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Morphophonological Alternations

Introduction

Morphophonology is the study of how word formation interacts with phonology. The domain of phonology proper is concerned with identifying phonemes, the allophones of each phoneme, and the context in which the allophones appear. For example, [d] and [ð] are both allophones of /d/: [d] appears post-pausally and post-nasally while [ð] occurs elsewhere. This phonological alternation is generally considered exceptionless, which contrasts it with morphophological processes that have many exceptions. In morphophonology, not only may allophones of the same phoneme be involved in an alternation, but allophones of different phonemes may alternate. So, although [t] and [s] belong to different phonemes they alternate in the morpheme /perßert-/ 'pervert' when it is followed by different affixes: /perßert+ir/ 'to pervert,' /perßers+o/ 'perverted'.

Morphophonological alternations are quite common in both the derivational and inflectional morphology of Spanish. For instance, the alternation between [t] and [θ] (e.g., /inyekt+ar/ ~ /inyekθ+jon/ 'inject, injection') has received attention by researchers (Harris 1969, Núñez 1993) as have the [o] ~ [we] and [e] ~ [je] alternations (e.g., /tost+ar/ ~ /twest+an/, 'to toast, they toast,' /tjen+e/ ~ /ten+emos/ 'it has, we have' (Bybee & Pardo 1981, Carreira 1991, García-Bellido 1986, Eddington 2006, Harris 1969, 1977, 1978, 1985, 1989, Halle, Harris & Vergnaud 1991, St. Clair 1971). On the other hand,

alternations such as [f] ~ [Ø] as in /fum+ar/ ~ /um+o/ 'to smoke, smoke,' and [ð] ~ [ß] as in /ßiß+ir/ ~ /ßið+a/ 'to live, life' are rarely discussed in any systematic fashion.

Why some morphophonemic alternations attract more attention than others certainly has to do with how many words contain them, although no cutoff point has been established to separate the significant from the insignificant (Esau 1974: 10). For some, significant patterns are those that are most amenable to rule-based analysis (Chomsky 1965: 42, Chomsky & Halle 1968: 335, Hurford 1977: 575). Rather than grapple with the issue of significance, and given the purpose of the present volume, I have chosen to address some of the morphological alternations based on how much attention they have received in the literature. Therefore, I will discuss diphthongization, diminutive allomorphy, velar and coronal softening, and depalatalization. Plural formation is discussed by Janda in the present volume (see chapter 10).

Diphthongization

Diphthongization refers to the alternation of [o] with [we] as in *b[wé]no ~ b[o]ndád* ‘good, goodness’ and [e] with [je] as in *pim[jé]nta ~ pim[e]ntéro* ‘pepper, pepper shaker.’[1] Historically, these alternations arose from the Romance vowels /ɔ/ and /ɛ/. When unstressed, /ɔ/ became /o/ and /ɛ/ became [e]. However, in stressed position they diphthongized: /ɔ/ became [we] and /ɛ/ became [je] which gave rise to the contemporary morphophonemic alternation that is largely conditioned by stress. In verbal forms, analogy sometimes interrupted this regular evolution (Penny 2002: 182-184). Since the phonemes /ɔ/ and /ɛ/ no longer exist, it is difficult to predict which instances of unstressed [o, e] alternate with stressed [we, je] (e.g. *c[wé]nto ~ c[o]ntámos* ‘I count, we count,’ *v[jé]ne ~ v[e]nís* ‘s/he comes, you come’) and in which cases there is no stress-conditioned alternation (e.g. *t[ó]sen ~ t[o]séis* ‘they cough, you cough,’ *of[e]ndér ~ of[é]nsa* 'to offend, offense'). The existence of stressless diphthongs (e.g. *p[we]blíto ~ p[wé]blo* ‘small town, town,’ *m[jé]do ~ m[je]dóso* ‘fear , afraid) is an additional issue that must be dealt with.

In traditional generative analysis, all allomorphs are derived from a unique underlying representation. A critical part of an analysis in this tradition, then, is to distinguish which vowels participate in the diphthongization alternations and which do not. As a result, a number of ingenious diacritics and rule-systems have been proposed. These include diacritic marks on the vowels, empty vowel slots, and cyclic rule

1 Accent marks indicate spoken stress and do not follow orthographic conventions.

application (Carreira 1991, García-Bellido 1986, Harris 1969, 1977, 1978, 1985, 1989, Halle, Harris & Vergnaud 1991). While such methods allow everything, including apparent exceptions, to be accounted for, they have the disadvantage of being completely abstract; they lack any surface validity and thus escape potential falsifiability. As a result, it is impossible to prove one analysis is more correct than another on an empirical basis.

