Prosodic Fusion and Minimality in Kabardian*

Matthew Gordon and Ayla Applebaum
University of California, Santa Barbara

Abstract

The Northwest Caucasian language, Kabardian, displays a typologically unusual process of word formation whereby two lexical roots fuse to form a single prosodic word that behaves phonologically parallel to prosodic words containing a single root. It is shown that this process of fusion, which is subject to a number of phonological and morphosyntactic restrictions, reflects a typologically unusual response to a cross-linguistically common minimal word requirement banning monomoraic prosodic words. Rather than employing segmental lengthening or insertion to ensure that minimality is satisfied, Kabardian chooses to violate the one-to-one mapping between grammatical and prosodic words. A further complication is the scalar nature of minimality in Kabardian: while the impossibility of fusion in certain prosodic and morphosyntactic contexts allows monomoraic prosodic words to surface, a more stringent minimality restriction ensures that all prosodic words have at least one mora.

* The authors wish to thank three anonymous reviewers, the associate editor, and the editor for their numerous insightful comments and suggestions on earlier versions of this paper. Thanks also to John Colarusso, Bruce Hayes, Pam Munro, Jaye Padgett, Colin Wilson, Kie Zuraw, and audiences at UCLA and UC Santa Cruz for their feedback on this research. A great debt of gratitude is owed to the many speakers without whose generosity and linguistic expertise this study would have been impossible. This work was supported by NSF Grant BCS0553771 and a UCSB Academic Senate Grant to the first author and an ELDP grant from the Hans Rausing Foundation to the second author.
1. Introduction

Many languages impose minimality restrictions on the size of their prosodic words (McCarthy and Prince 1986/1995). For example, the smallest prosodic word in Chickasaw (Munro and Willmond 1994) is CVV. Thus, monosyllabic words of the shape CVV (1a) are found in Chickasaw, as are disyllabic words (1b). Monosyllables of the form CVC (1c) and CV (1d) are prohibited, however.

(1) a. ja: ‘s/he cries’, ma: ‘s/he mows it’ 
b. koni ‘skunk’, hapi ‘salt’, iti ‘mouth’, paska ‘bread’, fakit ‘turkey’
c. *kon, *tap, *nim 
d. *ko, *ta, *ni

This paper explores word minimality effects in Kabardian, a Northwest Caucasian language spoken primarily in the Kabardino-Balkar Republic of Russia and in Turkey. Kabardian is of interest from a minimality perspective due to the scalar nature of its minimal word requirement. The prosodically worst formed words consist simply of a single consonant, i.e. C. Slightly better are CV words, while optimal words are at least bimoraic, i.e. CVC, CVV, or CVCV. The resulting hierarchy of well-formedness is \( C \mu \mu > CV > C \). This minimality scale is evinced by two alternations that conspire to improve the standing of words within the hierarchy. First, the prosodic fusion of CV roots to an immediately preceding root under certain prosodic and morphosyntactic conditions indicates that CVC and larger (i.e. CVV or disyllabic) prosodic words are preferable to CV words. Thus, the roots ‘w´nå ‘ho use’ and ‘S´å ‘new’ merge to form a single prosodic word w´nåS´å ‘new house’ in order to beef up the CV root ‘S´å. An epenthetic schwa is inserted between the roots in the fused form if the first root ends in a consonant: S´d ‘donkey’ + S´å ‘new’ → S´dS´å ‘new donkey’.

The second minimality-induced alternation shows that a CV prosodic word is preferable to one consisting of only a consonant. Roots that may be analyzed as underlyingly consisting only of a consonant and surface as such in fused forms are realized with a final schwa, i.e. as CV, when conditions on prosodic fusion are not satisfied. For example, the noun meaning ‘horse’ has two realizations: one as [zə] in isolation or when it occurs in a phrasal context that does not allow for fusion and another as [ʃʃ] in a position where fusion is allowed, e.g. zəʃ ‘one horse’ (=zə ‘one’ + ʃ ‘horse’).
The phenomenon of minimality in Kabardian is of relevance to several phonological issues. First, the scalar nature of Kabardian minimality necessitates an analysis appealing to a more complex interaction between prosodic constraints than those driving the cross-linguistically more common binary minimality conditions. In particular, the Kabardian data argues for a finely grained series of foot well-formedness constraints. A constraint requiring that feet be binary drives prosodic fusion, while another higher ranked constraint requiring feet to be minimally monomoraic ensures that all words surface with at least one vowel. Crucially, foot binarity is more stringently enforced for feet carrying phrasal stress than those carrying word-level stress. Furthermore, the phenomenon of epenthesis that accompanies fusion provides evidence for a distinction between a relatively highly ranked anti-epenthesis constraint holding within roots and a lower ranked generic anti-epenthesis constraint.

The structure of the paper is as follows. Section 2 presents background information on the Kabardian phoneme inventory. Section 3 examines the structure of prosodic words and phenomena that are diagnostic for them. Section 4 introduces the process of prosodic fusion, while section 5 presents an Optimality-theoretic analysis of fusion. The process of vowel epenthesis in fusion and non-fusion contexts is examined in section 6. Section 7 situates the minimality effects in Kabardian within the broader typology of minimal word requirements. Finally, section 8 summarizes the results of the paper.

2. Background on Kabardian

Kabardian is a Northwest Caucasian language spoken by approximately 647,000 people (Gordon 2005). While the statistical majority of speakers of Kabardian reside in the Kabardino-Balkar republic of Russia, nearly one third of speakers live in Turkey owing to a mass migration from Russia in the 19th century. The present paper focuses on the variety of Kabardian spoken in Turkey. The data on prosodic fusion discussed in this paper are primarily based on fieldwork conducted with 12 speakers during three trips to Turkey between 2005 and 2007. The basic phenomenon of fusion in Kabardian is described in several published descriptions of the language that are based on Kabardian as spoken in Russia, including Turchaninov and Tsagov (1940), Jakovlev (1948), Kardanov and Bichoev (1955), Abitov et al. (1957), Kuipers (1960), and Colarusso (1992, 2006). Forms presented in the paper are from fieldnotes with the exception of data accompanied by a reference to published materials. In the latter case, cited forms were
checked with native speakers. In addition to offering a theoretical account of prosodic fusion, this paper builds on these published works by describing additional complications in the pattern and relating fusion to prosodic constituency in Kabardian.

2.1 Consonants

Like other languages of the Caucasus, Kabardian is characterized by a large consonant inventory and a small vowel system. The consonants of Turkish Kabardian are given in table 1.

