2 PREVIOUS WORK

2.1 ARBITRARY SUBCATEGORIZATION

In all of the published work on transformational grammar, only one device has been utilized for handling irregularities: arbitrary subcategorization. If most words in a class had to undergo a rule, while a few exceptions could not undergo it, it was assumed that further subcategorization was necessary and that the exceptions formed a subclass of their own, to be distinguished from the regularities by a separate syntactic feature. For simplicity, let us take an example from phonology. There is a rule in English that makes tense vowels lax in the syllable before the suffix *-ity* (providing that there is an intervening consonant). Since this rule occurred in the grammar before the contemporary rules that reflect the great vowel shift, it, together with the vowel shift rules, is responsible for the vowel alternations in *obscene-obscenity, vain-vanity, divine-divinity, profound-profundity,* and many others. One of the very few exceptions to this rule is *obese.* It yields [obīysity], not [obĕsity]. No other fact about *obese* is correlated to the fact that it does not undergo this rule. It is simply an isolated fact.

With only the device of arbitrary subcategorization in our linguistic theory, we would have to handle *obese* in the following way. We would have to conjure up an arbitrary feature, perhaps called "shortening." Normal words like *obscene, vain, divine,* and so on would have to be marked in the lexicon as "plus shortening." *Obese* would be marked as "minus shortening." The rule would then have to be made somewhat less general, so that it would apply only to "plus shortening" vowels.

The shortcomings of such a solution are fairly obvious. The feature "shortening" serves no other purpose than to distinguish

an isolated exception to a rule from those normal words that undergo the rule. It would never be mentioned anywhere else in a grammar of English. This is disturbing on a number of counts. First, we would have to revise our tentative universal theory of language to include the feature "shortening" as one of those features that can possibly occur in a grammar of a natural language. But it seems absurd to set up a given feature as a universal if it occurs only once in only one language and then serves only to distinguish a handful of exceptions to a single rule of the language. But even if such a feature played an important role in a wide variety of languages, it would be questionable to set up as a functioning property of English a feature that would play no role at all if a handful of words were lost from the language.

But there are even more serious difficulties here. The device of arbitrary subcategorization fails to capture two notions that an adequate theory of language should capture.

> 1. A theory of language should provide a way for grammars defined by that theory to distinguish exceptions from regular cases. Thus, an irregularity like *obese* should be formally distinguished in a grammar of English from regular cases like *rain, divine,* and so on.
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> 2. A theory of language should provide an evaluation measure that prefers grammars with few exceptions to those with many exceptions. That is, the grammar that points out the most regularities should be preferred. In terms of the only evaluation measures that have been proposed so far—those that map generality inversely into length—we would expect exceptions to count more than nonexceptional cases. Thus, all other things being equal, the grammar with the greater number of exceptions would have the greater length.

Clearly, these conditions are not independent. Condition 2 depends on Condition 1, since you must be able to tell what items are exceptions before you can assign numbers to them. Thus, to show that arbitrary subcategorization fails both conditions, it is sufficient to show that it fails Condition 1.

Consider the case of *obese*. The only way that our theory allowed us to distinguish *obese* as an exception to Rule n was to mark it with respect to a special feature, which we called "shortening." We decided to assign *obese* minus and the regular cases, the value plus, with respect to this feature. The only way that we could pick out the exceptions with respect to this rule by looking at the lexicon would be by the fact that they were marked minus with respect to this special feature, while the regular cases were marked plus. Since this distinction seems to form the only basis

on which this theory might be made to meet Condition 1, we could set up a tentative proposal based on it. One logical proposal would be the following:

> *Proposal 1:* Amend Theory I in the following way: establish in it a special vocabulary of arbitrary features, which will be used to mark exceptions. Then, in a grammar defined by Theory I', a lexical item marked minus with respect to one of these arbitrary features will constitute an exception.

There is one immediate difficulty with Proposal 1. Again consider the case of *obese*. Since the exception features are arbitrarily chosen, they may be given arbitrary values. Thus, we could have called our exception feature for Rule n "nonshortening" instead of "shortening" and correspondingly marked *obese* plus nonshortening instead of minus shortening. Since the choice of each value for each possible arbitrary feature is arbitrary, we could perfectly well have a situation where the irregularities with respect to one arbitrary feature were marked plus, while those with respect to another feature were marked minus. This would not allow us to characterize exceptions in the lexicon according to Proposal 1.

To get Proposal 1 to work, we would have to be able to guarantee that all exceptions were marked in the same way—all minus or all plus. That is, we need a way of regularizing the marking of exception features. Note that when we decide that exceptions to a rule will be marked minus for some arbitrary feature, the plus value for that feature must be added to the structural description of the rule in question. Thus, we had to revise Rule n so that it referred to tense vowels that were marked plus shortening. We can use this fact to amend our theory in such a way as to regularize the marking of exceptions.

> *Proposal 2:* Amend theory I as follows: only the plus value of an exception feature may appear in the structural description of a rule.

Proposal 2, together with Proposal 1, will enable us to regularize the marking of exceptions for cases like Rule n: an item marked minus for an exception feature would be an exception. If all rules were like Rule n, and if all exceptions were like *obese*, then Proposals 1 and 2 would allow us to characterize exceptions using arbitrary subcategorization. Moreover, there would be a natural sort of evaluation measure for exception features, namely, count the exception features marked minus, but not those marked plus. Since the exception features marked plus indicate regularities, while those marked minus indicate exceptions, this measure

simply says count the exceptions, not the regularities. Such an evaluation measure will prefer grammars with the fewest exceptions.

