Feature domains and lexically conditioned harmony in Turkish

Jennifer Bellik

UC Santa Cruz

1. Introduction

Walker (2012) describes vowel harmony as follows: “In vowel harmony, the vowels in a domain, such as the word, systematically agree, or ‘harmonize’, in some phonological property.” Intuition suggests that this domain-level harmony be represented with a domain-level specification of the shared phonological property. This intuition is formalized in feature-spreading representations of vowel harmony, such as auto-segmentalism (e.g., Clements and Sezer 1982), as well as analyses situated in Optimality Theory (Prince and Smolensky 1993) that employ constraints such as ALIGN (Kirchner 1993, among others) or SPREAD (Kimper 2011).

Domain-level feature representations are formalized even more directly in Optimal Domains Theory (Cole and Kisseberth 1994), Span Theory (McCarthy 2004, O'Keefe 2007), and Smolensky’s (2006) headed feature domains. In these theories, Gen constructs feature domains which incorporate multiple segments. A feature domain takes its value from its head (some segment in the domain); all the segments in a domain must realize the domain's feature value.

Though feature-spreading and feature-domains both use featural structures that transcend the segment, these larger structures still depend on an individual segment: the head of the domain, or the anchor for the spreading feature. This segment-dependence predicts that the value of harmony can always be traced to the value of a particular segment or segments. This paper examines a class of Turkish words which violate this prediction. The words of interest require front suffixes, and yet they contain no segment that can be a plausible trigger for front harmony. Some examples appear in (1).

(1) Turkish front harmony without a front trigger segment

<table>
<thead>
<tr>
<th>Nom.</th>
<th>Dative</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. dikkat</td>
<td>dikkat-e, *dikkat-a</td>
<td>'attention'</td>
</tr>
<tr>
<td>b. harf</td>
<td>harf-e, *harf-a</td>
<td>'letter'</td>
</tr>
<tr>
<td>c. rab</td>
<td>rabb-e, *rabb-a</td>
<td>'God'</td>
</tr>
</tbody>
</table>
Unlike the rest of the Turkish harmony system, the class of words exemplified in (1) has received little attention. Previously unnoticed is the fact that the vowel failing to trigger harmony is always /a/. There is no word like *hurf-ler to correspond to harf-ler. The specialness of /a/ for this group of words is surprising given that /a/ is a normal participant in harmony for the vast majority of the Turkish lexicon. That is, /a/ only behaves as transparent in a small group of roots. I refer to this behavior as **lexically conditioned transparency**.

This paper proposes an analysis of lexically conditioned transparency using **FEATURE DOMAIN THEORY** (FDT). FDT extends Smolensky’s (2006) headed feature domains, but innovates by positing feature domains that are specified in the *input* to phonology and are *independent* of individual segments. This extension connects FDT to gesturally-grounded models of phonology like Articulatory Phonology (Browman and Goldstein 1993), and enables FDT to provide a unified account of harmonic, disharmonic, and exceptional roots in Turkish. The paper is organized as follows: § 2 describes the regular pattern of Turkish backness harmony, then presents the problem and the previous autosegmental account; § 3 presents an analysis of lexically conditioned harmony using Feature Domain Theory; § 4 provides an account of the specialness of /a/ in Turkish lexically conditioned transparency; and § 5 concludes.

2. Harmony and disharmony in Turkish

All eight vowels in the Turkish vowel inventory participate in backness harmony, alternating with the vowel that they match in for [high] and [round]. Suffixes harmonize in backness with the nearest root vowel, whether the vowels in the root are front as in (2) a, back as in (2) b, or both as in (2) c.

(2) Normal backness harmony (plural suffix /lEr/ is realized as [ler] or [lar])\(^1\):

a. gündüz + lEr → gündüz-le
   ‘daytimes’

b. ayı + lEr → ayı-lar
   ‘bears’

c. kitap + lEr → kitap-lar
   ‘books’

The topic of this paper is a group of roots (3) in which a final /a/ fails to trigger back harmony—instead, these roots requires front suffixes, and also epenthetic front vowels where epenthesis is required (e.g. (3) j,k). The /a/ thus behaves as transparent, even though elsewhere in the lexicon /a/ triggers back harmony.

