Connection Between Lexical Processing and Phonological Regularity: A Comparison Between English and Turkish

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Abstract

Phonological theories rely on rules being able to apply regularly to all members of a particular domain. When there are exceptions to these regular patterns, accounting for inconsistencies poses a challenge for phonological theories. This is especially true when morphophonological factors alone cannot explain the observed variation. In addition to phonological or morphological factors, this paper argues that the way words are recognized in the process of lexical access can account for exceptional morphophonological patterns. In two corpus studies, one on English (a morphologically poor language) and one on Turkish (a morphologically rich language), results show a correlation between factors consistent with lexical decomposition and morphophonological exceptionality. For both languages, exceptional suffixes are more likely to be decomposed from stems than non-exceptional suffixes. This suggests that there is a connection between the way complex words are processed in the lexicon and the way they are treated by the phonological grammar.

Keywords: phonology; morphology; suffix; frequency; lexicon; decomposition; lexical access

Introduction

Phonological rules make changes to the pronunciation of phonological units across a language. However, when they apply across morphological boundaries, such as the boundary between a stem and a suffix, this can lead to varied outcomes. An example can be seen in Table 1, which shows the process of stress shift in English. English typically places prominence (i.e. primary stress) on the syllable as far to the right in the word as possible without falling on the final syllable. When syllables are added to the end of a word in the form of suffixes, the stress shifts further rightward, obeying the stress rule. This process proceeds normally for cases like (1a) *rígid* and *rigídity* – the stress shifts further rightward as expected in the suffixed form. However, there are some suffixes which fail to trigger stress shift, like (2a) *rígid* and *rígidness* (not **rigídness*). In this case, the stress remains the same, even though the stress shift pattern predicts it should move rightward once the suffix *-ness* has been added.

A failure for a rule to apply across a morphological boundary results in the affix appearing as if it is phonologically separate from the stem, even though they are part of the same complex word domain. This variation leads to a central question in the phonology-morphology interface: how can we predict whether or not a rule will successfully apply across a stem-affix boundary (Chomsky & Halle, 1968; Kiparsky, 1982)? This question may seem specific, but it actually feeds into a larger question about how to model sources of variation in complex systems like human language. Understanding the source of this morphophonological variation can shed light on the types of factors that lead to variation in human language,

Table 1: Examples of cohering and non-cohering suffixes from Kaisse (2005).

(1) Cohering:	(stress shifts)	
a. rígid	→	rigíd-ity
b. móment	→	momént-ous
(2) Non-cohering:	(no stress shift)	
c. rígid	→	rígid-ness
d. mánifest	→	mánifest-er

as well as the strategies that speakers use to learn this complex variation.

Previous work on morphophonological variation proposes that there are different types of affixes – some undergo particular phonological rules, and some do not (Chomsky & Halle, 1968; Kiparsky, 1982). Other accounts assert that instead of differences between the rules affixes are subject to, there are differences in the strength of phonological boundaries between morphemes, with stronger boundaries preventing rules from applying across them (Poser, 1990; Hsu, 2015). Either of these accounts can successfully model the phonological variation of these affixes, but they do not address crucial questions about why this varied exceptionality exists in the first place. Can we predict when phonological rules will apply across a morpheme boundary? And what kinds of factors are associated with exceptional and non-exceptional affixes?

This study seeks to answer these questions by conducting a corpus study on patterns of morphophonological variation in two languages: stress shift in English and vowel harmony in Turkish. Results for both languages show support for the hypothesis, that lexical decomposition and phonological variation are correlated. Results also reveal that a promising factor in explaining whether a rule will apply across a morphological boundary is the way that word is represented in lexical access. This suggests a close relationship between the way complex words are treated by the phonology, and the processing behavior of words in the lexicon.

Morphological Decomposition

Studies on morphological processing have proposed that characteristics of individual affixes can be explained by the way words are stored in the lexicon (i.e. whether they are decomposed. Hay, 2001; Hay & Baayen, 2002, 2003; Dabouis, 2019). When words are decomposed in the lexicon, it means that they are broken down into their composite parts in order to be recognized. For example, the complex word *complexity*

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can be decomposed into its stem, *complex*, and its suffix, *-ity*.