If linguistics is a branch of cognitive science (Chomsky 1968: 1), the goal of morphophonological analysis is to determine what generalizations have relevance for actual speakers as well (Pilleux 1980:115). As far as diphthongization in Spanish is concerned, Bybee and Pardo (1981; see also Eddington 1998) wondered how synchronically valid diphthongization is. They presented Spanish speakers with sentences containing nonce verbs such as *biérca, muéna, monár* that demonstrate diphthongization and elicited responses that entailed manipulating the diphthongization alternation. They found that many subjects provided responses that go a against a rule of diphthongization (e.g. *biercó* rather than the expected *bercó*). Rule systems derive both [je] ~ [e] and [we] ~ [o] by means of a unitary process, yet the experimental data demonstrate that [je] ~ [e] is much more productive, suggesting that the two alternations are independent of each other in cognitive processing.

Another question that merits investigation is how speakers determine when simple vowels that alternate with diphthongs are realized as diphthongs and when they are not. Abstract mechanisms proposed by rule analyses are not helpful because they have no tangible counterparts in the speech signal. Are there surface-apparent clues to diphthongization? Eddington (1996, 1998) investigated this issue by examining ten

derivational suffixes and the relationship they have to diphthongization in the stem of the words they are affixed to. Only words that have morphemic relatives with and without a diphthong (e.g., *diente ~ dentista* 'tooth, dentist') were considered in the study.

Usage suggest that words with the productive diminutive, superlative, and augmentative suffixes, *-(c)ito, -zuelo, -(c)illo, -ísimo*, and *-azo,* generally appear with diphthongs (e.g., *fuerte ~ fuertezuelo,* 'strong, somewhat strong,' *vieja ~ viej(ec)illa* 'old woman, little old woman'). A dictionary search for common words ending in the less productive suffixes *-al, -(i)dad*, *-ero*, *-oso*, and *-ista* reveals a great deal of variety. For instance, all of the common words ending in *-al, -(i)dad*, *-ero*, contain simple vowels (e.g., *dental, novedad, herrero*) compared to 83% of words with *-oso* (*vergonzoso*) and 50% of those ending in *-ista* (*dentista*). This was determined experimentally. See Eddington (1996).

In order to test whether the relationship between suffix and diphthongization was psychologically significant, native Spanish speakers were asked to state their preferences for diphthongs or simple vowels in a series of neologisms. For example, was a person who worked scattering *estiércol* an *estiercolero* or an *estercolero*? The percentage of simple vowel responses given by the subjects reflects quite well the percentage of simple vowels that appear in common words in usage and the dictionary search. In other words, the presence of a diphthong or simple vowel in a neologism is dependent to some extent on how often simple vowels or diphthongs appear in common extant words in the language ending in a particular suffix.

Suffixes are not the only surface-apparent clue to diphthongization. Albright,

Andrade and Hayes (2001) studied diphthongization in Spanish verbs and show that the phonemic make-up of the verb stem provides clues to how likely a verb is to have a diphthongizing stem. They examined 1,689 verbs with [e] and [o] in the stem computationally (Albright & Hayes 1999). The algorithm they applied yielded probabilities that verbs with a certain phonological shape would be diphthongizing verbs. For example, based on diphthongizing verbs such as *cerrar* 'to close' and *enterrar* 'to bury' the model predicts that verbs ending in *-errar* have a high probability of being diphthongizing. On the other hand, no verbs ending in *-echar* (e.g., *echar* 'to throw,' *aprovechar* 'to take advantage of') are diphthongizing, which means that [e] ~ [jé] alternation is not likely to appear in similar verbs. The prediction of their model significantly correlated with responses given by subjects to nonce words. For example, given *lerrámos* the subjects preferred the diphthongized inflection *lérro* over *liérro* when the crucial syllable was stressed.

When the results of these studies are considered together, they suggest that diphthongization can be extended to some degree to nonce words and neologisms. The experimental data support a model of processing in which speakers make use of the properties of the words they have experienced, such as the suffix the word ends in and the phonological make-up of the word, in order to handle the alternation between diphthongs and simple vowels.

Diminutive Formation

Variation in diminutives ending in *-ito/a(s)* is of two types. First, there is allomorphy in the suffix itself which appears as either *-ito, -ecito,* or *-cito* (e.g., *normal+ito, rey+ecito, joven+cito* 'normal, king, young man') or the feminine or plural forms of these (e.g., *normal+ita, rey+ecitos, joven+citas* 'normal, kings, young women'). The diminutivized stem itself varies depending on whether the final vowel is retained or not. In *Lupe > Lupi+ta* 'Lupe' and *minuto > minut+ito* 'minute' the final vowel is lost, while in *Andrés > Andres+ito* and *llave > llave+cita* it is retained. According to some researchers (Jaeggli 1980, Méndez-Dosuna & Pensado 1990) many cases of diminutivization do not entail loss of the final vowel when *-ito* is affixed (*minuto > minut+ito*). Instead, it is viewed as infixation of *-it-* (*minuto > minut+it+o*) in the same way *Carlos > Carl+it+os* and *Víctor > Vict+it+or* appear to involve an infix.

