1. Introduction

In English, there are different kinds of stems. Two such categories are 'bare stems' and 'suffixed stems'. In this study we will analyze the alternation of consonant sounds in bare stems and suffixed stems, and discover why certain consonant sounds tend to appear and disappear under certain circumstances. We first start off with the words 'damn' and 'damnation'. The question is, why does the n sound drop off in the bare stem but reappear in the suffixed stem? We find that in many other examples such as 'hymn' and 'hymnal' and 'condemn' and 'condemnation' that this seemingly bizarre alternation occurs as well.

Two analyses will be conducted in order to bring to light where the n sound fits in. The first analysis suggests that the n sound is a part of the root itself, and only drops off when it follows m and is found in word final position. The second analysis stipulates that the n sound is a part of the suffix, and appears after m only when it is found on a separate syllable in the suffix. Through underlying and surface representations, I have concluded that the first analysis is superior to the second. This is because the hypothesis that the n sound belongs to the suffix does not make sense when it is compared with similar words that do not contain an n sound in the exact same suffix. Words such as 'defame' and 'defamation' portray that the surface representation does not support the hypothesis that n belongs in the '-ation' suffix, and thus I have reasoned that n must be a part of the initial root in the underlying representation, and the n sound drops off when following m in word final position, and reappears when it is found on a separate syllable preceding a vowel in the suffix.

The comprehensive analysis of the alternation of n in bare and suffixed stems will be organized according to their analysis. In both analyses we will see where the alternation occurs, make a generalization into a phonological rule, and then carry out the rule via derivations of the data. Once the analyses are completed, I will conduct a comparison of both analyses and explain why Analysis 1 is superior to Analysis 2. Section 3 provides us with more concrete data showing why Analysis 1 is a better fit than Analysis 2, and we conclude with a recap on both analyses.

2. Analysis

This section provides two different analyses of the phonological alternation in bare stems and suffixed stems. Here we will see that the first analysis makes more sense because it explains the data with minimal rules, and it applies to other words other than the specific examples given without adding extra rules. Section 2.1 displays the first method of analysis and explains that the n sound belongs to the bare stem. Section 2.2 describes the second method of analysis and states that the n sound belongs to the suffixed stem. Section 2.3 clears up which analysis makes more sense by calling into account other bare and suffixed stems that contain the same suffix but do not have the n sound in their surface forms, and thus show that the n sound must be part of the bare stem's underlying representation rather than the suffixed stem's.

2.1 Analysis 1: Determining patterns of alternation on the basis that n originates from the bare stem

There are two examples of bare stems and two examples of suffixed stems focused on in this section. The first set is 'damn' and 'damnation' and the second is 'hymn' and 'hymnal'. Both of these examples share the fact that the n is silent in the bare stem but then reappears when a suffix is attached.
Here is the first analysis of these four forms. It suggests that the \( n \) sound was initially made in the underlying representations of the bare stems, and thus was always there in the suffixed form as well. My job is to discover and explain why the \( n \) sound has dropped off the bare stem, and to reason out why the \( mn \) combination of sounds never co-occur with one another in the English language. Below we see a chart portraying the underlying surface representations. We see that the \( n \) sound was always there, but it dropped solely off of the bare stem.

(1)

<table>
<thead>
<tr>
<th></th>
<th>/dæmn/</th>
<th>/dæmne(\text{\textasciitilde}n)/</th>
<th>/hɪm/</th>
<th>/hɪm(\text{\textasciitilde}l)/</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>[dæm]</td>
<td>[dæmne(\text{\textasciitilde}n)]</td>
<td>[hɪm]</td>
<td>[hɪm(\text{\textasciitilde}l)]</td>
</tr>
<tr>
<td>SR</td>
<td>[dæm]</td>
<td>[dæmne(\text{\textasciitilde}n)]</td>
<td>[hɪm]</td>
<td>[hɪm(\text{\textasciitilde}l)]</td>
</tr>
</tbody>
</table>

Here we see that the alternation takes place only when \( n \) is found in word final position following \( m \). The next step is to formulate a phonological rule that stipulates where \( n \) is exclusively found. In prose it looks something like this:

(2) Phonological rule regarding the exclusive environment of \( n \) with the assumption that it is originally a part of the bare stem

\( n \) is dropped off when it is found following \( m \) and is in word final position.

Here in (3), we see a chart containing the derivations for this rule. It portrays that \( n \) is dropped off following \( m \) when it is found in word final position. It also shows that the suffixed forms of these two words are not affected by the rule.

