

DISJUNCTIVE ORDERING IN INFLECTIONAL  
MORPHOLOGY\*

0. INTRODUCTION

One approach of recent work in inflectional morphology (Anderson, 1977, 1982, 1984a, 1984b; cf. also the papers in Thomas-Flinders 1981, as well as Janda 1983 and other sources) has been directed toward developing a view of that domain of grammar which can avoid well-known problems deriving from the notion that words can be exhaustively partitioned into meaningful morphemes. The difficulties posed for that view by such phenomena as infixation, vocalic or consonantal ablaut, grammatically conditioned metathesis and deletion, etc., were already quite clear in American structuralist discussions (e.g., Hockett, 1947), though no real resolution of them (beyond developing a nomenclature for the circumstances in which a morphemic view was evidently untenable) was arrived at. Morpheme-based views fare only a little better<sup>1</sup> under more recent assumptions about the richness of phonological structure, and the alternative 'relation' or 'process' based view, which has

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<sup>1</sup> For instance, McCarthy (1979) and Marantz (1982) show that many, if not all, instances of reduplication can in fact be treated as affixation in a suitably enriched view of the phonological structure of morphological elements. Outside of reduplication, however, the attempt of McCarthy (1984) to reduce all of the classical problem cases to affixation remains a program rather than an established result. Needless to say (I hope), there are still many aspects of the present program as well which remain to be substantiated. The fact remains, however, that 'morpheme-based' views, whatever their success in particular areas (such as Semitic verbal morphology and most cases of reduplication) have not fully responded to the challenge posed, e.g., in Matthews (1972) as well as later work. It would naturally be of great interest if the restrictions implicit in the classical morpheme were to turn out to be consistent with word structure in all languages, though I have argued elsewhere (Anderson, 1984a) that this view is not a necessary one but rather a (far-reaching) consequence of a logical error in the interpretation of the views of early workers in the field. In the present state of our knowledge, the 'process' or 'relation-based' view of morphological structure advocated here seems at minimum worthy of further investigation.

come to be known as Extended Word and Paradigm (EWP) morphology, is intended to provide a fundamental re-orientation for morphological description.

In inflection, it seems useful to separate the categories expressed by an inflected form from the formal markers it contains which reflect those categories. Once this is done, the notion of the morphology as an inventory of meaningful morphemes (each one composed of a specific formative and its associated meaning) which are concatenated to produce a complex form can be replaced by a system of rules. Each of these rules operates on an ordered pair consisting of a stem  $\mathcal{S}$  and its associated morpho-lexical representation<sup>2</sup>  $\mathcal{M}$ , modifying them in some systematic fashion:

$$(1) \quad (\mathcal{S}, \mathcal{M}) \Rightarrow (\mathcal{S}', \mathcal{M}')$$

For example this way of construing morphological markers replaces a lexically listed English plural formative  $\{-z\}$  with the following rule:

$$(2) \quad [+Plural] \\ /X/ \rightarrow /X + z/ \text{ (e.g., /bɔj/} \rightarrow \text{/bɔj} + z\text{)}$$

The modifications performed by such a rule can include changes in the stem such as affixation, ablaut changes, deletions, metatheses, etc. Naturally one hopes that the precise expressive power of such changes can be appropriately constrained; but at least at present it does not appear that a narrow condition allowing only affixation is adequate to accommodate all of the phenomena of natural language morphology.

In addition to allowing changes in the stem (corresponding to the formal markers of inflectional categories), the rule format suggested here also admits the possibility of rules which modify the internal structure of the morpholexical representation itself. This possibility will not be relevant to the present paper; however, see Anderson (1977, 1984b) for some examples of the application of this notion in Algonquian and Georgian, respectively.

The question that must be asked, of course, is whether such a replacement of the morpheme-based view by a rule-based one has any advantages beyond the resolution of the problems which originally provided its motivation. Does it, in particular, raise any new sorts of

<sup>2</sup> This is a complex symbol indicating the inflectional categories expressed by the form in question. While most morphosyntactic representations are simply unordered feature complexes after the model of the terminal symbol in phrase markers in Chomsky (1965), others display significant internal structure. See the references above for further discussion of this point.

questions we might not have thought about otherwise, or suggest new ways to approach other problems that seem intractable on other views? The point of the present paper is to argue that such benefits do indeed result from the re-orientation of morphological views represented by the EWP framework.

One example of a benefit that this theoretical picture might yield, at least potentially, derives from the fact that rules as we know them in other domains typically interact in highly structured ways which have been the object of intensive study over a number of years. An inventory of items (such as the traditional list of a language's stock of inflectional morphemes) has no particular motivated structure: we can of course impose such structure (perhaps in the form of a tree-like organization), but the point is that we have no independent reason to expect it to take one shape rather than another. If the morphology is described by a system of rules, however, we should expect the interactions of those rules (and thus much of the structure of the morphological description) to follow the lines of rule interactions in other areas of grammar, where generally valid principles can be suggested.

Construing inflectional systems as sets of rules suggests that some problems in morphological structure can be approached from the standpoint of rule-ordering. We mean to argue here that this is a productive move: we will find that some established results in the study of rule interaction transfer from other domains (especially phonology) into the new one.

A central concept in the study of rule ordering is that of the disjunctive application of rules: a term used to describe a situation in which the application of one rule systematically precludes the later application of some other rule whose structural description is in fact met, and which would therefore be expected to apply. Dating from an important early paper by Chomsky (1967) and the framework of Chomsky and Halle (1968), such disjunctive relations have played a central role in phonological research. As we will see below, the same principle(s) that appear to occupy this central place in phonological theory also transfer in interesting ways to morphology, though they do not exhaust the facts of disjunctive relations in this domain.

The theory of morphological disjunction assumed here has two parts. One of these is particular to morphology rather than deriving from elsewhere:

- (3) Rules may be organized (by stipulation) into disjunctive blocks, corresponding (roughly) to the traditional notion of *position class*.

Such a block of (descriptively adjacent) rules are explicitly stipulated, as part of the language-particular description, to apply disjunctively. As noted, this use of disjunction is intended to reconstruct (what is correct about) the traditional notion of position classes: a set of formatives which are not incompatible with one another for any independent reason, but which effectively 'compete' with one another for a particular space in a form. The descriptive coverage of the device of stipulated disjunction is not identical with that of structural position classes<sup>3</sup>, but the two are close enough to be treated as equivalent for present purposes.

The second (and probably more interesting) part of the theory of disjunctive ordering assumed here is a condition due originally to Pāṇini. As a component of a theory of phonological structure, this notion was revived in Anderson (1969), and is now generally known by the name given it in Kiparsky (1973), the "Elsewhere Condition". The content of this condition is the claim that whenever one rule is *more specific* than another in the sense that the forms subject to the first constitute a proper subset of those subject to the second, the application of the more specific rule precludes the later application of the more general, less specific one. As applied to morphology, this can be interpreted as mandating three sorts of circumstance in which rules are to be construed disjunctively:

- (4) i. Rules that specify the realization of some set of features in  $\mathcal{M}$  prevent the later application of other rules whose SD's refer to a proper subset of those features.
- ii. Stems that are lexically characterized for some set of features block the operation of rules specifying a (non-null) subset of those same features.
- iii. When the dictionary entry for an item contains more than one stem, only the most specifically characterized one (consistent with the requirements of  $\mathcal{M}$ ) can be inserted as  $\mathcal{E}$ .

Of these conditions, (4i) describes a disjunctive relation between two rules of the grammar; (4ii) a relation between a lexically idiosyncratic

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<sup>3</sup> For instance, of two descriptively adjacent rules, one might be a rule of prefixation and the other of suffixation. Such rules could potentially be stipulated to be disjunctive on the present approach, giving complementarity between structurally non-equivalent forms, which is obviously impossible within the theory of position classes. It is clear that some examples require complementarity between members of different position classes, but the exact scope of this phenomenon has not been studied extensively enough to allow us to say anything substantive here about whether the relaxation of position-class theory implicit in the present view is appropriate and/or sufficient to cover all such facts.

stem and a rule that would specify the features this stem already signals; and (4iii) a relation between two stems that are part of the same paradigm (but one of which is specifically associated with certain features while the other is more general or 'unmarked' for those features).