(3) Roots that fail to trigger harmony

<table>
<thead>
<tr>
<th>Nom.</th>
<th>Dative</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. infil</td>
<td>ak infil</td>
<td>ak-e, infil</td>
</tr>
<tr>
<td>b. hel</td>
<td>ak hel</td>
<td>ak-e, *hel</td>
</tr>
<tr>
<td>c. eml</td>
<td>ak eml</td>
<td>ak-e, *eml</td>
</tr>
<tr>
<td>d. istiml</td>
<td>ak istiml</td>
<td>ak-e, *istiml</td>
</tr>
</tbody>
</table>

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\(^1\) I employ Turkish orthography throughout this paper. Turkish orthographic symbols mostly coincide with IPA symbols, but there are a few differences: ö = /ø/, ü = /y/, ı = /ɯ/, ç = /dʒ/, ç = /ʃ/.
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e. dikkat dikkat-e, *dikkat-a 'attention'
f. menfaat menfaat-e *menfaat-a 'interest'
g. beraat beraat-e *beraat-a 'acquittal'
h. liya:kat liya:kat-e *liya:kat-a 'merit'
i. saat saat-e, *saat-a 'hour'
j. kabir kabr-e, *kabr-a 'tomb'
k. rahim rahm-e, *rahm-a 'womb'
l. harf harf-e, *harf-a 'letter'
m. rab rabb-e, *rabb-a 'God'

Several dozen words, mainly ending in /t/, /k/ or a cluster containing /r/, exhibit the same behavior as the examples above. In every case, the final vowel in the word is /a/.

The existence of these back roots that require front suffixes is noted in Lewis (1967) and Underhill (1976) as an exception to vowel harmony. Both note that all such words are borrowings from Arabic, and ascribe the requirement for front suffixes to the properties of the Arabic consonants involved. This is plausible as a diachronic explanation but does not explain the synchronic representation of the exceptional words, since modern Turkish does not exhibit a phonetic distinction between front and back consonants (except for /k g l/). Lewis (1967) implies that these words are exceptional because they are unassimilated—in modern terms, they belong to a distinct cophonology. However, no independent property picks out the words in which /a/ is transparent, making a cophonologies account unprincipled.

The previous analysis of these roots is due to C&S, who model harmony as the spreading of [+/- back] features from underlyingly specified (“opaque”) segments to underlyingly unspecified segments, according to an association convention (left-to-right, one to one, ...). Directly extending this representation to consonants, they say that any consonant can be underlyingly marked as [-back], and then trigger front harmony on suffixes. This analysis is problematic because it implies that any consonant in Turkish can occur in three varieties: [-back], [+back], or unspecified, even though for consonants other than /l k g/, these three variants always sound exactly the same. And for all consonants but /l/, all three varieties sound exactly the same at the end of a word, which is precisely the environment where the variety needs to make a difference. In addition, though disharmonically front suffixes can occur following a wide variety of consonants, they occur after only one vowel: /a/. Under the consonant-driven analysis, this remains a suspicious accident.

The fact that all the exceptional words have /a/ for their last vowel suggests an approach in which the /a/ itself has a [-back] that triggers front suffixes. But since /a/ in these words is not audibly more front than in other words, an /a/-based approach shares the problems of the consonant-based account, albeit with only one segment occurring in [+back] and [-back] variants that are phonetically indistinguishable.

This shortcoming is not specific to an autosegmental approach. As discussed in the introduction, current theories of vowel harmony always require a segment as a harmony trigger. But the exceptional cases discussed here lack an audibly front segment to trigger the required front harmony on suffixes. In some cases, a front segment appears earlier in the word, but the most local trigger is back (dikkat); in other cases, there is no front segment in the word at all (harf). Consequently, any account that tries to pin the frontness
of the suffixes to a particular segment in the word will lack phonetic grounding. To avoid this pitfall, a segment-independent model of harmony is necessary.

3. Proposal: Feature Domain Theory

Nothing in the surface phonology uniquely picks out the words that are exceptions to harmony in Turkish. Instead, a theory that accounts for the exceptional behavior of these roots must make reference to their underlying representations. However, these posited underlying representations should not make claims about segmental feature make-up that are not reflected in surface phonology.

An account of these exceptions to vowel harmony should capture the intuition that something about these particular words requires them to take front suffixes – not a characteristic of any of their segments in isolation. This intuition accords with the observation that harmony is a characteristic of the word: the requirement of harmony is that all the vowels in a word should agree in backness. Evidence from psycholinguistic (Harrison and Kaun 2001; Kabak et al 2010) and articulatory (Boyce 1990) studies converges with the evidence of epenthesis and the distribution of vowels in the Turkish lexicon (Kabak and Weber 2013) to support the idea that harmony in Turkish acts as a word-level phenomenon. The theoretical representation of harmony should capture this by marking harmony at the word level, while at the same time remaining flexible enough to represent disharmonic words.