Spanish diminutivization has received attention in a number of different frameworks. Jaeggli (1980) treats it in a classical generative model, while Colina (2003), Elordieta and Carreira (1996), and Miranda (1999) approach it in optimality theory. Eddington (2002) accounts for it in an exemplar model. The key point that Prieto (1992) and Crowhurst (1992) make is that diminutivization is partially governed by prosody. Two of the more problematic cases, diminutives of singular stems that end in *-s* and cases of infixation as in *Víctor > Vict+it+or*, are dealt with respectively by Bermúdez-Otero (2007) and Méndez-Dosuna and Pensado (1990). Ambadiang (1996, 1997), Colina (2003), and Harris (1994) argue that diminutive formation is morphological, not phonological in nature.

The bulk of the work on Spanish diminutives centers on finding the phonological or morphological context that governs which suffix (or infix) is applied as well as the formal mechanisms for deriving the diminutives. In one sense, diminutivization is a very regular process that appears to be conditioned by phonology. This means that it is possible to describe the majority of the forms with a small number of generalizations. On the other hand, the more data one considers the more one encounters diminutives that escape simple phonological explanation. In part this is due to dialectal differences, but there is individual variation as well. Even when these are eliminated from consideration, a sizable number of odd cases remain. This prompted Harris (2004) to abandon the quest for predictability based on phonology and conclude that "diminutivisation is riddled with arbitrary lexical choices" (2004: 186).

Is there a way to test the extent to which the diminutive allomorphs are predictable based on non-abstract properties? The 2,447 diminutives taken from Eddington's (2002) search of the Corpus del Espanol (Davies 2002) may serve as a test set to this end. All approaches to diminutives should account for these data, and it would be ideal if each of the extant analyses could be compared against this data set. Unfortunately, none of them deals with the full range of diminutive forms in the data set. A further difficulty is that many crucially depend on entities that cannot be tested because they are not surface-apparent (e.g., constraints, Colina 2003, Miranda 1999; epenthetic vs. terminal *-e* and resyllabification, Crowhurst 1992). For this reason, I focus on surface-apparent characteristics.

The generalizations in Table 1 (taken from Eddington 2002) represent an attempt

to describe diminutivization in the simplest and most theory-neutral way possible based on three characteristics of the base form. The most predictive part of a stem as far as diminutive allomorphy is concerned is the word-final phone. However, the number of syllables in words ending in *-e* is a conditioning factor as well (Crowhurst 1992, Elordieta & Carreiras 1996, Prieto 1992): 67% of bisyllabic words ending in *-e* are of the type *traje* > *trajecito*. Those with three or more syllables tend to be of the *elefante* > *elefantito* type in that 88% are formed in this manner. Grammatical gender also plays a part in that, with few exceptions (e.g., *la manita/o, el mapita*), the final phone of a diminutive is *-a* if feminine and *-o* if masculine. This is indicated in Table 1 as *depends on gender* (d.o.g.). A respectable 94% of the diminutives may be predicted with these simple generalizations. So few words take *-ecito* (e.g., *tren*+*ecito, pan*+*ecito*) that no generalization is made about these forms.

Table 1. Generalizations that predict diminutive allomorphs based on the final phone, gender, and number of syllables of the base word (d.o.g. = depends on gender).

Final Phone	Process	Example	Total #	% Correct
/o/	Add *-ito* to stem minus *-o*	*carro > carrito*	948	96
/a/	Add *-ita* to stem minus *-a*	*pena > penita*	1044	96
/e/	Add *-cito/a* to bisyllabic stem minus *-e*, d.o.g.	*llave > llavecita*	90	86
/e/	Add *-ito/a* to stems with 3+syllables minus *-e*, d.o.g.	*elefante> elefantito*	72	99
/r/	Add *-cito/a* to the stem, d.o.g.	*pastor > pastorcito*	58	83
/n/	Add *-cito/a* to the stem, d.o.g.	*colchon > colchoncito*	104	94
/l/	Add *-ito/a* to the stem, d.o.g.	*Isabel > Isabelita*	75	97
/s/	Add *-ito/a* to the stem, d.o.g.	*Andrés > Andresito*	28	50
Other phoneme	Add *-ito/a* to the stem, d.o.g.	*reloj > relojito*	28	39
			2446	94

The question that arises is how to account for the 6% that do not fit into these generalizations. Part of it is due to the corpus the data are derived from that includes diminutives from many different countries; diminutivization is known to vary regionally. There is also variation even within the same speech community (Crowhurst 1992, Jaeggli 1980, Prieto 1992) and within individual speakers (Harris 1994). This may be partially responsible for the doublets that exist in the database (e.g., *carne > carnecita/carnita* 'meat,' *chofer > chofercito/choferito* 'chauffeur,' *tren > trencito/trenecito* 'train,' *piedra > piedrita/piedrecita* 'stone'). In these cases, one is predicted by the generalization while the other escapes it into the other 6%.