While it is important to emphasize that all three of the conditions in (4) are essential components of the morphological notion of disjunctive ordering, it is clear that all three are actually instantiations of the same notion. One might argue, in fact, that all of the sub-cases of (4) are merely the morphology-specific realizations of a more basic, general cognitive condition giving priority to specific processes over more general ones which they include. Such a line is taken by Kiparsky (1982b), for example, who suggests that morphological disjunction can be reduced to a semantic phenomenon of 'blocking' which also encompasses the fact that ordinarily syntactic paraphrases of lexical forms are disallowed (e.g., \**the day after today*, vs. *tomorrow*).<sup>4</sup> A more general cognitive principle may well underlie disjunctive relations in a number of distinct domains, but it is unlikely that the content of its specific instantiations in various areas of grammar can be exhaustively reduced to the general principle alone. The relation between such a putative general principle and individual grammatical phenomena seems analogous to the undoubted connection that exists between phonetic 'explanations' and the supposedly 'natural' phonological rules they underlie.<sup>5</sup> We will also argue below that blocking the insertion of morphological material on the basis of a principle based on synonymy is not adequate to account for all such relations in inflectional morphology.

The remainder of this paper will examine the role of conditions (3-4) in inflection. Section 1 examines a particular example, in which the assumption that inflectional morphology is described by a system of rules subject to (3-4) rather than being an inventory of meaningful morphemes brings order and coherence to a set of facts that is otherwise of bewildering complexity. Section 2 then poses two sets of apparent problems for the disjunctive ordering conditions (and for (4) in particular): cases in which regular morphology is apparently added to lexically idiosyncratic

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<sup>4</sup> Notice, however, that such a principle has very different status from the morphological and phonological notions of disjunction. This is shown by the fact that, while disfavored, syntactic paraphrases are not absolutely disallowed (as shown trivially by the possibility of dictionary definitions, paraphrases, and repetitious redundancies), while the mutual exclusion of phonological and morphological rules, where it is required by conditions such as (3) and (4), is essentially absolute.

<sup>5</sup> See Anderson (1981) for some discussion of the nature of the relation between language-specific phonological rules and the phonetic processes to which they are (often distantly) related.

stems in violation of (4ii), and cases in which the disjunctiveness of a relation between two aspects of the morphology is apparently subject to historical change, in violation of the claim that disjunctive ordering is due to general principles of the theory rather than language-particular conditions. In section 3, we show that in each case the apparent problem for the theory of disjunctive ordering dissolves upon closer investigation. More interestingly, the solution in each case has some independent interest and might not have been arrived at without the particular stimulus of the theoretical issue at stake here.

### 1. THE ANALYSIS OF GEORGIAN -t

We proceed now to analyze a particular set of data concerning an apparently unitary formative in Georgian. This element, which appears on the ends of verbs, has the surface form *-t*. Notice in particular that this element poses no problem whatsoever for segmentation: it has a clear and distinct form, and does not involve any of the sorts of 'non-concatenative' morphology that provide the original motivations for the EWP framework.

The first set of forms to examine in connection with this element is as follows:

- |       |                |          |                  |               |
|-------|----------------|----------|------------------|---------------|
| (5)a. | v- <i>klav</i> | I kill   | v- <i>klav-t</i> | we kill       |
| b.    | <i>klav</i>    | you kill | <i>klav-t</i>    | you (pl) kill |
| c.    | <i>klav-s</i>  | he kills | <i>klav-en</i>   | they kill     |

Comparing the first with the third column in these forms, we can see that *-t* occurs when the subject is plural, and either first or second person. In each case, it constitutes the minimal difference between such forms and those in which the subject is singular. We might thus propose that the gloss (or inflectional 'meaning') of *-t* is 'first or second person plural subject'.

Moving on to the additional forms in (6) below, we can consider the general properties of verbal inflection in Georgian:

- |       |                  |                     |
|-------|------------------|---------------------|
| (6)a. | m- <i>klav</i>   | 'you (sg) kill me'  |
| b.    | g- <i>klav</i>   | 'I kill you (sg)'   |
| c.    | m- <i>klav-s</i> | 'he kills me'       |
| d.    | g- <i>klav-s</i> | 'he kills you (sg)' |

From these forms, we can see that Georgian verbs contain both prefixes and suffixes marking person and number of both the subject and the object (as well as an indirect object, if one is present). In (5a), we

have already seen a prefix **v-** marking first person subjects. No overt prefix marks second person subjects, as we see from (5b). In (6a, c), on the other hand, we find a marker **m-** that indicates first person singular objects, while (6b, d) contain a marker **g-** for second person objects. Among suffixes, we have thus far seen an element **-s** that marks (present tense) third singular subjects and an element **-en** for (present tense) third plural subjects, as well as the **-t** element we are concerned with here.

The evidence thus suggests that the Georgian verb contains a prefix position and a suffix position, each of which may be filled by one of several possible elements. Within the prefix position, the following rules<sup>6</sup> might be suggested:

(7)	[... [+me, +sg]]	[... [+you, +sg]]	[+me([...])]
	/X/ → /m + X/	/X/ → /g + X/	/X/ → /v + X/
	<b>m-rule</b>	<b>g-rule</b>	<b>v-rule</b>

If these rules indeed specify a single prefix position, they should constitute a disjunctive block under the terms of (3) above. This should have the effect of allowing at most one of them to apply. In order to examine this possibility, we need to consider a form in which more than one would potentially be applicable: that is, a form with first person subject and either first or second person object. When both subject and object are first (or both second) person, the syntax of the language<sup>7</sup> mandates that the direct object NP be instantiated by a reflexive pronoun which is morphologically a third person form: as a result, the only relevant form for our purposes would be one with the morphosyntactic representation [+me[+you]] (i.e., with first person subject and second person object).

When we examine such a form as (6b), which meets this condition, we see that instead of the combination of **v-** and **g-** which we might expect, only the **g-** appears. In many traditional descriptions, this phenomenon is attributed (explicitly or implicitly) to a quasi-phonological reduction: the morphology specifies both **v-** and **g-** for such forms, and this combination is then reduced to /g/ alone. Such an account has very little plausibility from a phonological point of view, however. Georgian is a language which tolerates consonant clusters of quite impressive complexity, and

<sup>6</sup> The format of these rules follows that of Anderson (1977, 1982, 1984b) and other papers. Note that the layers of bracketing in morphosyntactic representations represent as hierarchical structure the difference among various argument types (subject, direct object, indirect object) that can trigger potentially distinct markers. Nothing in the present paper depends critically on this specific mode of representation, however.

<sup>7</sup> See Harris (1981) and Anderson (1984b) for discussion.

there is no reason whatsoever to expect either the sequence /gv/ or the reverse sequence /vg/ to be reduced. Indeed, the sequence /gv/ is precisely the phonetic content of another marker in the system (cf. (11) below). Further, the first person subject marker **v-** occurs quite happily with **g-** initial verbs (e.g., **ga-v-gzavni** 'I will send it'), as does second person object marking **g-** with **v-** initial verbs (e.g., **g-vneb-s** 'it is harmful to you'). The reduction in question thus cannot be other than morphological in character. The disjunctive organization of the prefix rules following (3) describes this situation quite precisely, without invoking otherwise unmotivated deletions: it is simply the case that the formal markers **v-** and **g-** are mutually exclusive by virtue of their 'competition' for the same formal position, a relationship which is expressed in precise terms as one of disjunctive application of the **v-** rule and the **g-** rule in (7) above (where the **g-** rule comes first and thus takes priority).

Continuing to explore the content of the formative **-t**, we can now add the forms in (8) to the partial paradigm developed thus far:

- (8)a. **g-klav-t** 'I kill you (pl)'  
 b. **g-klav-t** 'he kills you (pl)'

Two facts are evident from these forms. First, (8) shows that in addition to marking plurality of a first or second person subject as we saw above, **-t** also marks plurality of a second person object. Secondly, we can see that the suffix **-t** blocks the otherwise expected appearance of the suffix **-s** marking third person singular subject, as in (5c), (6c, d). Apparently, then, the **t-** rule and the **s-** rule should be organized as parts of a single disjunctive suffix position block, parallel to the relation between the **v-** rule and the **g-** rule, with the **t-** rule taking precedence over the **s-** rule.