(3)

<table>
<thead>
<tr>
<th></th>
<th>/dæmn/</th>
<th>/dæmne(\text{\textasciitilde}n)/</th>
<th>/hɪm/</th>
<th>/hɪm(\text{\textasciitilde}l)/</th>
</tr>
</thead>
<tbody>
<tr>
<td>n→(\emptyset)/m_#</td>
<td>dæm</td>
<td>NA</td>
<td>hɪm</td>
<td>NA</td>
</tr>
<tr>
<td>SR</td>
<td>[dæm]</td>
<td>[dæmne(\text{\textasciitilde}n)]</td>
<td>[hɪm]</td>
<td>[hɪm(\text{\textasciitilde}l)]</td>
</tr>
</tbody>
</table>

This rule makes sense because if the \( n \) belongs to the bare root in the underlying representation, then it would obviously be voiced in the suffixed root. The two sounds \( m \) and \( n \) are no longer found together on the same syllable most likely due to language's constant shift towards convenience and easier pronunciations.

2.2 Analysis 2: Determining patterns of alternation on the basis that \( n \) belongs to the suffix

This second analysis suggests that the \( n \) sound originates from the suffix, making the suffix on “damnation”, “-nation” rather than “-ation”. This suggestion may sound plausible at first, but when other examples are called into question other than the four examples we have already covered, the underlying representations do not add up to the surface representations and ultimately does not help us understand why the \( mn \) combination is never found in English, as well as the fact that there would have to be extra rules made up to compensate for the discrepancies found in examples of words with the same suffix such as “defamation”. In (4) we see that the underlying representation leaves out the \( n \) sound and states that the \( n \) appears once the suffix '-nation' is added onto the bare stem.
The next step is to formulate a phonological rule in order to explain the appearance of the $n$ once the suffix has been added on. The rule is stated in prose like this:

(5) Phonological rule placing $n$ as a part of the suffix

$n$ appears after $m$ only when it is found preceding a vowel in a suffix.

Here is (6) we see derivations for this rule. It shows that $n$ appears after $m$ only when it is found in syllable onset position. The key is that they are on separate syllables, and according to this analysis, this is the only environment where $n$ and $m$ can co-occur.

(6)

Orthography in linguistic analysis is usually very unimportant because often it is not an accurate representation of the sounds of a particular word. But this analysis also leaves out the explanation to the question, “Why is there an $n$ at the end of the root ‘damn’ if it is never pronounced?” This question is very valid, and I believe this analysis plainly leaves it unanswered along with a gamut of questions that are soon to be raised and answered in Section 3.1.

3. Comparison of the analyses

In Section 2.1 we see that the $n$ is part of the bare stem, whereas in Section 2.2 the suffixed stem is where the $n$ originates. Let us compare the two analyses and determine which makes more sense regarding everything from the number of phonological rules needed to satisfy all English words containing this particular suffix, to the basic orthography that may or may not give us clues as to what the original underlying representation may have been.

Analysis 1 explains how the combination $mn$ never occurs in the English language. It shows in (1) that the $n$ is in the underlying representation of the bare stem, and the $mn$ combination is attested there, but when this set of sounds occurs at the end of the word, the $n$ is dropped because of articulatory convenience. It is not natural to form the bilabial sound $m$ and then the alveolar sound $n$ without great attention to your pronunciation. It is not like this only in the English language, in fact in nearly all languages this sound combination is not attested. This goes to show me that these two sounds are not convenient for any mouth to articulate, and thus the $n$ sound gets dropped off at the end of the word when it follows $m$ and is in word final position.

Analysis 2 however, does not address the question of why $mn$ do not show up together in English, instead it glosses over it by just saying that the $n$ does not exist in the root and is only a part of the suffix. This summation is absolutely incorrect as we will see in 3.1, where we call into account
other examples of words that contain the same exact suffix without an n attached to the beginning of it. Because of this discrepancy, multiple phonological rules would have to be made in order to account for all of the words that do not fall in line with the first phonological rule in (5) and it would end up being too complicated and too far of a stretch. The better solution resides in Analysis 1, where the alternation of n is accounted for and the question of why m and n do not co-occur following each other respectively within the same syllable, is addressed.

