to apply before Stress Shift, giving the form *trja with a final short a. We see from these examples that insurmountable difficulties arise when the KSN proposals are applied to OI data.

4.6. MUTUAL ANALYSABILITY. Besides the problems discussed above, the KSN proposal raises an additional difficulty. Cases exist in which their proposal is insufficient to predict a correct ordering. We point to such a case in Old English in which two rules are required in Drescher's analysis (1974), each of whose outputs is a potential input to the other. The two rules are Breaking and Umlaut. It can be shown that the verb hliehhan 'laugh' derives from underlying /hlæh+i+an/. The Termsync rule to apply to this form to delete the final vowel of the bisyllabic stem.

\[
\begin{align*}
\text{(31) a. Breaking:} & \quad [x] \rightarrow [ea] / \quad \text{IC} \\
& \quad \text{rC} \\
\text{b. Umlaut:} & \quad [ea, eo] \rightarrow [e] / \quad \text{C}_0 i \\
& \quad \text{c. Gemination:} \quad i \rightarrow \text{C}_x / \quad \text{V C}_x \quad \text{V}
\end{align*}
\]

where \text{C}_x \neq r

\[6 \text{Drescher's treatment extends an in-depth analysis in preparation by S. Jay Keyser. Some preliminary results appear as Keyser 1975.}

\[7 \text{Breaking is not quite as simple as we depict it here; it is probably a diphthongization rule which epenthetically inserts a back syllabic congener between a stressed front vowel and certain following consonants. The Umlaut rule has also been simplified for expository purposes, and a slightly different form of the Gemination rule has been proposed in recent work by Keyser 1974; however, adjustments in these rules would not affect the point being made in this discussion. The examples are from the West Saxon dialect of OE discussed in Brunner 1965.}
We note that the derivation in 32 cannot be handled by KSN’s proposal, since they have no way of specifying that Breaking precedes Umlaut. Underlying /hlæh+i+an/ satisfies the structural descriptions of both Breaking and Umlaut, but both rules cannot apply simultaneously since the results of the two rules are contradictory. Principle 2c, Counterbleeding Precedence, is inapplicable because the output of either rule is an input to the other. Breaking and Umlaut are not mutually feeding in the strict sense, because one rule does not create forms to which the other would not normally have applied. Each rule does, however, have an output which satisfies the structural description of the other. Principle 2b, Proper Inclusion Precedence, is also inapplicable: the structural descriptions of Breaking and Umlaut are disjoint. Thus KSN’s proposal is incapable of predicting the correct order of application. It is a critical fact that the order is not arbitrary, because if Umlaut applied before Breaking, the incorrect *hleohon would result:

| (33) Underlying | /hlæh+i+an/ |
| Umlaut (31b)     | hleih+i+an  |
| Breaking (31a)   | hleoh+i+an  |
| Gemination (31c) | hleoh+h+an  |
| Surface          | *hleohon    |

This example demonstrates that the KSN proposal is descriptively inadequate with respect to rule pairs which are mutually analysable.

5. CONCLUSION. We have demonstrated the descriptive inadequacy of KSN’s proposal on ordering, and have argued that the strong form of the predictive power of their proposal must be satisfied in order to warrant its inclusion in linguistic theory. KSN, however, offer analyses consistent merely with the weak form of the predictive power of their proposal, which is insufficient to justify the inclusion of their proposal in linguistic theory. We have also demonstrated the complete inadequacy of their proposal in handling the phonology of OI. Finally, their proposal suffers an additional lack of descriptive adequacy in that it cannot account for cases in which two rules are mutually analysable.

The major part of our critical evaluation of the KSN proposal has been based on our analysis of OI (1975, ms). We observe that in most derivations the rules do not necessarily stand in direct ordering relationships with all other rules in that derivation. From such an observation about rules, KSN falsely conclude that the simultaneous application of phonological rules can be the general mode of rule application. However, as Table 6 shows, rules stand in relatively intricate indirect ordering relationships with one another. In OI, simultaneous application of a few of the rules is a possible mode of application, but the majority of rules stand in rather strict ordering relationships. Moreover, these ordering relationships violate the KSN principles of ordering (2a–c) in all possible ways, therefore vitiating their
claim to universality. We conclude that any attempt to alter our grammar to conform to the KSN proposal will lead to an unacceptable loss of generality.

A further weakness in KSN's proposal concerns its open-endedness. There is nothing to block the positing of additional principles which might play a role in determining the application of phonological rules; e.g., one could propose a condition of Feeding Order Precedence, or a condition that rules apply so as to be maximally transparent (cf. Kiparsky 1972). KSN are aware, of course, that their conditions must be open to empirical test (cf. their fn. 6); but they do not face the prospect of competing conditions on ordering. In selecting the optimal set of ordering conditions from among the various potentially competing conditions on rule application, we already have an independently motivated principle at our disposal: the evaluation metric. A natural extension of this principle would be:

(34) Select those conditions on ordering which result in the most general grammar (i.e. which do not conflict with the evaluation metric).

We claim that the most general grammar will result when the grammar is not constrained to conform to conditions of any sort imposed to eliminate extrinsic ordering.

Many theoretical claims have been made in the past based on analyses involving just a few rules, sometimes retrieved from widely disparate languages. KSN's proposed conditions on ordering appear possible only because of their very small amount of data and the superficial analyses which they bring to bear. Treatments involving just a few rules—even if taken from various languages—inevitably will be superficial, and will not supply sufficient evidence for claimed universals. The truly significant issues in phonology (and in linguistic theory in general) will become apparent only when in-depth synchronic analyses are undertaken.

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