Consider now the following forms:

- (9)a. **g-klav-en** 'they kill you (sg or pl)'  
 b. **g-klav-t** 'we kill you (sg or pl)'  
 c. **mo-g-klav-es** 'they killed you (sg or pl)'

These forms establish some further points about the organization of Georgian verbal inflection. First of all, since (9a) can refer to either a singular or a plural second person object, we conclude that the **en-** rule introducing the third person plural suffix **-en** belongs to the same disjunctive block as the **s-** rule and the **t-** rule, and in particular that it takes precedence over the **t-** rule within that block. Form (9c) illustrates the rule introducing **-es** in certain third person plural subject aorist forms. This **-es** rule has the same status as the **-en** rule in this block, and also takes

precedence over the **-s** and **-t** rules; more interestingly, it shows that the absence of /s/ in forms like (8b) must be a morphological rather than a phonological fact. In both (8b) and (9c), that is, we would expect the normal rules to lead to a sequence /st/: in (8b), only the /t/ appears, while in (9c) only the /s/ does. Evidently there is no phonological rule at work in reducing such final clusters. An essentially minimal pair with (9c) is furnished by the form in (10b):

- (10)a. mo-g-c-e-s 'let him give it to you(sg)'  
 b. mo-g-c-e-t 'let him give it to you(pl)'

In these optative forms, the sequence /es/ represents the optative marker followed by the basic third singular marker **-s** already familiar from forms like (5c) and others. Notice that this **-s**, like that of (8b), is superseded by the plural marker **-t** in (10b); while in the essentially similar form (9c), it is the **-t** which is omitted. This is because, while the **-s** of (10a) is introduced by a rule subordinate to the **t**-rule, that of (9c) is due to the **es**-rule which itself takes precedence over the **t**-rule.

A final aspect of the rule system which we can infer from the forms presented thus far concerns the case in which more than one application of the **t**-rule would apparently be motivated. Form (9b), for example, can mean 'we kill you (pl)', in which case we would expect one **-t** due to the first person plural subject and another due to the second person plural object. The fact that only one **-t** occurs cannot, again, be due to phonological reasons: verbs ending in the segment /t/ suffix another **-t** where required. Rather, the absence of two **t**'s in (9b) and other such forms must be due to the organization of the rules.

As we have seen, plurality of a first or second person subject or of a second person object is marked by the same morphology as for the corresponding singulars, with the addition of a final /-t/. In the case of a first person plural object, however, we do not find the combination **m...-t** as we might expect by analogy with these cases. Rather, we find the unitary marker **gv-**:

- (11)a. gv-klav 'you (sg) kill us'  
 b. gv-klav-s 'he kills us'  
 c. gv-klav-t 'you (pl) kill us'  
 d. gv-klav-en 'they kill us'

Importantly, plurality of the argument marked by **gv-** is not (also) indicated by a final /t/. We might attempt to explain this fact along the lines of the instances of mutual exclusion of formatives that we have seen above (e.g., the fact that the **v**-rule and the **g**-rule never apply together

in a single form by virtue of their belonging to the same disjunctive block), but this account cannot be correct: (11c), for example, shows that the **gv**-rule and the **t**-rule can perfectly well apply together. The fact is simply that the **t**-rule does not apply to mark plurality of the object argument which is marked by the **gv**-rule. In the context of the present theory, however, there is a direct account of the non-occurrence of **-t** in conjunction with **gv**-. The **gv**-rule applies specifically to mark a first person plural object argument, while the **t**-rule (if it were to include this case) applies to mark a non-third person argument whether subject or object. Clearly the **gv**-rule is more specific than the **t**-rule (in the terms of condition (4i) above), and thus the operation of the former excludes the latter by disjunctive ordering.

Before presenting a final analysis of the facts of Georgian **-t**, we consider one additional set of facts:

- (12)a. mo-u-klav-s    '(apparently) he has killed him/them'  
 b. mo-u-klav-t    '(apparently) they have killed him/them'

Up to this point, we have seen that **-t** marks the plurality of a first or second person argument (except where blocked, e.g., by the **gv**-rule). In (12b), however, the final **-t** marks plurality of a *third* person subject argument. Note, in contrast, that the ambiguity of (12a) shows /t/ does not function to indicate plurality of a third person object argument. We cannot appeal to disjunction here, since we already know (and see further from (12b)) that it is the **t**-rule which takes precedence over the **s**-rule. There must be some other reason that the **t**-rule does not apply in (12a).

The forms in (12) illustrate the so-called "inversion" construction in Georgian. Without going into the syntax and morphology of this construction further here,<sup>8</sup> we note that in such forms the syntactic (and notional) subject is indicated by the markers that serve elsewhere to characterize indirect objects, while the syntactic (and notional) direct object is indicated by morphological means otherwise used for subjects. The prefix **u-** in both forms in (12) is thus an 'indirect object marker' used in agreement with the subject of an inversion construction, and the /t/ in (12b) is determined by the same argument as this **u-**.

This situation is doubly anomalous: first of all, plurality of third person subjects is normally indicated by a specific marker (such as **-en** in (5c), **-es** in (9c), etc.), rather than by the more general pluralizer **-t**; and secondly, the plurality of third person arguments marked by indirect object mor-

<sup>8</sup> See Harris (1981) and Anderson (1984b) for details and discussion.

phology is never indicated except in the inversion construction. This latter fact seems properly to be attributed to the agreement rule itself: it copies the feature [+plural] onto the verb only in association with (a) non-third person NPs, or (b) subjects. This complexity must inevitably be located somewhere in the grammar, and the agreement rule seems a plausible locus for it since there are several other peculiarities of third person plural agreement: it only occurs with animates, for example, and only with NPs not containing an overt quantifier.<sup>9</sup>

It appears, in fact, that the *-t* in inverted forms like (12b) actually represents the way the inflectional system of Georgian deals with a limited lacuna in its formal expressive apparatus. On the one hand, the subject of such a verb form is syntactically a *subject* (cf. Anderson, 1984b), and thus should be able to show number agreement; but on the other, the formal apparatus of subject agreement in the inversion construction is the set of indirect object markers, and third person indirect objects systematically fail to show plural agreement. What happens is that no specific marker of plurality is available from the relevant series of markers, and the subject markers (where distinct third person plural forms are systematically present) cannot be used; so the marker *-t*, which indicates plurality under a variety of other circumstances, is pressed into service.

To summarize, the plural marker *-t* occurs in Georgian verbs to mark the following argument types.<sup>10</sup>

- (13)a. first, second person plural non-inverted Subjects
- b. second person plural non-inverted Direct or Indirect Object
- c. second, third person plural inverted Subject
- d. first, second person plural inverted Direct Object

Suppose we were to attempt to define {-t} as a classical morpheme. In that case, its 'inflectional meaning' would be the collection of possibilities in (13). In addition, we would have to say that, while {-t} is normally realized as /t/, there are various circumstances under which it or an adjacent morpheme is realized as  $\emptyset$  instead:

- (14)a. {-t} =  $\emptyset$  / \_\_\_ {-t}
- b. {-t} =  $\emptyset$  / \_\_\_ {-es}, {-en}, ... (including other 3pl subject markers)
- c. {-s} =  $\emptyset$  / \_\_\_ {-t}

<sup>9</sup> For further details, see descriptive treatments such as Aronson (1982).

<sup>10</sup> Not all of the possibilities listed here have been directly instantiated above, but all are real and implicit in what has been said about *-t*.

