Flat vs. Branching Morphological Structures: The Case of Suspended
Affixation
Author(s): Cemil Orhan Orgun
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# Flat vs. branching morphological structures: the case of suspended affixation

Cemil Orhan Orgun
U.C. Berkeley

**1.** INTRODUCTION. This paper presents an analysis of an unusual construction in Turkish called Suspended Affixation by Lewis (1967). The analysis has several theoretical implications. First, a principled account requires a contrast between branching and flat nodes in constituent structure. Second, the constituent structure motivated by Suspended Affixation differs from the one needed for the enforcement of a disyllabic minimal size condition. This suggests that morphological and phonological structures do not always match each other perfectly.

**2.** SUSPENDED AFFIXATION

**2.1** DATA. Suspended Affixation in Turkish has been described by Lewis (1967: 35) as a construction in which "one grammatical ending serves two or more parallel words."

An example is shown in (1a), where the two nouns *sihhat* 'health' and *a:fiyet* 'well being' are conjoined, and the locative suffix, which has scope over both of them, is found only once at the end of the conjoined phrase instead of on both conjuncts. Example (1b) is similar. Further examples can be found in Lewis (1967), Underhill (1976), and Inkelas and Orgun (1994).

(1)　a)　*sihhat ve a:fiyet-te*　　　b)　*halk-ɨn [aɟɨ ve sevinč-ler-i]*
　　　　health and well.being-LOC　　　people-GEN sorrow and joy-PL-POSS
　　　　'In health and well-being'　　　'the people's sorrows and joys'

Example (2) shows the null hypothesis for the structure of this construction. I assume that the constituent structure is as implied by the scope relations, with the locative suffix is attached to the whole conjoined NP. At this point, we make this assumption as a notational convenience to use in presenting examples of Suspended Affixation. We will later see that this assumption is justified. Note that I use constituent structure notation solely because of its visual appeal and that the proposal I make is consistent with realizational views of morphology (e.g. Anderson (1992)). The analogue of flat structures is realizational "constructions" referring to a combination of features rather than just one feature.

(2)　[　　[ *sihhat ve a:fiyet* ]　*te* ]

There are initially puzzling restrictions on the combinations of affixes that Suspended Affixation can target. As seen in (3a), it is possible to suspend ALL eligible affixes. Here, the plural suffix *-ler*, the possessive *-im*, and the accusative suffix *-i* are all suspended. Example (3b) shows that it is acceptable not to suspend any affixes at all. Here, all suffixes are realized on both conjuncts.

(3) a) All affixes suspended:    *[tebrik ve tešekkür]-ler-im-i*
   [congratulation & thank]-PL-1SGPOSS-ACC
   'my congratulations and thanks (acc)'

   b) No affixes suspended:   *tebrik-ler-im-i ve tešekkür-ler-im-i*

Example (4) shows the promised puzzling restrictions on Suspended Affixation. In (4a), we see that it is possible to suspend just the accusative suffix *-i* while realizing the plural and possessive suffixes on both conjuncts. Example (4b) shows that it is NOT possible to realize the plural suffix *-ler* on both conjuncts while suspending the possessive and accusative suffixes.

(4)     Suspension of some but not all affixes (new data; author's judgments; confirmed by three additional native speakers).
    a)     [*tebrik-ler-im ve tešekkür-ler-im*]-*i*
    b)    * [*tebrik-ler ve tešekkür-ler*]-*im-i*

Our task is to account for this inseparability of the plural and possessive suffixes in Suspended Affixation. That is, we need to find a formal account of the observation that the plural and possessive suffixes are either both realized on all conjuncts or both suspended.

**2.2** ANALYSIS. I offer an analysis of this seemingly strange restriction in terms of constituent structure. I claim that the plural and possessive suffixes form a flat (ternary branching) structure with the base they attach to, as shown in (5b), rather than a binary branching hierarchical structure as in (5a).

(5)         a)  *    N           b)
                                                 N
                    N
           *tebrik ler*   *im*        *tebrik ler im*

This ternary branching structure is supported by the three way ambiguity of third person plural possessive forms, shown in (6).
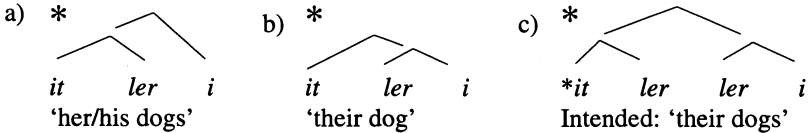
(6)        *it-ler-i*         a) 'her/his dogs'
        dog-PL-POSS     b) 'their dog'
                        c) 'their dogs'

The plural suffix can be interpreted to indicate that the head noun is plural, that the possessor is plural, or both. Since neither affix is required to have scope over the other, it is reasonable to conclude that the plural and possessive suffixes are not in an asymmetric c-command relationship, following the common assumption that c-command implies scope.

