Morphology, part 1: the big subtraction problem

If you were to ask someone off the street what kinds of things individual languages were made up of, the odds are overwhelming that the answer you’d get would be ‘Words’. But spend even a little bit of time looking over a list of, say, 200 randomly chosen words of English, and you’ll definitely come away with the impression that there’s something important going on inside of words—that there are portions of certain words that show up in other words, and that there’s a connection amongst the meanings of all the words that one of these word-portions shows up in. Something simple, for example, such as the set \{farmer, baker, worker, boxer\} makes the point: all of these words are about groups of people who share a common occupation—the one that’s identified by the word you get when \[i\], corresponding to the er spelling. Of course, there’s no necessary connection between spelling and the identity of the word-portion in question: liar is pronounced \[\text{lai}\] and seems to be parallel to the examples already listed spelled with er: farm is to farmer as lie is to liar. Easy, right? Well, not necessarily. Let’s take a slightly harder example. What about doctor? It identifies a profession, it’s got X+i form... So is there an English word doct, meaning some kind of medical activity whose practitioners would be expected to be known as doctors? Well, not exactly. For most of you, doct is not a word that you use, or possibly even recognize. It does not exist in the history of English during the phase when the word doctor first appears in the language. The problem is, of course, that doctor isn’t English by birth, but by adoption: it’s from Latin. The source is Old French, with the word showing up as docteur, based on the OF verb docre ‘teach’, related to our word docent—the volunteer who gives you the tour at a museum, doctrine—what is taught, and, slightly further afield, docile—ready to accept instruction without resistance. The er portion goes back to at least Proto-Western-Germanic. So powerful is our association between the [i] and the notion of agency, or the use of agency as a description of some kind of thing, that we seem to have created a novel form doct based on the pseudo-ratio X: ‘activity’ :: X+i :: ‘one who does that activity’. We have the following simple semantics in English:

‘tends to people’s medical needs’ : ‘one who tends to people’s medical needs’ : : ? : doctor (= [d´akt])

According to the ratio, therefore, ? should be doct ([d´akt]). And this form actually does appear to exist, at least in certain quarters:


What’s happened is that we had carried a small subtraction problem: given that we have reason to believe that a verb X will yield a form Xer meaning ‘one who does X’, when we encounter a form Y meaning ‘one who practices medicine’ which seems to be analyzable as some X+er, we then have warrant to assume that there should be a verb X meaning ‘to practice medicine’: if a string of sounds Y contains a smaller string X, and the meaning of Y represents some operation or addition or modification of the meaning of X, then the string of sounds Y−X should correspond to the difference between the meaning of Y and the meaning of X—i.e., the operation, or addition, or modification.

That mode of reasoning represents our main tool in approaching the facts about how words are put together in any given language. No matter what the data look like, our first step is to look at pairs of words which seem to have related meanings and determine if there is a relationship between the phonetic form of the words in each pair. If there is, we can hypothesize that where the two words in each pair contain the same meaning
element, that meaning element corresponds to the shared phonetic form. And the difference in meaning then corresponds to the different bits of phonetics that are ‘left over’, so to speak, when we subtract the shared phonetic elements expressing the shared meaning.

We saw some simple examples in class. Here’s another, from the Panamanian language Guaymi:

1. kuge ‘burns’  
2. blite ‘speaks’  
3. kite ‘throws’  
4. mete ‘hits’  
5. kugaba ‘burned’  
6. blitaba ‘spoke’  
7. kitaba ‘threw’  
8. metaba ‘hit’

The data are conveniently arranged in pairs, making it easy to observe commonalities of meaning paired with commonalities of form. We see immediately that 1. and 7. have a meaning in common—the idea conveyed by English ‘burn’—and a continuous stretch of phonetic form, the common string of sounds [kug]. The default conclusion, then, is that [kug] contributes to the meaning of the Guaymi word the component of its meaning that the English word ‘burn’ signifies. Conversely, we have the right to assume that whatever is left over when we subtract ‘burn’ from the meaning of 1. and 7. will be constitute the contribution of the phonetic portion left over in each of these words when we subtract [kug]. In the case of 1., the residue of meaning, judging by the English translation, is the third person singular nonpast sense (since that’s what the [s] conveys), and the phonetic remainder, when [kug] is removed from [kuge], is [e]. In the case of 7., the residual meaning is past tense, corresponding to the phonetic remnant [aba]. Exactly the same line of reasoning leads us to posit the form/meaning associations [blit] ‘speak’, [kit] ‘throw’, and [met], with [e] conveying third singular nonpast in each case, and [aba] similarly signaling past tense—all very straightforward.