All of this apparatus is apparently needed to describe the behavior of {-t} on the assumption that it is a concatenative morpheme of the standard sort, which combines with others into a complex form and contributes simultaneously to the form and the meaning of the whole. In contrast, we submit that on the view of disjunctive ordering represented by ((3), (4)) above, the only principle specific to the description of this formative is:

$$(15) \quad [ \dots + \text{plural} \dots ] \\ /X/ \rightarrow /X + t/$$

In other words, {-t} is simply a perfectly general marker of the presence of a plural argument. The resulting system of rules for person/number marking in Georgian is summarized in Table I below, where each of the two rule blocks is internally disjunctive, with earlier rules in a block taking precedence over later rules:

TABLE I

Prefix rule block:	<b>gv-rule</b>	$/X/ \rightarrow /gv + X/$	for [[... +me, +pl...]]
	<b>g-rule</b>	$/X/ \rightarrow /g + X/$	for [[... +you...]]
	<b>m-rule</b>	$/X/ \rightarrow /m + X/$	for [[... +me...]]
	<b>v-rule</b>	$/X/ \rightarrow /v + X/$	for [+me...]
Suffix rule block:	<b>en-rule</b>	$/X/ \rightarrow /X + en/$	for [-me, -you, +pl...] <sup>11</sup>
	<b>es-rule</b>	$/X/ \rightarrow /X + es/$	for [-me, -you, +pl...]
	<b>t-rule</b>	$/X/ \rightarrow /X + t/$	for [... +pl...]
	<b>s-rule</b>	$/X/ \rightarrow /X + s/$	for [-me, -you[...]] <sup>12</sup>

On this account, we might expect to find exactly as many instances of /t/ in a form as there were plural arguments, which is not the case. All of the deviations from this state have an explanation, however. Let us take the sub-cases defined by (13) as a starting point. For *non-inverted subjects*, the absence of -t in the third person (13a) follows from the fact that for any particular tense/aspect form, a specific third person plural

<sup>11</sup> This rule, the following one, and other rules mark 3pl subjects under various combinations of tense, aspect, and verb class. Since these conditions (which are not directly relevant to our concerns here) are mutually exclusive, at most one 3pl subject marking rule will be applicable to any given form.

<sup>12</sup> This rule marks third person (singular) subjects of 'inflectionally transitive' verbs in some but not all tense/aspect combinations. Other rules mark 3sg subjects under other circumstances, which (as in the case of the 3pl subject markers referred to in the previous note) do not concern us here. For some further discussion, see Anderson (1948b), Aronson (1982).

subject marker is available, and the appearance of such a marker precludes the more general marker **-t** by (4a) – the basic ‘elsewhere’ case. In the case of *non-inverted objects*, (13b), the absence of **-t** when such a NP is third person follows from the fact, noted above, that the agreement rule never induces plural agreement with third-person non-subjects. In the case of *first person plural objects*, the specific marker **gv-** again precludes the appearance of **-t** by (4a). In the case of *inverted plural subjects*, the specific marker **gv-** for the first person (an object marker, but here used in agreement with a syntactic subject) again blocks **-t** by (4a), while **-t** is otherwise allowed to mark any plural NP, as in (13c). Note in particular that the otherwise quite remarkable appearance of **-t** in third person inverted forms follows directly, on the assumptions adopted here. Finally, in the case of *inverted direct objects*, **-t** occurs with non-third person NPs as indicated in (13d), but neither it nor any of the specialized third person ‘subject’ markers can appear, since non-subject third person NPs do not trigger plural agreement (as remarked above).

Turning to the conditions on the realization of **-t** in (14), we can again account for them in terms of the organization of the grammar. The failure of more than one **-t** to occur in any given form (14a) follows from the fact that (15) is after all only a single rule: it suffixes a **-t** to a form if that form agrees with a plural argument (subject to the other conditions under discussion here), but there is no reason a priori to expect it to apply more than once no matter how many such arguments may be present. There is thus no need to say anything about the failure of multiple **-ts** to occur: this follows from the absence of multiple **t**-rules, unless some principle explicitly allowed the single rule (15) to re-apply.<sup>13</sup> The failure of **-t** to appear with **-es**, **-en**, etc., on the other hand, as noted in (14b), follows from the fact that all of these rules constitute a single block of suffixes which are disjunctively ordered by stipulation (as admitted by (3) above). The **s**-rule forms a part of the same block, as seen in (14c), but this rule is subordinate to the **t**-rule (as well as to all of the others in the block).

We can observe that the role of disjunction in blocking the appearance of certain formatives (especially {-t}) cannot be comprehensively sup-

<sup>13</sup> In derivation, of course, the same process may be able to apply more than once if a cyclic derivation of forms from already-derived forms is allowed (as it must be in some languages). In inflection, the corresponding circumstance would be presented by a form marked for some inflectional category, and then inflected again for the same category. A Georgian example is the form **bavšv-eb-is-eb-it** ‘with the ones of the children’, which is inflected first as a genitive plural of **bavšvi** ‘child’, and then again as an instrumental plural of (the empty nominal head of the NP whose only overt material is) this modifying element. Such instances of ‘multiple inflection’ are quite distinct from the basic case where the inflection of (e.g.) a transitive verb reflects more than one argument.

planted by a principle of 'semantic blocking' that prevents the occurrence of an element whose meaning is already encompassed by form as developed at earlier stages of its morphology. This principle (whose application to inflectional morphology is a way of expressing (4) above) would correctly prevent {-t} from appearing to mark plurality of a first person plural object already marked by {gv-}, for example; but it would have nothing to say about the failure of {-t} to appear to mark plurality of the object of a verb whose subject is marked by one of the 3pl suffixes ({-es}, {-en}, etc.), or about the failure of more than one {-t} to occur in a given form regardless of how many plural arguments it has, or about the failure of {-s} to occur in forms containing a {-t}. In such cases, the meaning of the missing element is in no way implicit in the form without it.

The complexities of meaning and distribution of the Georgian formative {-t} find a straightforward and elegant resolution on the theory of morphological structure advocated here. Assuming that morphological operations have the character of rules, and that principles of disjunctive ordering such as (3) and (4) govern the application of such rules, the otherwise baroque complexity of (13) and (14) is reduced to the simple statement in (15). As the primary function of a theoretical framework is to allow us to understand the nature of the facts, bringing order and coherence to them, this sort of demonstration constitutes an important argument in favor of such a view.

## 2. SOME PROBLEMS FOR THE THEORY

While the approach to disjunctive ordering outlined above has manifest advantages in dealing with a range of problems, it is not at all uncontroversial. The extension of conditions such as (3) and (4) to a comprehensive account of relations of mutual exclusion within (at least a well-defined subdomain of) word-formation processes faces a number of *prima facie* counterexamples. Partly on the basis of apparent problems with the applicability of formal conditions such as ((3), (4)), some investigators have sought different accounts of mutual exclusion among morphological rules. In the development of the theory of Lexical Phonology, for example, the first substantial statement of the theory (Kiparsky, 1982a) made extensive use of a view of disjunctive ordering quite similar to that espoused here. In later work, however (Kiparsky, 1982b), such a condition was replaced by an appeal to a semantically based notion of blocking. While there is by now little doubt that such a principle plays an important role in the description of derivational

morphology, it is not obvious that it can completely replace the more formal conditions of ((3), (4)) in the domain of inflection.

Dardis and Janda (1983), while maintaining a view of morphology similar to that taken here, surveyed a wide range of cases that appear to motivate formal principles of disjunctive ordering both in phonology and in morphology, and concluded that (a) few if any cases exist which require the positing of principles like (4) in either domain, though some possible cases motivating a condition similar to (4ii, iii) may possibly be valid; and (b) that a number of counter-examples to (4), and especially to (4i) show that (4) is probably too general. While we cannot review all of the numerous examples they discuss, we hope that the role of (4i) in the analysis of Georgian *-t* developed in the previous section will be seen to support the assumption of such a condition. Further, a number of the apparent counter-examples which they raise are similar or identical to problems treated below. There seem good reasons to anticipate that comparable answers could be developed for the remainder of Dardis and Janda's reservations about (4).

Among the problems that might appear to motivate an abandonment of ((3), (4)), we survey two classes below. The first of these are examples in which a lexically specified marker of an inflectional category does not appear to block the later application of a productive inflectional rule, as would be predicted by (4ii); these pose an obvious and direct challenge to the correctness of this condition. Second, we consider examples in which precisely the disjunctiveness of the relationship between two rules appears to be subject to historical change. Evidently, if disjunctiveness follows (at least under the conditions of (4)) from general principles of linguistic theory, it should not be possible for such a change to occur (short of a genetic mutation affecting the human language faculty!).

