An Approach to Morphology

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1. The Modular Structure of Morphology

Knowledge of the words of a language L is an essential component of the knowledge of L acquired by its native speakers. Knowledge of words consists in large part of rote memory of items such as dog, usurp, difficult, etc. We assume that when speakers memorize a word, they store a set of phonological markers along with information about the syntactic and semantic nature of the memorized item in a special register, the VOCABULARY. Only words stored in the vocabulary of a particular speaker can figure in actual utterances processed by that speaker. For example, speakers of English who do not have dog, or usurp, or difficult in their vocabulary experience difficulty in processing sentences containing these words.

The words dog, usurp, difficult appear in the vocabulary as single constituents; they have no internal morphological structure. Of course this is not true of all types of words. A major fraction of the words that speakers know have internal structure, as illustrated in (1):

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(1) [[un[[[gentle] [man]] li]] ness]
         A   N N A A   N

     [anti[[[dis[establish]] ment] arian]] ism]
              V V   N   A A   N

       We assume that when such words are memorized, their full
constituent structure is stored in memory. (A plausible reason
for this might be that our memory is so constituted that
structure makes memorization and retrieval easier.)

       The term MORPHEME designates the bracketed elements
illustrated in (1) that are strung together to make up words, as
well as unitary constituents like dog, usurp, and difficult.
Morphemes are of two major kinds: STEMS and AFFIXES. Stems
usually may constitute words by themselves; e.g. gentle, usurp,
difficult, dog, man. However, as noted in Aronoff 1976, there
are stems such as those in the top line of (2), which do not
function as independent words. Using terminology that goes back
at least to Bloomfield's Language, we refer to such morphemes as
BOUND, as opposed to FREE morphemes such as dog,   usurp,
difficult.

(2)   -ceive   -port   -here   -mit
                                   im-port   in-here
                       re-ceive   re-port   re-mit
                                              ad-here   ad-mit

       As their name implies, affixes are entities that are added
to something, and the somethings to which affixes are added are
stems, non-derived (not already containing an affix) or derived
(the product of prior affixation). There are two kinds of
affixes: PREFIXES, which are added to the left, and SUFFIXES,
                                   1
which are added to the right of a stem.

       Affixes normally determine the lexical category of the word
that they form; e.g., a word formed with the suffix -ion is a
noun, while one formed with the suffix -ize is a verb. Moreover,
affixes are particular about what stems they attach to, as the
ill-formed (starred) examples in (3) illustrate.

(3)

  seren-ity, civil-ity *but* *shop-ity, *proverb-ity, *machin-ity
  regular-ize, scandal-ize *but* *usurp-ize, *develop-ize

The ill-formed words in (3) are ruled out because the affixes illustrated are restricted to stems of particular lexical categories: -<u>ity</u> is added to adjectives but not to nouns or verbs, while -<u>ize</u> is added to adjectives and nouns but not to verbs. Since the inadmissible items in (3) are readily recognized as ill-formed, we conclude that speakers know not only the words of their language but also the bound morphemes and the privileges of occurrence of such morphemes. We hypothesize that the knowledge English speakers have of the bound morphemes of their language is essentially of the form illustrated in (4).

(4)

a. -<u>ness</u>:   b. <u>un</u>-
   /nes/   /ʌn/   phonological UR
   N   A   syntactic category
   "quality, degree,   "not A"   meaning
       ... of X"
   [X] ___   ___ [X]   contextual conditions
       A   A

As shown, the stored knowledge of particular morphemes normally contains phonological, syntactic, semantic, and distributional information. In (5) this sort of information is presented in condensed form and examples are supplied.

(5) a.   [[X] <u>ness</u>]: gentleness, grammaticalness, uneasiness
         N A

    b.   [<u>un</u> [X]]: ungrammatical, unaware, unconscious
         A   A

    c.   [[X] <u>ity</u>]: serenity, grammaticality, electricity
         N A

    d.   [[X] <u>ly</u>]: godly, gentlemanly, husbandly, daily
         A N

    e.   [[X] <u>th</u>]: truth, width, breadth, depth
         N A

    f.   [<u>per</u> [Stem]]: permit, pertain, perform, persist
         V   Lat

    g.   [Pfx   [-<u>port</u>]]: deport, import, purport, support
         V   Lat

It is by virtue of the sort of knowledge conveniently illustrated by the templates in (5) that speakers are able to assign an analysis to newly learned words. This does not mean, however, that such templates are employed "on line" whenever speakers use morphologically complex words. For example, we claimed above that a word such as <u>ungentlemanliness</u> is stored in memory in the nested form indicated in (1). In general, words are stored in the vocabulary in this form; they are selected "ready-made" from that list when speakers use them.

This view does not imply that speakers are incapable of creating new words or understanding correctly words not previously encountered, for the vocabulary is evidently an open list to which speakers can add new words. Once a new word is added to a speaker's vocabulary it can be used immediately, since there is no minimum time that must elapse before a newly acquired word can be put to actual use in processing a sentence. In admitting the possibility that speakers may use newly coined or newly learned words more or less freely, we do not intend to deny any difference between such words and those that have been stored in memory for some time. For example, it seems likely that there could be measurable differences in the reaction time of speakers to the two types of words.

1.1 Concrete versus Abstract Morphemes

Each of the morphemes that has figured in the discussion so far has a single fixed underlying phonological representation. We call these CONCRETE MORPHEMES. Not all morphemes are like this. For example, the plural morpheme has strikingly different phonological manifestations in various classes of English nouns, as illustrated in (6):

(6) a. sheep   fish   deer   moose
    b. radi-i   mag-i   alumn-i   sarcophag-i
    c. ox-en   childr-en brethr-en
    d. dog-s   cat-s   fox-es

We call morphemes that do not have a fixed phonological shape ABSTRACT MORPHEMES. These differ from concrete morphemes such as those illustrated in (4) in that they lack a phonological UR in the vocabulary entries. Abstract morphemes are obviously as real as any other kind of morpheme and as much part of what speakers know about their language. Despite its phonological variability, the abstract English plural morpheme is one unit

from the point of view of syntax. This unit is implicated in subject-verb agreement and in the form of determiners (e.g. this vs. these)--phenomena quite independent of the phonological realization of plurality in nouns.

The majority of concrete morphemes such as dog, -al, pro- are relatively inert syntactically (except for their membership in the categories Noun, Verb, etc.). In contrast, abstract morphemes are more directly involved than concrete morphemes in syntactic processes such as subject-verb agreement, noun-adjective concord, case marking, sequence of tenses, etc. It might therefore be suggested that we equate the distinction between concrete and abstract morphemes with that between derivational and inflectional morphemes. We do not accept this suggestion because the two distinctions are not always co-extensive. On the one hand, there are cases like the double plurals of Breton (Stump 1989) and Yiddish (Perlmutter 1988), where only one of the two plural exponents is syntactically motivated.[2] On the other hand, it is clear that not all inflectional morphemes are phonologically variable; e.g. the first person plural verb inflection -mos in Spanish admits no variation at all, though all other Spanish verbal inflections show allomorphy.

How are abstract morphemes to be represented in syntactic structure? There are two basic proposals. In some theoretical frameworks, abstract morphemes are features on non-terminal nodes in syntactic trees. This proposal is made, for example, by S. Anderson (1982, 1986, 1988) and by N. Chomsky in Aspects of the Theory of Syntax. In other works, for example, Chomsky's Syntactic Structures and Chomsky and Halle 1968 (SPE) abstract morphemes are treated as elements in the terminal string. We illustrate the contrasting representations in (7).

