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Alternations: An Introduction (and Some Further Explorations) for Conlangers

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Abstract

This essay explores the nature of alternations: variations in form across different contexts. In addition to providing a basic introduction of the phenomena in both English and in other languages, it considers several frameworks for understanding the behavior of alternations in natural languages. This essay also offers some recommendations for the creation of alternations in constructed languages and gives some examples to illustrate these recommendations. It is a revised and expanded version of a talk given at the 7th Language Creation Conference (July, 2017) in Calgary, Alberta, Canada.

1 Introduction

One might think that an optimal system of communication would have a collection of invariant symbolic entities corresponding to a collection of singular meanings; and, indeed, computer languages are often designed along the lines of this principle. However, for better or worse, human languages do not have this property in general and in fact, the idealized correspondence breaks down in several different ways. The focus of this paper is the variation at the symbolic level: for spoken languages, this boils down to the fact that there may be different pronunciations (including, in the most complex cases, rather different strings of sounds) which correspond to a particular meaning. As it turns out, such variation – henceforth called *alternations* – is hardly rare in natural languages and, in some languages, the amount of alternation can be surprisingly high or surprisingly complex.

As an apparently common property of natural languages, the inclusion of alternations in constructed languages (henceforth conlangs) would seem to be desirable, especially if a language creator (henceforth conlanger) intends to create a naturalistic language. However easy it might be to include some variation in forms in a given conlang, creating realistic alternations is on the trickier side of language creation (henceforth conlanging), as this appears to not be one of the more transparent aspects of linguistic structure. Thus, in the tradition of articles in model railroading magazines that look to help model railroaders refine their technique, this article looks to provide some aid to conlangers in improving their technique with respect to alternations. Alternations, of the kind that we will focus on here, lie mostly within the realm of form, generally treated under the linguistic disciplines of phonology and morphology. So, this paper will pursue a discussion of alternations with a careful eye to both their phonological and morphological aspects. Thus, this paper will delve into some details about how linguists view the grammar of sounds systems (“phonological theory”) and the grammar of word-building systems (“morphological theory”). As the discussion proceeds, I will consider both synchronic (language considered at a single time) and diachronic (language considered across time) aspects of phonology and morphology, as both have something to offer in better understanding how alternations work.

1.1 Caveats About Linguistic Theory and Conlanging

Unquestionably, there is a certain danger in considering particular theoretical frameworks in conlanging. Conlanging does not, in any existential sense, require any linguistic theory: conlangs are languages and, if learners can come to learn languages without any explicit linguistic theory, I believe there is surely nothing that forces a conlanger to employ linguistic theory in the creation of their languages. On the other hand, there does not seem to be any notable harm in learning about linguistic theory either, and conlanging with respect to theoretical notions may result in particularly interesting works of art. The fact that I will, in fact, be talking about the interrelation between linguistic theory and conlanging probably betrays the fact that I personally have found this route interesting and have used it in my own conlanging (no doubt a function of the fact that I have been trained as a theoretical linguist and use a fair amount of theoretical linguistics in my “day job” as a professor of linguistics). However, this paper is written without the thought that a conlanger must master the material contained herein to create a “true” conlang (whatever that might be).

Theoretical frameworks have two further issues that are worth noting. First, by their very nature, theoretical frameworks are incomplete models of a particular phenomenon, so they most

likely do not encompass everything there is to know about a particular topic. Second, theoretical frameworks all involve making particular commitments about what is important and what is not; this can result in a skewed view of the area of inquiry. To combat these issues, I have been fairly intentional in steering clear of what I see as irrelevant theoretical issues and from any unnecessary details of formalization, all while providing references to relevant works from the academic literature that an interested reader can investigate. I also include discussion of two different (though perhaps sympathetic) theoretical approaches to alternations, which, if nothing else, should help lessen the blind spots of any single theoretical framework. Nevertheless, these above issues might not be completely overcome in the pages that follow.

1.2 A Road Map

This essay covers some significant ground. The section immediately after this one introduces alternations in some depth, using both English and non-English examples. The third section examines a two-way typology of alternations, discussing both the diagnostics that are used to differentiate the two types as well as some example alternations from English that simultaneously serve to illustrate how the diagnostics can be applied. The fourth section discusses how one might, in a conlang, create realistic alternations, of the easier-to-create type from the third section. The fifth section goes into greater depth on the more difficult-to-create type from the third section, introducing both a different framework for understanding this type and also considering some of the historical aspects to the phenomenon. The sixth section discusses how one might, in conlangs, create realistic alternations, of the more difficult type, and provides an example from my own chief constructed language, Skerre. The seventh section concludes the essay.

If you, as the reader, are fairly new to doing phonological and morphological analysis on natural languages (or constructed languages), this essay might be best consumed in small doses. Nevertheless, I have tried to write this essay in a way accessible to conlangers of all sorts of levels. I do assume that the reader is able to read transcriptions in the International Phonetic Alphabet (IPA); many of the examples make use of the IPA, because a full understanding of these phenomena is difficult without close attention to the precise sounds of particular words.¹

2 Introducing Alternations

Having dealt with the preliminaries, let me turn to the concrete topic of what form-based alternations actually are.² A fairly simple, but reasonably accurate, working definition of an alternation is that it is variation in the form of a subpart of a word in different contexts. In the classic Structural approach to linguistics widely practiced in the first half of the twentieth century (see, for instance, Bloomfield 1933), this was understood in terms of different instantiations of either phonemes or morphemes (or both); however, alternations still exist as a phenomenon regardless if one believes that phonemes and morphemes are useful theoretical devices or not.

¹The transcriptions are of American English pronunciations, as a result of me speaking that dialect.

²The descriptor ‘form-based’ is useful because there are also what are known as *diathesis alternations*, which involve variation in how particular participants are linguistically encoded in sentences (as in the differences between active and passive sentences). This is an interesting topic on its own, but reasonably far afield from the alternations under discussion here.

A well-trod example of an alternation (found in numerous introductory linguistics textbooks [including Fromkin et al. 2014 and Finegan 2015] as well as on the “Alternation” page of Wikipedia [Wikipedia contributors 2017]) is in the behavior of the “regular” English plural suffix *-s* (I will call it the Z Alternation here). In spite of the conventional spelling, there is, in fact, variation in exactly how this chief English signal of the plural³ is pronounced. There are three possible pronunciations: [s], [z], or [ɪz]. (Each of these different forms is known as an *allomorph*, which, more broadly, might be defined as a contextual variant of what seems like a single morphological unit.) Examples of words showing these different allomorphs are given in Table 1 (relevant forms are in red). Closer examination of this variation reveals that it is not random; rather, patterns occur

Table 1: English Plural Words Illustrating the Z Alternation

	[s]		[z]		[ɪz]
Canucks	[k ^h ənʌks]	badgers	[bædʒɪz]	cases	[k ^h eɪsɪz]
cats	[k ^h æts]	conlangs	[k ^h ɔ̃nlæŋz]	judges	[dʒʌdʒɪz]
fifths	[fɪf(θ)s]	logs	[lɔgz]	leashes	[liʃɪz]
tips	[tɪps]	taxis	[t ^h æksɪz]	mirages	[mɪrɑʒɪz]

based on the pronunciation qualities of the final sound in the base (the non-affixal part of the word), to which the suffix is immediately adjacent. The three generalizations for the different allomorphs are as follows:

- [s] occurs after a non-sibilant, voiceless sound
- [ɪz] occurs after a sibilant⁴ sound
- [z] occurs after a non-sibilant, voiced sound (≈ everywhere else)

Having the “choice” of allomorph crucially depend on the nature of the neighboring sounds – as seen above – is quite common with alternations, though it does not occur in every last instance.