### 2.1. *Apparent Additions of Regular Morphology to Irregular Stems*

Condition (4ii) above requires that a stem already marked (as a lexical property) for some category or set of categories not undergo further rules marking only a subset of the same features. In various languages, however, the morphology of at least some irregular forms appears to include the regular morphology as a proper sub-part, in a way that would seem to be inconsistent with this requirement. If such cases indeed exist, the condition must either be abandoned or re-formulated.

An example which comes readily to mind in this connection is the class of 'mixed verbs' in German. These verbs form a category which seems intermediate between the true strong verbs (which form their preterite

and past participle by Ablaut) and the weak verbs (which form these stems by suffixation of a /t/, without stem change). The mixed verbs, like the strong class, show a change in stem between the present stem and other forms; but they also resemble the weak verbs in suffixing /t/:

(16)	bringen	brachte	gebracht	'bring'
	wenden	wandte	gewandt	'turn'
	wißen	wußte	gewußt	'know'

The rules involved in forming the weak verbs appear to be the following:<sup>14</sup>

(17) a. [+Past]	b. [+Pret]	c. [+PPart]
/X/ → /X + t/	/X/ → /X + ə/	/X/ → /ge + X/

If we make the usual assumption that the stem changes in strong verbs are in fact lexically marked, the stem occurring in the preterite and past participle of 'mixed' verbs might be taken to be characterized as [+Past]. If that is the case, however, rule (17a) ought not to be applicable to it, assuming the validity of condition (4ii).

This example is actually typical of a range of cases which appear to involve 'double marking' for some inflectional category. Another instance is furnished by the occurrence in Breton of a substantial number of 'double plurals', such as **lerner** 'foxes' or **merc'hedou** 'girls'. The corresponding singulars **louarn** 'fox' and **marc'h** 'girl' can be pluralized by unproductive, lexically idiosyncratic stem changes as **lern** and **merc'h**: **lerner** and **merc'hedou** appear to represent the cumulation of this lexically marked pluralization with the regular, more or less productive suffixes **-ed** and **-ou**. Again, condition (4ii) would seem to rule out the application of regular rules such as those suffixing **-ed** and **-ou** to stems that are already listed as [+plural].

In addition to 'double marking' cases from various languages, such as those just cited, a similar phenomenon can also be found in language development. As is well-known, forms such as *feets* and *wented* are attested in the speech of many children learning English. Such forms appear to involve the suffixation of regular endings for the plural of

<sup>14</sup> The account here assumes without argument that the /t/ found in preterite forms is the same as the /t/ found in past participles, and that the two forms share a feature [+past]. This aspect of the analysis is not a necessary one, and alternatives to the specific rules in (17) could be developed on other assumptions. This point does not, however, appear to affect the questions under discussion here.

nouns and the past tense of verbs to lexically irregular stems that already encode these categories. Though these forms are generally eliminated as the child's language attains to the adult standard, their appearance is if anything even more problematic than the cases surveyed above. After all, forms such as the German mixed verbs or the Breton double plurals might simply be learned as wholes rather than representing the application of regular affixation to irregular stems, and thus present only apparent counter-examples to a principle like (4ii). The appearance of forms like *feets* and *wented* in child language, however, is clearly an instance of spontaneous creation rather than the memorization of learned forms. If language learners spontaneously allow regular affixation to apply to lexically marked stems in violation of (4ii), the latter surely cannot be a principle of universal grammar.

## 2.2. *Apparent Historical Changes in Disjunctiveness Between Rules*

In principle, relations of mutual exclusion among rules ought to be changeable over time only insofar as they constitute a language-particular aspect of the structure of grammars. In that connection, disjunctive relations corresponding to principle (3) above – position-class phenomena – ought to be subject to alteration in historical change, but not those due to (4) – ‘elsewhere’ phenomena. Nonetheless, in some attested historical changes, a disjunctive relation of the latter sort seems to be precisely the locus of change.

One such example is furnished by facts in the history of Swedish.<sup>15</sup> Consider the following partial paradigm of the Noun **hårr** ‘gentleman’ in early Old Swedish and its reflex at a later stage of the language:

- (18) Nsg *hårr* > *hårr*  
 Gsg *hårrs* > *hårrs*  
 Gpl *hårra* > ***hårras***

In addition to these forms, there were also distinct forms for the accusative singular and plural, the nominative plural, and the dative singular and plural. The change involved, attested in relatively few Nouns and for a relatively short period in the history of the language, involved the replacement of the genitive plural in *-a*, as on the left in (18), by one in *-as*, as on the right.

<sup>15</sup> These facts, based on Wessén (1965) were originally brought into the discussion of morphological theory by Wurzel (1975). They were cited by Anderson (1977) precisely as evidence that disjunctive relations are subject to change over time. *Mea culpa*.

The rules involved in forming the genitive at the earlier stage, represented by the left hand column, seem to have been the following:

- (19) a. [+Gen, +Pl]      b. [+Gen]  
       /X/ → /X + a/      /X/ → /X + s/

Given condition (4i), rule (19b) does not have to be explicitly restricted to the singular, since a genitive plural will already have undergone (19a) which will block the more general rule from applying. What appears to have happened in the transition from the left hand column in (18) to the right hand column, however, is precisely that this disjunctive relation has been eliminated: The general s-rule for genitives seems to be extended from singulars only to apply also to genitive plurals – which have already been marked as genitive plurals by (19a). Clearly if (4i) is correct, the disjunctive relation between the rules of (19) which is exemplified by the forms in the left column in (18) ought to be general, and not subject to change into the sort of relation that could yield the forms in the right column.

Relations of disjunction described by (4), ascribed to universal convention, ought not to be subject to change at all in the histories of individual languages. Relations of the sort described by (3), stipulated on a language-particular basis, might on the other hand be subject to change, but such change ought nonetheless to have a particular character: insofar as such a disjunctive relation is a relation between rules, a change ought to affect all of the forms to which the rules in question apply. Any such shift in stipulated disjunction should thus be general across the language, rather than proceeding on a lexical-item-by-lexical-item basis.

A class of cases which we can refer to as instances of Kuryłowicz' First Law of Analogy,<sup>16</sup> however, seem to contravene this claim. Kuryłowicz claims that "A bi-partite morpheme tends to assimilate an isofunctional morpheme consisting of only one of its parts." The substance of this claim relates to a situation in which a language provides two ways of marking the same category (two 'iso-functional' morphemes), with the property that one consists of the other plus an additional mark. The prediction of the claim is that lexical items bearing only the simple marker will, over time, come to acquire the more complex combination marker.

An example of this phenomenon is provided by the marking of

<sup>16</sup> See Kuryłowicz (1949) for discussion of this and other 'analogical' principles of historical change.

plurality in German Nouns. Originally, many Nouns bore vocalic suffixes in the plural, most of which were subsequently reduced to **-e** (/ə/). Insofar as the reduced vowel represented an original high front vowel, however, it was capable of causing Umlaut of the stem vowel. As a result of these changes, some Nouns came to be marked for plurality by the suffix **-e** alone, while others showed an umlauted stem vowel as well as bearing the suffix. The two markers, **-e** alone and **-e** plus umlaut thus meet Kuryłowicz' condition: they are isofunctional, and one is bi-partite while the other consists of only one of the parts. As Kuryłowicz predicts, the simple marker tends to be replaced by the bipartite one: nouns such as **Baum** 'tree' that originally formed their plural by suffixation alone (**Baume**) came to have umlaut as well (giving modern **Bäume**), while the reverse development does not occur.

The problem posed by this example in the present context is that this development is very much specific to individual lexical items. Some German Nouns continue to form their plurals by suffixed **-e** alone (e.g., **Arm/Arme** 'arm(s)'), while many that originally did not have Umlaut now do. It would appear that the following development has taken place: there are two rules of plural formation in German, **e**-suffixation and Umlaut.<sup>17</sup> For Nouns like **Arm/Arme**, these are disjunctive, with the suffixation rule precluding Umlaut. For others, like **Bart/Bärte** 'beard(s)', the two rules apply conjunctively. In the course of history, words like **Baum** have shifted from the disjunctive class to the conjunctive class, on an individual basis. But if such a scenario is correct, it is seriously at odds with the conception of disjunctiveness envisioned here, which treats this as a relation between rules with no provision for its being relativized to particular lexical items as would be necessary to describe the change as above. Any such change would compromise the effectiveness of (3) in accounting for the class of cases of mutually exclusive rules not covered by the general convention in (4).