Table 1. The consonant phonemes of Turkish Kabardian

<table>
<thead>
<tr>
<th></th>
<th>Labial</th>
<th>Denti-</th>
<th>Palato-</th>
<th>Palatal/</th>
<th>Velar</th>
<th>Uvular</th>
<th>Pharyngeal</th>
<th>Laryngeal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-alveolar</td>
<td>-alveolar</td>
<td>Palatalized Velar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stops</td>
<td>p</td>
<td>p’</td>
<td>b</td>
<td>t</td>
<td>t’</td>
<td>d</td>
<td>k’</td>
<td>k”</td>
</tr>
<tr>
<td>Affricates</td>
<td></td>
<td>ts</td>
<td>ts’</td>
<td>dz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricatives</td>
<td>f</td>
<td>f’</td>
<td>v[w]</td>
<td>s</td>
<td>z</td>
<td>ç</td>
<td>j</td>
<td>x[w]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y[w][g[w]]</td>
</tr>
<tr>
<td>Nasals</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>h</td>
</tr>
<tr>
<td>Laterals</td>
<td>i</td>
<td>i’</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>h</td>
</tr>
<tr>
<td>Tap</td>
<td>r</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>j</td>
</tr>
<tr>
<td>Glides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2. Vowels

There is considerable controversy about the number of vowel phonemes in Kabardian. Most sources\(^2\) (e.g. Catford 1942, 1984, Jakovlev 1930, 1948, Turchaninov and Tsagov 1940, Abitov et al. 1957, Bagov et al. 1970) assume two short central vowels differing in height /ä, /, as well as a longer and qualitatively lower vowel /a:/\(^3\). The long /a:/ is joined on the surface by four other

\(^1\) Speakers from Turkey have a single set of palato-alveolar fricatives unlike speakers of literary Kabardian from Russia, who have both the palato-alveolars /ʃ, ʒ/ and the alveolo-palatals /ɕ, ɕ’, ʑ/\(^1\). In addition, the palatal fricative /ɕ/ employed by the speakers examined in this paper corresponds to a more posterior /ʃ/ for many speakers of Kabardian from Russia. Speakers of Kabardian from Russia generally also have a voiced palato-alveolar affricate /dʒ/ instead of the more conservative (Kuipers 1960:21) voiced palatalized velar stop /ɡ/ used by speakers from Turkey.

\(^2\) Kuipers (1960) is exceptional in assuming that all instances of [a] are the result of epenthesis and that [e, a] are allophones.

\(^3\) Duration measurements by Choi (1991) indicate that the lowest vowel is best analyzed as a long vowel, since it is nearly twice as long as the next lowest vowel quality /ə/. Some instances of the long low vowel occur in morphophonemic alternation with the slightly higher short vowel /e/, a fact which has led Colarusso (1992) to posit only two underlying vowels and derive the long /a:/ by rule. However, as Colarusso (1992, 2006) points out, there are several instances in which the occurrence of the long /a:/ is not predictable.
long vowels [i:, e:, o:, u:], which are typically regarded as deriving from underlying sequences of short vowel plus glide: [i:] = /`oj/, [e:] = /`øj/, [o:] = /`ow/, [u:] = /`ow/. The short vowels also have many different surface variants depending on surrounding consonants, e.g. rounded allophones adjacent to labialized consonants, retracted allophones next to uvulars and pharyngeals, etc. (see Colarusso 1992, 2006 for description and Choi 1991 for phonetic data).

3. The word in Kabardian

Words in Kabardian consist of a root and optionally prefixes and suffixes. The combination of roots plus bound affixes will henceforth be termed the “grammatical word” in contrast to the “prosodic word”, which consists of the root plus prefixes and certain suffixes (see section 4.2 on the relationship between affixes and the prosodic word). Diagnostics for the prosodic word are considered in section 3.2.

3.1. Distribution of schwa

A prosodic word may end either in a consonant or a vowel. Any of the surface long vowels (underlyingly short vowel plus glide sequences) may occur in word-final position. However, while short /`ø/ may occur in final position of both monosyllabic and polysyllabic words (2a), final schwa is restricted to monosyllabic prosodic words (2b). The confinement of schwa to monosyllables, a distribution noted by Kuipers (1960) and Colarusso (1992, 2006), will play a central role in the analysis of prosodic fusion.

(2a)

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>p`æ</td>
<td>‘bed, place’</td>
</tr>
<tr>
<td>ðæ</td>
<td>‘hand, arm’</td>
</tr>
<tr>
<td>jæ</td>
<td>‘milk, bullet’</td>
</tr>
<tr>
<td>ðæmæ</td>
<td>‘table’</td>
</tr>
<tr>
<td>’wɔmæ</td>
<td>‘house’</td>
</tr>
<tr>
<td>’da:mæ</td>
<td>‘wing’</td>
</tr>
<tr>
<td>χa:`zɔmæ</td>
<td>‘good’</td>
</tr>
</tbody>
</table>

4 Most prosodic words begin with a consonant. The only words beginning with a vowel are a few words that begin with the long vowel /a:/.
The ban on final schwa in polysyllabic words leads to allomorphic variation in the shape of monosyllabic roots, which end in schwa in isolation but lack final schwa when prefixed (3).

\[
\begin{align*}
(2b) \quad & \text{\textipa{tə}} \quad \text{‘blood’} \\
& \text{\textipa{fə}} \quad \text{‘horse, three’} \\
& \text{\textipa{jə}} \quad \text{‘man’} \\
& \text{\textipa{bə}} \quad \text{‘seven’} \\
& \text{\textipa{fə}} \quad \text{‘good’} \\
\end{align*}
\]

The ban on final schwa in polysyllabic words leads to allomorphic variation in the shape of monosyllabic roots, which end in schwa in isolation but lack final schwa when prefixed (3).

\[
\begin{align*}
(3) \quad & \text{\textipa{s- o- fə}} \quad \text{‘I eat it (habitual)’ (cf. \textipa{fə} ‘Eat!’)} \\
& \text{\textipa{1ERG- HAB- eat}} \\
& \text{\textipa{s- o- tə}} \quad \text{‘I write it (habitual)’ (cf. \textipa{tə} ‘Write!’)} \\
& \text{\textipa{1ERG- HAB- write}} \\
& \text{\textipa{jə- ə} \quad \text{‘his, her blood’ (cf. \textipa{ə} ‘blood’)} \\
& \text{\textipa{3POSS- blood}} \\
& \text{\textipa{jə- fə} \quad \text{‘their earth’ (cf. \textipa{fə} ‘earth’)} \\
& \text{\textipa{3PLPOSS- earth}} \\
\end{align*}
\]

Alternations between final schwa and zero underlie the long-standing controversy surrounding the status of schwa in Kabardian. While most analyses (e.g. Catford 1942, 1984, Jakovlev 1930, 1948, Turchaninov and Tsagov 1940, Abitov et al. 1957, Bagov et al. 1970) treat the unaffixed form as underlying and thus assume that schwa is present lexically, Kuipers (1960) and Peterson (2007) treat the schwaless allomorph as basic and derives the schwa found in the bare root by epenthesis. In the representations presented in this paper, the schwa will arbitrarily be treated as underlying for the sake of expository clarity. As will become apparent, however, this decision is not crucial for the proposed analysis, which appeals to surface well-formedness constraints rather than input-output faithfulness to account for the alteration between root-final schwa and zero.

The failure of final schwa to surface is a pervasive pattern in Kabardian that is also observed in the cases of prosodic fusion that are the focus of the paper. Prosodic fusion and the behavior of schwa are discussed in detail in section 4. First, however, section 3.2 presents several diagnostics for the prosodic word besides the ban on final schwa.
3.2. Diagnostics for the prosodic word

Before examining the process of prosodic fusion that is the focus of the paper, we consider evidence for the prosodic word, which plays a crucial role in characterizing fusion. Sections 3.2.1—3.2.3 present diagnostics for the prosodic word that can be applied both for words resulting from prosodic fusion as well as for words in which fusion has not taken place.

3.2.1. Stress in Kabardian

The prosodic word is the domain of stress assignment in Kabardian. Stress is phonologically predictable (Abitov et al. 1957, Colarusso 1992, 2006), falling on a final heavy syllable (CVV, CVC), otherwise on the penult (4).