An alternative (but incorrect) approach would be to propose that there are two different hierarchical structures corresponding to the two different scope relations possible. The structure of 'her/his dog' would then be as shown in (7a).

Here, the possessive suffix has scope over the head+plural combination. The head is thus taken to be plural. In (7b), the proposed structure of 'their dog', the plural and possessive suffixes form a constituent. Thus, neither suffix c-commands the head noun. Rather, the node dominating the plural and possessive suffixes c-commands the head. Therefore, the possessor is interpreted to be plural. So far, there are no problems. However, this account would lead us to expect that 'their dogs' would have the structure in (7c), where both the possessor and the head are pluralized. Of course, this form is ungrammatical. Instead, we get the three-way ambiguity described in (6). This supports the flat structure that I am positing, which accounts for the observed "repeated morph constraint" effect in a straightforward and intuitive way.

(7)    Incorrect approach: "Scope follows from structure."



a) *  
it  ler  i  
'her/his dogs'

b) *  
it  ler  i  
'their dog'

c) *  
*it  ler  ler  i  
Intended: 'their dogs'

We have thus seen that the plural and possessive suffixes have to be sisters whenever they are both present (5b). Given that the plural and possessive suffixes form a ternary branching structure with the base they attach to, the pattern of suspension in (8) is ungrammatical because it forces the plural and possessive suffixes to be in a hierarchical structure. This example is similar to the one we have seen before in (4b), except that the accusative suffix is not involved here. This further supports the position that the source of the problem is the configuration of the plural and possessive suffixes. There are two possible structures for this form. The first is shown in (8a). Here, the possessive suffix is attached to the conjoined NP, as it has scope over both conjuncts. This configuration violates the condition that the plural and possessive suffixes must be sisters whenever they both have scope over the same head. Therefore, this structure is ruled out. This leaves us with the possibility in (8b), which is structurally well formed. However, this structure does not give us the desired scope relations. In particular, the possessive suffix has scope over the second conjunct but not the first conjunct. Therefore, we explain the fact that the plural and possessive suffixes have to be suspended together, or not suspended at all.

(8)    *[tebrik-ler ve teşekkür-ler]-im  
       [thank-PL & congratulation-PL ]-1SGPOSS
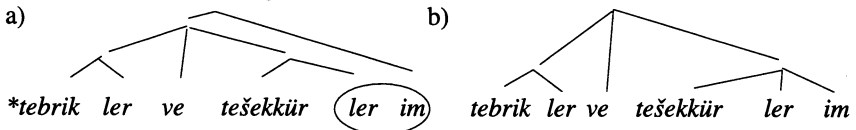


a)  
*tebrik  ler  ve  teşekkür  (ler  im)  
Problem: -ler and -im not sisters

b)  
tebrik  ler  ve  teşekkür  ler  im  
Problem: Incorrect scope (-im)

In general, then, suffixes can be separated in Suspended Affixation only if they form a hierarchical structure. If they form a flat structure, they have to be suspended as a group, or not at all.

**3.** MINIMAL SIZE CONDITION. We have seen that the proposed contrast between flat and branching structures accounts for Suspended Affixation in a simple manner. Now, I will show that this contrast finds further justification in the differential enforcement of a disyllabic minimal size condition. As noticed by Itô and Hankamer (1989), and later studied by Orgun and Inkelas (1992), certain derived forms in Turkish have to contain at least two syllables (9).

Example (9a) shows monomorphemic forms that consist of a single syllable. These forms are acceptable. Example (9b) shows the same forms with consonantal suffixes. Here, we see that the forms are ungrammatical if they contain only one syllable. The last two forms in (9b) confirm this observation: These forms are grammatical because they contain two syllables.

(9)     Disyllabic minimal size condition

| a) Monomorphemic forms | | b) Affixed forms ($\sigma\sigma$ minimum) | |
|---|---|---|---|
| *ye* | 'eat!' | *\*ye-n* | 'eat-PASS!' |
| *do:* | 'musical note do' | *\*do:-m* | 'do-1SGPOSS' |
| *yut* | 'swallow!' | *yut-ul* | 'swallow-PASS' |
| *sol* | 'musical note sol' | *sol-üm* | 'sol-1SGPOSS' |

Orgun and Inkelas noticed a curious fact concerning the possibility of repairing subminimal forms by adding further suffixes. The idea is that one should be able to add more suffixes to subminimal forms to bring the total size to two syllables. The resulting form should then be grammatical.