### 3. THE THEORY OF DISJUNCTIVE ORDERING *REDUX*

The cases surveyed in the previous section pose serious potential problems for the theory of disjunctive ordering constituted by (3) and (4) above. Closer investigation, however, will show that in each case, an alternative account is available for which some support can be found,

<sup>17</sup> Note that some Nouns, like **Vater/Väter** 'father(s)' show only umlaut, and no suffix.

and which eliminates the apparent problem.<sup>18</sup> The reason for considering these cases here, however, is not only to show that the theory of disjunctive ordering can be redeemed. In each of the cases dealt with below, the alternative explanations that turn out to be justified have some independent interest in and of themselves – and we might not have been led to seek these explanations had it not been for the problems the examples pose for the theory. They thus justify not only the correctness (or at least plausibility) of the theory, but its utility in directing research.

### 3.1. *German 'Mixed' Verbs*

The problem posed above by this example was the apparent addition by rule of the regular morphology of German weak verbs to lexicalized past stems as in the strong verbs. In this connection, however, note an interesting difference between the class of mixed verbs and that of strong verbs, such as those below:

(20)	bergen	barg	geborgen	'save, rescue'
	bitten	bat	gebeten	'ask someone for something'
	trinken	trank	getrunken	'drink'

In such true strong verbs as (20), we typically find three distinct stems: the present and infinitive stem, the preterite stem, and that of the past participle. These are presumably listed in the lexicon of German, and related by (no longer productive) rules of word-formation that specify the range of classes of such verbs that occur. In the case of the 'mixed' verbs, however, the paradigms (as illustrated in (16) above) are consistently and curiously reduced: the same stem appears for both the preterite and the past participle. These verbs, then, show only an opposition between a non-past stem and a past stem.

Given a lexically idiosyncratic three way distinction, such as that in the true strong verbs, it is inescapable that the listed stems bear features that block the application of the regular rules in (17), as predicted by (4ii). In the case of a two-way distinction, however, as exemplified by the mixed verbs, the situation is not so clear. In order to distinguish the past stem from the non-past, it might be that the former bears the feature [+past], which ought incorrectly to block the application of (17a). On the other

<sup>18</sup> Of course, the observant reader may well consider that, if this were not the case, I wouldn't have brought them up in the first place. Such a reader would undoubtedly be right, but should be assured that there aren't other, more problematic cases that I know about but am keeping under the rug.

hand, suppose that it is the *non-past* stem which is explicitly characterized, bearing the feature [-past], with the opposed past stem lexically unmarked. In that event, the unmarked stem will be used only in past environments, since in any non-past environment the specific [-past] stem would take precedence over it by (4iii). On the other hand, in a [+past] environment, this stem (e.g., /brax/) could be inserted, and would be expected to undergo regular suffixation by (17) (giving **brachte**, **gebracht**). On such an account, of course, the German mixed verbs cease to present a problem for principle (4ii).

We suggest that this is exactly what has happened in the class of German 'mixed' verbs: unlike other verbs showing a stem alternation, this class treats the non-past stem as the marked form, lexically identified as [-past], and the stem appearing in [+past] environments as the regular, unmarked entry. Admittedly, this is an unusual state of affairs, but it is limited to a small number of verbs, and surely no linguistic principle exists which would logically exclude it. Such verbs probably represent the operation of a sort of morphological analog of 'rule inversion'. It is known that a phonological rule replacing /A/ by /B/ in some environment  $\_E$  may be reanalyzed historically as involving the replacement of underlying /B/ by derived /A/ in the complementary environment  $\_\_\neg E$ . In the German mixed verbs, what appears to have happened is that the 'derived' past stem has been re-interpreted as a basic form to which the specifically characterized non-past stem corresponds. This view is consistent with the fact that at least some of the 'mixed' verbs (e.g., **wißen/wußte/gewußt** 'know') represent original preterite-present verbs, in which the present stem actually represents an original (presumably marked) preterite stem which came to be used in non-past environments.

### 3.2. Breton Plurals

The 'double plurals' of Breton referred to above are particularly interesting because they are embedded in one of the most complex singular/plural systems known<sup>19</sup> In Breton, we find not only plural markers on Nouns (such as **-ou**, **-ed**), but also overt singulative markers, which operate to render the reference of a basically plural collective singular and individual. Thus, from basic **kelienn** 'flies' and **stered** 'stars', we can form **keliennenn** 'fly' and **steredenn** 'star'. The singulative marker **-enn**

<sup>19</sup> See Trépos (1957) for discussion of these and many other facts concerning Breton plurals.

can be added to overtly marked plurals as well, to give a more 'individuated' sense: thus, the plural of **pesk** 'fish' is **pesked**; the latter form serves as the base of a new singular **peskedenn**. This form (the singulative of a plural, formally) has virtually replaced basic **pesk** in some dialects. On the other hand, a singulative such as **steredenn** can itself serve as the base for a new plural form **steredennou** 'stars (one by one)', with a more individuated sense than that of the collective **stered**.

The point of these observations is that, in Breton, one cannot simply tell from the fact that a Noun has plural reference whether it is a basic collective or derived from a corresponding singular by pluralization. Double plurals can thus be regarded as formed in the following way: a plural like **lern** 'foxes', though it is (at least historically) a plural form of **louarn** with a lexicalized form involving vowel change in the stem, could also be interpreted as a basic (simplex) collective, from which a new explicit plural **lerved** can be derived by regular suffixation of **-ed**. If the form **lern** is thus interpreted as not bearing a lexical morphological feature [+plural] (even though plural in reference, because collective), there is no reason to expect principle (4ii) to block this. In at least some instances, the semantics of such 'double plural' forms appear to bear this out: thus, **merc'hedou** 'girls' (double plural of **marc'h**) refers not simply to more than one girl, but to several groups of girls. It does not seem that such a highly differentiated interpretation characterizes all 'double plurals', but in light of the practical difficulty of differentiating 'plural' and 'plural-of-plural' readings it would not be surprising if these were not consistently distinguished in all cases where they are formally motivated.

### 3.3. *Child Language*

The explanation of forms like *wented* and *feets* in the speech of children learning English falls into two parts, and neither class turns out to pose a problem for (4). In the case of *wented*, Bickerton (1983) has argued on completely independent grounds that such apparent double past forms are not in fact the result of applying past tense morphology to a lexically marked [+past] stem. Instead, he argues that in the earliest stages of the acquisition process, children interpret the English tense distinction not as one of [±past], but rather as aspectual in content ([±Perfective]).<sup>20</sup> Later,

<sup>20</sup> Note that this specific account is not essential to the analysis suggested here: insofar as children treat lexically suppletive verbs as involving any sort of lexically represented distinction, rather than two inflectionally different forms of the same item, it does not matter what property they take as differentiating e.g. the verb *go* from the verb *went*. Bickerton argues that the development in question is universal in character, as illustrated by a putative universal preference in Creole languages for aspectual distinctions as

the ending  $-(a)d$  comes to be re-interpreted as marking (past) tense; but exactly in the form of verbs like *go/went* which show suppletive forms, the present and past stems are treated as lexically distinct verbs (possibly differing, as Bickerton suggests, in aspect, although as observed in footnote 20 above this specific account of the difference is not critical). On this basis, a form like *wented* represents not the doubly marked past of *go*, but rather the [+past] form of the [+perfective] correspondent of [-perfective, -past] *go*.<sup>21</sup> Note that forms like *goed* (instantiating the combination [-perfective, +past]) also occur, though they are less remarked on because they appear to represent simply the extension of 'regular' past marking to the stem *go*. On this basis, neither *goed* nor *wented* pose a problem for (4ii).