(4)

<table>
<thead>
<tr>
<th>Kabardian</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>sebən</td>
<td>‘soap’</td>
</tr>
<tr>
<td>tebjeņ</td>
<td>‘plate’</td>
</tr>
<tr>
<td>saibë</td>
<td>‘baby’</td>
</tr>
<tr>
<td>na:nu:</td>
<td>‘kid’</td>
</tr>
<tr>
<td>pa:sə</td>
<td>‘early’</td>
</tr>
<tr>
<td>sa:be</td>
<td>‘dust’</td>
</tr>
<tr>
<td>mədəɾəsə</td>
<td>‘apple’</td>
</tr>
<tr>
<td>xəɾzəne</td>
<td>‘good’</td>
</tr>
</tbody>
</table>

Kabardian also has phrase level prominence, which will turn out to be a useful diagnostic for determining when two roots within the same phrase do not belong to the same prosodic word (section 4.1). The distinction between phrasal stress and word-level stress is diagnosed through a combination of pitch, duration, and intensity and also by the pattern of pitch accent placement. The pitch accent, H*, within a phrase falls on the primary stressed syllable of the phrase (Applebaum and Gordon 2007). In a phrase consisting of multiple prosodic words, both words have a stressed syllable and the stressed syllable of the rightmost word characteristically carries the phrasal pitch accent. For example, the first syllable of both words in the phrase ‘fəz ’daːçə ‘beautiful woman’ has word-level stress with the stress on the second word carrying the phrasal pitch accent (5).

(5)

\[
\begin{array}{c}
\text{H*} \\
\text{‘fəz ’daːçə}
\end{array}
\]
3.2.2. Vowel coloring

The phenomenon of vowel coloring provides further evidence for the prosodic word. The quality of vowels is substantially influenced by neighboring consonants in Kabardian, with a stronger effect exerted by a following as opposed to a preceding consonant and a stronger influence on short vowels than long vowels (see Catford 1942, 1984, Choi 1991, Colarusso 1992, 2006 for details). Vowels are rounded next to rounded consonants, while the place of articulation of consonants conditions the backness and height of neighboring vowels. While the effects of vowel coloring are either absent or only observed at rapid speech rates (depending on the speaker) across prosodic words, it applies consistently and saliently when the trigger and target are in separate grammatical words that have fused. Examples of coarticulatory rounding, the perceptually most salient of coloring effects are given in (6).

\[(6)\]
\[\text{/ts’ok’w’/} \rightarrow \text{[ts’uk’w’]} \text{ ‘small’}\]
\[\text{/g’odz/} \rightarrow \text{[gudz]} \text{ ‘wheat’}\]
\[\text{/d ox’w’/} \rightarrow \text{[dox’w’]} \text{ ‘thief’}\]
\[\text{/q’w’/} \rightarrow \text{[q’w’]} \text{ ‘pig’}\]

The failure of vowel coloring to apply across prosodic words is illustrated in (7).

\[(7)\]
\[\text{’f’o’x’w’a:’a be ‘warm horse’ *}[u’x’w’a:’a}\]
\[\text{m’o’d’a:’a ‘ripe apple’ *}[m’o’d’a:’a ‘ripe apple’}\]
\[\text{’w’o:’e x’w’a:’a be ‘warm house’ *}[w’o:’e x’w’a:’a be}\]

3.2.3. Stop voicing

A final diagnostic for the prosodic word is provided by the phonetic realization of the stop series traditionally classified as phonemic voiced stops. These “voiced” stops are usually realized as voiced stops in intervocalic and final position of a prosodic word, but as voiceless unaspirated stops in initial position (8).

\[(8)\]
<table>
<thead>
<tr>
<th>Initial</th>
<th>Intervocalic</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>[tz]a:me ‘naked’</td>
<td>[s]i:dzɛ ‘my tooth’</td>
<td>g’o:dzɛ ‘wheat’</td>
</tr>
<tr>
<td>[t]a:me ‘wing’</td>
<td>[f]a:dzɛ ‘drink’</td>
<td>[o]dɛ ‘donkey’</td>
</tr>
<tr>
<td>[k]a:me ‘shirt’</td>
<td>[b]u:dzɛ ‘mirror’</td>
<td>bɛ[g]ɛ ‘spider’</td>
</tr>
</tbody>
</table>
Figure 1 depicts waveforms illustrating the realization of phonemic voiced stops as phonetically voiceless unaspirated word-initially (upper waveform) and as voiced stops intervocically (lower waveform).

![Waveform Illustration](image)

Figure 1. Unaspirated voiceless stop (above) and voiced stop realizations of phonemic voiced stops in the words [t]aːmː ‘wing’ and faː[d]e ‘drink’

4. Prosodic fusion

Thus far all the prosodic words considered have contained a single root. The process of prosodic fusion creates prosodic words consisting of multiple roots. Prosodic fusion applies most pervasively within noun phrases (see section 4.1.1 for more on morphosyntactic constraints on fusion) and involves the combination of a head noun with another root within the same noun phrase. Such cases include noun plus adjective sequences (9a), compounds consisting of two nouns (9b), and sequences of numeral plus noun (9c). Adjectives and numerals appear after the noun they modify except for /za/ ‘one’ which occurs before the noun. The numeral suffix –iː (/aː/) intervenes between a noun and a following number. Note that all the morphemes (with the exception of the numeral suffix –iː, which is a bound morpheme) in their free-standing form are given in (9) to the left of the arrow.

\[
\begin{align*}
\text{(9a)} & \\
\text{pig + good} & \rightarrow & \text{good pig} \\
\text{son + old} & \rightarrow & \text{old son} \\
\text{house + good} & \rightarrow & \text{good house}
\end{align*}
\]
As the examples in (9) show, schwa at the end of the second root fails to surface parallel to the situation observed in polysyllabic prosodic words containing a single prefixed root (see section 3.1).

Parallel to prosodic words consisting of a single root, final /ə/ at the end of a noun phrase consisting of more than one root is characteristically not deleted (10).\(^5\)

\[\text{(10)}\]

\[
\begin{align*}
g^{\text{w}} \, \epsilon + f^{\text{w}} \, \epsilon \rightarrow g^{\text{w}} \, f^{\text{w}} & \quad \text{‘daring’ (cf. no final [ə] in } g^{\text{w}} \, \epsilon: \ p^{\prime} \, \text{‘four hearts’)}

f^{\text{w}} \, \epsilon + f^{\epsilon} \rightarrow f^{\epsilon} \, f^{\epsilon} & \quad \text{‘horse skin’ (cf. no final [ə] in } f^{\epsilon} \, f^{\prime} \text{ ‘good horse’)}

\text{w}^{\text{w}} \, \text{a} + f^{\prime} \, \text{a} \rightarrow \text{w}^{\text{a}} \, \text{f}^{\text{a}} & \quad \text{‘new house’ (cf. no final [ə] in } \text{w}^{\text{a}} \, \text{a} \, f \text{ ‘old house’)}
\end{align*}
\]

The loss of final schwa and the preservation of final /ə/ in the forms in (10) and (11), respectively, follows if one assumes that the roots in both sets of forms have fused to form a

---

\(^5\) Although our consultants limit final vowel deletion to schwa, there are certain speakers who delete final short /ə/ as well (John Colarusso, p.c.).
single prosodic word. The other diagnostics for prosodic word status presented in section 3.2 confirm this analysis.