At a slightly higher level, it seems that at least two requirements of English prompt the Z Alternation: (1) if there are the two adjacent consonants, both must have the same voicing property (in the plural forms, the voicing value is controlled by the voicing of the end of the base) and (2) two sibilants cannot appear in a row. The voicing requirement seems to be behind why both the sounds [s] and [z] are involved – a voiceless sound is needed for voiceless-final bases and a voiced sound for voiced-final bases. The requirement against two sibilants in a row seems to be behind why the sound [ɪ] is included in the allomorph [ɪz]: without the [ɪ], two sibilants would appear in a row.

A simple lesson that conlangers can take from the Z Alternation is that, if they are to create alternations, they must pay attention to the *environment*; that is, the sound-related “neighborhood” surrounding either key sounds or key morphological units (at key locations, like at the boundary between a base and an affix) involved in an alternation.

³There is an interesting question of how to treat plural suffixes like *-en* in *oxen*, *-i* in *alumni*, *-a* of *phenomena*, as well as the internal changes found in *mouse–mice* and *foot–feet*. However, since all these patterns noted in this footnote are clearly of a different etymological source from *-s*, I leave them aside here.

⁴Sibilants are all sounds that have a high intensity noise and include hissing and hushing fricatives and affricates: in English, [s, z, ʃ, ʒ, tʃ, dʒ]. Some phonologists characterize this class with the feature [+strident].

The pattern of having multiple affixes for a single morphosyntactic category where the distribution of affixes is based on phonological properties of the base appears to be common in natural languages. Another language that shows a surprisingly similar kind of variation (to English) in its plurals is Luiseño, a Uto-Aztecan language indigenous to Southern California. As shown in Table 2,⁵ the suffix *-m* occurs with vowel-final bases, while *-um* occurs with consonant-final bases (in this example, the base is identical to the singular form).

Table 2: Luiseño Plurals

Base gloss	singular	plural
base ending in a vowel		
‘arrow’	huula	huulam
‘house’	kiicha	kiicham
‘owl’	muuta	muutam
base ending in a consonant		
‘bear’	hunwut	hunwutum
‘child’	’amaay	’amaayum
‘dog’	’awaal	’awaalum

In my experience as an instructor in language construction classes, simple alternations where there are two different affixal forms and the forms are deployed based on whether the relevant edge of the base has a consonant or vowel (or a particular type of consonant or vowel) – like in the plurals in English and Luiseño – are fairly easy for novice conlangers to conceive of and, thus, include in their languages. However, the behavior with alternations can be a bit more complex than this, as will (hopefully) become apparent as this essay unfolds.

While the above examples from English and Luiseño involved suffixes, alternations – as a general phenomenon – can be found in both bases and affixes. English, where alternations are generally not very pervasive, nevertheless exhibits base alternations with some words. Table 3 gives some select English examples; sounds and sound-related phenomena (like stress) alternating in these forms are noted in red:⁶

Table 3: Example English Stem Alternations

Base Word		Derived Word	
elf	[ɛlf]	elves	[ɛlvz]
horizon	[həˈraɪzən]	horizontal	[hɔːrəˈzɔ̃ntl]
keep	[k ^h ɪp]	kept	[k ^h ɛpt]
Plato	[ˈp ^h leɪrɒs]	Platonic	[p ^h ləˈt ^h ɔ̃nɪk]

Key, in the very least, to spying any alternations is morphology. Additional morphological material changes the environment – at both the sound and morphological levels – and this can allow

⁵The data in Table 2 come from several sources: Kroeber & Grace 1960 (as cited in Grune 1997), Steele 1988, Steele 1990, and Hyde & Elliot 1994. All forms cited are ‘non-possessed nominatives’; possessed forms and accusatives, among some others, present some other complications not worth going into here, though the basic generalization given in the text appears to hold throughout the nouns of Luiseño.

⁶Note that *Plato*~*Platonic* and *horizon*~*horizontal* have segmental changes that are probably consequences of different locations of stress; I have not noted them in red.

further forms to emerge, if they exist in the language. Without even the possibility of additional morphological material, a form cannot change and there will not be any alternations. Observe that if English had only the form *horizon* and not *horizontal*, there would be no indication that another form of *horizon* exists and *horizon* would always just be *horizon*. This effect can also be seen in reverse with the English word *mundane*: the etymological predecessor in Latin of the English adjective, *mundānus*, had about 14 different possible forms (though only one stem), while the current English word has just one form. Any of the “extra” forms of *mundane* are completely unknown to modern-day English speakers, unless they have independently learned Latin, and English *mundane* is just the single form, *mundane*. As a consequence of the morphological-sensitivity of alternations, languages without much morphological complexity very likely will have few-to-no alternations.⁷

Introductory texts (or instructors using them) may give the misleading impression that data such as that from Italian presented in Table 4 (original data provided in Cipollone et al. 1998; one scholarly discussion of these facts is in Bertinetto & Loporcaro 2005) involves an alternation. In fact, these sorts of data indicate that the sounds [n] and [ŋ] can be characterized by particular

Table 4: Italian nasals

[tinta]	‘dye’ (n.)	[tiŋgo]	‘I dye’
[tenda]	‘tent’	[teŋgo]	‘I keep’
[dansa]	‘dance’ (n.)	[fuŋgo]	‘mushroom’
[nero]	‘black’	[bjaŋka]	‘white’
[dʒente]	‘people’	[aŋke]	‘also’
[sapone]	‘soap’	[faŋgo]	‘mud’

phonotactic (sound sequencing) generalizations. The relevant generalizations could be represented as in Figure 1.⁸ But because single bases or collections of related word forms do not allow for

[n]: vowel ∨ coronal consonant [ŋ]: velar stop

Figure 1: Phonotactics of Italian Nasals

both [n] and [ŋ] (in different contexts), the words in Table 4 do not, strictly speaking, exhibit an alternation. For Italian to have an alternation involving [n] and [ŋ], there would have to be a form like [dasan] which had a morphologically-related complex form [dasan̄ka] (where *-[ka]* is some sort of suffix). Generally, to qualify as alternation, there must be multiple forms (with different, though related sounds) of the same morphological unit in a disjoint distribution across several (related) words, not just different sounds in a disjoint distribution across (unrelated) words. (To put it differently, alternations must involve allomorphy; instances of “pure” allophony are not alternations.)

Nevertheless, given the focus by many theoretical phonologists since about 1990 (and some before) on modes of analysis that crucially make reference to phonotactic generalizations (or, as

⁷However, even though languages like Mandarin and Vietnamese do not have much in the way of *inflectional* morphology, that does not mean they have no morphology. The idea that so-called isolating languages have no morphology might be more a myth than a fact.