Abstraction representations such as differing prosodic templates (Crowhurst 1992, Prieto 1992) and constraint reranking (Colina 2003) have been proposed to account for these differences, as have different morphological parses (Bermúdez-Otero 2007). There are however, some concrete characteristics that are related to the dialectal differences such as whether the stem contains the diphthongs [je] and [we] (Prieto 1992). In these cases, some varieties prefer the *-ecito/a* allomorph and others *-ito/a* in these cases (e.g., *pueblecito/pueblito,* 'small town', *tienda* > *tiendecita/tiendita*, 'small store').

Other cases escape the broad generalizations in Table 1 because the internal morphological structure of the word may need to be taken into consideration. A case in point are *corona* and *llorona* 'crown, crying woman', both of which are feminine and end in *-a*. The diminutive forms, however, are quite different (*lloroncita, coronita*). A Google search reveals that *lloronita* is not unknown, but is about ten times less frequent than *lloroncita*. Harris (1994) argues that the differing morphological structure of the words is responsible for the different diminutive forms: *coron+a* and *llor+on+a*, while Colina (2003) attributes the difference to each belonging to a distinct morphological class. Another possibility is that *lloroncita* is based on the masculine form *lloroncito* rather than on *llorona*.[2]

Morphology has also been attributed a part in the creation of the diminutive form of words that end in *-s,* but are not plurals (e.g., *lejos* 'far,' *Carlos* 'Charles,' *garrapatas* 'tick'). Only 50% of these in the database are formed by adding *-ito/a* to the word (e.g., *adiós* > *adiosito* 'goodbye,' *Jesús* > Jesusito 'Jesus'). Others appear to have an infixed

2 Thanks to J.I. Hualde for this insight.

morpheme (*lejos* > *lejitos, Carlos* > *Carlitos*). Bermúdez-Otero (2007) suggests that much of the variation may be accounted for by dividing such words into two morphological categories. Words with athematic stems such as *virus* are treated as having no internal morphological structure. As a result, *-ito/a* is added directly to the base (*virus* > *virusito*), while pseudoplurals such as *Carlos* and *Lucas* are parsed as *Carl+o+s* and undergo diminutivization as do true plurals such as *galletas* (*gallet+a+s* > *gallet+it+a+s,* 'cookies,' *Carl+o+s* > *Carl+it+o+s*).

Perhaps the most difficult diminutives to account for are the handful of forms whose base ends in *-or* and *-ar* and that have penultimate stress. These include *Víctor* > *Victítor* 'Victor,' *azúcar* > *azuquítar* 'sugar,' *Héctor* > *Hectítor* 'Hector,' and *ámbar* > *ambítar* 'amber.' They are similar to pseudoplurals in that, despite their monomorphemic status, they are inflected as if they had an internal morpheme boundary (e.g., *azúc+ar*). All approaches to diminutives require some sort of manipulation of the formal apparatus in order to account for these unusual forms.

In sum, diminutive forms are largely predicable based on their gender, number of syllables, and phonological form, although dialectal and individual variation is attested. Appeals to morphological structure and abstract mechanisms have been resorted to in order to describe both dialectal variation as well as the forms that do not appear to be predictable phonologically.

Velar and Coronal Softening

The lexicon of Spanish is replete with morphologically related forms that exemplify velar and coronal softening in derived environments. Velar softening denotes an alternation between the velar stops /g/ and /k/, and the fricatives /θ/ and /x/ (or /s/ and /x/ in dialects without /θ/), as shown in (1).

(1) /g/ ~ /θ/ *distin/g/uir* 'to distinguish' *distin/θ/ión* 'distinction'

	grie/g/o	'Greek'	*gre/θ/iano*	'Grecian'
/g/ ~ /x/	*ma/g/o*	'magician'	*ma/x/ia*	'magic'
	conyu/g/al	'marital'	*cónyu/x/e*	'spouse'
/k/ ~ /θ/	*Costa Ri/k/a*	'Costa Rica'	*costarri/θ/ense*	'Costa Rican'
	católi/k/o	'Catholic'	*catoli/θ/ismo*	'Catholicism'

Coronal involves an alternation between the coronal stops /t/ and /d/ and the fricative /s/, and in those dialect that contain it, the fricative /θ/ as well, as demonstrated in (2).

