Words and their Internal Structure: Morphology (1)

Every speaker of a language knows words, indeed a great number of them. Part of our linguistic knowledge thus consists of knowledge of words as well as a system of rules regulating how words are formed.

To know a word is to know what it sounds like and to know what it means. As we have discussed already, knowledge of the way a word sounds involves knowledge of a pair of phonological representations (an Underlying Representation and a Surface Representation) as well as knowledge of phonological rules. We won’t discuss how the ‘meaning’ of words are coded in mental representations in much detail in this class (since it is a difficult topic about which linguists still do not know all that much). Instead, we will focus on how the relation between sound and meaning is established and what constitutes a ‘word’.

As we have discussed, speakers of English know, for example, that the UR of the word pen is /pɛn/ and that its SR is [pʰɛⁿ], as derived by the application of the Aspiration, Nasalization, and Vowel Lengthening Rules. Speakers also know that this sound representation corresponds to a particular ‘meaning’ (that is, a ‘concept’ or ‘idea’ of some sort).

To explain this, we must postulate a level of linguistic representation where certain phonological representations, such as /pɛn/, /bUk/, and /dɛsk/, are matched together with certain semantic representations (namely, a representation of ‘meaning’), for which we will use the notation of double-square brackets (for example, [PEN], where PEN, in all capital letters, is simply a “shorthand” notation for whatever the semantic representation of the word actually is, presumably in terms of some theory of semantic features, much like we use IPA symbols as shorthand for sets of phonological features).

\{
\{/pɛn/, [PEN]\}
\{/bUk/, [BOOK]\}
\{/dɛsk/, [DESK]\}
\}

A related fact is that when I say, for example, the sentence give me a pen please, this speech event constitutes, acoustically, a continuous stream of sound. Yet speakers know that there are five discrete words in the above sentence. In other words, they know that there are word boundaries in such an expressing. We may be tempted to think that we have already solved this problem by postulating discrete phonological representations in terms of discrete phonological segments (ultimately sets of discrete features): Speakers can somehow translate back-and-forth between the acoustic continuum and the phonological representation [gtvmiApʰɛⁿ:npʰli:z], which is itself derived from the representation /gtvmiApenphliz/ by way of the application of various phonological rules, such as the Aspiration Rule, the Nasalization Rule, and so on. But this does not tell us where one word starts and the next begins. Ultimately, we need to indicate word boundaries in mental representation (we will use the symbol # to indicate the beginning/end of a word):

[#{gIv#mi#A#pʰɛⁿ:n#pʰli:z#}]
Can we say, then, that “a word” is simply the level of representation where there exists some sort of systematic relation between sound and meaning? Obviously not, since there seem to be several such levels. For example, there is clearly a systematic relation between the entire string \[ #gIv#mi#A#p^{\text{e}}\cdot n#p^{\text{li}:z#} \] and some particular meaning. Suppose, however, that we try to define ‘words’ as the minimal level of linguistic representation where there is a systematic relation between sound and meaning. Will that work?

Impossible! Why? Because, on one hand, it seems that *impossible* is indeed one word. On the other hand, the word *impossible* can be further analyzed into two discrete parts, *im* and *possible*, each with its own associated meaning.

That is to say that whatever the minimal unit of representation where sound is linked to meaning turns out to be, *impossible* surely consists of two of them. At the same time, there is an intuition that *impossible* is something (shall we call it a word?), as is *possible*, that *im* is not! Consider also the following pairs of adjectives:

```
A                      B
desirable             undesirable
likely                 unlikely
happy                  unhappy
developed             undeveloped
```

The meaning of each of the adjectives in the B-column is essentially the meaning ‘NOT + corresponding adjective in the A-column’ (for example, *undesirable* means ‘not desirable’, *unhappy* means ‘not happy’, and so on). A popular English dictionary lists close to 3000 adjectives beginning with *un*, the meanings of all of which accord to the above pattern.

The minimal units of language that exhibit a systematic pairing of sound and meaning thus do not correspond to words, but to in fact something more basic. These basic, minimal units of sound and meaning are called *morphemes*. That, of course, now leaves us without a clear definition of ‘word’. For the moment, however, let’s keep to a very intuitive idea about what words are, and focus on morphemes. Once we better understand the nature of morphemes, and the rules regulating how morphemes can be combined, and once we further see how these units relate to “higher level” units of linguistic expression (phrases/sentences, which will be our next topic in this class), we will be in a better position to define words properly.