⁸The underscores in Figure 1 serve as an indicator of where the sound before the colon appears in strings of sounds in the language.

sometimes called, syllable structure), statements about phonotactics are important to make in any in-depth linguistic description, of either a natural or a constructed language. So I encourage conlangers to make such statements within their descriptions of their languages, independent of the presence of any alternations. (Among the benefits of doing so is that phonotactic generalizations clarify what a possible word is in a given conlang, guiding a conlanger to make uniform words as they generate new vocabulary.) As will become clear, phonotactic generalizations will play an important role in several bits of discussion in the following sections.

3 A Classic Division of Alternations

If one takes a closer look at alternations within single languages and across languages, it becomes apparent that they do not all behave in quite the same fashion. A classical division of alternations divides them into two types.⁹ One is known as *phonologically-conditioned* alternations (also known as Automatic alternations [so-called because they appear to occur automatically] or phonemic alternations). As their name suggests, they are determined entirely by sound environment. The other is known as *morphologically-conditioned* alternations (also known as Morphophonological alternations or morphophonemic alternations). As their name suggests, they are determined, at least in part, by morphological environment, though they may have phonological aspects, too.

As it turns out, the type of a particular alternation is not obvious from mere superficial inspection, so diagnostics to probe the type of alternation have been developed. These diagnostics and their related properties give some indication about the differing behavior of the two kinds of alternations, so they are worth going over, as they could be interpreted (by the conlanger) as design desiderata. The discussion of these properties over the next two subsections is largely based on the discussion in Haspelmath & Sims 2010, ch. 10. Each subsection will use a particular alternation from English to illustrate the properties presented.

3.1 Phonologically-Conditioned Alternations

Phonologically-conditioned alternations have three chief diagnostic properties. To illustrate them, I will consider the alternation from English commonly known as Flapping. Flapping, which is especially common in American English varieties (though found in other dialects, too), involves variation between the sounds [t]¹⁰ and [ɾ] (the latter sound known as the tap or flap, hence the name of the alternation). The [ɾ] only occurs in a particular environment in English: between syllabic sounds (that is, between vowels and/or consonants that are, exceptionally, behaving like vowels); for the precise English distribution, there is the further restriction that the post-tap syllabic sound must be unstressed. In contrast, the sound [t] never occurs in English between syllabic sounds where the following syllabic sound is unstressed. However, it does occur in several other sound

⁹This division first appeared in one of the first linguistic works on alternations: Baudouin de Courtenay 1895. The division appears to be continued in the works of major Structuralists like Edward Sapir and Leonard Bloomfield. Though classical generative phonology (as in Chomsky & Halle 1968) did not acknowledge the difference, the distinction was resurrected by practitioners of Natural Phonology (see Stampe 1979; Donegan & Stampe 2009) and is commonly assumed by many phonologists (sometimes tacitly) from the 1970s to the present day.

¹⁰Actually [d] participates in these alternation, too. An interesting but tangential – for our purposes – property of Flapping is that it is neutralizing, meaning that Flapping does not require one to make a distinction between /t/ and /d/, at the location where Flapping occurs.

environments, where, in turn, [ɾ] does not occur. The pair *write* ['aɪɾt] and *writer* ['aɪɾɪ] exhibit the Flapping alternation.

Let me now consider the diagnostic properties and how Flapping exemplifies them.

Phonologically-Conditioned Diagnostic Property 1 *These alternations are very general in application; thus, they occur wherever the alternation's conditioning environment does. For some phonologically-conditioned alternations, that means they even occur across words.*

This diagnostic property requires consideration of what one could consider the “domain” of the alternation. When one considers this for Flapping in English, this alternation appears to be quite general; in fact, so general that it can occur across words. To see that this is so, let us consider the phrase *write a novel*. This English expression can be pronounced in a number of different ways, but one way (probably more characteristic of fast, casual speech) is ['aɪɾə'nɒvəl]. In this example, there is a [ɾ] where the student of English might otherwise expect a [t]: at the end of *write*. Furthermore, this “morphing” of sound occurs between two syllabic sounds – [aɪ] and [ə] – and the latter is, in fact, unstressed (in connected speech, the indefinite article *a* is rarely stressed); thus, the relevant sounds meet the conditioning environment of this alternation, across words! Further examination would yield numerous other parallel examples. So Flapping seems to clearly have this property.

Phonologically-Conditioned Diagnostic Property 2 *The sound sequence patterns that the phonologically-conditioned alternation “creates” are also found in morphologically simple words.*

This diagnostic property requires one to compare the phonotactics of relevant words with the alternating sounds *and* with affixes (morphologically complex words) to relevant words without affixes (morphologically simple words). There are, thus, several kinds of words to consider. In the case of Flapping, one can observe the pattern “stressed vowel–tap–syllabic r” in morphologically complex words like *writer* ['aɪɾɪ]. (It is no accident that the pattern of interest includes the tap and the sounds immediately before it and after it – this is precisely the sort of pattern that one needs to consider for this diagnostic.) One can also observe the same pattern – “stressed vowel–tap–syllabic r” – in words without any affixes, like *litter* ['lɪɾɪ]. Identical patterning in both morphologically complex and morphologically simple words¹¹ is exactly what one hopes to find, if the alternation is a phonologically-conditioned one. Again, further examination of English data would yield numerous other parallel examples. So Flapping seems to have this property, too.

Phonologically-Conditioned Diagnostic Property 3 *If the sounds involved in the alternation are non-contrastive in the language, the alternation is surely phonologically-conditioned.*

This diagnostic property involves consideration of how the sounds involved in the alternation generally behave in the language. In particular, the key question is whether the language uses the sounds in question to distinguish between different words (such sounds are often considered “contrastive”). Operationalizing this further, one could conceive of the relevant question being “Are there any two words in the language that are distinguished solely by having either the alternating sound #1 or alternating sound #2 in an identical location?” If not, the sounds are non-contrastive and a phonologically-conditioned alternation is surely occurring. With Flapping in English, this

¹¹The fact that morphology seems to be irrelevant for the application of this alternation also speaks strongly *against* considering it a morphologically-conditioned alternation, as the diagnostic properties of that kind of alternation in section 3.2 will make clear.

is what an analyst finds: there are no pairs of words in English that are distinguished solely by whether they have a [t] or [r] in a given location. Thus, Flapping involves non-contrastive sounds, and so it clearly tests, by this diagnostic, as phonologically-conditioned.

This third diagnostic property is worded carefully: while a non-contrastive pair of sounds clearly points to a phonologically-conditioned alternation, finding the alternating sounds to be contrastive does not actually point clearly in either direction. Contrastive pairs of sounds occur with both phonologically-conditioned alternations and morphologically-conditioned alternations (maybe at higher rates with the latter, but, nevertheless, found with both). So this is just a one-way implication, not a bidirectional one.

In best case scenarios, all three of the above diagnostic properties will point in the same direction. While there certainly could be cases where these diagnostic properties are not entirely conclusive – or unable to be applied, due to independent properties of the language – the above do seem to be quite reliable. While other diagnostic properties have been proposed (including that phonologically-conditioned alternations involve more articulatorily- or acoustically-related alternating sounds, that phonologically-conditioned alternations are more subject to speech style or other sociolinguistically-conditioned variation, and that phonologically-conditioned alternations are more reliably extended to loanwords), the diagnostic properties above seem, to me, to be the ones that best capture the distinction, are the easiest to apply, or give the clearest results.