In all forms displaying fusion, stress follows the predictable Kabardian pattern (section 3.2.1) according to which the final syllable is stressed if heavy, otherwise the penult is stressed (11).

\begin{align*}
(11) & \quad \text{\textit{w}õnå + f'å} \rightarrow \text{\textit{w}õnåf}' \quad \text{‘good house’} \\
& \text{\textit{c}å:me + l'å} \rightarrow \text{\textit{ç}æmæl’} \quad \text{‘foreigner’} \\
& \text{\textit{b}zu: + i: + bå} \rightarrow \text{\textit{b}zu:i:bl} \quad \text{‘seven birds’} \\
& \text{\textit{b}o: + i: + p’l’å} \rightarrow \text{\textit{b}o:i:p’l’} \quad \text{‘four stables’} \\
& \text{\textit{g}“å + j{x}“å} \rightarrow \text{’g“åj{x}“å} \quad \text{‘daring’} \\
& \text{\textit{j}å + fe} \rightarrow \text{’jāfe} \quad \text{‘horse skin’} \\
& \text{\textit{w}õnå + j‘å} \rightarrow \text{\textit{w}õnåj’å} \quad \text{‘new house’} \\
\end{align*}

If the prosodic word corresponded to the grammatical word we would expect each grammatical word to have a stress. Furthermore, we would also expect stress to fall on the syllable preceding the one it actually falls on in cases involving fusion of a word to a preceding polysyllabic word, i.e. *\textit{w}õnåf’ instead of \textit{w}õnåf’ ‘good house’ and *\textit{ç}æmæl’ instead of \textit{ç}æmæl’ ‘foreigner’.

Figure 2 compares a pitch trace (taken from the speech of a female speaker) illustrating the stress pattern characteristic of a prosodic word resulting from fusion (lower pitch trace) with the typical pitch pattern found in a phrase consisting of two prosodic words (upper pitch trace). In the phrase consisting of the prosodic words /q’abərdəj/ ‘Kabardian’ and /ts’okw’/ ‘little’, the highest pitch peak, associated with the phrasal H° pitch accent (section 3.2.1), falls on the
second word with a clear secondary peak representing word-level stress falling on the final syllable of the first word. In the single prosodic word resulting from fusion of the prefixed noun /m’bósɔm/ ‘this guest’ and the adjective /f’ɔ/ ‘good’, there is a single pitch peak on the final syllable. Note that the schwa occurring between the two roots is due to a regular process of epenthesis occurring in fused forms that would otherwise have a consonant cluster at the boundary between the two roots (see section 6 for discussion of epenthesis).

Figure 2. Pitch patterns in prosodic phrases (upper pitch trace) and prosodic words (lower pitch trace)

Vowel coloring (section 3.2.2) also occurs across grammatical words that have fused. For example, the fused form [ʃɔχʷ ‘stallion’ (=ʃə ‘horse’ + χʷə ‘male’) (Colarusso 1992:47) is realized with a rounded vowel, i.e. [ʃuχʷ], owing to the labialized consonant in the second root. The rounding in this form can be compared with the lack of rounding in noun phrases in which fusion has not taken place, ‘ʃə ‘χʷə:ba ‘warm horse’ *ʃuχʷə:ba, məʔəɾəsə ‘χʷə: ‘ripe apple’ *məʔəɾəsə ‘χʷə:.

Finally, in forms involving fusion, an intervocalic voiced stop, or stop phase of an affricate, is obligatorily realized as a voiced stop parallel to the realization of voiced stops in prosodic words consisting of a single root (section 3.2.3), e.g. ʃə + [ts]ə ‘horse + tooth’ → ʃə[ds]ə. In contrast, in phrases comprised of multiple prosodic words, intervocalic voicing of
stops across word boundaries is limited to fast speech rates. Figure 3 depicts a waveform illustrating voicing in a stop that comes to stand in intervocalic position due to prosodic fusion of the root /ʃd/ ‘donkey’ with the adjective /ɔ/ ‘new’.

![Figure 3. Intervocalic voiced stops in the fused form [ʃdɔʃ] ‘old donkey’](image)

In summary, roots that have phonologically fused pattern as prosodic words parallel to grammatical words consisting of a single root. Diagnostics that indicate the prosodic word status of fused forms include stress assignment, vowel coloring, and the distribution of voicing in stops.

4.1. Restrictions on fusion

Prosodic fusion is subject to certain restrictions, both morphosyntactic and phonological, which are discussed in sections 4.1.1 and 4.1.2, respectively.

4.1.1. Morphosyntactic restrictions on fusion

Fusion is limited to noun and adjective phrases and can only involve constituents (with one exception to be discussed later). These conditions limit fusion to sequences of noun plus adjective (12a), noun plus numeral (12b), numeral plus noun (12c), noun plus noun compounds (12d), and adverb plus adjective sequences (12e). It precludes fusion between nouns and other syntactic classes, even if they are constituents and satisfy phonological conditions for fusion, for example, a CV noun and a verb belonging to the same verb phrase, e.g. /ʃɔʃç/ ‘Eat a horse!’.
The constituency requirement also precludes fusion between two adjectives to the exclusion of a noun (13a) or between a noun and a preceding modifier such as a numeral or a possessive prefix to the exclusion of a modifier following the noun (13b).

---

6 We take no position on the internal structure of postnominal numeral phrases.

7 The schwa intervening between the adverb and the adjective in this form reflects a regular process of epenthesis applying in fused forms in which the first root ends in a consonant (see section 6 for discussion of epenthesis).
It does, however, allow, for the possibility of recursive fusion involving a noun plus two adjectives (14a), a noun plus adjective sequence following a numeral prefix (14b), a compound followed by one or more adjectives (14c), or other combinations of words eligible for fusion within the noun phrase. Examples (14a) and (14b) are the grammatical versions of their ungrammatical counterparts in (14a) and (14b), respectively.
(14)
(a) ʃə + χʷə + ʃə = f'ʃə ʃuf η‘good male horse’
horse + male + good

(b) zə + ʃə + ʃə = zəʃəf η‘one good horse’
one + horse + good
The attested form in (14b) differs minimally from its ungrammatical counterpart in (14b) by having its second schwa before the final consonant rather than after it, i.e. \[z\partial f\partial\] vs. \[^*z\partial f\partial\]

The grammatical form in (14a) differs from its unattested counterpart in (14a) in displaying rounding of the vowel preceding the initial \[\chi\]

In addition, the unattested forms in (13a) and (13b) have a stress on each of the prosodic words, with the stress on the second word being stronger (section 3.2.1). In contrast, the grammatical forms in (14) have a single stress.

There is one circumstance in which fusion can apply between words that are not constituents. If an adjective that is too large to fuse to a preceding noun (15a) or an already fused form is followed by a numeral (15b), the numeral fuses to the preceding element.

---

8 A short vowel preceding the numeral marker –i: is deleted.
4.1.2. Phonological restrictions on fusion

Fusion is also subject to a phonological restriction: the second element must consist of a single light syllable, i.e. (C)C(V). This light syllable may have either /ə/ as its nucleus or may be a monosyllabic root that ends in schwa in its bare form. The number of onset consonants in the second root is irrelevant. Fusion does not take place if the second root is either polysyllabic or consists of a single heavy syllable, i.e. (C)CVV or (C)CVC. In such cases, both roots are stressed with a stronger (phrasal) stress falling on the second element (16).
Further evidence for the lack of fusion where the second root is larger than CV comes from vowel coloring. As we have seen (section 3.1.2), vowel coloring is observed in noun phrases involving fusion: ʃə + ʃʰə → ʃəʃʰ [ʃɬʰ] ‘stallion’, ɲə + ɡʷə → ɲəɡ [ɲog⁶] ‘face’. Vowel coloring is not observed, however, when there is no fusion (17).