(7) a. *features on non-terminal nodes*

N,[+plural]	N,[+plural]	N,[+plural]	N,[+plural]
sheep	radius	ox	dog
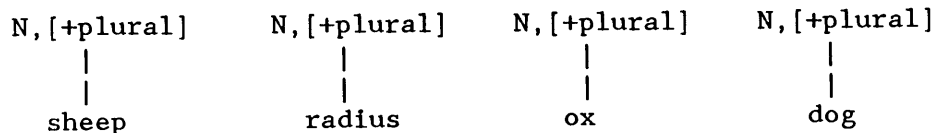
b. *elements in terminal string*

N	N	N	N
sheep plural	radius plural	ox plural	dog plural
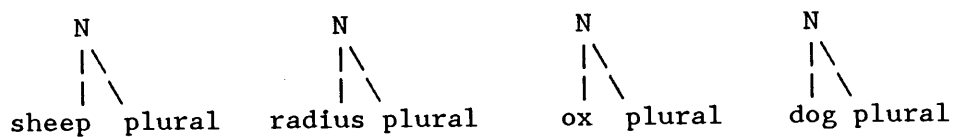
A straightforward argument can be constructed in favor of representations such as those in (7b) as against those in (7a). In their overwhelming majority abstract morphemes in fact surface as affixes to stems; we may just as well assume, therefore, that post-stem position in the syntactic terminal string is the position of abstract morphemes favored (or even demanded) by the syntactic rules of agreement. In a framework where abstract morphemes are initially instantiated as features on non-terminal syntactic nodes, it is necessary to provide a series of rules that will "spell out" these features as prefixes or suffixes. To the extent that this procedure makes no appeal to independently motivated syntactic phenomena, the burden of proof falls to its [3] proponents.

We contrast ABSTRACT MORPHEMES such as Case, Number, Voice and Tense with MORPHOLOGICAL FEATURES such as inflectional class, animacy, count vs. mass, transitive vs. intransitive, etc. Abstract morphemes figure as units in the terminal string of syntactic trees, while morphological features represent properties that are an integral part of the vocabulary representation of particular vocabulary items. For example, it is an idiosyncratic property of the Latin noun <u>nauta</u> 'sailor' that it belongs to declension class 1; i.e. suffixes -<u>a</u> in the nom. sg., -<u>ae</u> in the gen. sg., etc.. Abstract morphemes and morphological features differ in degree of involvement in what are clearly syntactic functions--such as movement, ECP effects, subject-verb agreement, head-specifier concord, etc. For example, the fact that Latin <u>nauta</u> is masculine is relevant to head- specifier concord, but its membership in declension class 1 of nouns has no syntactic import. At the moment we are not in a position to give a precise criterion for drawing the line between abstract morphemes and morphological features but the distinction will be illustrated at several points in the exposition below.

Returning to (7b), we account for the various phonological actualizations of the abstract English plural morpheme by assuming that the language has a set of "spell out" rules such as those in (8).

(8) Plural a. ---> 0   if noun is <u>sheep,</u> <u>man,</u> <u>moose</u>, etc.

        b. ---> /i/   if base noun ends with the suffix /us/
                     (which is deleted in the plural).

        c. ---> /en/   if noun is <u>child,</u> <u>ox,</u> <u>brother</u>, of
                     which some also undergo changes in the
                     phonologic compositio of the stem.

        d. ---> /Vz/ (default)

Since we assume that Plural is an abstract morpheme in English that figures in the terminal string, the function of the rules in (8) is to replace "Plural" by the appropriate phonological realization in various contexts. We intend this literally; each of the rules (8a-d) eliminates the abstract morpheme "Plural" from the syntactic string, replacing it by zero or by a concrete sequence of phonemes. As a result, each rule in (8) bleeds all later rules; once the Plural morpheme is spelled out, i.e. replaced by any rule, the string in question can no longer serve as input to any later rule that spells out "Plural." The frequently noted disjunctiveness of spell-out rules such as those in (8) thus is a consequence of the fact that spell-out rules are rewrite rules that apply in a specific order--not the result of a special proviso as proposed by S. Anderson in various works (see bibliography).

In addition to the suffix-less plurals of English in (6a), there are also those in (9), all of which undergo changes in their stem vowel.

(9) men women geese feet teeth mice lice

If we assume that the only role of the rules in (8) is to replace abstract morphemes in the terminal string by sequences of phonemes or by zero, then we cannot deal with the forms in (9) by means of spell-out rules. We must postulate an additional type of rule, specifically, rules that change the composition of morphemes in the terminal string. We call these READJUSTMENT RULES. A typical readjustment rule is given in (10), which modifies the underlying stem vowels of the words in (9), among others.

(10)   V --> $\begin{bmatrix} \text{-back} \\ \text{-low} \end{bmatrix}$ /[X ___Y] + Plural in <u>woman, goose, foot</u>
<u>mouse, louse, man</u>
<u>brother, tooth</u>

On this account, the plural of the nouns in (9) differs from regular plurals in two ways: the nouns in (9) are subject both to readjustment rule (10) and to spell-out rule (8a) or (8c). That these two types of rule represent distinct processes is neatly illustrated by forms such as those in (11), which are found in children's speech and in certain varieties of adult English.

(11) feets   mices   geeses

These forms reflect the practice of speakers who have mastered rule (10), but either have not (as yet) acquired rule (8a) or have not assigned these forms to the class of words that idiosyncratically undergo this rule.

We sketch in (12) a block diagram of the model of syntax/morphology/phonology interaction that is employed in the treatment of the data discussed in this paper.

(12)
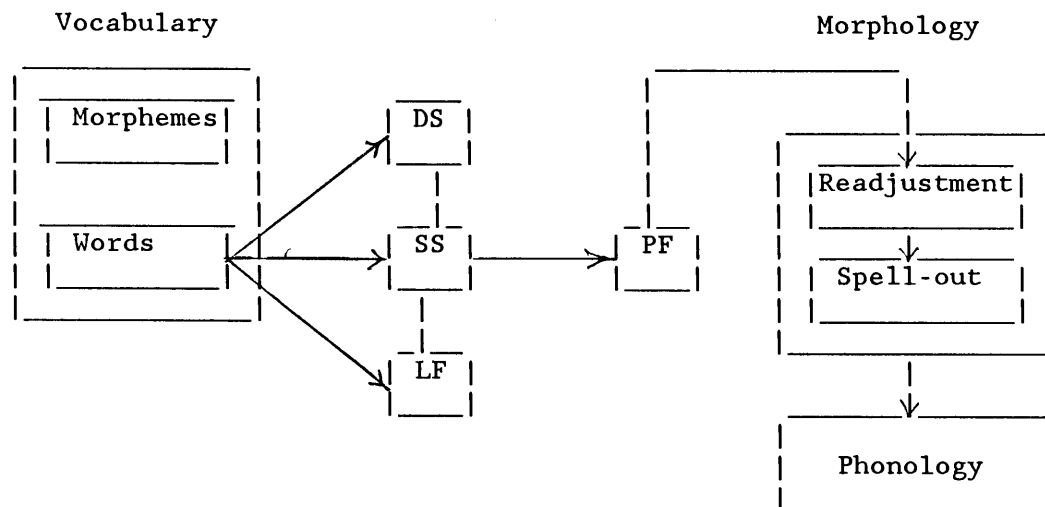
In (12), the Vocabulary consists of two lists, one containing the morphemes of the language and the other containing the words. In most languages, the latter are not the actual inflected words that appear in surface syntactic structures (SS), since they do not include the inflectional affixes that are

supplied to words by the syntax. We have supplied the Vocabulary with very little machinery other than the ability to decompose new words into their constituent morphemes. Additional machinery is certain to be required, but we are not yet in a position to make explicit suggestions about its nature.