(2) /t/ ~ /s, θ/ *inyec/t/ar* 'to inject' *inyec/θ/ión* 'injection'

	Mar/t/e	'Mars'	*mar/θ/iano*	'Martian'
/t/ ~ /s/	*emi/t/ir*	'to emit'	*emi/s/or*	'emitter'
	perver/t/ir	'to pervert'	*perver/s/o*	'perverted'
/d/ ~ /s/	*alu/d/ir*	'to allude'	*alu/s/ión*	'allusion'
	exten/d/er	'to extend'	*exten/s/ivo*	'extensive'
/d/ ~ /s, θ/	*aba/d/*	'abbot'	*aba/θ/ial*	'abbatial'

The large number of lexical items that participate in these alternations may be the reason they have received attention from so many investigators (Harris 1969, 1983, Morin 1997,

2002, Nuñez-Cedeño 1993, Pilleux 1980, Spencer 1988, Wieczorek 1990).

Most studies of coronal and velar softening take one of three approaches to the issue. The first has as its goal to demonstrate that the alternations are the result of rules that depend primarily on phonology, that transform underlying representations into surface forms (Harris 1969, 1983, Nuñez-Cedeño 1993). Apparent exceptions to these mechanisms are explained by appeals to differing phonetic and morphological contexts, as well as to a series of morphological and phonological elements used as diacritics. The second approach is principally a reaction to the first (Morin 1997, 2002, Pilleux 1980, Spencer 1988, Wieczorek 1990). These researchers argue that there are so many exceptions to the postulated rules, and so much *ad hoc* use of formal mechanisms that are essentially diacritic marks, that velar and coronal softening must be a lexicalized rather than a productive processes. The third approach represents attempts to determine the degree to which the alternations are synchronically productive by experimental means (Morin 1997, 2002, Nuñez-Cedeño 1993).

In Harris' (1969) approach to velar softening, he proposes that underlying /k/ becomes /θ/ before front vowels (e.g., *místi/k/o ~ misti/θ/ismo* 'mystic, mysticism'). In like manner /g/ becomes /x/ before front vowels (e.g., *larin/g/oscopio ~ larin/x/e* 'laryngoscope, larynx'). The first difficulty with proposing front vowels as the motivating context is the existence of so many cases of velar stops before front vowels (e.g., *Puerto Ri/k/o ~ puertorri/k/eño* 'Puerto Rico, Puerto Rican,' *bode/g/a ~ bode/g/ero* 'wine cellar, wine producer'). Coronal softening suffers from many exceptions as well. For example, in some words it fails to apply before front vowels (e.g., *compe/t/ir ~ compe/t/idor* 'to

compete, competitor'). In other cases, it paradoxically applies before back vowels (e.g., *perver/t/ir ~ perver/s/o* 'to pervert, perverse'). One way that Harris maintains the apparent regularity of velar softening is by assuming a phonological diacritic such that words with /k, g/ before front vowels are underlyingly /k^w, g^w/. These labiovelars are then deleted once they have served their function of blocking velar softening.

Another mechanism that Harris uses to explain apparent counterexamples is morphological boundaries. Accordingly, softening applies to *indi/k/ar ~ índi/θ/e* 'indicate, index' but not to *arran/k/ar ~ arran/k/e* 'to start, start' because they have different morphological boundaries in the underlying representation (i.e., *arrank#e* vs. *indik+e*). In essence, # blocks softening. The lack of true morphological motivation for different boundaries has been pointed out by many (Pilleux 1980, Spencer 1988, Wieczorek 1990). Morin (1997) extended and fortified this criticism by demonstrating that softening cannot be tied to particular suffixes either. For example, *-e, -ía,* and *-ismo* appear in some words (e.g., *api/k/al ~ ápi/θ/e* 'apical, apex,' *aboga/d/o ~ aboga/θ/ía* 'lawyer, practice of law,' *católi/k/o ~ catoli/θ/ismo* 'Catholic, Catholicism'). However, in other cases no softening is observed (e.g., *arran/k/ar ~ arran/k/e*, 'to start, start,' *aba/d/ ~ aba/d/ía* 'abbot, abbey,' *taba/k/o ~ taba/k/ismo,* 'tobacco, nicotine addiction').

I have discussed two of the diacritic mechanisms used by Harris in his attempt to describe velar and coronal softening as processes that are mostly exceptionless, at least at an abstract level. A full treatment of the entire apparatus necessary to do this is beyond the scope of the present paper. Both Harris, and the lengthy but the lesser-known treatment by Nuñez-Cedeño (1993), require a great deal of formal manipulation and use

of abstract entities. Accounting for softening in a more contemporary framework such as optimality theory does not eliminate the need for diacritics (see Morin 2002).