As it turns out, a word (or, at least for the time being, something we intuitively think of as being a word) can consist of one, two, three, four, five, six, or perhaps even more, morphemes:

1 morpheme: *desire* 2 morphemes: *desirable* 3 morphemes: *desirability* 4 morphemes: *undesirability* 5 morphemes: *unprofessionally* 6 morphemes: *antidisestablishmentarianism*
The combinations of morphemes witnessed above are all fine, but we should note that there are constraints on the way in which morphemes can be combined to derive more complex words. So, *undesirable* is a word, but *desireun*, *abledesireun*, *ableundesire*, *desireunable*, and *unabledesire* are not. Also, as we will see below, a word consisting of more than one morpheme has a very rich, articulate structure, which in fact results from the very way in which it was derived. The study of the rules by which morphemes can combine to form words is called **morphology**.

**Free and Bound Morphemes**

Some morphemes, such as *desire*, *happy*, *man*, *child*, and so on, are able to “stand alone” as words on their own. Such morphemes are called **free morphemes**. Other morphemes, however, such as *-ish*, *-ness*, *-ity*, *un-*, *re-*, etc., cannot function as words on their own, but must combine with some other morpheme, in which case they constitute part of a derived/complex word. Morphemes of the latter type are called **bound morphemes**.

Bound morphemes are also known as **affixes**. English has two different kinds of affixes: **prefixes** and **suffixes**. Prefixes attach to the beginning of a word to form a new word, whereas suffixes attach to the end of a word.

- **happy** = a free morpheme, or free-standing “word.”
- **unhappy** = a complex “word” derived by attaching the prefix *un-* to the base (root) word, **happy**
- **unhappiness** = a complex word derived by attaching the suffix *-ness* to the previously derived word, **unhappy**.

Most languages of the world have suffixes and prefixes. In the language Isthmus Zapotec, the prefix *ka-* attaches to nouns to make them plural.

- *zigi* ‘chin’
- *zike* ‘shoulder’
- *diaga* ‘ear’

    *kazigi*  ‘chins’
    *kazike*  ‘shoulders’
    *kadiaga*  ‘ears’

In Turkish, the suffix *-ak* is attached to a verb to derive a noun with the meaning “a place for verb-*ing*”:

- *dur* ‘stop’
- *bat* ‘sink’

    *durak*  ‘a stopping place’
    *batak*  ‘a sinking place’

Some languages have a type of affix that attaches not to the beginning or end of a word, but rather is inserted somewhere in the middle. Such affixes are called **infixes**. In Bontoc, a language spoken in the Philippines, the infix *-um-* is inserted after the first consonant of a noun or adjective to form a verb:

- *fikas* ‘strong’
- *kilad* ‘red’
- *fusul* ‘enemy’

    *fumikas*  ‘to be strong’
    *kumilad*  ‘to be red’
    *fumusul*  ‘to be an enemy’
We have just seen many examples of morphology in languages where an affix is attached to a word to create a new, more complex word. There are in fact several types of morphology, all of which involve different types of morphological processes/rules and have different characteristics. In this class, we will talk about three major types of morphology: derivational, inflectional, and compound morphology. We will begin with derivational morphology.

**Derivational Morphology**

Consider again the morphologically complex word *undesirability*, which is derived as follows:

Starting with the verb *desire* as the base/root word:

\[ \text{[V desire]} \]

The suffix *-able* is attached to form the adjective *desirable*:

\[ \text{[A [V desire] able]} \]

The prefix *un-* is then attached to this derived word to form the adjective *undesirable*:

\[ \text{[A un [A [V desire] able]]} \]

Finally, the suffix *-ity* is attached to this complex derived word to form yet another derived word, in this case a noun, *undesirability*:

\[ \text{[N [A un [A [V desire] able]] ity]} \]

As we have seen, derivational morphology involves computational processes that take a word as the input and derive a new, more complex, word as an output by attaching an affix (a derivational prefix or suffix). One of the main characteristics of derivational morphological rules is that the meaning of the output word differs systematically from that of the input word. Also, it is very often the case that the category of the output word is different from that of the input word; although we will introduce more categories later on, for now we can assume the word categories (also known as **lexical categories**) to be: nouns (N), verbs (V), adjectives (A), and adverbs (Adv).