The input to all three levels of syntax--DS, SS, and LF--consists of items in the word list.   None of these serves as input to the morphology proper. We assume--with Marantz 1988--that hierarchical nesting of constituents but not their linear order is represented in the three levels of the syntax. Linear order is imposed by a set of principles that map SS into PF. These principles convert the "mobile"-like structure of SS into the linearly ordered constituent tree that serves as input to the morphology. The same principles account also for the limited but extremely important differences between SS and PF representations of a given sentence. They include both universal and   language-particular   propositions.   From   the language-particular set, we can mention the principle that all constituents are left-headed or right-headed in a given language, or that the object person markers of the verb are suffixes, whereas the subject person markers are prefixes, or that the possessive marker is a suffix of the last word of the preceding constituent, and so on.   Much valuable information about these mapping principles is provided by Marantz 1988, but much else remains to be discovered.

Each of the two inner components of the morphology--the readjustment rules and the spell-out rules--applies cyclically to the nested PF structure, modifying it in ways that have been illustrated above. More detailed discussion and illustration of the functioning of these subcomponents is provided below.

2. Noun-Modifier Concord in the NP in Latin and Russian

2.1 Noun-Adjective Concord in the NP in Latin

In the examples discussed to this point each spell-out rule replaced a single abstract morpheme by a string of zero or more phonemes. This type of one-for-one replacement is characteristic of an <u>agglutinative language</u> such as Finnish, where as shown in (13) each of the terminal morphemes is actualized by a separate

sequence of phonemes; e.g.,

(13)   N   + Pl + Loc + 1S (poss)

     kirja + t + ssa + ni   >   kirjo+i+ssa+ni 'in my books'

This one:one correlation between abstract morpheme and its
phonetic exponent is however not generally the case. In
particular, in the Indo-European languages we find that strings
of several abstract morphemes are commonly represented by a
single phoneme sequence. A good example of this <u>fusion</u> process
is provided by the declension of the Latin nouns. Latin nouns
are traditionally assigned to five declension classes of which
the first two are illustrated in (14).

(14)

	1	2	1	2
	Singular 'gate' 'friend' 'boy' 'gift'		Plural	
N.	port-a amiic-us puer doon-um		port-ae	amiic-ii puer-ii doon-a
A.	-am	-um	-aas	-oos doon-a
G.	-ae	-ii	-aarum	-oorum
D.	-ae	-oo	-iis	-iis
Abl.	-aa	-oo	-iis	-iis

     It is obvious that the different suffixes represent
simultaneously the Case and the Number of the form. Thus, the
Accusative Singular is /am/ for class 1 and /um/ for class 2,
whereas the Accusative Plural is /aas/ and /oos/, respectively.[4]

     I assume that singular vs. plural number of nouns is
selected in D-Structure, whereas case is computed in Surface
Structure. we assume further that the Latin noun has the
structure shown in (15).

(15)   N
               /|\
              / | \
             / | \
            / | \
          port PL GEN

In (15) number has been placed before the case, because number is
a property of each noun whereas case is assigned to the NP by the

syntax and is moved to the head noun of the NP by a special rule. Thus, in the syntax the Accusative morpheme is a sister of an NP such as (16).

(16)   eccleesi-am parv-am Sanct-ii Petr-ii
                                    'the small church of St. Peter'

In the derivation of PF from SS, the Accusative morpheme is moved to the head noun of the NP. Since the number of the head noun is independent of the composition of the rest of the sentence, we assume that it is directly adjacent to the Noun, and as this sequential order is not changed by any rule, Case adjunction results in the Case morpheme being placed to the right of the Number morpheme.

Latin differs in this respect from English where the Genitive case morpheme is not moved to the head noun but is rather incorporated into the last word of the NP. Thus we say in English the church of Rome's prime concern, the king of Portugal's navy or the man who loves children's greatest pleasure.

Latin also differs from English in that in Latin Case and Number are represented by a single phoneme sequence, whereas as shown by forms such as children's, oxen's, in English Plural and
                                                                5
Genitive are spelled out as distinct phoneme sequences.

In the framework that has been outlined above the paradigms in (14) are formally expressed by spell-out rules such as those in (17).

(17) a. [sing] + [nom]   ---> a /[Class 1] + ___

                         ---> um /[Class 2, +neut] + ___

                         ---> 0 /[Class 2, -neut] + ___
                                 if noun ends with suffix /er/

                         ---> us /[Class 2] + ___

     b. [sing] + [acc]   ---> am /[Class 1] + ___

                         ---> um /[Class 2] + ___

     c. [pl] + [nom]   ---> ae /[Class 1] + ___

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                              ---> a   /[Class 2, +neut] + ___
                              ---> ii  /[Class 2] + ___

      d. [pl] + [acc]         ---> aas /[Class 1] + ___

                              ---> oos /[Class 2] + ___
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The accusative of neuter nouns is identical with the nominative in all declension classes and in the singular as well as in the plural. We account for this fact by the readjustment rule (18).

$$(18) \quad [acc] \longrightarrow [nom] \ /[+neut] + \begin{Bmatrix} \text{Singular} \\ \text{Plural} \end{Bmatrix} + \underline{\quad}$$

Since readjustment rules are ordered before spell-out rules the existence of rule (18) eliminates the need for a separate rule to spell-out the accusative of neuter nouns.

In their majority Latin nouns of class 1 are feminine in gender, whereas those of class 2 are either masc. or neuter. (In the paradigm (14), doon-um is neuter, whereas the other class 2 nouns are masculine.) There are, however, numerous exceptions in both classes to this correspondence between gender and declension class; e.g., poeeta 'poet', nauta 'seaman' are class 1, yet masculine in gender, whereas malus 'appletree', fiicus 'figtree' are class 2, but feminine.

Adjectives have three declension paradigms of which the first two are identical with paradigms of classes 1 and 2 illustrated above. As illustrated in (19) there is grammatical concord in Latin Noun Phrases: adjectives always agree with the noun that they modify in gender, number and case , but not in declension class. Note especially the examples in the last two columns.

(19)

N.S.	port-a magn-a	puer magn-us	naut-a magn-us	fiic-us magn-a
A.S.	port-am magn-am	puer-um magn-um	naut-am magn-um	fiic-um magn-am
N.P.	port-ae magn-ae	puer-ii magn-ii	naut-ae magn-ii	fiic-ii magn-ae

We account for these facts by postulating that Latin is subject to the concord rules (20), (21).

(20) a. In an NP the number and case of the head noun are copied onto the specifiers and adjectives that are in the head noun's domain.

b. In an NP, the gender feature of the head noun is spread to specifiers and adjectives that are in the head noun's domain.

(21)   Declension class is assigned by the rules:

         [+fem] --> [Class 1]

         [-fem] --> [Class 2]

The concord rules (20 a,b) are part of the rules that relate SS to PF, and are therefore part of the syntax, rather than of the morphology. By contrast, rule (21) is a bona fide readjustment rule and as such belongs to the morphology proper. Since rules (20) and (21) are redundancy rules they supply information not already present in the string, but are incapable of modifying features of elements represented in the string. They are instances of "feature-filling" rules, in the terminology of Kiparsky 1982, and contrast with the other major class of rules that are "feature-changing." This property of redundancy rules plays a crucial role in our account in sec. 2.3 of surface Case assignment in Russian numeral phrases, where Number is not copied onto certain numerals because they are nouns that are inherently singular.

The syntactic concord rules in (20a,b) apply before the readjustment rule (21). This order accounts for the fact noted above that though adjectives agree with the head noun in gender, they do not necessarily agree with the head noun in declension class. In particular, they fail to agree in declension class when in the head noun gender stands in a marked relationship to declension class.