But it’s important to understand just what we’ve shown here, and what we haven’t shown. We’ve shown that there is a correlation between the appearance of [e] on what we may think of as the basic ‘piece’ of the word—the root, as we’ll call it—and the third person nonpast version of that meaning, and between the appearance of [aba] following the root, on the one hand, and the past version on the other. What we haven’t shown is that the appearance of these phonetic strings corresponds to simply putting together two separate pieces which are, in some sense, representable as preexisting building blocks, with an independent form [e] and an independent meaning ‘3rd.singular.past’, on the other. An equally possible description of what we’ve uncovered would take the following form: there is a rule which takes the root form as input, and yields a form which adds to that input form the final sequence [e], and adds to the root form’s meaning an additional element—the identification of the sense of [kug] as applying to some entity typically described as 3rd person singular. Think about this distinction for a moment, because it may not seem as though there really is much of a difference in the two ways of putting it. But there is, and another example will make it clear just how.

The relevant data are from the Brazilian native language Terena:

1. emo‘my word’  
2. emo ‘his word’  
3. emo ‘your word’  
4. ayó ‘my brother’  
5. yayo ‘your brother’  
6. ayo ‘his brother’  
7. òwokú ‘my house’  
8. yowoku ‘your house’  
9. owoku ‘his house’

Start by looking down each column and you’ll be struck by the similarity amongst the three forms you’re comparing—but there’s a difference from the previous case. Take column two, items 4.–6.: there’s a low mid vowel followed by a palatal semivowel and finally a mid back rounded vowel in every case, and that presumably is the common form associated with the common meaning—‘brother’. And in the case of 5. vs. 6., it’s clear that the difference between the two is the extra [y] that precedes the [ayo] sequence. Presumably, that [y] is the part that corresponds to the second person possessive meaning. But there’s nothing phonetic that seems to correspond to the meaning of third person possessive. The seemingly basic form, [ayo], apparently means ‘his brother’ on its own, in the absence of any indication of some other person. When
[y] is added, that changes the meaning from third to second person. One way we could formalize this—and maintain some skepticism about this, because it’s not a solution which I think is actually optimal—would be to say that the bit of form which marks third person possessive is phonetic silence:

\[ \emptyset \text{ ‘third person’ } + \text{ ayo ‘brother’ } = \text{ ‘his brother’} \]

\[ y \text{ ‘second person’ } + \text{ ayo ‘brother’ } = \text{ ‘your brother’} \]

This approach might work for the second and third persons, but it’s not going to be of much use in the case of the first person forms. The problem is that the relationship between the bare form [ayo] and the first person possessive of ‘brother’ doesn’t seem to be associated with a single, separable piece of form—even when that piece of form is supposedly silence, as in the case of the third person. Rather, it seems as if first person possessive is signaled by a systematic nasalization of every vowel in the word. The only way to handle this kind of case in parallel to the others is to suppose that there’s another empty element which triggers a phonological rule of nasalization, along the following lines:

**Nasal Harmony:** 

\[ [\text{nasal -}] \rightarrow [\text{nasal +}] /\emptyset_{\text{nasalize}}+\#X\_Y\# \]

where \(\emptyset_{\text{nasalize}}\) is the special empty first person marker X and Y are any stretches of sound (possibly empty).