Unfortunately, not all exceptions are like *obese*, cases where a very general rule does not apply in isolated cases. Consider cases like *foot-feet, mouse-mice, louse-lice, tooth-teeth, goose-geese*. In these cases, the plural is formed by a rule that makes tense, grave vowels in Germanic words nongrave (Rule *k*). But Rule *k* is not a productive rule; items that undergo Rule *k* are not ordinary cases, but exceptions. Ordinary cases like *boot, soup, suit, lout, bout, juice,* and so on do not undergo Rule *k*.

The existence of rules like *k* makes it impossible to maintain Proposals 1 and 2 and still characterize exceptions in terms of arbitrary subcategorization. Proposals 1 and 2 require that the value of the arbitrary feature indicating the exception be opposite that of the feature mentioned in the rule. For rules like *k*, however, the reverse is true. Let us call our arbitrary feature "umlaut." If Rule *k* is revised so that it applies to grave, tense vowels in Germanic words marked plus umlaut, then items like *tooth* and *mouse* must be marked plus umlaut if the rule is to apply to them. For nonproductive rules like *k*, the exceptions and the structural description must be marked in the *same* way with respect to the arbitrary feature involved. It is the regular cases such as *house* whose arbitrary features must not coincide in value with the corresponding feature mentioned in the structural description. For this reason, Proposals 1 and 2 cannot be maintained. It seems, then, that if our tentative theory of language is to meet Conditions 1 and 2, it must be revised to include some more powerful devices for handling exceptions.

2.2 THE CHOMSKY-HALLE SYSTEM

Noam Chomsky and Morris Halle, in *The Sound Pattern of English,* have devised the following way of dealing with irregularities in phonology. They assume that each morpheme will be subcategorized with respect to each phonological rule. That is, they assume that linguistic theory defines a set of "rule features" for each grammar, each rule feature referring to one rule of the given grammar. Suppose a lexical morpheme is an exception to a rule, say Rule 73. The morpheme will be entered in the lexicon marked [−R73]. Everything that is not an exception would be marked [+R73]. The evaluation procedure would count the minus-valued rule features, not the plus-valued ones. Thus, it would value more highly grammars with fewer exceptions.

By claiming that rule features are associated with entire morphemes, Chomsky and Halle are making a rather strong assertion: it will never be the case that one segment in a morpheme will be

an exception to a rule while another segment is not; either all segments are exceptions to a given rule, or no segments are. So far, no counterexamples to this assertion have been uncovered.

In incorporating rule features into linguistic theory, Chomsky and Halle have adopted the following conventions:

No rule feature may be mentioned in the structural description of a rule. (2-1)

All morphemic features, including rule features, are projected by a mechanical procedure into each phonological segment. (2-2)

If Rule n is a phonological rule, then it may not apply to a segment marked [—Rule n]. (2-3)

A theory of language incorporating these conventions can handle cases like *obesity* [see Section 2.1]. *Obesity* would be marked minus for the rule that makes vowels lax before *-ity*. The rule, without modification, will then fail to apply to *obese*, though it will apply in all normal cases. In general, such a theory can handle cases where exceptional individual items cannot undergo obligatory rules.

The theory, as stated so far, cannot handle two common cases in phonology: (1) Cases where an otherwise very general rule does not apply in some simply stated environment; to take a hypothetical example, consider a case in which a penultimate vowel is shortened unless preceded by an /h/. (2) Cases like *foot-feet* [see Section 1.1] in which a rule does not generally apply, but applies only in isolated cases.

In order to handle cases like (1), Chomsky and Halle set up the following device. They allow rules that say that the next rule does not apply in some environment. That is, they allow rules equivalent to those of the following form:

Rule $k:$ [ ] → [—Rule $k+1$]/ in some environment (2-4)

Thus, in case (1) above, suppose that the vowel shortening rule were Rule 89. Rule 88 would read:

Rule 88: [ ] → [—Rule 89]/h__ (2-5)

Although Chomsky and Halle did not set up their system to account for cases like (2), we can handle such cases in their system by using a null environment in a rule of the form of (2-4). Suppose the rule that produces *geese* from *goose* is Rule 374. Rule 373 would then read:

Rule 373: [ ] → [—Rule 374] (2-6)

This says that all normal words do not undergo Rule 374. Cases like *goose* can now be looked at as exceptions to Rule 373, rather than to Rule 374. That is, we can mark *goose* [−Rule 373] in the lexicon. It, like all normal words, will be marked [+Rule 374]. Unlike normal words, *goose* will not undergo Rule 373, will remain marked [+Rule 374], and will undergo Rule 374.

Note the differences between this system and use of arbitrary subcategorization:

1. Arbitrary features can now be eliminated from the universal vocabulary of the theory of language. Instead, the theory, given a grammar, automatically defines an appropriate set of rule features.

2. This system provides what seems to be an adequate definition of the notion of exception to a phonological rule. It also provides an evaluation measure that values grammars with few exceptions more highly than grammars with many exceptions.

3. This system makes the claim that exceptions to phonological rules are morphemic in nature, rather than segmental. It also makes the claim that all exceptions to phonological rules can be represented within the system in terms of negatively specified rule features. We will see in Chapters 6, 7, and 8 that this system cannot be simply extended to syntax and still provide an adequate definition of an exception. However, we shall find that the notion of rule features of this sort will be indispensable in handling syntactic exceptions.