Unlike nouns, adjectives in all languages that we have examined have no inherent gender, but obtain their gender in all instances from concord rules like (20b).   Latin adjectives belonging to classes 1 and 2 also lack inherent declension class and obtain this information from the readjustment rule (21). Class 3 adjectives like <u>feeliix</u> 'fortunate', <u>vetus</u> 'old' are subject to the syntactic concord rules (20) but not to the readjustment rule (21), because, as stated above, like all redundancy rules, the concord rules (20), (21) are rules of the "feature-filling" rather than of the "feature-changing" kind. Note, moreover, that since rule (21) does not apply to items with inherent declension class, we can capture the difference between regular nouns of class 1,2 and irregular nouns such as <u>nauta,</u> <u>fiicus</u> by omitting declension class specifications in the former (i.e., regular) nouns, but by providing these indications in the

case of the latter -- irregular -- nouns. The former will then
obtain their declension class from the readjustment rule (21).[6]

Implicit in the above account is the proposition that
collocations such as <u>nauta</u> <u>magnus</u> or <u>fiicum</u> <u>magnam</u> are regular
syntactically. Their irregularity -- the fact that the
adjectives have suffixes of a different declension class than the
nouns -- is the result of an irregularity in the declension class
assignment of the nouns. As noted, for the majority of nouns
belonging to the unmarked declension classes 1 and 2, the choice
of class is predicted by rule (21). This is not true for the
nouns in the examples cited: for these declension class is
unpredictable from their gender and must therefore be stipulated
in their representation in the Vocabulary.

2.2 Noun-Adjective Concord in the NP in Russian

In (22) we have exemplified a portion of the noun[7]
declension paradigms of modern Russian.

(22)   SINGULAR

	class 1		class 2		class 3	
nom.	rabot-a	ZenSCin-a	gorod-(U)	proletarij-(U)	tetrad'-(I)	loSad'-(I)
acc.	rabot-u	ZenSCin-u	gorod-(U)	proletarij-a	tetrad'-(I)	loSad'-(I)
gen.	rabot-y	ZenSCin-y	gorod-a	proletarij-a	tetrad-i	loSad-i
			PLURAL			
nom.	rabot-y	ZenSCin-y	gorod-a	proletari(j)-i	tetrad-i	loSad-i
acc.	rabot-y	ZenSCin-(U)	gorod-a	proletari(j)-ev	tetrad-i	loSad-ej
gen.	rabot-(U)	ZenSCin-(U)	gorod-ov	proletari(j)-ev	tetrad-ej	loSad-ej
dat.	rabot-am	ZenSCin-am	gorod-am	proletari(j)-am	tetrad-jam	loSad-jam
	'work'	'woman'	'town'	'proletarian'	'notebook'	'horse'

As shown in (22) for class 1 nouns there is a distinct
ending for each case in the singular, and these endings are
different from those of the same case in the plural. Nouns of
different declension have different endings. The spell-out rules

of Russian must therefore replace a sequence of abstract morphemes such as Singular + Nominative either by -(U), or -o, or -a, or -(I), depending on the declension class of the noun, and as we shall see directly also on its animacy. By contrast there is only a single spell-out rule for the Dat. Pl.; it is always am.

In addition to the three declension classes illustrated in (22) Russian includes a number of nouns that take no case suffixes, but appear in the same form in all case forms, singular or plural. Among these are foreign borrowings like Sosse 'highway', kupe 'train compartment', kofe 'coffee', madam, ledi, and also clearly Russian family names such as Zivago, Durnovo, KruCenyx, Cernyx.[8]

We shall assume that all 'indeclinable' nouns are assigned to declension class 0, and that in the spell-out rules for the Russian number + case sequences there is a special rule that rewrites these as zero for nouns of class 0. It should be noted that although bearing no overt mark of case, gender, or number, these nouns trigger the Russian analog of the concord rules (20), (21) as shown by the affixes taken by the specifiers and adjectives that modify these nouns.[9]

We have focused on Russian nouns of class 0 to bring out once again the important fact that declension class and gender are separate morphological properties inherent in each Russian noun. Though less obvious than in class 0 nouns, this is also true of nouns of the three other declension classes, where like in Latin there is a fairly high correlation between gender and declension class, yet where the correlation is not 100%. Thus, while the overwhelming majority of the nouns in class 1 are feminine, a fair number of class 1 nouns are masculine; e.g. djadja 'uncle', sud'ja 'judge', muZCina 'man', vel'moZa 'nobleman', and numerous hypocoristics such as MiSa 'Michael', Vanja 'Ivan', etc . With the sole exception of put' 'way', all class 3 nouns are feminine. Finally, with some marginal vacillations in the case of nouns where the referents are female such as doktor, professor, naCal'nik 'head', class 2 are non-feminine.

We have given in (23) the spell-out rules for the Number+Case sequences of the noun forms illustrated in (22).

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(23) a.  [sing] + [gen]     ---> y    /  [Class 1] + ___

                            ---> a    /  [Class 2] + ___

                            ---> i    /  [Class 3] + ___

     b.  [sing] + [nom]     ---> a    /  [Class 1] + ___

                            ---> (U)  /  [Class 2] + ___
                                            (masc. except e.g.
                                              podmaster'e)

                            ---> o   /  [Class 2] + ___   elsewhere

          + [nom]           ---> (I) /  [Class 3] + ___
            [acc]

     c.  [sing] + [acc]     ---> u    /  [Class 1] + ___


     d.  [pl] + [nom]       ---> a    /  [Class 2] + ___
                                      (neut. and marked masc stems)

                            ---> i    /  [Class 2] + ___
                                      (marked stems, e.g. uxo)
                                      /  [Class 1] + ___
                                              (marked stems)

                                      /  [Class 3] + ___

                            ---> y    /  [Class 2] + ___
                                      (masc. and marked neut stems)
                                      /  [Class 1] + ___

                            ---> e    /  [Class 2] + ___
                                 (marked masc. stems; e.g., cygan)

     d.  [pl] +   [gen]     ---> ej   /  [Class 3] + ___

                                      /  [Class 1] + ___
                                      (marked stems or stems ending
                                       in [-anterior] coronal)

                                      /  [Class 2] + ___
                                      (marked stems or stems ending
                                       in [-back] consonant or in
                                       [-anterior] coronal)