Furthermore, stops at the beginning of a morphological word that has not undergone fusion are realized (except at fast speech rates) as voiceless unaspirated rather than as voiced as one would expect if fusion had taken place (section 3.1.3) : q’ə:ɾ + da:ɾə ‘city + beautiful’ → q’ə:ɾə “[t]a:ɾə (cf. ʃəd + ʃ’a ‘donkey + new’ → ʃədəʃ’a⁶).

A final piece of evidence for a lack of fusion when the second root is polysyllabic or heavy comes from the non-application of schwa epenthesis, which inserts a schwa after a consonant-final root that fuses to a following root. This process is discussed in section 6.

4.2. Extraprosodicity and fusion

Thus far we have only considered cases in which the right edge of the prosodic word is aligned with the right edge of the grammatical word. In fact, all of the examples presented thus far have ended in a bare root. Kabardian makes extensive use of suffixes in both nouns and verbs. Stress patterns suggest a division between nominal and verbal suffixes in terms of their relationship to
the prosodic word. Colarusso (1992) observes that nominal suffixes and those that can attach to either nouns or verbs fail to attract stress, suggesting that they fall outside of the prosodic word. (Note that prosodic words are enclosed in {} in the presented forms.) On other hand, suffixes that are strictly verbal fall within the domain of stress, indicating that they lie within the prosodic word. The forms in (18) contain suffixes that potentially attract stress if phonological conditions are met, while those in (19) contain suffixes that fall outside the domain of stress. Note that the declarative suffix –s, which can attach to both nouns and verbs, fails to attract stress; this means that the verb forms in (18) containing this suffix have final stress because of the long vowel in the preceding (strictly verbal) suffix and not because of the declarative suffix. It should also be noted that the deletion of the root-final schwa before the past tense suffix in the third form in (18) is due to a regular phonological rule deleting a short vowel before a long vowel.

(18)

wə- ləznə- a: -s ‘You worked’ [wə{ləznə}a:s]
2ABS- work -PST -DECL

də- [ζə -nu: -s ‘We ate’ [də{ζənu}a:s]
1PLABS- eat -FUT -DECL

jə- təyəwə -a: -ya: ‘Had she seen it?’ [jə{təyəwa}ya:
3ERG- see -PAST -PLUPII

jə- s- wək’ə -fə- -n -s ‘I will be able kill him’ [jə{wəkəfən}s]
3ABS- 1ERG- kill -POT -FUT -DECL

wə- s- tə -ζə -nu: -s ‘I will give you back’ [wə{təζənu}s]
2ABS- 1ERG- give -BACK -FUT -DECL

(19)

q’a:la- k’ə [q’a:la:k’ə] ‘city (instrumental)’
city -INST

badəzə -s [badəzəs] ‘It is a fly’
fly -DECL

sə- tɔə -s [sə-tɔəs] ‘I write’
1ABS- write -DECL
In the forms in (19), addition of a suffix to a CVCV root fails to pull stress to the right of its original location in the unsuffixed form. The fact that the suffixes in (19) fail to receive any stress suggest that they are outside the prosodic word and do not initiate a new prosodic word.

In keeping with the rejection of stress by the nominal and hybrid nominal/verbal suffixes in (19), these suffixes also fail to ensure that roots containing a final schwa in isolation have this schwa when suffixed, as the forms in (20) show. The failure of schwa to surface in these examples falls out from the general ban on prosodic-word-final schwa in polysyllabic (but not monosyllabic) words under the assumption that nominal and nominal/verbal suffixes fall outside the prosodic word.  

(20)

\[
\begin{align*}
&\text{\textsc{f} + \textsc{g} - \textsc{h} + \textsc{i} \rightarrow \text{\textsc{f}g}h} \quad \text{‘with a good man’} \quad \text{\textsc{f}g}h
\end{align*}
\]

\text{man good -INSTR}

\[
\begin{align*}
&\text{\textsc{g} + \textsc{h} - \textsc{s} \rightarrow \text{\textsc{g}h}s} \quad \text{‘It’s an old woman’} \quad \text{\textsc{g}h}s
\end{align*}
\]

\text{woman + old -DECL}

\[
\begin{align*}
&\text{\textsc{h} + \textsc{t} \rightarrow \text{\textsc{h}t}} \quad \text{‘It was one horse’} \quad \text{\textsc{h}t}
\end{align*}
\]

\text{one + horse -PST}

\[
\begin{align*}
&\text{\textsc{n} + \textsc{p} - \textsc{r} \rightarrow \text{\textsc{n}p}r} \quad \text{‘tears (ergative)’} \quad \text{\textsc{n}p}r
\end{align*}
\]

\text{eye + water -PL -ERG}

---

9 Suffixes beginning with a sonorant, however, are preceded by a schwa following a root-final consonant. The schwa in this case, however, is not attributed to fusion, but rather reflects a general process of epenthesis applying between a consonant and a following sonorant (Kuipers 1960, Colarusso 1992, 2006), e.g. \textsc{f} + \textsc{g} + \textsc{h} ‘donkey + ergative’ \rightarrow \text{\textsc{f}g}h, \text{\textsc{f} + r} ‘woman + absolutive’ \rightarrow \text{\textsc{f}r}.

21
Further evidence for the extraprosodic status of nominal suffixes is provided by the behavior of laryngeal features in obstruent clusters. In most positions, Kabardian does not allow obstruent clusters in which the two members have different laryngeal features. Thus, ejectives can only be adjacent to ejectives\textsuperscript{10}, voiced obstruents can only occur next to voiced obstruents, and voiceless obstruents can only be adjacent to voiceless obstruents. In most cases, this restriction holds as a static constraint on roots. However, consonant final verbal prefixes have different allomorphs depending on the initial consonant of the root (21).

\begin{itemize}
\item \textit{VOICED} \quad \omega \{z\text{da}\} \omega \text{‘I sewed it’} \quad \omega \{s\text{o}\text{a}\}\omega \text{‘I eat it (habit)’} \quad \omega \{s'\text{p}'\text{a}\} \omega \text{‘I educated him’}
\item \textit{VOICELESS} \quad \omega \{d\text{o}\text{t\text{c}}\} \omega \text{‘We write it (habit)’} \quad \omega \{t\text{l\text{a}}y\text{a}\text{r}\} \omega \text{‘We saw him’} \quad \omega \{t'\text{p}'\text{a}\} \omega \text{‘We educated him’}
\item \textit{EJECTIVE} \quad \omega \{v\text{d\text{a}}\} \omega \text{‘You(pl) sewed it’} \quad \omega \{f\text{l\text{a}}y\text{a}\text{r}\} \omega \text{‘You(pl) saw him’} \quad \omega \{f'\text{p}'\text{a}\} \omega \text{‘You(pl) educated him’}
\end{itemize}

Obstruent clusters containing a suffixal consonant fail to obey the voicing agreement restriction (22), indicating that the suffix lies outside of the prosodic word.

\begin{itemize}
\item \textit{VOICED} \quad \omega \{m\text{a}\z\} \omega \text{‘It was a forest’}
\item \textit{VOICELESS} \quad \omega \{f\text{a}\} \omega \text{‘It’s a donkey’}
\item \textit{EJECTIVE} \quad \omega \{f'\text{p}'\text{a}\} \omega \text{‘It’s not a back’}
\item \textit{PLURAL} \quad \omega \{f\text{a}\} \omega \text{‘donkeys (ergative)’}
\end{itemize}

\textsuperscript{10} If the first ejective is an unreleased stop, as commonly is the case in casual speech, the ejective feature is not audible on the first stop.
Since verbal suffixes fall within the prosodic word, we would expect root-final schwa to be preserved before a consonant-initial verbal suffix since schwa is only deleted in final position of the prosodic word. This prediction is borne out by the data. Consonant-initial verbal suffixes may follow verb roots that end in a schwa in isolation, in which case the schwa also surfaces before the suffix (23).