3.2 Morphologically-Conditioned Alternations

Morphologically-conditioned alternations also have multiple diagnostic properties. In some cases, one considers the same kind of question as those considered above for the phonologically-conditioned alternations; one just looks for a different result. Other diagnostics, however, consider rather different aspects of the alternation. Ideally, then, an analyst would want to consider both types of diagnostics – those of section 3.1 and of this section – before coming to a conclusion about a given alternation.

To illustrate the diagnostic properties of morphologically-conditioned alternations, I consider the English alternation known as Velar Softening. Velar Softening occurs with several sounds, but I chiefly focus the discussion just on the part of the alternation that involves variation between [k] and [s]. The [s] alternant has a tendency to appear before high front vowels, though there are some complications with this statement, as the following discussion will reveal. *Electric* [ɪlɛktɹɪk] and *electricity* [əlɛktʰɪrɪsɪti] comprise a well-known example pair of related words exhibiting this alternation.

Let me now turn to the diagnostic properties for morphologically-conditioned alternations and how Velar Softening exemplifies them.

Morphologically-Conditioned Diagnostic Property 1 *These alternations are limited in their application: they only occur with certain affixes or certain bases; consequently, they only occur in some morphologically complex words and never in morphologically simple words or across words.*

Like the first diagnostic property of the phonologically-conditioned alternations, this requires consideration of the “domain” of the alternation. However, contrary to any phonologically-conditioned alternation, any morphologically-conditioned alternation should occur in a quite limited domain and, crucially, show some kind of sensitivity to the morphological environment. In the Velar Softening alternation, the fact that a restricted domain is involved is quite evident.

To first get a handle on the domain of Velar Softening, one has to be aware of some of the affixes that participate in this alternation. As the example of *electric*~*electricity* indicates, the suffix *-ity* [ɪri] is one. Another suffix participating in this alternation is *-ism* [ɪzəm] (cf. *critic* [kʰɪrɪk]~*criticism* [kʰɪrɪsɪzəm]); a third is *-ist* [ɪst] (cf. *physics* [fɪzɪks] – *physicist* [fɪzɪsɪst]). (There are some others, but these three are fine for the present purposes.) It is clear that these affixes share something in common in their form: they all start with the sound [ɪ]. The bases (in the original, not in the derived form) also share something common in their form: they end with the sound [k]. These facts are key in the next portion of the diagnostic.

Having identified [ɪ]-initiality as a common thread of affixes participating in Velar Softening, one might consider other affixes in English with this sound-based property to see how they behave. One affix presents itself: *-ish* [ɪʃ]. Next, one wants to see how this affix “reacts” with a [k]-final base (to see the behavior in the full Velar Softening environment): for this purpose, the base *weak* [wɪk] will do nicely. If the *-ish* added to *weak* to form *weakish*, the complex word is pronounced [wɪkɪʃ] and certainly not *[wɪsɪʃ], the form it would have if it were undergoing Velar Softening. Thus, one has to conclude that, interestingly enough, *-ish* does not participate in Velar Softening. Furthermore, the *weakish* behavior (pardon the pun) clearly indicates that there must be some morphological sensitivity involved with Velar Softening: ostensibly, the same sounds – [kɪ] – would be occurring across the base + affix boundary, yet, in the presence of some affixes, Velar Softening occurs, while, with others, it does not.

As a further testament to Velar Softening’s morphological sensitivity, the phenomenon exhibits a sensitivity to the kind of base, in addition to the sensitivity to affixes noted in the previous paragraph. As already noted above, the bound base *physic-* shows Velar Softening with *-ist*: *physics* [fɪzɪks]~*physicist* [fɪzɪsɪst]. However, the bound base *anarch-* does not show Velar Softening: *anarchy* [ænɑːki]~*anarchist* [ænɑːkɪst]. While spelling might initially obscure the nature of *anarch-* example, when one looks purely at the pronunciation, it becomes crystal clear that the [k] is maintained in both forms. *Anarch-* is exceptional – perhaps ironically, given its meaning – but this exceptionality is precisely expected if Velar Softening is morphologically-conditioned.

Further telling, Velar Softening does not occur across words and, in fact, is quite strange in that location. Given the phrase *look it over*, no English speaker would ever come close to producing it as *[lʊs ɪt ʊvɪ], in spite of the /k/ ostensibly being in the same kind of “sound neighborhood” as it would be in words like *electricity* and *physicist*. Instead, the above phrase would be produced [lʊk ɪt ʊvɪ]. This further shows that this process only occurs in morphologically complex environments, as this first diagnostic leads us to expect.

Overall, Velar Softening clearly has this first diagnostic property, as the Softening occurs with a limited set of affixes, with a limited set of bases, and never across words.

Morphologically-Conditioned Diagnostic Property 2 *The sound sequence patterns found in the neighborhood of the alternation are “opaque”; namely, the phonotactic sequence without the alternation would have been allowed by the language and so the alternation could not be motivated by conforming to the language-specific sequential requirements, and, from that standpoint, is egregious.*

This diagnostic goes hand-in-hand with the first diagnostic: it supports and confirms the results from the first diagnostic test through approaching the data from a more phonological perspective (rather than a morphological perspective, as in the first diagnostic). The chief task for the analyst with this diagnostic is to compare three kinds of sound sequencing patterns:

1. the would-be patterns if the base and affix were put together as is,
2. the actual patterns at the relevant base-affix boundary, and
3. the patterns with similar sounds in morphologically simple words.

For an instance of Velar Softening, in, say, *electricity*, the pattern expected across the base-affix boundary if *electric* [ɪlɛktɹɪk] was put together with *-ity* [ɪrɪ] as is would be [...Vɪɪ...]. However, as we know from words like *electricity* [əlɛktʰɪɹɪsɪrɪ], the actual pattern across this boundary is [...Vɹɪ...]. In morphologically simple words in English – while not plentiful¹² – [Vɪɪ] is attested, as shown by the words given in Table 5. Because English allows the sequence [Vɪɪ], it is clear

Table 5: Morphologically-Simple [...Vɪɪ...] in English

<i>achilles</i>	[ə'kɪlɪz]
<i>akin</i>	[ə'kɪn]
<i>bucket</i>	['bʌkɪt]
<i>cricket</i>	['kɪkɪt]

that “canonical” phonotactic restrictions within English are not behind the change from [k] to [s] in this context. If “canonical” phonotactic restrictions are not behind this change, it is, in some sense, “egregious”. (Why change if nothing forces the change?) However, it seems that only morphologically-conditioned alternations have such egregiousness. So the Velar Softening Alternation also tests to be morphologically-conditioned by this diagnostic as well.

As with the phonologically-conditioned alternation diagnostics, the above diagnostics for morphologically-conditioned alternations should point in the same direction, although it is possible that not all the diagnostics will be conclusive or even available in a given language or for a given alternation. Also akin to the phonologically-conditioned alternations, a few more diagnostics have been proposed for morphologically-conditioned alternations than just the ones I discussed in-depth above. Among them are the ideas that, in morphologically-conditioned alternations, the alternating sounds can potentially be articulatorily- or acoustically-distant, that the alternations likely will not be extended to loanwords, and that the alternations are “absolute” and not subject to speech style or other sociolinguistically-conditioned variation. However, again, the diagnostics that I went over in some detail seem, to me, to be the most reliable or applicable to conlanging.