Lexical decomposition has been assumed to be a foundational part of recognizing complex words (Taft & Forster, 1975). However, decomposition does not apply to every complex word without fail (Caramazza, Laudanna, & Romani, 1988; Frauenfelder & Schreuder, 1992). Similar to the application of phonological rules, there is variation in whether decomposition is expected to take place for a given complex word. A key factor in understanding whether a complex word will be decomposed is relative frequency (Hay, 2001). That is, a comparison between the frequency of the base of affixation (often the stem) and the derived affixed form. (e.g. *complexity* → f(complex) / f(complex-ity)). Hay (2001) argues that complex words which contain a base with a higher frequency than its derived form can be recognized more quickly if it is decomposed into its composite parts. This is due to the widely held assumption that more frequent words have higher resting activation, which allows them to be recognized more quickly (Norris, McQueen, & Cutler, 2000; McClelland & Elman, 1986). If a derived word has a higher frequency than its base form, decomposition will not aid in recognition, so it is accessed as a whole word without being decomposed. Hay (2001) demonstrates this by comparing two complex words: *insane* and *infirm*. A word like *insane* has a derived form which is more frequent than its base *sane*. This would mean that the derived form has more resting activation than the base form, so it would be recognized faster via whole word recognition. Conversely, a word like *infirm* has a derived form which is less frequent than its base *firm*. In this case, decomposing the derived form into its base and affix would help recognize the word faster, since the base *firm* has more resting activation than the derived form *infirm*.

Using relative frequency as an indicator of decomposition, Hay and Baayen (2002) are able to predict the morphological productivity of an affix in English, finding that the most productive affixes are also predicted to be more likely to decomposed from their bases (i.e. be attached to bases which are more frequent than their derived forms). Hay and Baayen (2003) also show that phonotactic probability corresponds with differences in predicted decomposition, posing a connection between decomposition and the phonological grammar. They investigated the phonotactic probability of segments at the junctures where affixes attach to stems in English (e.g. how probable the ‘dn’ sequence from *rigidness* is across English). They find that affixes which create phonotactic junctures which are less likely to appear word-internally are more likely to be decomposed. Conversely, affixes which create phonotactic junctures that are more likely to surface word-internally are less likely to decompose. Hay and Baayen (2003) conclude that the low-probability phonotactic junctures created a perceptual boundary between the stem and affix, making them more likely to be perceived as separate from one another. This separation is then reflected in their lexical representation, leading to a higher likelihood of being decomposed in the lexicon. This result shows that phonological factors, like phonotactic probability, pattern with decomposition in a way that suggests a connection between the processing of complex words, and their phonological behavior.

This makes decomposition a compelling factor to test in order to understand the morphophonological variation demonstrated in Table 1. Since Hay and Baayen (2003) showed that low probability phonotactic junctures create a perceptual boundary, it is also possible that gaps in phonological rule application, like those of the non-cohering suffixes in (2a-b), could create perceptual boundaries which show distinct processing effects as well.

This poses the hypothesis that phonological exceptionality and morphological decomposition are linked. This would mean that affixes which pattern separately from the stem are predicted to be more likely to decompose, which should be indicated by higher base frequency compared to derived frequency. Affixes which pattern with the stem should then be less likely to decompose during the process of lexical access, showing higher derived frequency than base frequency.

Alongside the token relative frequency measure, several other measures were used to predict how likely a complex word is to be decomposed in the lexicon. These include token word frequency, parsing ratio, and decomposition score. Word frequency is simply the token frequency of the derived complex word. This indicator predicts that words which are more frequent are less likely to be decomposed, while those that are less frequent are more likely to decompose (Caramazza et al., 1988; Baayen, 1993). Parsing ratio is evaluated per affix, and is the summed frequency of words where the base is more frequent than the derived form divided by the total number of words which use that affix (Hay, 2001; Hay & Baayen, 2002, 2003). The higher the parsing ratio, the more likely an affix is to be decomposed from any given stem. Finally, decomposition score, originally used by Daland (2009), is the frequency of the affix multiplied by the frequency of the base (both normalized by the total number of words in the corpus), divided by the frequency of the derived form (also normalized). Like parsing ratio, a higher decomposition score would indicate a higher likelihood of a word being decomposed. Though the literature suggests that relative frequency has the best empirical support for being an accurate reflection of decomposition likelihood, the other measures have been used successfully by previous studies to measure decomposition as well. In order to get a clear picture of decomposition in both English and Turkish, multiple measures were used to evaluate the corpus data.