(23)

\[
\text{dò-} \quad \{\text{çò-nu;}\} \quad \text{-s ‘We ate’} \quad \{\text{dò-} \{\text{çò-nu;}\} \text{s}\}
\]

1PLABS- eat -FUT -DECL

\[
\text{jò-} \quad \{\text{la:γ-ò-} \text{-n} \} \quad \text{-s ‘I will be able kill him’} \quad \{\text{jò-} \{\text{la:γ-ò-} \text{n}\} \text{s}\}
\]

3ABS- 1ERG- see -POT -FUT -DECL

\[
\text{jò-} \quad \text{tò-} \quad \text{-n} \quad \{\text{jò-} \{\text{tò-} \text{n}\} \text{s}\}
\]

3ERG- give- back- FUTI -DECL

\[
\text{sò-} \quad \{\text{la:γ-ò-} \text{-a:} \} \quad \text{-s ‘You finally saw me’}
\]

1ABS- 2ERG- see -FIN -PST -DECL

4.3. Fusion: A summary

In summary, several phonological diagnostics support the generalization that Kabardian observes a ban on schwa in final position of a prosodic word. Prosodic words may consist of a single root or may contain multiple roots within noun or adjective phrases that have undergone prosodic fusion. In order to be eligible for fusion, certain morphological and phonological conditions must be met. First, only constituents within noun (or adjectival) phrases are eligible to join together to form a single prosodic word. Furthermore, the second root must consist of a single light (CV) syllable in order to be fused to the preceding root. Apparent cases of final schwa unexpectedly

11 The source of the rightmost schwa in the first three forms is ambiguous. It could either be due to the fact it is sheltered from the right edge of the prosodic word by the following suffix or because of a general rule of schwa epenthesis (not bounded by the prosodic word) targeting clusters whose second member is a sonorant (see earlier footnote in this section). Other schwas in the forms, however, are unambiguously not attributed to the general rule of pre-sonorant epenthesis.
failing to surface before suffixes turn out upon closer inspection to be attributed to the extraprosodic status of these suffixes.

5. An OT analysis of prosodic fusion

We propose that prosodic fusion in Kabardian is driven by a minimality condition requiring that prosodic words be at least as large as CVC. In moraic terms, the minimality constraint thus amounts to a requirement that feet be binary, under the assumption consistent with the stress facts (section 3.2.1) that codas are moraic in Kabardian. This foot binarity restriction, in conjunction with other prosodic constraints, ensures that subminimal words, i.e. monosyllables containing neither a long vowel nor a coda consonant, prosodically attach to the immediately preceding word within noun and adjectival phrases if the constituency requirement on fusion is satisfied.

We further suggest that the surfacing of schwa in open monosyllables that would otherwise lack a vowel and are ineligible for fusion for morphosyntactic reasons is due to an overarching ban on words containing no vowels; such a hypothetical word would not only fail to constitute a bimoraic foot but would also lack even a single mora. For this reason, schwa must surface in open monosyllables constituting a prosodic word that would otherwise not have a vowel. Crucially, whether the schwa in such words is assumed to be underlying or not does not influence the outcome of the two minimality conditions, which result from markedness constraints rather than input-output faithfulness.

An Optimality-theoretic analysis of Kabardian minimality effects was developed and checked using OTSoft (Hayes, Tesar, and Zuraw 2003). Several constraints are at work to yield the minimality effects in Kabardian. First, we must simultaneously account for fusion where the second element is (C)CV but block fusion where it is prosodically larger. A constraint based on the constraint requiring feet to be binary at either the moraic or syllabic level, $\text{FtBin}$ (Prince 1980, Broselow 1982, McCarthy and Prince 1986/1996, Hayes 1995, Prince and Smolensky 1993/2004), ranked above $\text{GramWd}=\text{PrWd}$ (Prince and Smolensky 1993/2004), produces the desired effect. The relevant $\text{FtBin}$ constraint, however, must refer to the main, i.e. primary stressed, foot of the phrase, since only the size of the second word, the phrasally stressed one, is relevant for determining whether fusion takes place or not: compare $\overset{\text{w}}{\text{w}}\overset{a}{\text{n}}\overset{\text{a}}{\text{r}} + \overset{\text{r}}{\text{a}} \rightarrow \overset{\text{w}}{\text{a}}(\overset{\text{w}}{\text{a}}\overset{\text{r}}{\text{a}}\overset{\text{r}}{\text{a}})$
‘new house’ with fusion and (‘qʷә) (‘daçә) ‘beautiful pig’ without fusion. The relevant constraint to produce this asymmetry is FtBin (*Φ); it is defined in (24).

(24) FtBin (*Φ): The primary stressed foot of the prosodic phrase is binary at either the moraic or syllabic level.\footnote{As the associate editor points out, the division of FtBin into separate constraints referring to different levels of prominence parallels Hayes’ (1995:87) distinction between strong and weak prohibitions on degenerate fee (see also Coetzee 2004 for the distinction couched within OT). Interestingly, though, the relationship between stress level and the strength of the binarity requirement is different in Hayes’ account than in the present one. Whereas Hayes’ shows that languages distinguishing between strong and weak bans on degenerate feet more stringently enforce binarity in syllables receiving secondary word-level stress compared to those with primary word-level stress, Kabardian enforces binarity more strictly in phrase-level stressed syllables than in syllables receiving word-level primary stress.}

The ranking of FtBin (*Φ) above GramWD=PrWD is exemplified in (25). Prosodic words are enclosed in {} and prosodic phrases in \(\{\}\).

(25)  
\[
\begin{array}{|c|c|c|}
\hline
\text{\[\text{ʃә + п}Ȼ/ \text{\textquoteleft horse + new\textquoteright}\]} & \text{FtBin (*Φ)} & \text{GramWD=PrWD} \\
\hline
\{\{[ʃәп}Ȼ\}\}_\omega \{[п}\}_\phi & \ast & \ast ! \\
\{\{\text{\textquoteleft horse\textquoteright}\}_\omega \{[п}\}_\phi & \ast & \ast ! \\
\hline
\end{array}
\]

The first candidate violates GramWD=PrWD, since the two grammatical words fail to constitute independent prosodic words as required by the constraint. The second candidate commits a fatal violation of higher ranked FtBin (*Φ), however, because its phrasal stressed foot is monomoraic. If the second word is larger than (C)CV and can thus be parsed into a canonical foot, fusion is blocked by GramWD=PrWD. GramWD=PrWD thus outranks the generic FtBin constraint banning monosyllabic feet (26).