Domain-based theories of harmony couched in Optimality Theory meet these criteria. An example is Smolensky (2006), who represents harmony using headed featural domains. The basic idea is that featural domains are constructed by Gen, producing representations like those in (4). A feature domain's value (e.g., [+back] or [-back]) is determined by its head, a segment in it (underlined in (4)). Segments in a domain are required to realize that domain's feature value. Harmony is largely driven by the markedness constraint \( ^\star \text{Head} \). Since each domain must have a head, every domain incurs a \( ^\star \text{Head} \) violation, and the number of domains per word is minimized in the optimal candidate.

(4) Turkish harmony with headed feature domains

a. harmonic root: violates \( ^\star \text{Head} \) minimally

\[
\text{aydın} +\text{ler} \rightarrow (\text{aydın-lar})
\]

b. disharmonic root: violates \( ^\star \text{Head} \) multiple times

\[
\text{kitap} +\text{ler} \rightarrow (\text{kitap})(\text{ler})
\]

c. embedded domain: violates \( ^\star \text{Embed} \)

\[
\text{dikkat} +\text{ler} \rightarrow (\text{dikkat})(\text{ler})
\]

For Smolensky (2006), transparency results when segments occur in embedded feature domains, as in (4) c. A segment in an embedded domain realizes the feature value of the innermost domain. Embedding is driven by markedness considerations, since embedding violates \( ^\star \text{Embed} \) but can enable a larger domain to satisfy ALIGN without any segments in it violating featural co-occurrence constraints. However, the constraint ranking which is needed to obtain the transparent structure predicts that /a/ will always be transparent and will not have a front counterpart. In reality, though, /a/ is normally opaque (like all Turkish vowels), and alternates systematically with /e/ in suffixes.
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The divergent behavior of *kitap* (which has the vowel sequence *i*-a and requires back suffixes) and *dikkat* (which has the same vowel sequence but requires front suffixes) indicates the need for either a different input structure or a different constraint ranking for these two types of words. A different constraint ranking is only available if *kitap* and *dikkat* belong to different co-phonologies, but this proposal seems suspect, as both words are loans from Arabic, there are no differences in stress assignment or clear segmental cues, etc. Therefore, a difference in input structure must account for the difference in output behavior.

In existing domain-based theories, however, feature domains are not present in the input. I therefore extend Smolensky's theory to use headless feature domains— independent of segments and present in the input to phonology. I term this approach Feature Domain Theory (FDT).

(5) Feature Domain Theory
For a feature F,

a. every value of F is represented in phonology as an F-domain, in both the input and the output.
b. F-harmony is the requirement that F-domains coincide with prosodic categories larger than the syllable—typically the word.
c. Segments inherit the F-value of the F-domain that contains them. When one domain is embedded in another, the deepest F-domain's F-value is realized in the output.

The central idea of FDT is that EVERY FEATURE IS A FEATURAL DOMAIN. Membership in an F-domain replaces segmental featural specification in a traditional theory of features. In a language without harmony, every feature is still a feature domain, but it happens to be a domain that coincides with a segment. So in a language like English, FDT's feature representation is largely isomorphic to traditional featural specifications. Meanwhile, in a language exhibiting harmony along some feature, the domains for that feature will regularly span entire words.

As will be shown in § 3.2, encoding feature domains in the input to phonology enables faithfulness to drive transparency in *harf-ler* and *dikkat-ler*, so that the full range of harmonic behavior in Turkish is accounted for with a single constraint ranking.

3.1 The regular pattern of Turkish backness harmony in FDT

For Turkish backness harmony, the relevant F-domains are backness domains. In a harmonic root, such as *ayı* 'bear', there is only one underlying backness domain. An alternating suffix like the plural marker *-lEr* has no backness domain of its own. But all segments must be fully specified in the output: Specify (6) is undominated. When the input contains underspecified material like *lEr*, then, either an existing feature domain can be expanded, or a new feature domain can be inserted. Expansion of an existing domain results in harmony and incurs a violation *Expand* (7); insertion of a new

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2 Thanks to Junko Ito for suggesting this name.
domain could produce disharmony, and violates DEP-FD. Since suffixes harmonize, DEP-FD must outrank *EXPAND.

Also, since harmony applies within roots, we need a constraint that penalizes the presence of multiple backness domains, *FEATURE DOMA(IN(BACK)) (9). Every surface form violates *FD, though, so *FD must also be dominated by SPECIFY, for the ranking in (10).

(6) SPECIFY: Every segment must be specified in the output of phonology.
(7) *EXPAND: Don’t expand a backness domain.
(8) DEP-FD(back): Assign a violation for every backness domain in the output that has no correspondent in the input.
(9) *F-DOMAIN(back) = *FD: Assign a violation for every backness domain.
(10) SPECIFY, DEP-FD >> *FD, *EXPAND

(11) Incorporating a suffix into the existing F-domain avoids violating DEP.