With respect to apparent double plurals like *feets*, we propose that what is actually going on is somewhat similar to the analysis proposed above for German mixed verbs. Observing that the lexical entry for *foot/feet* must contain two distinct stems bearing an idiosyncratic relationship to one another, the child is still not constrained to treat *feet* as the lexically marked plural of basic *foot*: the fact of a lexicalized difference between them does not by itself determine which member of the pair bears a special marker for number. If *feet* is in fact taken as lexically unmarked (with *foot* as its lexically characterized [-plural] counterpart), it can perfectly well undergo suffixation of /z/ to give *feets* in [+plural] contexts, eliminating the apparent violation of (4ii).

Indeed, this is not a completely gratuitous assumption. Tiersma (1982) argues at length that precisely in the case of such Nouns as *foot/feet*, which are typically encountered in non-singular reference, analogical change often generalizes an irregular plural base into the singular, rather than the other way around, supporting the claim that these plurals have to be analyzed as the foundational members of their paradigms. Tiersma cites instances from several languages in which it is apparently necessary to take the plural rather than the singular form of some nouns as the unmarked stem, in opposition to our usual assumption.

Related phenomena can be attested elsewhere, as well. For instance, in the history of the Indo-European languages, the category of the dual has generally been lost. In some languages, however, ancient dual forms have persisted as the basis of new plurals. Thus, Armenian *ačk* 'eyes',

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opposed to the marking of tense; but a number of other possible interpretations of the difference children hypothesize, and its origins, would fit the case as well.

<sup>21</sup> A similar account based on lexical differentiation might be suggested for such occasional forms as *bestest*, *mostest*: insofar as *best* is analyzed not as 'most good' but rather as 'extremely good' there is no reason not to expect that this stem could itself form a superlative by the addition of regular morphology, yielding *bestest*.

plural of **akn**; and **cungk**<sup>6</sup>, 'knees', plural of **cunr**, both continue the otherwise obsolete IE dual stem rather than the plural. In such case, the dual (while generally the most marked term of the number system) was treated as the unmarked [-singular] form. Again, such inversions of the usual markedness relations within paradigms are perfectly consistent with the assumption that lexically marked stems block the addition of regular morphology, as stated by (4ii).

### 3.4. Old Swedish

Although at first sight the Old Swedish change from genitive plurals like **härra** to the type **härrias** seems to involve the elimination of a disjunctive relation predictable from principle (4ii), a closer inspection shows that this interpretation is based on a mis-analysis of the relevant paradigms. Considering the other forms in the (original, early Old Swedish) paradigm of a word like **här**, we arrive at the fuller picture below:

(21)		Sg	Pl
	<i>Nom</i>	här	härar
	<i>Acc</i>	här	härra
	<i>Gen</i>	härss	härra
	<i>Dat</i>	härri	härnum

In this paradigm, the ending **-s** of the genitive singular was common to several other paradigms, as was the **-a** of the genitive plural (as well as the **-i** and **-um** of the dative singular and plural). The endings **-ar** and **-a** of the nominative and accusative plural, however, alternate with **-ir** and **-i**, **-ur** and **-u** (among regular forms), in the declension of other nouns.

In the history of Swedish, one important development was the effective loss of the dative as a distinct inflected form, with the consequent reduction of the paradigm in (21) to its first three rows. As a result of this development, however, the ending **-a** of the genitive plural is no longer distinct from that of the accusative plural. It appears that what happened was that this **-a** was re-interpreted as a mark of [+plural], appearing throughout the plural forms, yielding the following structure:

(22)		Sg	Pl
	<i>Nom</i>	här	här-a-r
	<i>Acc</i>	här	här-a
	<i>Gen</i>	här-s	här-a

In this structure, the markers are **-s** ([+gen]), **-a** ([+plural]), and **-r** ([+nominative]); in the singular this marker is either absent or reduced

phonologically after stems ending in /r/). As a result of the re-analysis of genitive plural **-a** as simply the plural marker, however, there is no longer any reason for (4ii) to predict that the rule introducing this formative should block the application of the **s**-rule in genitive plurals. The result is the cumulation of **-a** and **-s** to give **härrias**, not by relaxation of a formerly disjunctive relationship, but by restructuring of the entire paradigm.

The confirmation of this account comes from the fact that forms like **härrias** for the genitive plural are in fact only attested from the paradigms of nouns that show a nominative plural in **-ar**, and not from those forming their nominative plural with some other vowel. Of course, it is only in those cases that the old genitive plural ending could be confused with the thematic vowel of the plural endings, allowing for the re-analysis suggested here. The one apparent exception to this generalization is actually further evidence for it: the genitive plural **systras** '(of) sisters' is attested in one text, while the nominative plural of this word is normally **systir** 'sisters'. The interesting point is that for precisely this word, the alternative nominative plural **systrar** is also attested, showing that it is in fact on the basis of a plural with thematic **-a** that the form **systras** was created. The facts surrounding the history of the Swedish genitive plural, then, are entirely consistent with the theory of disjunctive ordering advocated here, and do not involve a historical change affecting a supposedly universally predictable relationship between rules.

### 3.5. *German Umlaut*

As a supposed instance of historical change in disjunctiveness that proceeds on a lexical-item-by-lexical-item basis, the formation of plurals with and without umlaut in German is rather easy to discount. We could propose, for example, that the umlaut rule is actually a morphologically conditioned one, triggered by some abstract feature [+U] appearing in exactly those morphological elements that trigger (synchronic) umlaut.<sup>22</sup> On this basis, German would simply have several plural classes, including one that merely suffixes /ə/, another that suffixes a /ə/ that is [+U], and another that suffixes nothing, but marks the form as [+U]. The shift from earlier **Baum/Baume** to modern **Baum/Bäume**, then, would simply involve a transfer of this word from the plain-/ə/ class to the [+U]/-ə/ class, and disjunctive ordering would be completely irrelevant.

<sup>22</sup> This is of course the standard analysis in generative grammar for those writers who do not attempt to reconstruct a purely phonological synchronic environment for Umlaut. For a recent example of this approach, see Lieber (1980).

It is also possible, however, that the answer to this problem is somewhat more interesting. In fact, a number of writers<sup>23</sup> have argued that this rule has undergone a sort of 'mitosis', by which the phonological change applying in each category which morphologically conditions umlaut has become a separate rule, part of the other Word-Formation Rule(s) for that category. The result is a system of exactly the sort we are fond of teaching our students in Linguistics 100 to avoid: massive repetition of the umlaut structural change, rather than a single unified generalization applying in various environments. We must not, however, allow our pre-theoretic notions of what an analysis should look like to determine the analysis entirely: it is not, after all, logically excluded that actual natural languages involve a great deal of redundancy and repetition in their structure,<sup>24</sup> and that the level at which a single generalization encompasses the range of umlaut phenomena in German is not that of the individual rule, but somewhere else.

Evidence that German umlaut is not, in fact, a single rule but rather an aspect of the changes performed by several different rules would come from a demonstration that umlaut in individual categories behaves in ways that do not generalize across all categories. Robinson (1975), for example, argues that this is the case insofar as the generality of umlaut changes over time in different ways in different categories. He also argues that (in the low German dialects he is concerned with) the relative ordering of umlaut and other rules varies from category to category. In modern standard German, Janda (1982) argues for the same conclusion from the fact that the phonological conditions on umlaut vary from category to category. Thus, the umlaut rule in comparatives and superlatives of Adjectives does not affect the diphthong /au/ (e.g., **braun** 'brown', comparative **brauner**, not \***bräuner**), though /au/ is affected by umlaut in other categories (e.g., **glauben** 'believe', **gläubig** 'believing, faithful'). Similarly, umlaut in comparatives and superlatives does not occur if an unstressed syllable follows the umlauted stem syllable (e.g., **mager** 'thin', comparative **magerer**, not \***mägerer**), though again such a restriction does not hold for other umlaut environments (cf. **Mutter** 'mother', **mütterlich** 'motherly').

Another argument cited by Janda for the same conclusion is that if there were a single rule of umlaut, applicable in various environments,

<sup>23</sup> See particularly Robinson (1975) and Janda (1982).