(26)  
\[
\begin{array}{|c|c|c|}
\hline
\text{\[\text{Ђә + п}wәf \text{\textquoteleft man + skinny\textquoteright}\]} & \text{GramWD=PrWD} & \text{FtBin} \\
\hline
\{\{[Ђәп}wәf\}\}_\omega \{[п]\}_\phi & \ast & \ast ! \\
\{\{[Ђәп}wәf\}\}_\omega \{[п]\}_\phi & \ast & \ast ! \\
\hline
\end{array}
\]

The second candidate is parsed as a single prosodic word in which the first grammatical word is part of the same prosodic word as the second grammatical word, thereby violating GramWD=PrWD.\footnote{As the associate editor points out, the division of FtBin into separate constraints referring to different levels of prominence parallels Hayes’ (1995:87) distinction between strong and weak prohibitions on degenerate fee (see also Coetzee 2004 for the distinction couched within OT). Interestingly, though, the relationship between stress level and the strength of the binarity requirement is different in Hayes’ account than in the present one. Whereas Hayes’ shows that languages distinguishing between strong and weak bans on degenerate feet more stringently enforce binarity in syllables receiving secondary word-level stress compared to those with primary word-level stress, Kabardian enforces binarity more strictly in phrase-level stressed syllables than in syllables receiving word-level primary stress.}
FtBin (Φ) is violated in phrases consisting of a word with a single (C)CV syllable. This demonstrates that all prosodic words must be parsed into prosodic phrases in keeping with the general principle of the prosodic hierarchy (Selkirk 1984, Nespor and Vogel 1986, Hayes 1989) requiring that lower constituents in the hierarchy belong to higher constituents. The constraint capturing this requirement is Parse-PrWd (27).

(27) Parse-PrWd: Prosodic words belong to prosodic phrases.

The ranking of Parse-PrWd over FtBin (Φ) is shown in (28). The losing candidate is parsed into a prosodic word but not a prosodic phrase as indicated by the lack of phrasal stress.

(28)

<table>
<thead>
<tr>
<th>1′ə ‘man’</th>
<th>Parse-PrWd</th>
<th>FtBin (Φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ə: {1′ə}ω</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>{1′ə}ω</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

Thus far, we have accounted for cases of fusion but have not tackled the allomorphy involving final schwa. First, let us consider allomorphs lacking final schwa. The constraint responsibility for the absence of final schwa in Kabardian reflects a cross-linguistically common type of restriction observed, for example, in Yupik (Reed et al. 1977), Chukchi (Kenstowicz 1994), Moroccan Arabic (Dell and Elmedlaoui 2002), and Javanese (Horne 1974). In these other languages, the ban on final schwa is bounded by the word. In Kabardian, this restriction must be must be narrowed to phrase-final position for reasons that are discussed in section 6. The constraint against phrase-final schwa is formulated in (29).

(29) *Final ə: /ə/ does not occur at the right edge of a prosodic phrase.

One strategy for honoring the constraint against final schwa is to change schwa vowels to another vowel quality in final position, as in Yupik (Reed et al. 1977), which displays an alternation between schwa and the low vowel /a/, whereby schwa in non-final position alternates

---

13 A third candidate, in which the first (monomoraic) root is not parsed into any prosodic word (and thus does not display rounding assimilation), 1′ə (r”ur) would violate a higher ranked constraint Parse-σ, which is only violated by suffixes falling outside of the prosodic word (section 4.2).
with /a/ in final position. Rather than changing the quality of word-final schwa, Kabardian instead opts to delete it. This means that IDENT-IO is ranked above MAX-IO, as (30) illustrated.

(30)

<table>
<thead>
<tr>
<th>/qʷə + fʼə/ ‘pig + good’</th>
<th>*FINAL ə</th>
<th>IDENT-IO</th>
<th>MAX-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>{ (qʷəf’) }_ω</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>{ (qʷəf’ə) }_ω</td>
<td>!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>{ (qʷəf’ə) }_ω</td>
<td>!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*FINAL ə is violated in phrases consisting of a monosyllabic root ending in schwa. This is due to the overriding requirements (not formulated here) that each foot have a head, i.e. at least one syllable, and that each syllable have a head, i.e. a nucleus (see also Peterson’s 2007 account of Kabardian, which follows Kuipers 1960 in assuming that schwa is not present underlyingly).

It may be noted that the distribution of schwa in both monosyllables and polysyllables is correctly produced whether schwa is assumed to be underlying, as in most analyses of Kabardian, or not, as in Kuipers’ (1960) approach. In the case of polysyllabic prosodic words, a highly ranked *FINAL ə will ensure that final schwa fails to surface. In monosyllabic words, the foot- and syllable-headedness constraints ensure that schwa surfaces in final position.

The fact that a light phrase final root fuses to a preceding root indicates that Kabardian elects not to beef up the second root through root-internal augmentation processes that would obviate the need for fusion. Thus, the vowel in the second root fails to lengthen, indicating that DEP-IO(μ) is ranked above GRAMWD=PRWD. Nor does the vowel lengthen in a CV root constituting an independent phrase, demonstrating that DEP-IO(μ) outranks FtBIN (’Φ). Both of these rankings are shown in (31).

(31)

<table>
<thead>
<tr>
<th>/wənə + j’a/ ‘house + new’</th>
<th>DEP-IO(μ)</th>
<th>FtBIN (’Φ)</th>
<th>GRAMWD=PR WD</th>
</tr>
</thead>
<tbody>
<tr>
<td>{ (wənʃ’) }_ω</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>{ (wənə) }_ω</td>
<td>!</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>‘skin’</td>
<td>DEP-IO(μ)</td>
<td>FtBIN (’Φ)</td>
<td>GRAMWD=PR WD</td>
</tr>
<tr>
<td>{ (’fn) }_ω</td>
<td>!</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>{ (’fa:) }_ω</td>
<td>!</td>
<td>!</td>
<td>!</td>
</tr>
</tbody>
</table>
A final possibility to exclude is the addition of an epenthetic consonant without a mora in order to shield a schwa from the right edge of the word. The ranking of Dep-IO(C) over *Final ə effectively eliminates this option (32).

(32)

<table>
<thead>
<tr>
<th>/ʃə/ ‘horse’</th>
<th>Dep-IO(C)</th>
<th>*Final ə</th>
</tr>
</thead>
<tbody>
<tr>
<td>fə</td>
<td>{(“ʃə”)}_0 f</td>
<td>*</td>
</tr>
<tr>
<td>fə</td>
<td>{(“ʃə”)}_0 f</td>
<td>*!</td>
</tr>
</tbody>
</table>

6. Epenthesis and prosodic fusion

A further complication arising in fusion contexts is that a schwa is inserted between the two roots undergoing fusion if the first root ends in a consonant (Colarusso 1992) (33).

(33)

fəz + fχₐ → fəzχₐ ‘mature woman’
woman + mature

gjød + fə → gjødəφ ‘chicken skin’
chicken + skin

fåd + fjₐ → fjødφₐ ‘new donkey’
donkey + new

Final schwa deletion and epenthesis can co-occur in the same fused forms (34).