                            ---> (U)  /  [Class 1] + ___
```

$$/ \text{ [Class 2, neut]} + \underline{}$$
$$(\text{except for a few marked stems})$$

$$\text{---> ov/ev} / \text{ [Class 2]} + \underline{}$$
$$(\text{default rule})$$

e. [pl] + [dat] ---> am

Like Latin, Russian has severe restrictions on the accusative. Specifically, in Russian the accusative of all nouns in the plural is identical with the genitive, if the noun is animate, and with the nominative, if the noun is inanimate. Moreover, the same regularity obtains for the singular of class 2 nouns.[10] We postulate therefore that in addition to being subject to rule (18), Russian nouns are also subject to the readjustment rule (24).

$$(24) \quad \text{acc --> } \left\{ \begin{array}{ll} \text{[gen]} & / \text{ [+animate]} \\ \text{[nom]} & / \text{ [-animate]} \end{array} \right\} + \left\{ \begin{array}{l} \text{Pl} \\ \text{Sg} \end{array} \right\} + \underline{}$$

Cond.: If Sg., stem must be Class 1

Russian NP's are subject to the same concord rules as Latin; i.e., (20a,b), as well as to the readjustment rule (21). The facts of Russian however require an extension of (20b) stated in (20b').

(20b') In an NP, the gender and animacy features of the head noun are spread to the specifiers and adjectives that are in the head noun's domain.

The information about animacy is required by rule (24); without[11] this information (24) cannot operate properly.

The major difference between Latin and Russian thus is that in addition to the concord rules (20) and (21), Russian nouns and adjectives are also subject to the readjustment rules (24). And it goes almost without saying that Russian has different[12] spell-out rules than Latin (i.e., (23) rather than (11)).

Unlike those of Latin the Number-Case suffixes of Russian adjectives and specifiers are not identical with the class 1 and class 2 nouns. Russian therefore requires an additional set of

spell-out rules for adjectives and specifiers. We give a partial
list of these in (25), where the suffixes to the left of the
vertical bar are those of the adjectives and those to the right
                                        13
are used for specifiers.

(25)   a. Sg + N ---> aja | a   / [Class 1] + ___

                  ---> yj/oje | U(tU)/o   / [Class 2] + ___

        b.   + A ---> uju | u

        c.   + G ---> oj   / [Class 1] + ___

                  ---> ogo   / [Class 2] + ___

        d. Pl + N ---> ye | i

        e.   + G ---> yx | ix

        f.   + D ---> ym | im

     We now in a position to treat Russian NPs that include
specifiers and adjectives. It will be seen that certain Case
configurations considered highly idiosyncratic and therefore
discussed at length in traditional grammars are in fact perfectly
regular consequences of independently motivated rules of the
language on the account we present here.

     Consider first the distribution of surface case in NPs of
the type illustrated in (26).

(26)   *Syntactic dative plural*:
              Inanimate   Animate
        Et-im   star-ym rabot-am   Et-im   star-ym ZenSCin-am
         PlD   PlD   PlD   PlD   PlD   PlD
        'these   old   works'   'these   old   women'

        Et-im   star-ym gorod-am   Et-im   star-ym proletarij-am
         PlD   PlD   PlD   PlD   PlD   PlD
        'these   old   towns'   'these   old   proletarians'

                                        Et-im   star-ym vel'moZ-am
                                 PlD   PlD   PlD
                                        'these   old   noblemen'

     In (26) the concord rules (20) apply, followed by
redundancy rule (24) and spell-out rules (23e) and (25f). The
result is surface sequences in which all words exhibit the same

Case, Number, and Gender.

The situation is not as transparent in NPs in the direct cases, Nominative and Accusative. Consider first the Accusative Plural illustrated in (27).

(27) *Syntactic accusative plural:*

	Inanimate				Animate	
	Et-i	star-ye	rabot-y		Et-ix	star-yx	ZenSCin-U
	P1N	P1N	P1N		P1G	P1G	P1G

Et-i	star-ye	gorod-a		Et-ix	star-yx	proletarij-ev
P1N	P1N	P1N		P1G	P1G	P1G

			Et-ix	star-yx	vel'moZ-U
			P1G	P1G	P1G

After concord (20), the syntactically Plural Accusative phrases in (27) are subject to the readjustment rule (23), which changes Plural Accusative to Nominative in inanimates and to Genitive in animates. Other rules then apply in the normal fashion, giving the correct results shown.

Consider next the phrases in (28):

(28)   *Syntactic accusative singular:*

	Inanimate				Animate	
Class 1	Et-u	star-uju	rabot-u		Et-u	star-uju	ZenSCin-u
	SgA	SgA	SgA		SgA	SgA	SgA
Class 2	Et-ot	star-yj	gorod-U		Et-ogo	star-ogo	proletarij-a
	SgN	SgN	SgN		SgG	SgG	SgG

The syntactically Singular Accusative NPs in (28) differ from their plural counterparts in (27) because of readjustment rule (23), which applies to all Plural Accusatives but only to Class 2 Singular Accusatives. Rabot- and ZenScin- are Class 1; their surface Case thus remains Accusative. Gorod- and proletarij- are Class 2; inanimate gorod- thus becomes Nominative while animate proletarij- becomes Genitive, in accordance with (23).

Consider finally phrases of the type illustrated in (29):

(29)   *Syntactic accusative singular*

Class	Et-ogo 2	star-ogo 2	vel'moZ-u 1
	SgG	SgG	SgA

It is striking that in (29), unlike (26)-(28), the specifier and the adjective do not surface with the same Case as their head noun vel'moZ-. The latter belongs to the exceptional set of masculine Class 1 stems. Vel'moZ- is thus not subject to rule (23) in the singular. This is not true of the specifier and adjective. Concord (20) makes them masculine singular in agreement with vel'moZ-. They are then assigned to Class 2 by (24); rule (23) thus applies to them, adjusting their syntactic Accusative Case to surface Genitive.

In short, the rules motivated in the earlier part of this section handle the examples in (26)-(29) without modification. This fact is especially noteworthy with respect to example (29), where the specifier and adjective have a different surface Case than the head noun. As noted above, most Russian grammars treat these phrases as anomalous and discuss their Case distribution at length. On the account presented here, they are perfectly regular consequences of otherwise fully motivated rules of the language.

2.3 Numeral Phrases in Russian[14]

Case distribution in Russian NPs that contain numerals is astonishingly opaque. We can account for these phrases, however, with the addition of only two special readjustment rules involving Case and Number.

The fundamental fact about Russian numerals is that they belong to two different syntactic categories: the numerals for 1-4 are adjectives; those for 5-20 and higher multiples of 10 are nouns. Numerals above 20 are composite expressions consisting of the word for 20, 30, etc., followed by the word for the single digits. They are treated exactly like expressions with the single digit alone; e.g. 31, 51, 101, etc. are adjectives like 1; 30, 50, 70, etc., are nouns like 10.[15]

Given this difference in syntactic category, other differences follow. As nouns, 5-20, etc., may have lexical

specifications for gender, animacy, and declension class. It happens to be the case that these noun-numerals are Class 3 feminine inanimates; furthermore, they are singularia tanta, which normally surface only as singulars. In contrast, as adjectives, 1-4, etc., cannot have lexical marks for gender and so on; they receive such specifications only by concord (20) and redundancy rule (24).

To deal with case distribution in numeral NPs, we begin with the natural assumption that when the numeral is odin '1' or ends in odin, the head of the NP is Singular in S-structure; otherwise the head is Plural. With this in mind, consider the examples in (30), where all the head nouns are plural, and both the syntactic and the surface Case of all words is Dative:

(30) pjat'- '5'   tr- '3'
      pjat-i star-ym rabot-am   tr-em star-ym rabot-am
         Sg   Pl   Pl   Pl   Pl   Pl

      pjat-i star-ym gorod-am   tr-em star-ym gorod-am
         Sg   Pl   Pl   Pl   Pl   Pl

      pjat-i star-ym ZenSCin-am   tr-em star-ym ZenSCin-am
         Sg   Pl   Pl   Pl   Pl   Pl

      pjat-i star-ym proletarij-am   tr-em star-ym proletarij-am
         Sg   Pl   Pl   Pl   Pl   Pl

      pjat-i star-ym vel'moZ-am   tr-em star-ym vel'moZ-am
         Sg   Pl   Pl   Pl   Pl   Pl

These examples illustrate that in all the oblique cases, rules (20) and (23) account for all relevant facts except for the Singular number of pjat'-. But this follows from the fact already noted that the numerals 5-20, etc., are singularia tanta nouns. In short, numeral NPs with syntactic oblique Case require no additional descriptive devices.

Additional machinery is required, however, for NPs in the direct Cases (Nominative and Accusative). Consider first the examples in (31), which illustrate syntactic nominative Case in NPs containing noun numerals 5-20.

(31)   pjat' star-yx rabot-U
                  SgN   PlG   PlG

                  pjat' star-yx gorod-ov
                  SgN   PlG   PlG

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```
pjat'    star-yx    ZenSCin-U
SgN                PlG                      PlG


pjat'    star-yx    proletarij-ev
SgN                PlG                      PlG


pjat'    star-yx    vel'moZ-U
SgN                PlG                      PlG
```

The numerals appears in the expected Nominative Singular form. The Plural Number of the adjective and the head noun are also expected, as noted in the paragraph immediately above (30). On the other hand, the Genitive Case of the adjective and head noun is totally unexpected and has no independent motivation. The appearance of this surface Case requires a readjustment rule applicable only in numeral phrases. This rule turns all Nominatives to the right of the numeral into Genitives. We state the rule as (32) and order it after readjustment rule (23).

$$(32) \quad N \rightarrow G \ / \ \underset{NP}{[\ldots [\text{Numeral}] + \text{NUMBER} + \begin{Bmatrix} N \\ A \end{Bmatrix} + \ldots + Pl \ \underline{\quad} \ldots]}$$

Rule (32) changes Nominative to Genitive in an adjective or noun to the right of a numeral in a direct case, with the further restriction that the head of the NP is Plural. In this way we prevent (32) from applying in NPs where the numeral is <u>odin</u> '1'. As stated (32) correctly applies not only to the head of the NP but also to any attributive adjectives that might be present.