4 Creating Realistic Phonologically-Conditioned Alternations in Conlangs

Of the two kinds of alternations discussed in section 3, phonologically-conditioned alternations are clearly easier to create. In this section, I go through an example of how one could create a phonologically-conditioned alternation in some depth.

To create natural language-like phonologically-conditioned alternations, there are two straightforward steps. First, one must find (or, more likely, decide upon) an attested sound change that

¹²Interestingly enough, it seems that the sequence [Vɪɪ] is much more common in English in morphologically complex words – like *making* and *freakish* – than in morphologically simple ones.

is conditioned: *conditioned* meaning that the sound-related environment is crucial for the sound change to apply. (Historical linguistics textbooks are great resources for seeing what sound changes are well-attested; see, for example, the discussion in Campbell 2013, 23–39.) Second, one must apply that sound change to all possible would-be forms in the language. Although these steps are stated simply enough above, going through an example would be useful.¹³

Given in Table 6 is a collection of would-be forms for some language, transcribed in the IPA. It might be useful to think of these as proto-forms (i.e. ancestral words to the current language’s,

Table 6: Would-be Forms

i.	[sina]	v.	[lanas]
ii.	[ko:s]	vi.	[tosi]
iii.	[mu:so]	vii.	[sani]
iv.	[kansi]	viii.	[wonsa]

on an evolve-your-language approach), though these could just as easily be seen as sketch words whose precise shape is getting fleshed out by the invention process. While ultimately one would want to attach meanings to all these forms, the actual meanings will not really matter for this exercise. It suffices to assume that all the would-be forms mean something different from the other forms present. Within Table 6, the reader will observe there is a preponderance of the sound [s]. This is by design, as the conditioned sound change chosen for this demonstration involves the sound [s]. In particular, the chosen sound change is the one in (1):

$$(1) \quad s > [j] _i$$

The sound change in (1) is a (particularly common) kind of change known as palatalization.¹⁴ (Observe that the [s] is articulated in a more palatal way by becoming [j].) The notation in (1) is to be interpreted as saying that any “original” [s] that once was next to the sound represented by [i] will change into (≈ “be henceforth pronounced as”) the sound represented by [j]. The sound change in (1) will affect several of the forms in Table 6, due to the sounds present within them. By (1), three of the words from Table 6 change, as given in (2) (the other words will stay as they were):

$$(2) \quad \begin{array}{lll} \text{i.} & [\text{sina}] & \rightarrow [\text{jina}] \\ \text{iv.} & [\text{kansi}] & \rightarrow [\text{kanji}] \\ \text{vi.} & [\text{tosi}] & \rightarrow [\text{toji}] \end{array}$$

¹³This example is inspired by an alternation that existed once upon a time in my constructed language, Skerre. However, the details are solely created for illustration here.

¹⁴This sound change – or a very similar change where the resulting sound is the voiceless alveolo-palatal fricative [ç] – has been proposed for lots of languages or their ancestors. Among the languages it has reported in include Chinese (Late Middle Chinese to Standard Mandarin) (Baxter, 1992), Japanese (Shibatani, 2009), Korean (Sohn, 1999, 155), the Tibeto-Burman language of northwest India Hakha Lai (Peterson, 2016), the western African language Hausa (morphologically-restricted only) (Newman, 2009), pre-Nahuatl in Mesoamerica (Campbell, 2013, 21), and the southern African language Lamba (first discussed by Doke 1938; further discussed in several phonology textbooks, including Odden 2012). Assuredly, the above list is just a subset of the total number of languages that have undergone this change. Interestingly, a structural prerequisite for this sound change appears to be that the earlier stage must have only a single sibilant; though, perhaps further investigation would reveal that this is only a strong tendency.

At this point, a particular phonotactic pattern has been established – [ʃ] before [i] – but no alternations exist (yet). To have the latter, we need to a morphological unit (say, a suffix) that contains an [i] sound that could follow (at least some of) the historical [s] sounds. To choose a path of very little resistance, let us assume that there is a suffix -[i] that is semantically compatible with (ii) [ko:s] and (v) [lanas].¹⁵ The diagrams in (3) depict what occurs when this suffix is attached to these forms, and the change in (1) is applied:

$$(3) \quad \begin{array}{l} [ko:s] \rightarrow [ko:ʃi] \\ [lanas] \rightarrow [lanafʃi] \end{array}$$

However, if [ko:s] and [lanas] by themselves are also allowed forms in the language (or these forms also occur before some suffix that does not start with [i]), there will be an alternation: in some contexts, there will be the forms [ko:ʃ] and [lanaf] and in other contexts, there will be [ko:s] and [lanas] – precisely the set of circumstances that should hold if we have an alternation.

Further icing on the cake would be for the changes to occur across words. Thus, if the sequence of words /lanas ike/ was actual pronounced [lanaf ike], there would be no doubt that this was a phonologically-conditioned alternation, since it could occur across words. Something somewhat like this happens in English, though the trigger is not the vowel [i], but the glide [j]. The phrase *miss you* can be uttered as [mɪʃu], illustrating that palatalization can occur across words in English. (No doubt, this is a tricky instance to analyze as the trigger of the palatalization – [j] – does not even appear in actual pronunciation [see Krämer & Urek 2016 for some further discussion about this case and some other related ones]; nevertheless, on the view that this instance is an actual palatalization of [s], it does illustrate that the process can occur across words).

5 More on Morphologically-Conditioned Alternations

Before diving into how one could create realistic morphologically-conditioned alternations, it is worthwhile to explore some further ideas connected to these kinds of alternations, to have a better background before tackling this tricky task. This section explores some of these ideas. It first considers an alternative approach to the theoretical understanding of alternations; namely, the stratal approach to alternations, which focuses more on the domain of application of a particular alternation. The discussion then turns to some observations about the nature of alternation behavior over time.

5.1 The Stratal Approach to Alternations

To some, the basic division of alternations into phonologically-conditioned ones and morphologically-conditioned seems like a good way of understanding the array of alternations possible in natural language. To others, though, this division seems inadequate: in some respects, it underdifferentiates the types of alternations and, in other respects, the classic division seems to divide alternations in the wrong ways. People who have made these criticisms of the “classic” approach are (often) practitioners of what I will call the stratal family of frameworks. These frameworks include

¹⁵As is evident from the discussion, this sort of match-up can be done without recourse to specific meanings, though having meanings already established for the bases and affixes likely makes the process more straightforward.

constraint-based frameworks like Stratal Optimality Theory (Kiparsky 2000, 2015; Bermúdez-Otero 2010, 2018) and Cophonologies (Orgun 1996; Inkelas et al. 1997; Inkelas 2014) as well as their rule-based forebearer, Lexical Phonology and Morphology (Kiparsky 1982; Mohanan 1986). While there are notable differences between these different stratal approaches, these differences are not significant for our purposes and I will leave discussion of them aside here.

Central to the name “stratal” is that fact that this family of frameworks all recognize *strata* (singular: *stratum*); that is, different “layers” of structure within the grammatical combinations in a language. These strata amount to particular domains where certain phonological or morphological generalizations might hold, so, in essence, the stratal approach takes the notion of “domain” that was so important to some of the alternation-classifying diagnostics and builds the framework on top of that.