3.1 The exceptions to the rule in Analysis 2

The argument against Analysis 2 does not really come to light, until we consider the following four words:

(7)

<table>
<thead>
<tr>
<th>Root</th>
<th>Gloss</th>
<th>Root</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>defame</em></td>
<td>'defame'</td>
<td><em>deform</em></td>
<td>'deform'</td>
</tr>
<tr>
<td><em>defamation</em></td>
<td>'defamation'</td>
<td><em>deformity</em></td>
<td>'deformity'</td>
</tr>
</tbody>
</table>

Here is (7) we see that 'defamation' and 'deformity' both have m at the end of their root, and a suffix beginning with a vowel. The rule “n appears after m when it is followed by a vowel in a suffix” does not work in this case because if we were to do the derivations for these four words with this phonological rule in play we would not achieve the surface representations seen here in (7). Let us take a look at what these derivations would end up looking like.

(8)

<table>
<thead>
<tr>
<th>UR</th>
<th>/defeim/</th>
<th>/defəmətʃən/</th>
<th>/dfəm/</th>
<th>/dfəməτi/</th>
</tr>
</thead>
<tbody>
<tr>
<td>O→n/ [+vowel][+suffix]</td>
<td>NA</td>
<td>defəmətʃən</td>
<td>NA</td>
<td>dfəməτi</td>
</tr>
<tr>
<td>Predicted SR</td>
<td>defeim</td>
<td>defəmətʃən</td>
<td>dfəm</td>
<td>dfəməτi</td>
</tr>
<tr>
<td>Actual SR</td>
<td>[defeim]</td>
<td>[defəmətʃən]</td>
<td>[dfəm]</td>
<td>[dfəməτi]</td>
</tr>
</tbody>
</table>

In (8) I have emboldened the two n's that should not be there. The predicted surface representation does not line up with the actual, and thus this rule does not work for all roots ending with m that have suffixes starting with vowels attached to them. There are too many exceptions to this rule and in turn, many rules would have to be created to account for all of the discrepancies.

Now that we can explicitly see why Analysis 2 does not work, let us take a look at why Analysis 1 is a superior conclusion. Analysis 1, when presented with these four words works entirely. What should happen, is that since the roots 'defame' and 'deform' do not have the letter n at the end of them, whereas the roots 'damn' and 'hymn' do, the rule created to explain the mn sound combination will not apply to any of the four words. This is simply because this analysis is meant to reason out why there is alternation of when the n sound shows up in suffixed roots as a opposed to bare stems, not why the n sound does not show up in every other root that does not contain n. We reasoned that it is because it has
not always been this way, and the underlying representation actually includes the $n$ sound in the bare stem and then in perpetuated in the suffixed stem because it is just a part of the root. Let us take a look at how this analysis works in terms of derivations for these four words.

In (9) we see that this rule does not apply just as we predicted it would not, since the roots 'defame' and 'deform' do not end with the letter $n$. This supports our hypothesis that $n$ really is a part of the root in the underlying representation because it shows that if it was a part of the suffix, the rule would apply to other words under the same exact circumstances. Since it does not apply to these two sets of words we know that the supposition “$n$ is deleted when it appears after $m$ and is found in word final position” is entirely plausible. We see that the reason there is an $n$ at the end of the word 'damn' because it is the underlying representation of that word.

4. Conclusion

The alternation of $n$ in bare and suffixed stems is no longer a mystery. We have found that in the first analysis, the underlying representation of the bare stem included the $n$ sound and the suffix began where the vowel started. This analysis showed that $n$ dissappeared only when it was found following $m$ and in word final position. In contrast, Analysis 2 says that the $n$ sound is found as a part of the suffix rather than the root. This analysis displayed that $n$ appeared when it was found after $m$ and preceded a vowel that was part of a suffix. The first analysis proved superior because in section 3 we reviewed other words with similar environments that showed the discrepancies in the second phonological rule we just covered. The words showed that just because a root ends in $m$, and is followed by a suffix beginning with a vowel, does not mean that an $n$ must be inserted in every case that this environment arises. Thus, I concluded that it makes more sense to include the $n$ with the bare stem in the underlying representation and just make one rule stating why this consonant drops off at the end of the root when it is alone rather than making several rules to accommodate for the many exceptions to the rule that would come up such as 'defamation' and 'deformity'. The alternation of $n$ shows us that sometimes orthography shows us the underlying representation although it seems like it is an unaccurate representation of how we pronounce the word today. I thought this fact was very interesting because usually the orthography does not play any part in how something is distributed or alternated, but just looking at how it was spelled helped me to come up with what the correct underlying representation was in this case.