Observable data show that many instances of softening alternations exist. These may be conditioned by front vowels or particular morphemes. However, any generalization of this nature must admit a good number of counterexamples. For this reason, many researchers (Morin, 1997, 2002, Pilleux 1980, Spencer 1988, Wieczorek 1990) have concluded that softening alternations are lexicalized rather than playing a synchronically active role in Spanish phonology.

Historical considerations also place doubt on the validity of softening alternations. Rule analyses assume directionality in the alternations. For instance, underlying /g/ surfaces as /x/ and not vice-versa; underlying /k/ is transformed into /θ/ and not the other way around. However, Pilleux (1980) notes cases in which it must move in the opposite direction. Historically, *farin/x/e* 'farynx' and *Gre/θ/ia* 'Greece' are older words upon which the more modern words *farin/g/ólogo* and *Gre/k/olatino* are based, yet these assume a phonological derivation completely opposite of that assumed in velar softening rules (i.e., /x/ > /g/, /θ/ > /k/). The most likely explanation for velar (but not coronal) softening may be orthography. In Spanish orthography <c> is pronounced /k/ before <o, u, a> and as /θ/ before <i, e>. In like manner <g> is /g/ before <o, u, a> and /x/ before <i, e>. Accordingly, adding *-ólogo* to *faring-* places <g> before <o> at which point the spelling norm dictates the pronunciation as /g/.

Implicit in many accounts of softening is that it is the result of historical evolution. However, Morin (2002) demonstrates that softening alternations are not due to

diachronic derivational processes, but the result of massive borrowing of learned words from Latin. That is, in related words such as *par/t/e ~ par/θ/ial* 'part, partial' the latter did not derive from the stem of the former by adding the suffix *-ial* . Instead, the popular word *parte* has had a continuous history in Spanish, while *parcial* was a learned word borrowed in about the 15th century. Phonetic evolution of the borrowings eventually yielded the modern pronunciation and softening alternations. In short, "words with these apparent alternations were either integral borrowings from Latin, and/or reflect the spelling pronunciations of Spanish at the time they entered the language as learned words" (Morin 2002: 157). Since softening was not the result of a historical derivational process, one cannot assume that the derivational relationships between the softening alternations have survived into Contemporary Spanish.

Morin (2002) tested the synchronic validity of softening by asking Spanish speakers to add the suffixes *-ente, -ino, idad, -ico, -ense, -ismo, -ista, -ía*, and *-iano* to nonce words such as *semedo* and *semoca* to determine whether the stem final /t, k, d, g/ would be softened. None of the test questions containing stem-final /t/ or /d/ were softened by any of her 32 test subjects. That is, the coronal in *seme/d/o* was not softened into *seme/s/iano* or *seme/θ/iano*. Velar softening was somewhat more productive in that /k/ was softened in 30% of the answers (e.g., *semoca* > *semo/θ/ino*) and /g/ in 13% of the answers. It appears that these instances of velar softening are due to orthography. In the study, nonce words ending in /k/ and /g/ appeared next to suffixes beginning with orthographic high vowels. In the dialect of the subjects tested *ge, gi* are pronounced [xe, xi] and *ce, ci* are pronounced [θe, θi]. On the other hand, orthographic <t> and <d> do

not vary their pronunciation based on the following vowel. This explains why coronal softening was not productive at all compared to velar softening, which appears to be dependent on orthographic convention.

Núñez-Cedeño (1993) carried out a similar study to determine the synchronic validity of coronal softening through experimental means. In spite of the methodological limitations and statistical difficulties in his study (see Eddington 2004), the results are worth mentioning. As in Morin, Spanish speakers were asked to add suffixes that could trigger softening to stems ending in /t/ and /d/. Only 3.4% of his eight subjects' responses demonstrated coronal softening. In another study, he presented the subjects with nonce verbs such as *enfurtir* and had them rate a number of suffixed forms derived from the base verb in terms of their acceptability (e.g., *enfursión, enfurtión, enfurtición, enfusión*). The change /t, d/ > /s/ that is predicted by coronal softening was rated as acceptable in only 25% of the cases. The most acceptable option was to leave the /t, d/ unchanged. Both of these findings suggest only a modicum of productivity for coronal softening.

In short, softening alternations are not the result of historical phonetic evolutions that have survived into Contemporary Spanish, nor are they very active synchronically either. The evidence for the productivity of velar softening appears to be due to orthographic factors. Formal attempts to make softening appear synchronically valid postulate mechanisms to account for the alternations, but are obliged to explain away the large numbers of counterexamples by appealing to abstract entities that cannot be verified. Since softening alternations are not predictable based on surface apparent criteria, they must be lexicalized in the words that exemplify them.