At the bare minimum, it seems that stratal theorists recognize three strata. These are conventionally named and defined as such:

Stem: a minimal collection of form that must or can have further morphological material attached to it (but may not be a free form)

Word: a minimal collection of form that is inflectionally complete (could serve as a free form)

Phrase: a minimal collection of form that could consist of more than one word

Though often presented as central to phonology, the strata are intimately tied with morphology, as stem and word are long-standing useful notions in the study of word structure. However, it is crucial for the stratal approach not only that the strata exist but also that they interact with each other. They are arranged in a “Russian nested doll” fashion (to borrow a metaphor from Bermúdez-Otero 2018). Because every phrase is made up of words and all (or maybe just almost all) words are made up of the stems, conditions at the phrase-level apply to everything, whereas conditions at the other levels apply to successively smaller domains. Thus, a generalized view of the structure is as in (4):

(4) [phrase ... [word ... [stem FORM] ...] ...]

With these three kinds of domains in play, stratal analysts can actually recognize three kinds of alternations, instead of just the two from earlier. In the stratal mode of analysis, there can be stem-level alternations, word-level alternations, and phrase-level alternations. However, it does seem that the types of alternations – regardless of framework – are highly correlated, so, in fact, all morphologically-conditioned alternations from the initial framework are viewed strally as either stem-level alternations (most likely) or word-level alternations and all phonologically-conditioned alternations are viewed strally as either phrase-level alternations or word-level alternations.

The stratal approach might have some benefit – for both theorist and conlanger – in offering a slightly greater set of alternation possibilities and a sharper way to figure out the kind of alternation present via its domain of application. Yet, this is not without complication, as, in many cases in many languages, the word and the stem are coextensive or close to it – so determining if something is a stem-level or word-level alternation must be done carefully.¹⁶ In the discussion that follows,

¹⁶Furthermore, this mode of analysis does lend itself to the thinking that maybe the best treatment of a particular phenomena is at a level higher or lower, which, if not tied to some empirical observations, has the potential to be abused.

I will make use of the different domains as they appear to be useful, though for many conlanging applications, the choice of framework probably will not matter significantly.

5.2 Historical Aspects of Alternations

Regardless of whether one adopts the classic phonologically-conditioned vs. morphologically-conditioned approach, a stratal approach, or some other approach to alternations, it does seem that there is a fairly decent understanding of at least how alternations change their behavior over time. This is an important aspect of alternations to understand; furthermore, this understanding is crucial, I believe, for the creation of realistic alternations in constructed languages.

5.2.1 Common Diachronic Pathways for Alternations

Like has been observed for particular syntactic/semantic changes (under the rubric of what is sometimes called “grammaticalization” see Heine & Kuteva 2002 for a discussion of “grammaticalization”; interesting parallels between grammaticalization and “phonologization” are drawn in Hyman 2013), the behavior of alternations over time does follow recurrent progressions. On the “classic” view, the progression is as in (5):

(5) Phonologically-conditioned → Morphologically-conditioned

On the stratal view, the progression is the same in nature, but is, of course, domain-sensitive. Graphically, the picture is as in (6):

(6) phrase-level → word-level → stem-level

Examples of progression along the lines of (5)/(6) are easy to find. As one example, the mutations found throughout the Insular Celtic languages appear to involve a change where particular (phonologically-conditioned) phrase-level alternations became restricted to at least the word-level (with some non-trivial restructuring, so that the present-day patterns are all strongly sensitive to syntactic context), becoming morphologically- (or morphosyntactically-) conditioned.

Another example would be the [f] ~ [v] Alternation in English, as occurs in the forms *elf-elves*, illustrated earlier in Table 3. In Old English, [f] and [v] had a predictable distribution: [f] occurred word-peripherally (including word-finally) and [v] occurred word-medially, between voiced sounds. Thus, the changes between [f] and [v] between singular and plural (as occurred in Old English [ælf] ‘elf’ – [ielvə] ‘elves’¹⁷) were quite expected, since the [f] ~ [v] Alternation, at the time, was a phonologically-conditioned alternation. Of course, the distribution of [f] and [v] has changed from Old English to Modern English and, relatedly, this particular alternation has become a morphologically-conditioned stem-level alternation (restricted to a rather specific set of stems, at that) in the modern variety.

There are several ideas useful for the conlanger from the above pathway observations. First is the idea that the same sorts of sound details (that is, the sounds alternating and the environments) can be used for all the different kinds of alternations; thus, a conlanger does not necessarily need to

¹⁷As these examples reveal, the paradigm involving *elf* was not the same in Old English as it is now, suggesting that the patterns surrounding this word have been restructured through the years.

come up with a strange sound relationship for a morphologically-conditioned word-level or stem-level alternation (though, morphologically-conditioned stem-level alternations do seem to be where the quirkiest of sound relationships occur). Second is the simple fact that many morphologically-conditioned alternations are just narrowed “old” phonologically-conditioned alternations, suggesting that if a conlanger would like a particular alternation to be morphologically-conditioned, they just need to make sure that domain (of, likely, some old sound change) is restricted in some fashion.

5.2.2 Other Pathways to Morphologically-Conditioned Alternations?

What might be other historical sources of morphologically-conditioned alternations, aside from the narrowing process noted in the previous subsection? I am not aware that a survey has been undertaken, as of yet, that comprehensively documents all the ways that this might occur. But from my own preliminary informal surveying, it seems that there are other possibilities.

One appears to be borrowing: by borrowing bunches of (related) words with particular form-related patterns, a language can import a pattern (or more). Especially if the borrowed-in alternations are rather different in nature from any pre-existing alternations (if those even occur), these borrowed words can prompt new (and usually morphologically-conditioned) alternations to come into being. This was surely what happened with English’s Velar Softening (discussed above in section 3.2): this alternation existed already in French (arising out of a sound change in the Late Latin to Old French time frame); it was borrowed into English right along with the plethora of borrowed words from French.

Another phenomenon related to the historical pathways of morphologically-conditioned alternations is analogy. Analogy is a term used for a kind of historical change where one form (or set of forms) changes to match, in some fashion, a larger pattern. Garrett & Blevins (2009) discuss a particular instance where analogy appears to have created an unusual alternation in Ancient Greek. The relevant alternating sounds are the coronal stops, [t] and [d], together with [s]; forms like *pseúdomai* ‘I am lied to’ and *épseusmai* ‘I was lied to’ show the alternation. By well-established sound change in Greek, [d] (or any other coronal stop) is not expected to appear as [s] before [m]. Yet, this occurs in several forms in the paradigm. Table 7 shows a relevant part of the overall paradigm of the verb *pseúdo* ‘lie’ – the forms of the perfect middle. This table also provides, for each form, either the etymology by regular sound change (each earlier form has an asterisk in front of it) or the contrary-to-fact result by regular sound change (these forms appear in italics). As is

Table 7: Ancient Greek Prefect Middle of *pseúdo* ‘lie’

<i>épseusmai</i>	‘I was lied to’	<i>epseúsmet^ha</i>	‘we were lied to’
	↳ should be <i>épseudmai</i>		↳ should be <i>épseúdm^ha</i>
<i>épseusai</i>	‘you (sg.) were lied to’	<i>épseust^he</i>	‘you (pl.) were lied to’
	↳ *épseussai ← *épseudsai		↳ *épseudt ^h e
<i>épseustai</i>	‘he/she was lied to’	<i>epseúdatai</i>	‘they were lied to’
	↳ *épseudtai		

evident from Table 7, Greek speakers adopted the ahistorical *-pseus-* stem for the first person forms *épseusmai* and *épseúsme^ha*. Garrett & Blevins suggest that the motivation for this was analogy: instead of just having the [s]-final stem before coronal sounds, speakers expanded the range of this stem so it appeared before all consonants (and through almost all of the perfect middle paradigm).