<table>
<thead>
<tr>
<th></th>
<th>SPECIFY</th>
<th>DEP(FD)</th>
<th>*EXPAND</th>
<th>*FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>/EyI_B +Iler/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phrase a.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ayı-lar_B</td>
<td>***</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>phrase b.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ayı_B (-lar)_B</td>
<td>*!</td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>phrase c.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ayı_B -Iler</td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

In a disharmonic root like kitap 'book', there are two contrasting backness domains in the input: (kI)_F (tEp)_B. Since disharmonic roots surface faithfully, faithfulness to underlying featural domains must outweigh the pressure to harmonize within roots – *FD must be dominated by MAX-FD: “Assign a violation for every FD in the input that has no correspondent in the output.” If *FD were to outrank MAX-FD, all words would be harmonic, because extra backness domains would be deleted.

When multiple domains are present, underspecified suffixes are incorporated into the later harmonic domain, since this minimizes violations of *EXPAND.

(12) Suffixes are incorporated into the nearest harmonic domain

<table>
<thead>
<tr>
<th></th>
<th>SPECIFY</th>
<th>DEP(FD)</th>
<th>MAX(FD)</th>
<th>*FD</th>
<th>*EXPAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ki ρ (taplar)_B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phrase a.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ki(taplar)_B</td>
<td>**</td>
<td>***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phrase b.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ki(tap)_B ler)_F</td>
<td>**</td>
<td>***</td>
<td>**<em><strong>!</strong></em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phrase c.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kitepler)_F</td>
<td>*!</td>
<td>**<em><strong>!</strong></em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2 Apparent harmony failure as lexically-conditioned transparency

On the surface, dikkat looks like it should have the same structure as kitap: a front domain containing the front vowel, followed by a back domain containing /a/. However, this structure predicts that dikkat will behave like kitap and take back suffixes. Rather, dikkat requires an input containing an embedded domain. Such an input structure will allow Faith to drive transparency.

The failure to phonetically realize a feature due to conflicting demands of multiple governing featural domains is anticipated and penalized by *Embed (13) (Smolensky 2006). *Embed is outranked by faithfulness constraints Max(FD), Dep(FD), and *Contract (14).

(13) *Embed: Assign a violation for every segment contained in multiple domains.
(14) *Contract: Don’t remove segments from a featural domain.

*Embed is violated by the /a/ in harf or dikkat, revealing that it must be ranked below the faithfulness constraints that preserve embedded featural domains.

(15) \textit{Faith(FD) >> *Embed}

<table>
<thead>
<tr>
<th></th>
<th>Specify</th>
<th>Dep(FD)</th>
<th>Max(FD)</th>
<th>Contract</th>
<th>Embed</th>
<th>Expand</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(dIk(kEt)B )F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. (dik(kat)B )F</td>
<td></td>
<td></td>
<td></td>
<td>***</td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. (dik)F (kat)B</td>
<td></td>
<td></td>
<td><em>!</em>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (dikket)F</td>
<td></td>
<td></td>
<td><em>!</em>*</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Suffixes must be incorporated into the nearest featural domain, not an embedded featural domain, both because of *Expand and because of *Embed. Pulling a suffix into an embedded domain, as in (16)b, results in twice the number of *Expand violations as pulling it into the outermost domain as in (16)a.

(16) *Expand prevents suffixes from being pulled into embedded domains.

<table>
<thead>
<tr>
<th></th>
<th>Specify</th>
<th>Faith(FD)</th>
<th>*Embed</th>
<th>*Expand</th>
<th>FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(dIk(kEt)B )F +E/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. (dik(kat)e)F</td>
<td></td>
<td>***</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>b. (dik(kata)B )F</td>
<td></td>
<td>****</td>
<td></td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>
Bellik

The losing candidate (dik(kata)B)F is harmonically bounded by the winning candidate, showing that embedding will always result in disharmony between the embedded vowel and any suffixes.

Introducing underlying embedded domains, then, allows the transparency of /a/ in certain Turkish words to fall out naturally from the previously defined constraint set. FDT can account for harf-ler and dikkat-ler where other domain-based theories could not, because in FDT, domains themselves are targets for faithfulness since they are present in the input, not just constructed by Gen.

This same constraint set and input representation also accounts for the apparently disharmonic epenthesis in words like kabir ~ kabr-e 'tomb (+dat)', but I do not present the tableaux here for reasons of space. It remains to be explained, however, is why only /a/ is able to be transparent in Turkish—the task of the next section.