Nasal and Velar Depalatalization

The alternation between /n/ and /ɲ/ and between /l/ and /ʎ/ are illustrated by the examples below shown in (3):

(3) *donce/ʎ/a* ‘damsel’ *donce/l/* ‘young nobleman’

aque/ʎ/a	‘that’	*aque/l/*	‘that’
*be/ʎ/*o	‘beautiful’	*be/l/dad*	‘beauty’
desde/ɲ/ar	‘to disdain’	*desdé/n/*	‘disdain’
te/ɲ/ir	‘to dye’	*ti/n/te*	‘dye’
re/ɲ/ir	‘to quarrel’	*re/n/cilla*	‘quarrel’

These alternations were first noted by Alonso (1945) and have been treated in a number of formal frameworks: generative phonology (Contreras 1977), cyclic phonology (Harris 1983), lexical phonology (Wong-Opasi 1987), distributed morphology (Harris 1999), and optimality theory (Baković 1998, 2001, Lloret & Mascaró 2007). The proposal is that the palatals are underlying, but are depalatalized when they fall into the coda. However, that the coda is the relevant context is not apparent from an inspection of the surface forms. In the case of /*des.de.ɲar/* ~ */des.den/* 'to disdain, disdain' the nasal palatal is apparently depalatalized in the coda, but the palatal would be expected in /*des.de.nes*/ 'disdains.' In order to account for this discrepancy a wide variety of formal mechanisms have been appealed to, many of which place the palatals in the coda at some stage of the derivation. While formal accounts of depalatalization may be adequate descriptions that relate a

number of lexical items, the questions of how pervasive depalatalization is in the Spanish lexicon, as well as how productive it is must be addressed.

Lloret and Mascaró (2007) compiled an extensive listing of word pairs that contain these alternations in order to determine their productivity. They point out that *atropellar* 'mob, run over'). Others, such as *útil ~ utillaje* 'useful, tool' have related lexical items that do not participate in the alternation (e.g., *utilidad* 'utility'). Still others, such as *catalán ~ Catalúña* 'Catalan, Catalonia' appear to have independent rather than shared bases. Once such cases are eliminated, the relevant data are reduced to three cases of /n/ ~ /ɲ/ (*desdén ~desdeñar* 'disdain, to disdain,' *don ~ doña* 'Mr. Mrs.,' *champán ~ champañería, champañera* 'champagne, champagne shop, champagne$_A$') and seven of /l/ ~ /ʎ/ (*él ~ ella* 'he, she,' *aquel ~ aquello*'that, that,' *doncel ~ doncella ~ doncellez* 'nobleman, maiden, maidenhood' *clavel ~ clavellina* 'nation, pink,' *piel ~ pellejo* 'skin, hide,' *Sabadell ~ sabadellense* Sabadell, from Sabadell,' *beldad ~ bello* 'beauty, beautiful').

Lloret and Mascaró recognize that the limited lexical presence of these alternations casts doubt on the productivity of a process of depalatalization. A study by Pensado (1997) also suggests a lack of productivity. Her subjects performed a number of experiments to test whether depalatalization is recognized and can be applied by native Spanish speakers. In the first experiment, subjects saw drawings of animal-like creatures and a machine that made them. The nonce animal names contained /l/ and /n/ in the coda (e.g., *enapil, sirapén*), while the corresponding verbs had /ʎ/ and /ɲ/ in the onsets

(*enapillar, sirapeñar*). For example, *Esto es un enapil* 'This is a *enapil*;' *Esto es una máquina de enapillar* 'This is a machine to *enapillar*.' The subjects' task was to form plurals of the nonce words by add *-es,* past participles of the words by adding *-ado*, and adjectives by adding *-oso.*

Past participles and adjectival formation resulted in some surprises. One group of test subjects saw the sentence containing the noun *enapil* before the sentence containing the verb *enapillar*. The other group was shown the verb before the noun. The order in which they were presented the sentences containing *sirapén* and *sirapeñar* varied as well. What is interesting is that the order of presentation influenced the outcome. For example, if the last nonce word seen by the subjects was *enapil*, subjects tended toward the adjective *enapiloso,* but when *enapillar* was the last nonce word seen, the trend was toward *enapilloso.* In other words, the choice was affected by order of presentation, and speakers had no qualms about putting either the palatals or the non-palatals in the syllable onset.

Since past participles are based on verbal stems, *enapillado* and *sirapeñado* would be the expected responses to the nonce words. In spite of this, many subjects chose *enapilado* and *sirapenado* completely disregarding the depalatalization allomorphy they were presented in the questionnaire. If depalatalization were a productive process, Pensado's subjects should have been able to apply it to the nonce words. However, the large degree of inconsistency in their answers, coupled with the fact that many answers were based on the phonological shape of the last nonce word presented to them suggest that the subjects were unaware of the depalatalization alternations and how to apply them.