Rule (32) is ugly, but it comes by its ugliness honestly. It is a reflex of the fact that in Old Russian the numerals 5-20 were head nouns in their NPs like English <u>gross</u> and <u>ton</u>, which required a genitive complement regardless of the case of the
[16]
NP.

The syntactically Nominative phrases in (31) have syntactically Accusative counterparts with identical surface forms. However, the derivation of the Accusative phrases is not identical to that of the Nominatives. This is due to the fact that the Accusative phrases are subject to (23). This rule, it will be recalled, changes Accusative to Genitive in Plural animates and Accusative to Nominative in Plural inanimates. (Numerals such as <u>pjat'</u> '5' that are Class 3 singular nouns are not subject to (24)). Application of (23) thus results in correct outputs in Accusative counterparts to (31) with animate head noun. In the phrases with inanimate head noun, rule (23) changes Accusative to Nominative, but the Nominatives do not

surface because they are changed to Genitive by rule (32).

The situation is somewhat different when the head noun is plural and the numeral is an adjective i.e. 2-4. This is illustrated in (33).

(33) a. *Syntactic nominative*   b. *Syntactic accusative*

     tr-i star-yx/e rabot-y   tr-i star-yx/e rabot-y
      P1N   P1G/N   SgG   P1N   P1G/N   SgG

     tr-i star-yx gorod-a   tr-i star-yx gorod-a
      P1N   P1G   SgG   P1N   P1G   SgG

     tr-i star-yx/e ZenSCin-y   tr-ex star-yx ZenSCin-U
      P1N   P1G/N   SgG   P1G   P1G   P1G

     tr-i star-yx proletarij-a   tr-ex star-yx proletarij-ev
      P1N   P1G   SgG   P1G   P1G   P1G

     tr-i star-yx/e vel'moZ-i   tr-ex star-yx vel'moZ-U
      P1N   P1G/N   SgG   P1G   P1G   P1G

Inspection of (33a) reveals that the numeral appears in the Nominative everywhere. This is expected since the syntactic Case of the head noun is Nominative, and the concord rule (20a) copies both Case and Number onto the adjectival numeral. The Genitive case in the adjective and noun to the right of the numeral in (33a,b) is also expected in view of (32). What is not expected is the optionality of the Genitive in adjectives of class 1. To account for this, a special proviso must be added to rule (32) stating that the rule is optional in adjectives belonging to Class 1.

Equally unexpected is the fact that the head noun in (33a) is consistently in the Singular. Nothing in the account developed to this point predicts this result. We therefore have no choice but to add rule (34):

(34) Pl --> Sg / [...[Numeral] + Pl + N + ... [NOUN] + ___
               NP   Adj

This rule states that an adjectival numeral--i.e. 2-4--in the Nominative Plural triggers a change in the number of the head noun from Singular to Plural.

The Accusative phrases in (33b) can now be readily disposed of. Since the syntactic case of the head noun is accusative,

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rule (23) is involved. And since all plural adjectives and nouns are subject to rule (23), we expect animate ZenSCin-, proletarij-, and vel'moZ- to surface as genitives. This expectation is borne out. We also expect (23) to turn inanimate rabot- and gorod- into surface nominatives. In fact they surface as genitives. Recall, however, that rules (32) and (34) have been motivated and included in the account. Both of these rules are triggered by a numeral in the nominative and together produce surface genitive singular head nouns. Our account of the forms in (33) is thus complete.

In sum, the theoretical framework we sketch in sec. 1 supports a simple and well motivated analysis of the dazzlingly intricate data of noun-modifier concord in Russian NPs--data that has long baffled most of the linguists, traditional grammarians, and second-language learners who have tried to conquer it.

3. Concluding Remarks

The theoretical framework that has been employed in the discussion above and is represented graphically in (12) is made up of modules that can be found in most other models of morphology. The only originality to which the framework can lay claim is the nature of the elements that the morphology processes and the interaction of the different modules. The model distinguishes morphemes, which are the elements that make up the terminal string of the syntactic trees, from morphological features, which are the constituents of the different morphemes. All morphemes fall into two basic types: concrete morphemes, both stems such as dog, usurp, yellow and affixes such as be-, con-, -ion, -al, -ness, and abstract morphemes such as Plural, Accusative, or Passive. The morphological features also fall into two classes: we distinguish features like gender, animacy and count vs. mass, all of which play a role in the syntax and semantics of the language, from inflection class, which has no semantic or syntactic significance, but is essential for the proper operation of the morphology and the phonology.

We have tried to demonstrate the advantages of distinguishing gender from inflection class in the discussion of gender/number concord in Latin and Russian NP's. Work in progress indicates that the distinction between inflection class and gender significantly clarifies apparent irregularities noted in affix distributions in a number of languages. For example, Harris 1989 has shown that significant improvements in the account of number-gender agreement in Spanish can be obtained if

the distinction between inflection class and gender is scrupulously observed.

The two main modules of the model discussed here are the readjustment rules like the Russian rules (24), (30), and (32), and the spell-out rules such as those given in (17), (23) and (25). We have tried to show that this organization of the modules model provides a natural and plausible account for a variety of phenomena including, in particular, the case distribution in Russian Noun Phrases. Although the explanation was rather lengthy, the actual account involves only three rules in addition to the quasi-universal concord rules. These three language-particular rules are the accusative rule (24), which in one version or another figures in every proper account of the Russian declension, and the two rules (32) and (34) that have to be postulated in order to deal with the highly unusual case distributions in numeral phrases.

The examples that have been analyzed here are, of course, not sufficient to establish the correctness of the theory; at best they represent a few steps in a journey of exploration that may well occupy us for years.

Appendix 1

It is instructive to compare the account of English pluralization in (8) and (10) above with an account in a framework where abstract morphemes are nonterminal features in the syntactic tree. In place of the rules (8) and (10) we would then need the set (35).

(35)   In the env. N [Plural]
                          |
                          |
                          |
                       ------

a.   X + us ---> X + i

b.   X ---> X + en where X = child, ox, brother some
                                of which also undergo changes in the
                                phonologic composition of the stem.

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c.   V ---> [-back]   where X = <u>woman, goose, foot</u>
              [-low]   <u>mouse, louse, man</u>
                                       <u>brother, tooth</u>
d.   X ---> X + /z,s, Iz/ depending on final phoneme of noun.

We recall that in English only one of the four rules in (35) can apply to a given form. In the framework outlined above this was achieved by exploiting the fact that the rules in (8) spell out morphemes in the terminal spring and by ordering these spell-out rules appropriately. Since in the alternative framework Plural is not a terminal morpheme there can be no talk of one rule bleeding another. The fact that the application of earlier rules (35a,b,c) prevents the later rule (35d) from applying must therefore be captured in some other way.