However, we see that this can only be done for some, not all, of the subminimal forms in (9). In (10b), we see that it is possible to repair the form *\*ye-n* 'eat-PASS' by adding an aspect suffix to bring the total size to two syllables. The resulting form, *ye-n-ir* 'eat-PASS-IMPRF' is grammatical. However, (10a) shows that the subminimal possessed form *\*do:-m* 'do-1SGPOSS' remains ungrammatical even when we add the accusative suffix to bring the total size to two syllables.

(10)    a)    *\* do:-m*    'do-1SGPOSS'        b)  *\* ye-n*      'eat-PASS'
              *\* do:-m-u*  'do-1SGPOSS-ACC'        *ye-n-ir*    'eat-PASS-IMPRF'

The forms in (10a) bring to mind the issue of cyclicity, or the application of phonology to the output of each morphological operation. In the framework of Lexical Phonology (Pesetsky (1979), Kiparsky (1982, 1985), Mohanan (1982)), the output of each morphological concatenation is submitted to the phonological module, where it is subject to phonological rules and constraints.

With this framework in mind, the Turkish minimal size condition seems to apply cyclically in (10a), as shown more clearly in (11a). Here, the

root+possessive combination is subject to the minimal size condition. It violates the condition, and is therefore ruled out. This appears to be a typical case of cyclicity. However, (10b) suggests that the condition is enforced noncyclically, as in (11b). Here, the root+passive combination is NOT subject to the minimal size condition. Instead, the whole form *ye-n-ir* 'eat-PASS-IMPRF' is subject to the condition only once, after all the suffixes have been added. Since this form contains two syllables, it satisfies the minimal size condition and is grammatical.

(11)　　The minimal size condition is sometimes enforced cyclically
　　　　a)　　*do: + m → *do:m*　　　(minimality enforced and violated)

　　　　... and sometimes noncyclically:
　　　　b)　　*ye + n*　　　　　　　(minimality NOT enforced)
　　　　　　*ye + n + ir → yenir*　　(minimality enforced and satisfied)

Of course, the form *\*ye-n* 'eat-PASS' would have been subject to the condition if it were to be used as a word by itself, and would have been ruled out because it is subminimal.
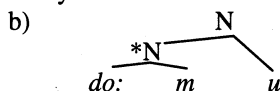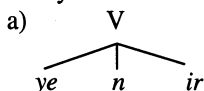
　　　　This contrast between cyclic and noncyclic application of phonological rules or constraints has been noticed in the Lexical Phonology literature. The traditional approach to this problem uses a diacritic feature [+cyclic] (e.g. Halle and Mohanan (1985), Halle and Vergnaud (1987), Czaykowska-Higgins (1993)). In this approach, the output of a given morphological operation is normally not subject to phonological rules or constraints before the word level. However, when an affix bearing the feature [+cyclic] is added, the resulting form *is* submitted to the phonological module, where it is subject to phonological rules and constraints. That is, we get cyclic phonology only when [+cyclic] affixes are added to a base.

　　　　This approach could certainly be used in analyzing the Turkish minimality facts. The passive suffix would not bear the [+cyclic] feature, while the possessive suffix would. This way, forms containing the possessive suffix would be subject to minimality enforcement before the addition of any further suffix.

　　　　However, it is in fact possible to DERIVE the cyclic versus noncyclic application of the minimal size condition rather than stipulating it in this fashion. We do not need any additional tools or ad hoc diacritic features like [+cyclic] to achieve this. Constituent structure, a tool we have already used in the analysis of Suspended Affixation, is all we need.

　　　　I claim that every nonterminal node in a phrase structure is subject to the minimal size condition (excluding nonbranching (unary branching) nodes in frameworks that allow them), and that the root+passive+aspect combination forms a ternary branching structure (12a), while the root+possessive+case combination forms a binary branching hierarchical structure (12b).