<sup>24</sup> Sadock (1983) argues for the general conclusion that the elimination of redundancy from descriptions is not at all the right strategy to take in analysis: rather, the same phenomenon may appropriately be reflected 'redundantly' at several points in a grammar.

there ought to be a unitary property of exceptionality with respect to this rule, such that a stem either umlauts (in all circumstances where this is possible) or does not. In fact, however, the distribution of exceptionality is much more complex than this. Given virtually any pair of umlaut environments, it is possible to find some stems that umlaut in both, some that umlaut in neither, some that umlaut only in the one, and some that umlaut only in the other:

(23)	Noun	Plural	Adjective in <b>-ig</b>
	Bart	Bärte	bärtig
	Arm	Arme	(drei-)armig
	Busch	Büsche	buschig
	Tag	Tage	(drei-)täigig

The best evidence in favor of the position that different categories involve different umlaut rules would come from a demonstration that the structural changes involved have the capacity to separate from one another over time. In (high) German, there is not a great deal of evidence of this sort; but at least one of the umlaut rules of the language seems to have distanced itself from the others to some degree. The second and third person singular present forms of many strong verbs show a vowel shift (with respect to other non-past forms) which involves some of the same relations as umlaut in other categories: thus, /a/ is replaced by /ä/ (cf. **backen** 'to bake', **er bäckt** 'he bakes'), /au/ by /äu/ (cf. **laufen** 'to run', **er läuft** 'he runs'), and /o/ by /ö/ (cf. **stoßen** 'to push', **er stößt** 'he pushes'). There are apparently no instances of an umlaut of /u/ to /ü/, however, though there are strong verbs with stem /u/. More importantly, some other relations are quite unlike anything that occurs in other umlaut environments: /e:/ alternates with /i:/ (cf. **befehlen** 'to order', **er befiehlt** 'he orders'), /e/ with /i/ (cf. **bergen** 'to save', **er birgt** 'he saves'), and /ö/ with /i/ (cf. **erlöschen** 'to die out', **er erlischt** 'he/it is becoming extinct'). Clearly the rule involved here is not the same as the rule involved in other categories. Of course, we might just say that this phenomenon (as opposed to all of the others) isn't really umlaut, but the question still arises of whether all instances of 'umlaut' are in fact effected by the same rule. If not, the numerous processes that individually involve 'umlaut' (in addition to whatever other structural changes – affixation, etc. – they may perform) would be instances of Kuryłowicz' 'bipartite morphemes' (i.e., internally complex formal markers) rather than conjunctively applied pairs of rules.

When we turn to other languages with corresponding phenomena, it is often possible to find evidence for the substantive separateness of the

morphologized reflexes of originally phonological rules (like German umlaut) in the various categories in which they occur. The Celtic mutations are a good example: originally a set of purely phonological processes of lenition, fortition, and aspiration in various phonetically transparent environments, these rules were rendered massively opaque by changes in the history of Celtic, and eventually became morphologized in a variety of arbitrary environments. When we look at a modern language of the family such as Breton, we find that individual peculiarities have accumulated in some environments without being applicable to other instances of the 'same' mutation. Many elements trigger the 'soft' mutation, for example (essentially the voicing of voiceless stops, and the spirantization of voiced stops plus /m/). Three particles, however, trigger a 'mixed' mutation, which involves softening of /m/, /b/, and /g/ – but hardening (another mutation) of /d/ to /t/. Several other 'mixed' or 'incomplete' mutations are associated with specific morphological environments or groups of environments.<sup>25</sup> The point is that over time, the system has shown little or no tendency to retain exactly the same set of changes in all 'softening', etc., environments: rather, it is as if there were a number of distinct 'softening' rules, each of which is capable of evolution independent of the others. The same conclusion could also be demonstrated in other cases, such as the system of stem changes produced by suffixes in the Wakashan languages ('Nootka', K<sup>w</sup>ak<sup>w</sup>ala, and others). Again, a phonologically unitary set of changes has become obscured over time, and the morphologized reflexes show a considerable amount of independence from one category to another.

Naturally, one does not want to go overboard in stressing differences between one 'umlaut' (or other morphologized rule) and another. Clearly, however, they do not appear to be the 'same rule' in the grammar. How are we to reconcile the two aspects of this situation: a number of morphological categories appear to involve changes that all fall within the same general channels of formal possibility, but which are not apparently identifiable as a single rule?<sup>26</sup> One possibility is that we recognize a sort of 'meta-rule', expressing generalizations over the mor-

<sup>25</sup> The details of these 'mixed' mutations, as well as the actual distribution of the 'classical' mutations varies considerably from one dialect to another.

<sup>26</sup> It would appear that the formal non-identity of the changes involved argues against an approach such as that of Schmerling (1983), based on distinguishing rules from the operations performed by those rules. Insofar as the operations performed by two (or more) rules are merely very similar rather than identical, we cannot say the two distinct rules invoke the same operation.

phonological system of a language which are valid for sets of rules but which do not constitute individual rules by themselves.<sup>27</sup> In German, for example, we might say that the word formation rule for a given category can involve, besides affixation, phonological changes from the following set: /a/ alternates with /ä/, /au/ alternates with /äu/, /o/ alternates with /ö/, etc. Largely for historical reasons (all of the modern umlaut rules are descendents of a single phonologically coherent rule fronting back vowels, after all), most rules that involve one of these changes involve the entire set – but they are not obligated to, and may involve other changes as well (as in the case of second and third person singular forms of strong verbs).

The level at which there is a single generalization about 'possible umlaut rules' is thus that of the meta-rule, not the individual rule of the grammar. Note that even in the case of affixes, some such device is apparently motivated. It is surely a generalization about English, for example, that essentially all of its productive inflectional morphology is carried out by means of affixes with the forms /z/ and /d/; but this hardly means that the grammar contains a single 'morpheme' /z/, which is triggered by some property common to the environments [+plural], [+possessive], [3sg pres], etc.

If we are correct in suggesting that generalizations about the morphology of a language can be expressed by meta-rules of some sort, there is no longer any impediment to associating changes such as that of umlaut directly with the marking of the categories in which they occur, rather than with a single unitary rule which is somehow triggered in these categories. As we have suggested above, there may well be substantive reasons to make this move. If we do so, however, this suggests an important thing about the range of rule types in natural language: it may well be the case that these include purely phonological rules, and purely morphological rules (in the sense of word-formation rules), but that a third category of 'morphologically conditioned phonological rules' which is generally posited does not in fact exist. Much more research is of course needed before we can be sure that we can do without such rules, but this result, if validated, would open the way to a much more coherent and constrained typology of rules in the expression systems of natural languages.

Returning to our original concern, however, we can see that the historical change of plural types such as **Baum/Baume** to **Baum/Bäume**

<sup>27</sup> Both the basic notion invoked here and the specific terminology, of course, are taken from syntactic work in the framework of Generalized Phrase Structure Grammar.

in German poses no problem for principle (3) or any other part of the theory of disjunctive ordering. Regardless of whether umlaut in plurals is the result of a morphologically conditioned phonological rule triggered by a diacritic property such as [+U] or a rule with a two-part structural change (umlaut plus suffixation), the issue of conjunctive vs. disjunctive application of rules does not come into play.

#### 4. CONCLUSION

At a minimum, the discussion above ought to have the effect of convincing the reader that the facts of natural language morphologies are as predicted by a theory of disjunctive organization based on principles (3) and (4) proposed in the introduction. In some cases, such a theory allows us to bring much more coherence to our account of the facts than seems possible on a more traditional, morpheme-based account, as with the analysis of Georgian *-t* in section 1. In others, superficial counter-examples to the theory, such as those examined in section 2, turn out on closer examination to be consistent with it after all, as shown in section 3. More important than the demonstration that particular examples can be given analyses (often ones that are superior to those otherwise available) within this theory, however, is another consideration. In each case above, the theory of disjunctive ordering itself suggested problems and lines of research that might not otherwise have been apparent, and which proved interesting and useful to investigate. It is thus not only a candidate for part of the theory of morphological structure, but also a productive research strategy for the investigation of such systems. Based as it is on the construal of morphology as a system of interacting rules expressing relations between forms, rather than as an inventory of unitary and meaningful 'morphemes', it supports the general utility of this larger view.

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