Additionally, many studies on word recognition use English as crucial data for theorizing, but it may be the case that word recognition does not proceed in Turkish in the same way that it does for English. For example, Gürel (1999) makes a case for affix frequency, the number of times that an affix appears in any word in the language, being a better indicator of decomposition for Turkish. In a lexical decision task, Gürel (1999) finds that words with the longest processing times are those with low-frequency affixes, and those with the shortest processing times are those with high-frequency affixes. This may be an indication that decomposition in Turkish is actually better predicted using affix frequency, not relative frequency. Because of the evidence provided in Gürel (1999), affix frequency was also evaluated as an indicator of decomposition for Turkish.

Why English and Turkish?

English and Turkish are very different in terms of their morphological structure. On the one hand, Turkish is quite morphologically rich, allowing for multiple suffixes to stack onto one another. English, on the other hand, is relatively sparse morphologically. Compared to English, the average word in Turkish has many more suffixes than the average English word. However, both languages still contain varied morphophonological patterns which are not easily accounted for by phonological factors alone. In both English stress shift and Turkish vowel harmony, phonological processes apply inconsistently across stem-affix boundaries. This means we are able to compare the same morphophonological phenomenon in two languages with quite different morphological structure. If we find evidence for a link between decomposition and phonological exceptionality in both English and Turkish, this would strengthen the claim that these two factors are linked, showing that decomposition and exceptionality are correlated in various different types of morphological structures, not just in English.

Corpus Study 1: English Stress Shift

To test the hypothesis, two corpus studies examining morphophonological variation in two languages were conducted. The first is on English stress shift, which utilized the morphologically annotated MorphoLex-En corpus (Sánchez-Gutiérrez, Mailhot, & Deacon, 2018). Since assumptions about decomposition norms become more complex when the structure of a word contains more morphemes (Booij, 2010), both the English and Turkish studies are limited to using words with one stem and one suffix only. Additionally, since the storage of derivational affixes in the lexicon is more widely supported than storage of inflectional affixes (Stump, 2017), both studies involve only derivational suffixes. Word frequency information was obtained from the Hyperspace Analogue Language (HAL) corpus (Lund & Burgess, 1996), which contains roughly 130 million word tokens gathered from an online news platform called Usenet (obtained via the South Carolina Psycholinguistic metabase (Gao, Shinkareva, & Desai, 2022)). Additionally, only words which contain stems that are genuine stand-alone words without suffixation were used in order to avoid cases of pseudo-affixation. After subsetting to only the suffixes of interest for the English stress shift pattern, 5,051 data points were available for the English corpus study.

Table 2: Full list of cohering and non-cohering suffixes used in corpus study 1 (Kaisse, 2005).

Cohering suffixes:
-age, -al, -an, -ant, -ance, -ary, -ate, -ic, -ion, -ify, -ity, -ory, -ous

Non-cohering suffixes:
-able, -er (agentive), -en, -ful, -hood, -ish, -ism, -ist, -ize, -less, -like, -ment, -ness, -ly, -wise

Data

The pattern used to test the hypothesis for English is the process of stress shift, briefly discussed before in Table 1. To reiterate, primary stress in English is preferred on the rightmost syllable which is not the final syllable. When syllables are added to the end of a word via suffixation, the rightmost eligible syllable for stress shifts further to the end of the word (as in rígid → rigíd-ity). This process is quite productive for many suffixes (referred to as 'cohering suffixes'), but there are some suffixes that fail to trigger stress shift (referred to as 'non-cohering suffixes'). When non-cohering suffixes attach to words, the stress does not shift in the stem, making the suffixes appear as if they are outside the phonological domain of the base (e.g. rígid → rígid-ness). This pattern presents the perfect test case for the hypothesis, that there is a relationship between decomposability and the regularity of phonological alternations, since it involves a good number of suffixes which interact with stem phonologically, and also a good number of those that do not interact with the stem, allowing for a thorough comparison of the properties of both affix types. The full list of cohering and non-cohering suffixes investigated in this study are listed in Table 2.