Once Greek speakers remodeled these forms, it became a quirk of particular morphological forms that a stem-final [d] changed to [s] before [m].

While analogy offers another interesting possibility for how morphologically-conditioned alternations change over time in a given language, how widespread this kind of change is and what sorts of restrictions it might have (such as whether it ever creates truly new alternations or just spreads already existing ones to further locations) is currently not well-understood and remains to be explored in future linguistic research.

6 Creating Realistic Morphologically-conditioned Alternations in Conlangs

6.1 Basic Recommendations

As I have noted several times already, creating realistic morphologically-conditioned alternations is more difficult than creating realistic phonologically-conditioned alternations. Nevertheless, several points from earlier in this essay can contribute to making (more) realistic morphologically-conditioned alternations. I detail them here.

First, some pointers emerge from the diagnostics of section 3.2. Principal among these is that one should restrict the alternation to particular bases or affixes. This is crucial to achieving the requisite *morphological*-conditioning. To make the morphological-conditioning even more apparent, one could have (certain) base + affix combinations undergo the alternation while other phonologically-similar base + affix combinations stay unchanged. The latter is not absolutely required for a morphologically-conditioned alternation, but is definitely not unexpected, given natural language behavior.

Second, the stratal approach and historical pathways from section 5 together suggest a basic methodology for creating a morphologically-conditioned alternation: one could select a particular sound change (like the palatalization exemplified in section 4), but restrict that change to a limited domain, like just within the word, or just within the stem. This, of course, requires that the conlanger creating the language carefully consider what counts, phonologically, as a word and as a stem in their language (probably no two languages do this in exactly the same way). But whether the conlanger is working specifically through the diachrony of their language or just is roughly simulating it, this method gives the conlanger some starting point for how the sound alternation could behave within a larger system. Of course, as happens with natural languages, additional sound changes (or morphological changes) could further obscure the original relationship between the forms – and thus, there is no requirement that a sound change behave in the “present” exactly as it did when it historically entered the language. Furthermore, if a conlanger does not wish to have an alternation emerge out of the native vocabulary of their language, an alternation could, of course, be “imported” through the borrowing of a collection of alternation-filled words from another language.

The above works nicely as a checklist of things to consider in making a morphologically-conditioned alternation. But it would probably be useful to consider an example. Let me, then, consider an example from Skerre, my own conlang.

6.2 An Example from Skerre

I began working on Skerre in 1994 and it has been my primary conlang since. The linguistic sophistication of Skerre has strongly correlated with my knowledge of linguistically-interesting phenomena and theoretical ideas; the language, hopefully unsurprisingly, has been subject to a number of revisions through the years that incorporate those (in addition to a collection of revisions that one could consider more whimsical). So, the facts detailed below are a relatively recent inclusion to the language.

Skerre has what I will call propriative denominal verbs; that is, there are verbs made from nominal bases which have roughly the meaning ‘having NOUN’ or ‘be NOUN-y’. (The difference between verbs and adjectives in Skerre is limited, if not non-existent, so I just consider the relevant words here to be verbs.) In Table 8, I give some examples of propriative denominal verbs, along with their related base. The Skerre words are rendered in both romanization (in italics) and in a fairly narrow IPA transcription (in square brackets). The key sound portion of the propriative denominal verbs is highlighted in red in the transcription. As is evident in Table 8, the relevant

Table 8: Propriative Denominal Verbs in Skerre

	Base		Derived form		
<i>eher</i>	[ɛhɛr]	‘(the) cold’	<i>waateher</i>	[wa:tehɛr]	‘be cold’
<i>iniquih</i>	[inik ^w iç]	‘belief(s), religion’	<i>waatiniquih</i>	[wa:tinik ^w iç]	‘be devout, religious’
<i>kitsa</i>	[kɪtsa]	‘point, sharp tip’	<i>waakitsa</i>	[wa:kɪtsa]	‘be pointed’
<i>nahi</i>	[nɑhi]	‘stomach’	<i>waanahi</i>	[wa:nɑhi]	‘be nervous’
<i>oonaqua</i>	[o:nak ^w ɑ]	‘strength’	<i>waatoonaqua</i>	[wa:to:nak ^w ɑ]	‘be intense’
<i>rasi</i>	[rasi]	‘tooth’	<i>waarasi</i>	[wa:rasi]	‘teethe’
<i>saan</i>	[sa:n]	‘blur’	<i>waatsaan</i>	[wa:tsa:n]	‘be blurry’
<i>toyos</i>	[tojos]	‘balance’	<i>waatoyos</i>	[wa:tojos]	‘be physically skilled’
<i>woris</i>	[woris]	‘shame’	<i>waaworis</i>	[wa:woris]	‘be ashamed’

prefixal forms for propriative denominal verbs are *waa-* or *waat-*: the latter is found before vowels and before [s]-initial bases.¹⁸ With these two prefixal forms, it is evident that an alternation is occurring here, involving [t] and the absence of a sound. I will call this the $T \sim \emptyset$ Alternation. Carefully observing the red highlighting in Table 8 for patterns, one can see that no sequences of consonants (I consider [ts] a single, complex sound here) occur across the affix + base boundary. This distributional fact would seem to provide some rationale for why the alternation occurs: if the [t]-final allomorph were added to most of the consonant-initial bases, a sequence of consonants would result and this sort of sequence does not appear to be allowed in this location.

The $T \sim \emptyset$ Alternation displayed in sound change format (that is, in the same format as (1)) is as in (7):¹⁹

¹⁸More strictly speaking, with [s]-initial bases, it seems that the affix-final [t] coalesces with the base-initial [s] to form a single affricate.

¹⁹It is worth considering the possibility that the additional [t] with the vowel-initial propriative denominal verb stems should be treated as an insertion rather than a deletion ((7) encodes the deletion analysis). However, the insertion analysis is less optimal because [ʔ] independently seems to intervene when two vowels would otherwise come together, as evident in Table 9; probably most analysts would prefer to just recognize one epenthetic consonant instead of two. However, even if insertion were the chosen analytical route, it actually would not crucially change the points below, as there is still a difference in sound sequencing behavior between this particular affix and other phenomena in the

(7) $t > \emptyset / _C_{non-sibilant}$

This notation says that the sound [t] should be eliminated (that is, turned into \emptyset) before a non-sibilant consonant. While not commonly given as a sound change by historical phonologists, something like (7) is found as a phonological process (as noted by Jun 2011) between words in Basque, between all sorts of units in the West African language Diola Fogy, and (as noted by Kang 2000) in morphological concatenation before stops in Attic Greek (see also Côté 2000, ch. 1 for discussion of all three of these and some others). So, this kind of sound-based change does seem to have natlang precedent.