Anderson's way of dealing with this problem is to have recourse to <u>disjunctivity</u>, a concept introduced by Chomsky in the 1960's, subsequently revised by Kiparsky (1973) under the heading of the 'elsewhere' condition. According to Kiparsky, a pair of adjacently ordered rules are disjunctive if the strings to which the earlier rule applies are a subset of the strings to which the later rule applies. This principle would evidently work in the present instance, because each of the rules (35a,b,c) applies to a listed subset of the nouns of the language, whereas (35d) is unrestricted; hence (35a,b,c) should be disjunctive with respect to (35d).

Anderson (1986, p. 3) observes that the principles of rule disjunctivity employed in phonology "do not exhaust the facts of the disjunctive relations" encountered in morphology and in order to deal with these morphological facts introduces a special principle of disjunctiveness, which "is particular to morphology rather than deriving from elsewhere." Anderson's principle reads:

(36a) Rules may be organized (by stipulation) into disjunctive
     blocks, corresponding (roughly) to the traditional notion
     of <u>position class</u>.

Principle (36a) extends disjunctivity to any arbitrary set of rules. It therefore subverts the restrictiveness embodied in the traditional principle of rule disjunctivity.

That rule ordering is involved in the English plural examples becomes quite plausible when we examine the rules in (8). It is obvious that rule (8d) will bleed -- make inapplicable -- any rule spelling out the Plural morpheme that is ordered subsequent to (8d). Hence, if (8a,b,c) are correct rules

of English they can only be ordered before (8d). If any of them were ordered after (8d) there would never be an occasion to apply it. However, this analysis presupposes that the rules in (8) are spell-out rules, i.e., rules rewriting an abstract morpheme by a sequence of phonemes. If Plural is not an abstract morpheme, the proposed account does not go through, and a principle like (36a) will have to be invoked.

The main examples used by Anderson to illustrate his framework are the inflection of the verb in Georgian, the double plurals in Breton, and Umlaut in Germanic languages, which includes the English examples in (35c). An alternative treatment of the English examples (35c) was given in (8) above. The Georgian and the Breton examples were described in as yet unpublished work (see Bromberger and Halle 1989 and Halle 1989). None of these requires recourse to principle (36a), but, as illustrated in the discussion of rules (8) above, some of them rely on the effect of rule bleeding, which is a by-product of extrinsic rule ordering.

The rules in (8) do not include a counterpart of rule (35c); the counterpart of (35c) is rule (10), which is a readjustment rule rather than a spell-out rule and which therefore cannot be included among the rules in (8). In our framework this is a consequence of the fact that (35c) does not rewrite the plural morpheme but affects rather the phonological composition of the noun stem. Rules of this type do not belong among the spell-out rules, but must instead be assigned to the readjustment component. In Anderson's framework this distinction between spell-out and readjustment rules is lacking. Since as shown in the body of this paper this distinction is of central importance, the fact that it is not specifically recognized in the Anderson framework must be regarded as a weakness.

It will have been noticed that there is no counterpart of rule (8b) in (35). Since the singular and plural are identical there is no reason to postulate a special rule for these cases. The absence of the rule, however, raises the following technical problem. An entry such as

$$
\begin{array}{c}
\text{N, [Plural]} \\
| \\
| \\
| \\
\text{sheep}
\end{array}
$$

would normally be subject to rule (35d). Since this would

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generate the incorrect <u>sheeps</u>, a means is required to block application of (35d). Anderson cannot invoke here any disjunctivity principle, since on his analysis no rule is involved.

This problem does not arise in frameworks such as the one adopted by Anderson in his later work as well as by Perlmutter 1988 for his treatment of plural formation in Yiddish. The modified framework is based on an idea advanced in Lieber 1980 that removes most allomorphy rules from the morphology and instead lists the different allomorphs in the lexicon as distinct items. Thus, both the singular <u>foot</u> and the plural <u>feet</u> are listed, and the principle (36b) formulated by Anderson 1986 p. 4 is invoked to block application of the regular plural in these cases.

(36b) Stems that are lexically characterized for some set of
features block the operation of rules specifying a
(non-null) subset of those same features.

In the case of <u>foot-feet</u> this procedure does not sound implausible. However, when extended to nouns such as <u>sheep,</u> <u>deer,</u> <u>fish</u> etc. the double listing is just a subterfuge for blocking the application of the regular plural rule. There is no other reason for proceding in this fashion. (For a additional discussion of the multiple listings of lexical items that is a basic feature of the Lieber model, see Bromberger and Halle 1989.)

Appendix 2

Concord in the Russian NP was discussed in Zwicky (1987). Zwicky considers an analysis along the lines developed in the body of this paper and rejects it on the grounds that it "is a disaster from the theoretical point of view . . . [because] . . .the boundary between syntax and morphology would be breached." (p. 34.) He finds, moreover, that the analysis is "simply wrong on factual grounds. There are clear instances of referral rules for Russian Ns, and in general these rules have no consequences whatsoever for the form modifiers take. Thus FEM Ns ending in a palatalized consonant have an ACC form that coincides with the NOM . . . but their modifiers nevertheless distinguish between ACC and NOM . . ." (p. 34)

Zwicky's <u>referral</u> <u>rules</u> are (readjustment) rules that change one abstract morpheme into another. Zwicky wants to allow these referral rules in cases where the contrast between two morphological categories is neutralized in a particular paradigm,

but he wants to exclude them in cases where they affect indirectly a variety of different paradigms.

Zwicky distinguishes _overt_ from _covert_ morphological categories. Covert categories for Zwicky are Declension Class and the Animacy Feature because "inflectional rules . . . provide no exponents for them" (p.32), whereas overt categories such as Gender, Case and Number are providead with exponents by the inflectional rules. Zwicky writes:"Within the framework of GPSG overt categories in a language are head categories . . . Covert categories in a language, _I_ _should_ _like_ _to_ _claim_, <emphasis supplied> are never head categories . . . one important consequence of this restriction is that covert categories cannot participate in grammatical agreement . . ." (p. 32) Zwicky provides no evidence that this claim is actually true of all languages. In fact, the analysis presented in the body of this paper makes essential use of the concord rule (20) which spreads Animacy from the head noun to its adjectives and specifiers in its domain. Zwicky does not show that an analysis of this sort is faulty, rather he rejects it on a priori grounds: "From the theoretical point of view <such analyses> are suspect because they . . . spread the covert categories DECL(ension class) and AN(imacy), respectively -- just the sort of use of inflectional features that I spoke against in section 3." (p. 35)

In place of the rules (20), (21) and (24) Zwicky's analysis "decompose(s) . . . ACC into several subCASEs" (p. 36), which for simplicity I label ACC 1, ACC 2, and ACC 3. Since for Zwicky ACC 1, ACC 2, ACC 3 are overt categories they can be subject to referral rules, where necessary. Thus, by assigning ACC 1 to the feminine singular nouns, ACC 2 to the masculine singular nouns, and ACC 3 to the neuter singulars, Zwicky is in a position to have recourse to a readjustment rule (his 'referral rule') much like (24), where "the first of these subCASEs <is> realized via the distinctly ACC form, the second by referral to GEN, and the third by referral to NOM."

Zwicky assures us that "the decomposition of CASEs into features . . . is not cheap formal trick" and writes that "such decomposition is called for in a large number of other instances." He unfortunately provides no evidence to back up these claims. Because of the availability of the decomposition mechanism the constraint that covert categories may not participate in morphological agreement is empty, Zwicky's assurances to the contrary notwithstanding.

Notes

*In preparing this paper I have had help and advice from L. Babby, F. Dell, J. Harris, G. Longobardi, and D. Pesetsky,for which I am most grateful. I alone am responsible for all remaining inadequacies.

1. I believe that infixes, a third kind of traditionally recognized affix, are not primitive elements but rather prefixes or suffixes attached to a phonologically or morphologically defined base inside a word. Cf. the treatment of infixation in Ulwa in Halle 1989.