While Pensado's data are interesting, it should be noted that there are a number of flaws in the exposition and methodology of her study (see Eddington 2004, Lloret & Mascaró 2007) which future research needs to take into account.

Another critic of depalatalization is Harris (1999). Although he supported a process of depalatalization in his earlier writings (Harris 1983), it proved problematic when incorporated into a distributed morphology model (Harris 1999). His reason for abandoning depalatalization is not based on historical reasoning or data suggesting it is not active. Instead, he finds that depalatalization results in exceptions to his rules which predict final /e/ epenthesis incorrectly derives *él* as /eʎe/ rather than /el/.

Only a handful of lexical items exemplify depalatalization. This, coupled with the experimental evidence that it is not applied to new lexical items, suggests that depalatalization is not a productive process. Nevertheless, Lloret and Mascaró (2007) argue that it must be an active process because it productively applies when words are adopted into Spanish. For example, Catalan *Co*/ʎ/ and *se*/ɲ/ become /kol/ and /sen/. They note that orthographic adaptation would render /ɲ/ as /ni/, but phonetic adaptation results in /n/. An innovative aspect of their treatment is that they expand the /ʎ/~ /l/ and /ɲ/~/n/ alternations to include /m/~/n/ (e.g., *Abrahán ~ abrahámico, íten ~ itemización*). In borrowings from other languages (e.g., *ron* < *rum*) word-final /m/ is normally realized as /n/ in Spanish. Rather than depalatalization, they speak of centralization of these phones to an alveolar place of articulation when they appear in the coda.

Lloret and Mascaró (2007) make a good case for productive depalatalization

word-finally in borrowed words. However, this fact does not in any way constitute evidence that depalatalization is a productive word-internal process as well. In a like manner, it has no bearing on whether words such as *bello* ~ *beldad* are derived from a common stem such as /beʎ-/ in the mental lexicon of Spanish speakers. This claim must be established independently. A similar error is made when one assumes that because the /l/ ~ /ʎ/ and /n/ ~ /ɲ/ alternations may be described by the same formal mechanism, the productivity of one is evidence for the productivity of the other. As already noted, Lloret and Mascaró (2007) include /m/ ~ /n/ alternations in their account and speak of centralization. If Spanish speakers are found to pronounce word-final /m/ as [n] with a high degree of frequency, this has no bearing whatsoever on whether Spanish speakers derive *don* and *doña* from the same underlying representation. The quest for elegance and simplicity in formal descriptions requires incorporation of as many similar alternations as possible into the description. However, actual processing suggests that speakers do not always account for such alternations in the most concise way (Bybee & Pardo 1981, Hale 1973).

Analyses that consider the /l/ ~ /ʎ/ and /n/ ~ /ɲ/ alternations to be the result of the same process of depalatalization must surmount another obstacle. In varieties of Spanish that contain /ʎ/, a stronger case for a unitary process is possible since both alternations entail only a change in place of articulation. However, most Spanish varieties lack /ʎ/ (Lipski 2004), and in its place have a non-lateral palatal which means that /l/ alternates

with /j/, /ʃ/, or /ʒ/. These phones not only differ from /l/ in place of articulation, but in manner (lateral versus approximant or fricative), and in the case of /ʃ/, in terms of voicing as well. Therefore, in most varieties of Spanish, the notion of a unitary process that only affects place of articulation, and accounts for both *don ~ doña,* and *él ~ ella* is untenable.

Given the small number of lexical items that participate in depalatalization, it has attracted a disproportionate amount of attention. While the process appears to be productive word-finally, mostly in Catalan borrowings, experimental evidence suggests that speakers are not able to extend it to pairs of nonce words that exemplify it. Its productivity in this context is probably due to a phonotactic constraint against /m, ʎ, ɲ/ in codas rather than to a morphophonological alternation. Additionally, the lack of /ʎ/ in the majority of the Spanish-speaking world argues against a unitary process of /ʎ/ and /ɲ/ depalatalization. In my view, it should be placed alongside other non-systematic alternations such as those in *amigo ~ amistad, resucitar ~ resurrección,* and *herejía ~ herético*.

Conclusions

In the present chapter I have discussed a number of morphophonological alternations in Spanish emphasizing the role of surface-apparent traits in the alternations. I argue that the somewhat productive status of diphthongization appears to be due analogy to existing words. I also show that diminutive allomorphy is largely predictable based on the base's final phone, gender, and number of syllables. Little evidence exists to support coronal softening as an active process, while the productivity of velar softening appears to be orthographic in nature. Depalatalization, on the other hand, only occurs in borrowings where palatals would appear in word-final position, but this phonotactic constraint is not evidence for a unique underlying /ʎ/ for both *bello* and *beldad*, for instance.

See also 13 GENDER AND NUMBER.

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