4. Transparent /a/ and its cross-linguistic implications

Formally, the generalization that lexically-conditioned harmony always involves an embedded /a/ can be accounted for simply with the constraint *EMBED[-LOW] in (17).

\[(17) \quad *_{EMBED}[-LOW] \text{: Assign a violation for every segment specified [-low] that contained in two backness domains.}\]

\[(18) \quad *_{EMBED}[-LOW] >> *_{EMBED}\]

The ranking in (18) captures the fatal markedness of embedding a high or mid vowel in backness domains in Turkish. Since *EMBED[-low] is unviolated, we can conclude that it is undominated. This ranking yields the desired result that only the low vowel /a/ is able to occur in embedded backness domains, as illustrated in (19), because in Turkish, the only transparent vowel is /a/, and the only low vowel is also /a/.

(19) \textit{Tableau for hypothetical /(h(U)B rf)F/}

<table>
<thead>
<tr>
<th>/(h(U)B rf)/</th>
<th>*EMBED[-LOW]</th>
<th>MAX[round]</th>
<th>FAITH(BD)</th>
<th>*EMBED</th>
<th>*EXPAND</th>
<th>*FD</th>
<th>IDENT[Low]</th>
<th>MAX[round]</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
</tbody>
</table>

If *EMBED[-low] and MAX(round) outrank MAX(Backness Domain), an input embedded domain containing a high vowel will be deleted in the output, as shown in (19)b. This incurs a Max(FD) violation but produces a harmonic, entirely front word. On the other hand, if *EMBED[-low] does not dominate FAITH(Backness Domain) but does dominate IDENT constraints governing height and rounding, then the embedded vowel
would instead be changed to become a low vowel to avoid violating *EMBED[low]. This is shown by candidate (a). Thus, adding *EMBED[LOW] as an undominated constraint in the Turkish constraint system enables FDT to capture the generalization that only /a/ is allowed to be transparent in Turkish.

There are both perceptual and articulatory reasons for *EMBED(BACK)[LOW]. Although transparent vowels are non-participants in harmony phonologically and acoustically, they still participate articulatorily to some degree (Gafos and Dye 2011). A transparent vowel must still be recognizable acoustically even when its articulation has been distorted by the surrounding context, and so only perceptually stable vowels (Stevens 1989) may be transparent. Since /a/ is perceptually stable, it is a good candidate for transparency—a perceptual motivation for a constraint like *EMBED(BACK)[LOW]. In addition, since low vowels are less contrastive for backness than high vowels, it is less taxing articulatorily to produce i-a-i than i-u-i. Therefore a disharmonic i-a-i sequence will be perceptually and articulatorily more similar to a harmonic i-a-i sequence than a disharmonic i-u-i sequence will be to a harmonic i-u-i sequence. Lastly, /a/ occurs in a relatively sparse part of the Turkish vowel space, meaning it is less confusable with the other phonemes. /a/ would have to raise as well as front or round in order to be perceived as one of the other phonemes. (Even Turkish [æ] is higher than /a/ and is described by some as a low mid vowel.) In contrast, /i/ would be a poor candidate for transparency in Turkish since there are three vowels that it differs from only by one feature (/ı/ in backness, /ü/ in rounding, and /e/ in height).

The constraint *EMBED(BACK)[LOW] may seem surprising, given that cross-linguistically, /a/ is uncommon as a systematically transparent vowel in backness harmony, while /i/ and /e/ are very common (Kramer 2003). But systematic transparency is driven by markedness and corresponds to gaps in the vowel inventory (Kiparsky and Pajusalu 2003), while lexically-conditioned transparency is driven by faithfulness, so differences in their patterning are not so unexpected.

5. Conclusion

Motivated by a pattern of lexically conditioned transparency in some Turkish roots, this paper proposes Feature Domain Theory. FDT extends the theory of headed feature domains (Smolensky 2006). Headed feature domains are only targets for markedness constraints, not faithfulness, since they are entirely built by Gen. FDT innovates by proposing underlying, unheaded featural domains. Since FDT's feature domains are present in the input, they are targets for faithfulness as well as markedness. Thus, exceptional transparency as in harf-ler can be captured by using a marked structure (embedding) in the input. Normal harmonic processes remain in force. But since FAITH preserves embedding, the suffix does not harmonize with the linearly-adjacent but embedded /a/. Instead, it harmonizes with the outermost domain, which is [-back]. This is lexically-conditioned transparency. This structural analysis accounts for both regular harmony and apparent exceptions using the same constraint ranking and representational mechanisms.

Jennifer Bellik
jbellik@ucsc.edu
References