Predictions

The hypothesis predicts that suffixes which pattern with the stem should be less likely to decompose from it, while suffixes which do not pattern with the stem should be more likely to decompose. For the English stress shift pattern, this means that cohering suffixes are predicted to be less decomposable than non-cohering suffixes. Since cohering suffixes shift stress, patterning with the stem, there is not a clear perceptual boundary between the stem and suffix. Therefore, they are predicted to be parsed as whole words, without decomposition. Non-cohering suffixes, which do not shift stress, do pose a perceptual boundary between themselves and the stem, which is predicted to make decomposition more likely. In terms of the relative frequency measurement for decomposability, this means that non-cohering suffixes should attach to words with higher base frequencies and have relatively lower derived frequencies. On the other hand, cohering suffixes should attach to lower frequency bases, and have relative higher derived frequency forms.

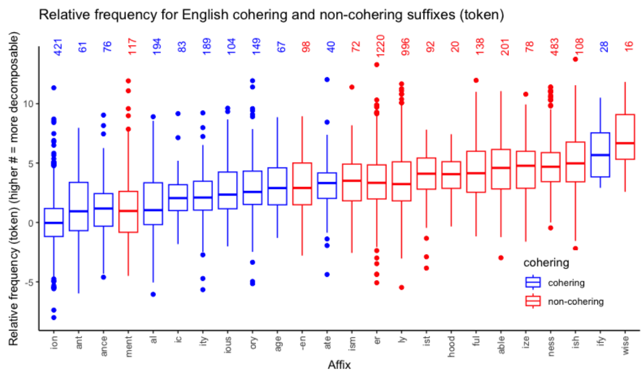

Figure 1: Plot of decomposition likelihood (indicated by relative frequency) for cohering and non-cohering suffixes in the English stress shift pattern. The values at the top of the plot indicate the number of data points in the corpus that each box-plot is based on.

Results

English results pattern in the direction of the hypothesis, showing that non-cohering suffixes are more likely to decompose from stems than cohering suffixes. This is predicted by relative frequency, which finds that suffixes which have more frequent bases (compared to their derived forms) are more likely to be non-cohering in the stress shift pattern. The plot in Figure 1 shows the aggregated relative frequency for each affix. Box-plots which fall higher up on the plot represent affixes which are more likely to be decomposed in word recognition. In line with predictions, the non-cohering suffixes (red) are more concentrated in the upper portion of the plot, indicating that they tend to be more decomposable than cohering suffixes (blue). There are a couple suffixes which go against the trend (*-ment* and *-ify*), but a majority of the data falls in line with the prediction that non-cohering affixes are more decomposable than cohering ones.

A generalized linear model was also used to test to what extent suffix coherence can be predicted by decomposition. Relative frequency, absolute frequency, and decomposition score were all log transformed to meet assumptions for the linear model. Cohering suffixes are coded as 0 and non-cohering suffixes are coded as 1. The model finds that non-cohering suffixes are significantly more decomposable than cohering suffixes according to relative frequency ($\hat{\beta}$ = 1.67, p = 0.006), as well as absolute frequency ($\hat{\beta}$ = -5.14, $p < 0.001$) and parsing ratio ($\hat{\beta}$ = 34.01, p = 0.008), but no significant effect was reported for decomposition score. There are also several interactions between decomposability indicators, (which is expected since they are all measurements of decomposability), but due to space constraints, they are not reported here.

Overall, the model finds support for the hypothesis that decomposition and morphophonological exceptionality are connected, with exceptional (non-cohering) suffixes predicted to be more decomposable than regular (cohering) suffixes.