For example:

\[
\begin{array}{c}
\text{[V desire]} \\
\text{\textit{Able-Suffixation Rule}} \\
\text{[A [N desire] able]}
\end{array}
\]

In this example, the input to the rule is the word (a simple morpheme) *desire*, which is a verb, whereas the output of the rule is the (complex) word *desirable*, which is an adjective. Furthermore, these two words have clearly different, but systematically related, meanings. These properties of rule are completely general and systematic: *-able* always attaches to a verb to yield an adjective with a particular systematic meaning, as in *adorable, likeable, readable, eatable*, and so on.
Another derivational rule attaches -en to an adjective forming a verb with a particular meaning (something like “to make x have property A”), as in darken. Below are some other derivational affixes in English that give rise to changes in lexical category:

**Noun → Adjective**

boy → boyish  
alcohol → alcoholic  
picture → picturesque  
virtue → virtuous

**Verb → Noun**

acquit → acquittal  
sing → singer  
clear → clearance  
predict → prediction

**Adjective → Adverb**

exact → exactly

**Noun → Verb**

moral → moralize  
brand → brandish  
vaccine → vaccinate

All derivational rules must specify the category of the input and the output. As already mentioned, in many cases of derivational morphology, the category of output differs from that of the input. However, there is not always a change in the category. Adding a prefix in particular very often does not give rise to any change in category. Some examples are:

<table>
<thead>
<tr>
<th>Noun</th>
<th>Prefix</th>
<th>Adjective</th>
<th>Adverb</th>
<th>Noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>amoral</td>
<td>a+moral</td>
<td>ex-husband</td>
<td>ex+husband</td>
<td></td>
</tr>
<tr>
<td>reprint</td>
<td>re+print</td>
<td>sub-minimal</td>
<td>sub+minimal</td>
<td></td>
</tr>
</tbody>
</table>

In the above examples, the category of the root and the category of the derived stem are identical. Some suffixes also fail to give rise to any change in category, as the examples below attest:

<table>
<thead>
<tr>
<th>Noun</th>
<th>Suffix</th>
<th>Adjective</th>
<th>Adverb</th>
<th>Noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>longer</td>
<td>long+er</td>
<td>Tokyoite</td>
<td>Tokyo+ite</td>
<td></td>
</tr>
<tr>
<td>shortest</td>
<td>short+est</td>
<td>faddist</td>
<td>fad+ist</td>
<td></td>
</tr>
<tr>
<td>musician</td>
<td>music+ian</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The application of derivational rules is recursive; the output of one derivational can serve as the input to another:

- desire
- desirable
- undesirable
- undesirability
Note that this sort of “step-by-step,” recursive derivation, where the output of one rule application serves as the input to the next rule application, gives rise to a hierarchical structure. This notion of recursive derivation, and the hierarchical morphological structure that it yields, turns out to be crucial. An alternative theory that simply recognizes a base/root word and the affixes that are attached to it, but assigns no hierarchical structure, or no intermediate levels of derived structure, simply cannot work. Let us now see why.

Consider the following examples again:

undrinkable  (a word consisting of the 3 morphemes un, drink, able)
undesirable  (a word consisting of the 3 morphemes un, desire, able)

These are well-formed, which tells us that we can have words in English consisting of a free root morpheme (in these examples, drink/desire), the prefix un-, and the suffix -able. The root morpheme in both of the above examples is a verb. Indeed, wherever we find -able in a well-formed word, it seems that we find it next to a verb. Apparently, -able cannot be attached directly to an adjective or a noun, as the following impossible words suggest:

*readyable  *happyable  *studetable  *adultable

We can explain these facts by making an explicit statement in the Able-Suffixation rule to the effect that -able can only be attached to a verb.

Next, note that the following words are ungrammatical, despite the fact that they are proper subparts of the good examples undrinkable and undesirable above:

*undrink  un+drink
*undesire  un+desire

The prefix un- can be attached to adjectives, in which case the resulting word too is always an adjective:

unready  un+ready
unhappy  un+happy

But then how can we account for the impossibility of *undrink above? We cannot resort to a rule stating that un- can never immediately precede a verb, since such a rule would also predict that undrinkable is bad.

Rather, to explain why undrink/undesire are impossible whereas undrinkable/undesirable are possible, we have to refer to intermediate levels of structure. In other words, a theory that assumes “flat structures” like the following, will not work:

[drink+able]  [un+drink+able]  *[un+drink]
[desire+able]  [un+desire+able]  *[un+desire]
Rather we need to assume hierarchical structures, with recursive embedding, like those below in order to guarantee proper application of the affixation rules:

\[
\text{[un [drink+able]]} \quad \text{[un [desire+able]]}
\]

As we have seen, such embedded hierarchy follows from the nature of the derivation and the recursive application of the rules, as follows:

**Derivation of undrinkable:**

1. **Able-Suffix Rule**
   \[
   \text{[v drink]} \rightarrow \text{[A [v drink] able]}
   \]

2. **Un-Prefix Rule**
   \[
   \text{[A [v drink] able]} \rightarrow \text{[A un [A [v drink] able]]}
   \]

Thus, if we state a rule to the effect that the prefix un- can attach to an adjective but not to a verb, we can explain the impossibility of undrink/undesire, since in these ungrammatical examples, un- has been prefixed to a verb. On the other hand, in the grammatical undrinkable/undesirable, un- is prefixed not to the verbs drink/desire but to the previously derived adjectives drinkable/desirable, within which the verbs drink/desire are embedded.