Turning to a different (though ultimately related) phenomenon in Skerre, the language also has affixes that signal the subject of the clause; they attach to verbs and a few other kinds of words. Among the relevant subject affix forms are *-wo* ‘1ST PERSON PLURAL’, *-na* ‘2ND PERSON SINGULAR’, *-ra* ‘2ND PERSON PLURAL’, and *-ti* ‘3RD PERSON PLURAL’.²⁰ Some example forms (again in Skerre orthography and phonetic transcription; key portions of the complete words appear in the transcription in blue) are given in Table 9. Contrasting with the behavior shown in Table 8,

Table 9: Subject-Affixed Forms in Skerre

	Base		Complex forms		
<i>koot</i>	[ko:t]	‘how’	<i>koot-na</i>	[ko:tna]	‘how ... you ...’
<i>kenat</i>	[kɛnat]	‘build’	<i>hikenat-na</i>	[hikɛnatna]	‘you are building’
			<i>hikenat-ra</i>	[hikɛnatra]	‘y’all are building’
<i>sorit</i>	[sorit]	‘agree’	<i>esorit-ti</i>	[ʔɛsorit:i]	‘they will agree’
<i>aket</i>	[aket]	‘understand’	<i>eʔaket-ti</i>	[ʔɛʔaket:i]	‘they will understand’
			<i>eʔaket-wo</i>	[ʔɛʔaketwo]	‘we will understand’

in Table 9, a base-final [t] is maintained in a complex form, aside from the fact that two [t]s in a row yields an elongated consonant, [t:] (arguably, maintaining the [t] as well). In particular, observe that particular sequences of consonants – like [tn], [tr], and [tw] – are found, unaltered, in the subject-affixed forms, even though these same sequences are apparently avoided in the privative denominal verbs. (Recall that, in Table 8, ‘be nervous’ was [wɑ:nahi] and not *[wɑ:tnahi].) The dissimilar phonotactic patterns – and their related dissimilar treatment of [t] – represent a significant difference between the two kinds of morphological combinations.

Let us consider the $T \sim \emptyset$ Alternation – and the other [t] behavior noted above – through the lens of my recommendations from section 6.1. One question to consider would be whether the $T \sim \emptyset$ Alternation involves a plausible sound change. As (7) and the discussion around it indicate, this desideratum is met: this alternation seems like a plausible sound change, at least at some point in time. A second – and perhaps more important – question to consider is whether the $T \sim \emptyset$ Alternation is morphologically-conditioned. Already from the above discussion, it is clear that the $T \sim \emptyset$ Alternation does not occur everywhere it possibly could – it does not occur with subject affixes, for instance – already pointing in the direction of a morphologically-conditioned alternation. And, in fact, further evidence from elsewhere in Skerre’s morphophonological patterns also supports this conclusion. While there are no other stop-final prefixes in the language, there

language.

²⁰In Skerre romanization, all these elements are obligatorily preceded by a dash, as shown in in-body text.

are compounds, some with a first component ending in [t]. In compounds, even before sounds that elsewhere trigger the $T \sim \emptyset$ Alternation, these components behave just as the subject affixes do, form-wise: the final [t] is maintained. This is exemplified with the compound in (8):

(8)	<div style="display: flex; justify-content: space-around; font-weight: bold; font-size: 0.8em;"> Components Compound </div>
	<div style="display: flex; justify-content: space-around; font-family: monospace; font-size: 0.8em;"> <i>seet</i> [sɛ:t] ‘15’ <i>ree</i> [rɛ:] ‘4’ <i>seet-ree</i> [sɛ:trɛ:] 19’ </div>

Thus, the $T \sim \emptyset$ Alternation in Skerre is surely a morphologically-conditioned alternation, occurring in a domain that includes the affix *waa(t)-* (and possibly only with the affix *waa(t)-*).

With the conclusion that the [t]-deletion behavior of the $T \sim \emptyset$ Alternation is morphologically-conditioned [t] behavior, it would seem likely that the [t]-maintenance behavior found in other morphological constructions is surely the phonologically-conditioned behavior in Skerre. Thinking about these patterns stratally, *waa(t)-* might be seen as a stem-to-stem affix (it attaches to stems and creates new stems²¹) while the subject affixes are word-to-word affixes (so they create words from other words²²). Therefore, on this view, the deletion of the [t] would be a stem-level alternation, while the maintenance of the [t] is the [t]-related behavior at the word-level (or perhaps even the phrase-level). Regardless of approach, it is definitely the case that, one of two – the [t]-deletion behavior or the [t]-maintenance behavior – is “opaque” with respect to the other: one would not think that a language would have this sort of differing behavior with the same sound in the same sorts of sound-based environments without some non-phonological conditioning behind it.

There also could feasibly be a historical aspect to this differential behavior. It could have been the case that earlier stages of Skerre did not allow any sequences of consonants (or, maybe, just relevant sequences) when *waa(t)-* became an affix, and so the [t]-deletion of (7) was warranted when the affix “entered” the word. Subsequently, however, the possibilities allowed elsewhere in the language changed. Or perhaps, the loss of the [t] is a newer change, but this change just affected elements inside of words (maybe to make them more like other insides of words) and became restricted that way. I actually did not need to decide on a precise historical pathway to include it in Skerre; it is sufficient that plausible historical progressions exist that could lead to the “present-day” state of affairs.

It is true that I could have chosen just one way to deal with [tC] sequences in Skerre, treating them the same whenever those kinds of sequences arose: plenty of languages do this sort of thing (one might call this a phonologically-conditioned solution). However, I felt it would add a further bit of nuance to Skerre to have different behavior with different kinds of affixes, so I opted to have the behavior detailed above (and have what one might call a morphologically-conditioned solution).

Overall, I hope that the above discussion has shown how all the various portions of the earlier sections can be incorporated and considered in a single example. Additionally, I hope that this discussion gives some insight into the different kinds of structural properties that might be considered and decided upon when creating a morphologically-conditioned alternation.

²¹Why might it be a stem-to-stem affix? For one, category-changing morphology (like here where a noun is becoming a verb) is often taken to be stem-creating. The phonotactic patterns here also match those found within morphologically-simple stems in Skerre.

²²The fact that subject affixes appear to attach to fully inflected words seems to speak for this treatment. The kinds of phonotactic patterns here also match those that can occur across words.

7 Wrapping Up

So, after all of this, where do we stand? I hope that the preceding pages have illuminated that: (1) there are changes in form across words called alternations and that they are plentiful in languages, both natural and constructed; (2) tools are available for understanding how alternations work in natural languages (both synchronically and diachronically); and (3) that there are ways in which a conlanger could take ideas about how alternations work to create more realistic instances in conlangs. Furthermore, I hope to have shown some good ways for creating what (I think) many conlangers seek: somewhat exceptional behavior – of the kind that languages are notorious for exhibiting – yet created in a principled way, so it is not randomly thrown in (or so that randomly thrown in aspects could be retconned into more principled understandings).

There is no doubt still much more to be learned about the nature of alternations: how precisely they behave across languages, what sorts of further structural interactions they have, and the fine details of how (and why) they start and progress over time, so, for the interested conlanger, further research – some already conducted, some still yet to come – could reveal even more interesting behavior and an even better understanding of how this sort of phenomenon works. So this is hardly the last word on the matter; perhaps, it is just an invitation for interested conlangers to explore the area further.

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