Table 3: Generalized linear model for the interaction between token decomposition measures and coherence for English suffixes. Variables in the model are token relative frequency (rel freq), token word frequency (word freq), parsing ratio (PR), and decomposition score (DS).

Fixed effects	Estimate	SE	z-value	*p*
(intercept)	-2.28	9.31	-0.25	0.81
rel freq	1.67	0.60	2.77	0.006
word freq	-5.14	0.26	-3.58	< 0.001
PR	35.01	13.11	2.67	0.008
DS	0.23	0.40	0.56	0.58

Corpus Study 2: Turkish Vowel Harmony

Experiment two investigates a similar type of pattern with exceptional suffixes in Turkish, this time with a vowel harmony pattern. The TS corpus (Sezer, 2017) was used, which is a corpus of over 760 million word tokens sourced from Turkish Wikipedia pages. Frequency information is included in the corpus, but words are not morphologically annotated. In order to subset the corpus to the relevant bimorphemic suffixed words (to make a proper comparison to English), the TS corpus lemma frequency list was search based on words ending in the suffixes relevant to the vowel harmony comparison. However, doing this search alone has a good chance of including words which end in a string of letters that look like a suffix of interest, but are not genuine instances of that suffix. To prevent this, potential stems of all the suffixed words returned by the initial subsetting procedure were separated from their suffixes and compared to a Turkish dictionary (Bouzout, 2015). If the potential stem matched a word of the dictionary, it was assumed to be a genuine stem and its suffixed form was included in the study. If the potential stem did not match a word in the dictionary, it was assumed not to be a genuine base for the suffixes of interest and was excluded. This procedure returned 8,833 data points for the Turkish corpus study.

Data

In Turkish, a vowel harmony process is active inside of complex word domains. The process proceeds from left to right, and requires that non-initial vowels assimilate to the initial vowel in their backness feature, as shown in (3a) and (3b) in Table 4. In addition to backness harmony, if a vowel is high, it should also agree with the roundenss feature of the preceding vowel, demonstrated by (3c) and (3d) in Table 4 (Polgárdi, 1999; Arik, 2015). Vowel harmony is a productive process, even across morpheme boundaries, however, there are suffixes which fail to harmonize. These disharmonic suffixes maintain the same vowels no matter which stems they attach to, making them exceptions in the vowel harmony pattern (shown in (4a-b). This pattern is another good test case for investigating the hypothesis (that disruptions in phonological regularity are connected to decomposition), since it has several suffixes which follow the expected phonological

Table 4: Examples of harmonic and disharmonic suffixes in Turkish (Polgárdi, 1999; Levi, 2001; Arik, 2015).

(3) Harmonic:			
a. dɑl + lɑr	→	[dɑl-lɑr]	'branch-PL'
b. gøl + lɑr	→	[gøl-ler]	'lake-PL'
c. ip + in	→	[ip-in]	'rope-1SG'
d. son + in	→	[son-un]	'end-1SG'
(4) Disharmonic:			
a. dost + ɑne	→	[dost-ɑne]	'friend-ly'
b. mest + ɑne	→	[mest-ɑne]	'drunken-ly'

Table 5: Full list of harmonic (collected by the author and verified with a native Turkish speaker) and disharmonic suffixes (from Arik, 2015).

Harmonic suffixes:
-me/mɑ, -lik/lık/luk/lük, -ce, -dɑs/des, -ek, -ey, -gi/gı/gu/gü, -i, -im -tɑs/tes, -tay, -mez, -msi, -eli, -esiye, -le, -in, -dir, -is

Disharmonic suffixes:
-kɑr, -iye, -iyet, -bɑz, -vɑri, -ɑne, -dɑr, -engiz, -imtrɑk, -istɑn, -gil, -gen

pattern, and several that do not. The harmonic (comparable to cohering) and disharmonic (comparable to non-cohering) suffixes examined in this study are listed in Table 5.