The hierarchical nature of the structure of complex words, especially those involving more than one affix, can be visually/graphically witnessed more easily by using a tree-diagram structure below, as opposed to the bracketing notion we have been using above (though it is important to realize that these are simply notational devices with no formal differences):

```
    undrinkable
       ↘
        un
       ↘
        drinkable
          ↘
           able
```

Let’s now examine a couple of derivational morphological rules in detail.

**Able-Suffix Rule:**

\[
\text{[v } \alpha \text{]} \rightarrow \text{[A [v } \alpha \text{] [suffix able]]}
\]

Meaning of \([A [v } \alpha \text{] [suffix able]]\) = “able to be \(\alpha\)-ed”

Ex.) \([v do] \rightarrow [A [v do] [suffix able]]\)

Meaning = “able to be done”
Un-Prefix Rule:

\[
\begin{array}{c}
[A \alpha] \\
\rightarrow [A \text{ [Prefix un]} [A \alpha]]
\end{array}
\]

Un-Prefix Rule

Meaning of [A \text{ [Prefix un]} [A \alpha]] = “not \alpha”

Ex.) [A happy] \rightarrow [A \text{ [Prefix un]} [A happy]]

Meaning = “not happy”

The existence of verbs like undo, unzip, unwrap, etc., may at first sight seem like an exception to Un-Prefix Rule, as stated above. However, more careful examination leads to the conclusion that there are actually two different un- prefixes, involving different rules, in which case these examples do not constitute exceptions. Let’s call the rule we just formalized above the Un1-Prefix Rule and now state another rule, call it the Un2-Prefix Rule, as below:

Un2-Prefix Rule:

\[
\begin{array}{c}
[V \alpha] \\
\rightarrow [V \text{ [Prefix un}2] [V \alpha]]
\end{array}
\]

Un2-Prefix Rule

Meaning of [V \text{ [Prefix un}2] [V \alpha]] = “to reverse the action of \alpha-ing”

Ex) [V do] \rightarrow [V \text{ [Prefix un}2] [V do]]

Meaning = “to reverse the action of doing”

It is thus predicted that there are two different words pronounced as undoable and that there have different meanings, one word meaning that something is such that it cannot be done, and the other word meaning that something is such that it is possible to reverse the action of its doing. Note that, even though the base/root morpheme do is the same in both words, this is because there are two possible morphological structures/derivations, one involving un1 and the other involving un2.

Two derivations of two different words undoable:

undoable1

\[
[V \text{ do }] \rightarrow [A [V \text{ do }] [\text{Suffix able}]]
\]

[A [V do] [Suffix able]] \rightarrow [A [Prefix un1][A [V do] [Suffix able]]]

Meaning = “not able to be done”

undoable2

\[
[V \text{ do }] \rightarrow [V \text{ [Prefix un}2] [V \text{ do}]]
\]

[V [Prefix un2] [V do]] \rightarrow [A [V [Prefix un2] [V do]] [Suffix able]]

Meaning = “able to reverse the action of doing”
One final point needs to be mentioned regarding the $Un_2$-Prefix Rule. Recall the ungrammatical words undrink and undesire discussed above. We explained the fact that these were impossible as words by appealing to the fact that $un$- can only prefix to an adjective not a verb. But, as we have just seen, there are really two $un$-s in English, one of which (our $un_2$ above) indeed attaches to verbs, not adjectives. So, what is wrong with undrink having the structure/derivation $[\nu \, un_2 \, \nu \, \text{drink} ]$, then? Let’s think about the meaning. What would it mean to “reverse the action of drinking”? Well, this is not an impossible thought; in fact, I think many of us have in fact had such an experience (I know that I have!). Still, it seems that human languages define the actions denoted by certain verbs as being “reversible” whereas others are not; the actions denoted by verbs like do, zip, button, fasten, wrap, pack, etc. are “reversible” in this sense; they can be prefixed by $un_2$. Apparently, verbs like drink, desire, eat, walk, etc., however, are not.