(12)    Every nonterminal node is subject to the disyllabic size condition.

a)            V                              b)                            N

       ye    n    ir                              do:   m    u

*(tree diagram (12a): V branching to ye, n, ir; tree diagram (12b): N with *N node branching to do:, m, and u)*

There is only one nonterminal node in (12a)—the node labeled V. The contents of this node equal two syllables. Therefore, this form satisfies the minimal size condition and is grammatical. In (12b), on the other hand, there are two nonterminal nodes. The lower one, labeled *N, violates the minimal size condition, because its contents equal only one syllable. This form is therefore ungrammatical, regardless of what may be added to it. This is because any additional suffix is not going to add to the contents of this particular node. Thus, we derive the apparent cyclic versus noncyclic application of the minimal size condition from static phrase structure configurations, without any diacritics (cf. Cole and Coleman (1993)).

        Support for this analysis comes from a perhaps unexpected source. Recall that the possessive and case suffixes may be separated from each other in Suspended Affixation. This is shown in (13) (repeated from (4a)).

(13)    a)    *[tebrik-ler-im ve tešekkür-ler-im]-i*
              [congratulation-PL-1SGPOSS & thank-PL-1SGPOSS]-ACC

        b)

              *tešekkür    ler    im    i*
              thank        PL    1SGPOSS  ACC
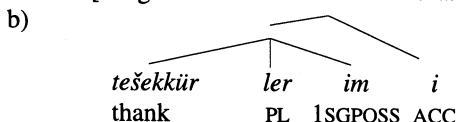
We have seen that it is acceptable to keep the possessive suffix on both conjuncts while suspending the case suffix, as shown again in (13a). This implies that that the possessive and case structures must NOT be sisters to each other. In other words, they do NOT form a ternary branching structure with the base they attach to. Rather, they form a binary branching hierarchical structure as shown in (13b). This is, of course, precisely the conclusion we have already arrived at on the basis of minimality enforcement. This agreement between the structures needed for Suspended Affixation and minimality verifies the analysis I am proposing.

        By contrast, an approach using exclusively binary branching (e.g. Williams (1981), Kayne (1983), Larson (1988), Baker (1988), Lieber (1992)) would have to STIPULATE the cyclic-noncyclic distinction (e.g. Halle and Mohanan (1985), Halle and Vergnaud (1987), Czaykowska-Higgins (1993)), would lack an account of Suspended Affixation, and could not relate the phonological and morphological phenomena to each other.

        Even if one somehow managed to devise an account of Suspended Affixation in such a framework, this would still not be related to the cyclic versus noncyclic enforcement of the minimal size condition or to the suffixal scope ambiguity in third person plural possessive forms. Only an approach that allows

flat as well as binary branching structures is able to offer an insightful analysis of all these phenomena.

**4.** INTERACTION OF SUSPENDED AFFIXATION WITH MINIMALITY. The interaction of Suspended Affixation with minimality reveals an apparent bracketing paradox. As shown in (14), the last conjunct, together with the suffixes at the end, forms a phonological domain which is subject to minimality. This is true even though the suffixes have scope over both conjuncts. The form in (14a) is ungrammatical because the last conjunct (plus the suffixes at the end) contains only one syllable, and thus violates the minimal size condition. In (14b), on the other hand, the last conjunct and the suspended suffix together add up to two syllables. The minimal size condition is thus satisfied, and the form is grammatical.

(14) a.  * *[do ve re]-m*            b.   *[fa ve sol]*-üm
         [do and re]-1SGPOSS              [fa and sol]-1SGPOSS
         'my do and re'                   my fa and sol'
         *[*re-m*] violates σσ requirement   [*sol-üm*] satisfies σσ requirement

Thus, the suspended suffixes form a phonological unit with the last conjunct even though they have scope over both conjuncts, and are attached morphosyntactically to the whole conjoined phrase. Morphosyntactic considerations based on scope and Suspended Affixation lead us to conclude that the structure is as shown in (15a). On the other hand, prosodic minimality enforcement suggests the structure in (15b).

(15)      a) Morphosyntactic structure (based      b) Phonological structure (based
             on Suspended Affixation)                 on minimality)

             do    ve   sol   üm                      do    ve   sol   üm

There are two common approaches to bracketing mismatches, which I call the "edge feature approach" and the "dual structure approach".

   The edge feature approach assumes that the structure implied by the phonology is the correct one. Certain features and edge feature percolation mechanisms then allow the morphological structure to match the phonological structure by letting the presence of a morpheme on a lower node at a designated edge indirectly influence the features borne by a higher node. This is the approach taken by Poser (1985), Zwicky (1987), Halpern and Miller (1991), Halpern (1992), Miller (1992), Miller and Halpern (1992), etc. The particular mechanism assumed in these works is usually a realizational approach to morphology. In this model, the presence of features on certain nodes triggers the phonological expression of affixes. In Suspended Affixation, the proper version of the edge feature convention would have to state that the relevant features are present on both conjuncts, but it is an option to realize them phonologically just on the

second conjunct.