Predictions

The hypothesis predicts that harmonic suffixes are less likely to decompose from stems compared to disharmonic suffixes. Similar to English cohering suffixes, Turkish harmonic suffixes do not pose a perceptual boundary between themselves and the stem. Disharmonic suffixes do pattern as if they are phonologically separate from the stem, which may pose a perceptual boundary, predicting a higher likelihood of being decomposed in lexical access.

In terms of predictors of decomposition, affix frequency is expected to an effective indicator for Turkish. Lower frequency affixes are predicted to be more likely to decomposed than higher frequency ones (Gürel, 1999), so the present study predicts that disharmonic suffixes should have lower frequency than harmonic ones, indicating that disharmonic suffixes are more decomposable. For relative frequency, higher relative frequency values are expected for disharmonic suffixes rather than harmonic ones. This would indicate that the bases are more frequent than the derived forms in disharmonic suffixed words. Decomposition score and parsing ratio values are predicted to be higher for disharmonic words for the same reason. Word frequency is predicted to be lower for harmonic words, as lower frequency is indicative of a higher likelihood of decomposition.

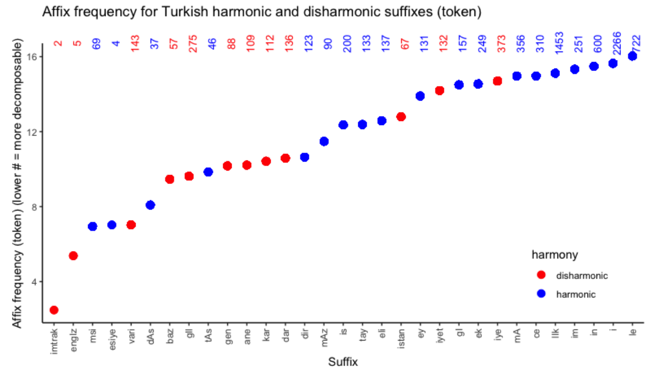

Figure 2: Plot of decomposition likelihood (indicated by affix frequency) for harmonic and disharmonic suffixes in the Turkish vowel harmony pattern. The values at the top of the plot indicate the number of data points in the corpus that each box-plot is based on.

Results

Initial results for Turkish show that, contrary to the robust results reported for English, relative frequency does not reveal any trends in the data. However, given that previous work on decomposition in Turkish finds that affix frequency is a better indicator of decomposition, it is worth focusing on this measurement for Turkish. When affix frequency is used as an indicator of decomposition, a clear trend does emerge in the data patterning in the direction of the hypothesis. In the plot in Figure 2, we see that disharmonic affixes (red) are trending toward the bottom half of the plot, indicating that they are less frequent compared to harmonic suffixes (blue), which are more concentrated toward the top of the plot. Given that less frequent affixes are more decomposable than frequent ones, this is taken as some support for the hypothesis, that disharmonic suffixes are more likely to decompose from stems than harmonic suffixes. Although it is worth pointing out that there are many more outliers here than in the English data. This might indicate that there is another factor which is needed to fully account for the exceptionality found in Turkish vowel harmony.

Once again, a generalized linear model was used to test to whether affix harmony could be predicted by decomposition. Relative frequency, affix frequency, absolute frequency, and decomposition score were all log transformed to fit the assumptions of the model, but decomposition score had to be removed due to co-linearity issues. Disharmonic suffixes are coded as 0, while harmonic suffixes are coded as 1. Results of the model report that disharmonic suffixes are more decomposable than harmonic suffixes according to affix frequency with marginal significance (($\hat{\beta}$ = 0.19, p = 0.06). Parsing ratio also predicts that disharmonic suffixes are significantly more decomposable than harmonic ones ($\hat{\beta}$ = -15.26, $p < 0.001$). Like the English model, interaction effects are not reported here due to space constraints.

Given that affix frequency is theoretically supported as an

Table 6: Generalized linear model for the interaction between token decomposition measures and harmony for Turkish suffixes. Variables in the model are affix frequency (AF), parsing ratio (PR), token relative frequency (RF), and token word frequency (WF).