2. Cf. Bromberger and Halle 1989 and Halle 1989, which contain attempts to deal with these facts in the descriptive framework outlined in this proposal.

3. For additional discussion see Appendix 1.

4. It is likely that the Case suffixes should be further analyzed into a vowel that marks the declension class (/a/ - class 1, /u/ - class 2) and a Case ending proper, for this will make it possible to capture the obvious identities between class 1 and 2 nouns; e.g. acc. sing. /m/. gen. pl. /rum/, acc. pl. /s/, etc. I have not done this here because this would require me to discuss a series of phonological processes in Latin which are irrelevant to the matters of primary concern.

It was pointed out to me by F. Dell that the assumption made here that Case-fusion is to be treated as an instance where a sequence of several abstract morphemes is spelled out by a single phoneme string is not the only possible one. Alternatively case fusion might be treated as an instance where the sequence of abstract morphemes coalesces into a single bundle of features, which is then spelled out as a phoneme sequence. I have not had an opportunity to explore this alternative proposal further, but I have observed with Dell that this would allow us to simplify several readjustment rules (e.g., (18), (32), (34)).

5. The absence of fusion of Number and Case in English is further illustrated by the fact that the Genitive marker fails to surface after a word ending with the suffix /s/, e.g., the king of the Franks' (*Franks's) vassals, a man who smokes' (*smokes's) lungs, a friend of John's (*John's's) brother. The Genitive s surfaces after words ending in non-suffixal /s/, e.g., Max's hat,

<u>the</u> <u>larynx's</u> <u>musculature</u>.

6. The distinction between gender and inflection class seems to be a wide-spread phenomenon and the failure to observe this distinction has been the source of much unnecessary confusion. Thus, in the Semitic languages, in the unmarked nouns gender determines inflection class; e.g., in the majority of Hebrew nouns the phonetic exponent of masc. is zero in the sg. and /im/ in the plural, whereas in feminine nouns the exponent of the singular is /ah/ and that of the plural is /ot/. There are however numerous nouns where this regularity is not obeyed and where the declension class is therefore an inherent property. Moreover, like their Latin counterparts Hebrew adjectives obtain their gender from the head noun and get their inflection class by the Hebrew analogue of rule (21). Strikingly, the numerals 2-19 exhibit what in some grammars is described as "gender disagreement" with their head nouns. These numerals take the suffix /ah/ when the head noun is masculine, and zero when the head is feminine in gender. Thus, we get <u>SiS-ah</u> <u>yam-im</u> <u>Ham-im</u> "six hot days" but <u>SeS</u> <u>maHbar-ot</u> <u>HadaS-ot</u> "six new notebooks". The explanation for these forms is quite straightforward: the Hebrew analog of rule (21) states that numerals of feminine gender are assigned to inflection class 2, while numerals of masculine gender are assigned to inflection class 1. I am grateful to John McCarthy for drawing my attention to the Semitic facts. For interesting evidence from Spanish bearing on the distinction between gender and inflection class, see Harris 1989.

7. The capital letters <u>S</u>, <u>Z</u>, <u>C</u> stand for palatal [š, ž, č] respectively. whereas capital I, U in parentheses represent the "yers," special abstract phonemes of Russian which surface as /o,e/ when followed by another yer, and as zero elsewhere. On the "yers", see Kenstowicz and Rubach 1987 and literature cited there.

8. Foreign family names ending in a vowel other than /a/ have the zero declension, whereas those ending in /a/ vacillate: according to the Academy grammar 1980, <u>Kurosava</u>, <u>OkudZava</u> are declined like normal class 1 nouns, whereas <u>de Sika</u> has the zero declension. Especially, curious is the treatment of foreign family names ending in a consonant. When their referents are masculine they are declined like class 2 nouns of masculine gender, but when their referents are feminine, they are assigned to the zero declension. The same is true is of titles such as the German <u>frejlejn</u> 'Miss' or the English <u>miss</u>.

9. The gender of a class 0 noun with inanimate referents is in some cases idiosyncratic; e.g., <u>kofe</u> 'coffee', <u>tornado</u> 'tornado' are masculine, but <u>Sosse</u> 'highway' and <u>kupe</u>

'compartment' are neuter. But as might be expected, the gender of animate nouns is predictable, e.g., <u>ledi</u> 'lady' and <u>frejlein</u> 'Miss' are feminine and <u>torero</u> 'toreador' and <u>janki</u> 'Yankee' are masculine. In his poem <u>150,000,000</u> V. Mayakovsky appears to treat <u>janki</u> as a declinable noun:

Ja odin tam byl,   I alone was there,

v barax el i pil,   in bars eating and drinking,

popival v barax s jankami dZin.   drinking gin in bars with the Yanks.

Mayakovsky's <u>jankami</u> assumes a class 2 noun <u>jank</u> 'Yank' rather than the more standard indeclinable <u>janki</u>.

10. The "animate-inanimate" distinction must not be taken <u>a la lettre</u>. Garde 1980 observes that the words for bacteria and oysters and other lower forms of life are treated as grammatical inanimates, whereas the words for corpse, chess pieces, dolls, playing cards, and mushrooms are treated as grammatical animates.

11. Mel'chuk 1987 points out that in order to account for the case distribution in a phrase such <u>siloj</u> <u>v</u> <u>tri</u> <u>medvedja</u> 'with the strength of three bears' it is necessary to prevent animacy from spreading to the numeral. David Pesetsky points out that this effect can readily be achieved by postulating that in the numeral phrases under discussion the head noun is marked [-animate] by a special rule. This rule will also account for other instances where the Accusative of an animate noun is identical with the Nominative rather than the Genitive; e.g., <u>postupit'</u> <u>v</u> <u>soldaty</u> 'to join up as a soldier'. Since this rule must be ordered before the concord rules (20) it will have to be included among the rules that relate S-structure to PF.

12. It is worth noting that the last rule in (23b) spells out both the nominative and accusative singular of class 3 nouns as /(I)/. This leads us naturally to inquire as to the reason for adopting this procedure rather than postulating a readjustment rule analogous to (24) which would turn the accusative singular into nominative singular for class 3 nouns. We have chosen the former alternative on the grounds that the addition of a readjustment rule is more costly than the addition of an extra environment to a spell-out rule. Moreover, if, as commonly supposed, grammatical cases are feature complexes the specification of the conjunction Nominative and Accusative will require one feature less than that of each of the two cases.

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13. Since in Russian the adjective and specifier spell-out rules are similar to, but not identical with those of the nouns, we have the option of stating the adjective spell-out rules not in terms of declension class but in terms of gender. The advantage of breaking the parallelism between the spell-out rules of the adjective and the noun is that if this is done we can dispense with rule (21), which assigns declension class to adjectives.

That this advantage is more apparent than real, however, is shown by the treatment of the accusative in Russian determiners and adjectives. The treatment is identical with that of the nouns which we have formally reflected in rule (24). When (24) applies to singular nouns the context must be stated in terms of declension class (cf. the condition given in the statement of (24)). We therefore are faced with the alternative of either dropping rule (21) and introducing corresponding complications into rule (24); or of leaving rule (24) unchanged and keeping rule (21) in the grammar of Russian. It seems preferable to opt for the latter alternative since it allows us in addition to preserve the parallelism between the spell-out rules for nouns and those for adjectives.

14. This paper was completed before I had an opportunity to familiarize myself with Mel'čuk's 1985 book on Russian numeral phrases. I hope to take account of this interesting study in a future publication.

15. We disregard further details connected with treatment of some of the multiples of 10: 40, 90, 100, 1000, etc.

16. Cf. Spanish _mil_ _hombres_ '1000 men', where _mil_ is an adjective, vs. _un_ _millon_ _de_ _hombres_ '1,000,000 men', where _millon_ is a noun requiring _de_ before its complement.

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