(16) Edge feature approach.

```
        ┌──────────┴──────────┐
   [possessed]      │      [possessed]  ↘
      do           ve         sol       üm
```

It may be possible to formalize this approach to make it possible to account for the simple cases of Suspended Affixation where a single suffix is eligible for suspension. However, when we consider the full range of facts, we realize that the edge feature approach is hard put to answer the crucial questions in (17).

(17) Challenges for the edge feature approach:
   a) why can only nonfinal conjuncts have missing affixes?
      *tebrik-ler-im-i ve teşekkür
   b) why can only the outermost suffixes can be suspended?
      *tebri-i ve teşekkür-ler-im-i
   c) why do suffixes of a flat node have to be suspended en masse?
      *tebrik-ler ve teşekkür-ler-im-i

At this point, I do not know if it is possible to extend the edge feature to account for these observations. In addition, we would demand that such an account explain the connection between affix suspension, minimality enforcement, and suffixal scope ambiguity. I leave the resolution of this question to future research.

The second common approach to bracketing paradoxes of this sort is to posit a dual structure. In this approach, both of the structures that we have motivated are assumed to be present. They are parallel descriptions of the same object on independent phonological and morphological levels of description. This is the approach taken by Marantz (1988), Sproat (1988), Inkelas (1989), Cohn (1989), Zsiga (1992) (cf. Sadock (1985, 1991)), etc. These two structures are identical by default. However, specific grammatical requirements may force mismatches between the phonological and morphosyntactic structure as needed.

(18) Dual structure approach.

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            m-structure ╱──╲
              ┌─┬─╲
            do  ve  sol üm
               ╲───╱
           p-structure
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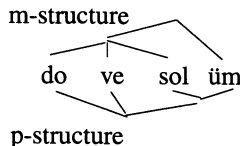
The success of this kind of approach depends crucially on how strong a theory of allowable types of mismatches one has. This issue is as yet unresolved, since we do not at this point know exactly what kinds of mismatches are motivated by empirical evidence. However, two points deserve mention. First, Orgun (1994) has proposed a view of dual structures according to which mismatches are only allowed if a specific morpheme has inconsistent phonological and

morphosyntactic attachment requirements. Suspended Affixation satisfies this description: The relevant suffixes attach to a phonological word. On the morphosyntactic side, however, they may attach to a lexical noun (which gives us the no suspension option), or to an NP. In the latter case, their phonological host will, in general, differ from their morphosyntactic host.

The second point of relevance is a study by Zsiga (1992). Zsiga claimed that when there is a morphosyntactic constituent containing more than one phonological word, affixes (and clitics) that are added to this phrase will phonologically attach to the edgemost phonological word. This claim, taken together with Sproat's (1986) observation that conjoined phrases tend, cross-linguistically, to contain multiple phonological words, leads us to expect that Suspended Affixation should give rise to such mismatches. In this light, the conclusions we have reached in this paper regarding the differences between the morphosyntactic and phonological properties of Suspended Affixation should not be surprising.

**5.** CONCLUSIONS. Regardless of whether we use the edge feature approach or the dual structure approach, the conclusions summarized below are valid.

Once flat (as opposed to exclusively binary branching) structures are allowed, cyclic versus cyclic phonological effects follow directly from independently needed constituent structure configurations. It is not necessary to introduce ad-hoc diacritic features to encode the cyclic-noncyclic distinction. Suspended Affixation further supports this view by showing that in Turkish, affixes can only be suspended independently of each other if they belong to different "cycles" (i.e. only if they are not sisters). Evidence from disyllabic minimality, suffixal scope ambiguity, and Suspended Affixation converge on the same flat versus hierarchical configurations.

Finally, a methodological conclusion may be drawn from this study. Many linguists distinguish in practice (some even in theory) between "core" and "peripheral" linguistic phenomena, designing their theories around the former and often neglecting the latter. The implicit (sometimes explicit) hope is that the core phenomena fully characterize the system underlying the language and that no additional information may be gained from the study of marginal phenomena. Suspended affixation and derived monosyllabic stems would not generally be considered core phenomena. However, we have seen that these phenomena provide crucial insight into the structure of Turkish and, by extension, into the properties of Natural Language.

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