Fixed effects	Estimate	SE	z-value	*p*
(Intercept)	-1.76	1.47	-1.20	0.23
aff freq	0.19	0.10	1.88	0.06
rel freq	-0.17	0.198	-0.83	0.41
word freq	-0.29	0.29	-1.02	0.31
PR	-15.26	2.76	-5.53	< 0.001

indicator of decomposition for Turkish, the affix frequency result, along with the parsing ratio result, is taken as support for the hypothesis, that decomposition is correlated with morphophonological exceptionality.

Discussion

Two corpus studies were conducted which tested whether decomposition is correlated with morphophonological exceptionality. The hypothesis stated that there is a link between morphophonological exceptionality and increased likelihood of decomposition in the lexicon. For the Turkish study in particular, this result is also in-line with recent work on word processing effects related to Turkish vowel harmony. Kilic (2015) finds that harmonic words in Turkish are recognized more quickly than disharmonic words. The finding from Kilic (2015), as well as the results of the present study, are also consistent with Gürel's (1999) finding showing that shorter processing times are associated with words which are predicted to be less likely to undergo decomposition.

Overall, this study finds evidence for a connection between decomposability and morphophonological exceptionality in English and Turkish. However, there is a difference in the types of factors which indicate decomposition likelihood between English and Turkish. Relative frequency, which is theoretically well-supported as a decomposition indicator for English, did not reveal and clear trends in the data for Turkish. Instead, affix frequency and parsing ratio were the most robust predictors. Affix frequency makes sense, as it has previously been discussed as a predictor of decomposition in Turkish (Gürel, 1999). The parsing ratio result is more puzzling, as it is basically a relative frequency measure with a threshold for decomposition, so it is strange that it was a strong predictor, while relative frequency was not.

One important question that falls out from this study is why the indicators of decomposition are so different between Turkish and English. For instance, why might affix frequency help better track exceptional behavior for Turkish speakers? The answer may lie in the morphological structure of each language. English has relatively sparse morphology, while Turkish has very rich agglutinative morphology. Essentially, Turkish has much more affixation than English does, which Oğuz and Kırkıcı (2023) hypothesize might lead to differences in lexical processing behaviors between languages. They highlight that English-speaking infants show some signs of discriminating suffixes from stems at around 15 months old (Mintz, 2013). However, in agglutinative languages like Hungarian, Ladányi, Kovács, and Gervain (2020) find that by the same age, children are able to reliably decompose suffixes and stems (when affixes are frequent), showing more advanced perceptual decomposition behavior. Ladányi et al. (2020) attribute this difference to the greater number of suffixes in agglutinative languages, which means speakers of these languages need to store more affixes, and also compose and decompose them more frequently.

This suggests that the baseline productivity for affixes between English and Turkish may be different, with baseline productivity in Turkish being higher. Higher affix productivity in Turkish might mean that tracking base vs derived frequency may not be sufficient for keeping track of the sheer amount of affixed forms in everyday speech, and tracking the frequency of individual affixes may be a more useful metric. English on the other hand, does not have as much affixation, so tracking the difference between frequencies of a bare form vs an affixed form can be more informative than doing so in Turkish.

To summarize, this study finds a correlation between morphological decomposition, and phonologically exceptional suffixes in both English stress shift and Turkish vowel harmony patterns. In both languages, exceptional suffixes are more decomposable than suffixes which follow the regular phonological patterns of the stem. These results suggest that there is a connection between the way that complex words are processed in the lexicon (i.e. whether they are decomposed into their composite morphemes), and how they interact with phonological rules. Specifically, suffixes that are more prone to decomposition are also more likely to behave phonologically separate from the stem, appearing to be exceptions. Suffixes that are more prone to whole-word processing are in turn more likely to pattern with the stem phonologically.

One open question left by this set of results is related to the exact variables that indicate whether decomposition is likely. For English, relative frequency predicts decomposition likelihood, but in Turkish, a combination of affix frequency and parsing ratio is the more effective measure of decomposition likelihood. Reasons for this difference are likely due to differences in morphological structure and affix productivity, but more concrete investigation into these possible explanations is left to future work.

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