We will then have

\[ \emptyset_{\text{nasalize}} + \text{ ayo} \]

Nasal Harmony

Nasal Harmony

Nasal Harmony

Nasal Harmony

\[ \text{ ayo} \]

\[ \text{ ayo} \]

But if you think about it, this whole setup is unsatisfactory for several reasons. In the first place, how do we know how the rule applies? We’ve arbitrarily decided that the rule works from left to right, but what evidence is there for that? Maybe it works from right to left. Maybe it works everywhere at the same time. There’s just no basis for the steps listed above. Second, what kind of ‘phonological’ rule is this anyway? There’s no actual phonological environment, no clear physical basis in the surrounding for the triggering of nasalization. One way of handling the latter objection would be to assume, first, that the morpheme involved was an actual phonological attribute—nasality—and that first person was marked by attaching this [nasal +] specification to the first vowel, with a rule that then triggered nasalization in the following syllable. Setting things up this way would work... but so would assuming that nasalization was added to the final syllable and that any syllable preceding a nasalized vowel also was nasalized! In fact, based on what we have here, the simplest solution would be to say that the marker for first person possessive isn’t a piece of form, but rather an operation—an instruction, so to speak—which says, basically, nasalize every vowel in the root form corresponding to the object possessed by the first person. If the object is what [ayo] ‘brother’ denotes, then nasalize all the vowels in that root, and so on. On this approach, words aren’t built out of pieces put together like bricks to build a wall, but by operations carried out on them which leave phonological footprints, so to speak, indicating that these operations have indeed applied.

Now let’s go back to the third person form. If we adopt the alternative approach sketched in the preceding paragraph, we can say that the operation which marks the third person involves doing nothing to the form of the root. And the operation which marks the second person form is, add [y] to the root at the front. The idea here is that words are not built by taking pre-existing items and arranging them, so to speak, but taking forms and subjecting them to certain processes, which may correspond to isolable continuous strings of sounds (such as [aba] in the first example we looked at) but which, in other cases, may not be identifiable as a single ‘piece’ phonetic material at all.

This alternative perspective on word formation—that it consists of applying rules to certain forms to produce other forms, rather than assembling larger units by adding preexisting units together like beads on a string—is
usually referred to as the ‘item in process’ perspective, in contradistinction to the ‘item and arrangement’ brick-wall-building model I’ve mentioned in class. It has the advantage that where we do encounter cases which appear to involve simple addition of parts (such as the [y] added to the front of the root in the Terena second person possessive), we can treat this operation as one of simple addition. In this sense, the item-in-process model includes the item-and-arrangement model, but goes beyond it to allow for phenomena such as the Terena data we’ve looked at—as well as more familiar kinds of data, such as the so-called strong vowel past tense forms in English. Recall that we have a number of verbs in English whose past tense is not marked by the simple -ed that shows up in the cases of verbs such as jog, cook, watch, but instead involves an internal vowel change (take/took, hide/hid, find/found, sing/sang, fly/flew, etc.). It is clear from such examples that the tense information is carried completely by the vowel, but not simply the vowel. This is an important point that you need to appreciate fully: the vowel in the past tense form found does not in itself mean ‘past tense’. In the case of the verbs pound (a nail) or round (some number up to the nearest 10) the vowel, the dipthong [aʷ], carries no tense information at all. Rather, what carries the information is the fact that a verb whose nonpast form is [faⁿd] is being pronounced with a particular different vowel. It’s not the [aʷ], in other words, but the change from [aˈ] to [aʷ], which marks the past form. This is easy to capture using the notion of item-in-process morphology, but much more difficult to do in a principled way if we stick to the simple item-and-arrangement approach.

Notice that this doesn’t mean that we should cease to regard doing morphology as a kind of subtraction problem. But it does mean that our concept of what that subtraction actually consists of needs to expand somewhat. It’s not merely a matter of subtracting some string of sounds A from some string of sounds B and saying, whatever’s left over represents the extra bit of meaning that B adds to the meaning of A. The difference now has to be regarded as any phonological difference between the two strings—e.g., the nasalisation of all vowels in Terena, or the difference between [aˈ] and [aʷ] in find/found. Our basic concept of how to go about carrying out the discovery of the components of a word doesn’t change, but we need to take into account the possibility that what we discover may well be something that can’t be described as a simple, single stretch of sound.