(34)

fəz + f’ə → fəzφ ‘good woman’
woman + good

wəs + ɔ → wəsəφ ‘old snow’
woman + old

wəɛd + p’ki’ə → wəɛdəp’ki’ ‘melody’ (Colarusso 1992:42)
song + frame

məl + psə → mələps ‘melt water’ (Colarusso 1992:42)
ice + water
The fused forms displaying epenthesis are clearly single prosodic words parallel to those not involving epenthesis. Stress patterns, vowel coloring, and stop voicing all indicate the prosodic word status of these forms. The epenthetic schwa is stressed if it stands in a penult preceding a light final syllable: \( g\dot{\text{o}}\text{o}d\text{a}f\text{a} \) ‘chicken skin’. The epenthetic vowel assimilates to a following consonant: \( g\dot{\text{o}}\text{d}\text{o}\text{u}\text{c} \) ‘male chicken’. A stop preceding an epenthetic schwa is voiced: \( \text{[d}d\text{a}]\text{v} \) ‘new donkey’ (see Figure 3 in section 4). Schwa epenthesis also provides a diagnostic for the lack of fusion when either morphosyntactic or phonological conditions on fusion are not met. For example, there is no epenthetic schwa between the roots comprising the phrase ‘\( \text{\text{v}}\text{\text{v}}\text{m} \) ‘be: ‘rich cattle’, because the second root ‘be: ‘rich’ is heavy.

As it turns out, epenthesis reflects one strategy to satisfy a more wide reaching constraint against coda consonants. This constraint, \( *\text{CODA} \), bans coda consonants within the prosodic word (35).

(35) \( *\text{CODA} \): No coda consonants within the prosodic word.

Coda consonants within the prosodic word are limited to four contexts. First, they are found root-finally either followed by a suffix (36a) or not (36b). Second, they are found root-medially (36c). Finally, they arise when the ergative prefixes, which consist of a single consonant, come into contact with a following root (36d).

(36)
(a) 
\{\text{w}\text{\text{v}}\text{s}\}_\text{\text{w}} \text{t} ‘\text{It was snow’}
\{\text{f}\text{\text{v}}\text{z}\}_,\text{\text{v}} \text{k’} ‘\text{woman (instrumental)\text{v}}
\{\text{f}\text{\text{v}}\text{d}\}_,\text{\text{v}} \text{m} ‘\text{It’s not a donkey’}
(b) 
\text{\text{v}}\text{\text{v}}\text{z} ‘\text{forest’}
\text{\text{v}}\text{\text{v}}\text{d} ‘\text{chicken’}
\text{\text{v}}\text{\text{v}}\text{m} ‘\text{ice’}
(c) 
\text{\text{t}\text{e}}\text{\text{p}} ‘\text{\text{t}}\text{\text{e}}\text{\text{g} ‘plate’}
\text{\text{h}}\text{\text{e}}\text{\text{\text{n}’\text{\text{c}}\text{\text{h}}\text{\text{o}}\text{\text{p}} ‘soup’}
\text{\text{c}}\text{\text{h}}\text{\text{a}}\text{\text{r}}\text{\text{z}}\text{\text{a}}\text{\text{r} ‘good’}
(d)
q’å- f- tç-a: -s ‘You (pl) started to write it’ [q’åf.tça:s]
HOR- 2PLERG- write -PST -DECL

q’ø- dø- p- tø-a: -s ‘You loaned the book to us’ [q’ødøptøa:s]
HOR- 1PLERG- 2ERG- give -PST -DECL

q’ø- s- tç-a: -s ‘I wrote’ [q’østça:s]
HOR- 1ERG- write -PST -DECL

Although verbal suffixes fall within the prosodic word, the structure of verb roots and verbal suffixes preclude examination of the applicability of the anti-coda constraint in suffixed verbs. Verb roots end in a vowel and there are no verbal suffixes either in isolation or in combination with one another that create closed syllables that are not in final position of the prosodic word.

The failure of epenthesis to apply following root-final consonants falls out from the ranking of the constraint against final schwa above the anti-coda constraint (38). (Prosodic bracketing is omitted from the tableau in (37) and from other subsequent ones where candidates do not differ in their constituency.)

(37)

<table>
<thead>
<tr>
<th>/møz/ ‘forest’</th>
<th>*FINAL ø</th>
<th>*CODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>møz</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>møzø</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

Consonants also fail to delete in order to honor the anti-coda constraint, indicating that Max-IO is ranked above *CODA (38).

(38)

<table>
<thead>
<tr>
<th>/søbøp/ ‘use, benefit’</th>
<th>Max-IO</th>
<th>*CODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>søbøp</td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>‘søbøp</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

The absence of epenthesis root-medially finds a natural explanation in terms of the tendency for faithfulness to be stronger in roots than in affixes (McCarthy and Prince 1995). In the case of Kabardian, a contiguity constraint referring to the root (cf. Kenstowicz 1994 for a similar analysis of Chukchi) ensures that contiguous segments in the input remain contiguous on the surface. This constraint, Contiguity-IO, militates against the insertion of epenthetic material within the root.
(39) **CONTIG-IO**\textsubscript{ROOT}: No intrusion or deletion of segments between segments belonging to the root that are contiguous in the input (McCarthy and Prince 1995).

**CONTIG-IO**\textsubscript{ROOT} is ranked above *CODA as indicated by the failure of epentheses to apply within roots (40).

(40) \[
\begin{array}{|c|c|c|}
\hline
\text{tēpēq} & \text{CONTIGUITY-IO} & * \text{CODA} \\
\hline
\text{tēpq} & & ** \\
\hline
\text{tēpq} & *! & \\
\hline
\end{array}
\]

In the case of the ergative prefix, inserting an epenthetic vowel is not an attractive option to eliminate the coda consonant since the ergative prefixes are contrasted with the absolute prefixes on the basis of the occurrence or non-occurrence of schwa. The ergative prefixes consist of simply a consonant while the absolutive prefixes corresponding in person and number consist of the same consonant plus schwa. This difference yields transitive vs. intransitive minimal pairs differing in whether they have a schwa or not, as noted by Catford (1984): stčaš ‘I wrote (trans.)’ vs. sātčaš ‘I wrote (intrans.)’. The blocking of epenthesis following the ergative prefix thus reflects an overriding morphological anti-homophony constraint (not formulated here, but see Crosswhite 1999, Kenstowicz 2002, Albright 2003, Gessner and Hansson 2004, Ichimura 2006, and Łubowicz 2007 for anti-homophony constraints in OT). Other than the ergative prefix, all other prefixes in Kabardian (17 cited in Abitov et al. 1957) have the shape CV reflecting the general dispreference for codas outside of the root.

In light of the general avoidance of clusters within prosodic words except for the contexts just discussed, the insertion of schwa between roots in prosodically fused forms may be viewed as a case of the emergence of the unmarked (McCarthy and Prince 1994). *CODA is ranked above DEP-IO(\(\mu\)), thereby accounting for the inter-root epenthesis observed in fused forms.\(^\text{14}\)

\(^{14}\) In order to account for the fact that the epenthetic vowel in Kabardian is schwa rather than /\(\text{e}^\text{\textasciitilde}\)/, we follow Gouskova’s (2003) analysis of schwa in Lillooet in assuming a series of constraints that ban epenthesis of different vowel qualities. These constraints, termed RECOVER constraints by Gouskova, are universally ranked such that constraints banning more sonorous vowel qualities are ranked above those prohibiting less sonorous vowels. Being the least sonorous vowel, schwa is thus the ideal epenthetic vowel.
Another failed candidate opts to delete one of the consonants comprising the cluster instead of inserting a vowel to break up the cluster. The fact that epenthesis rather than deletion is employed to avoid coda indicates that MAX-IO is ranked above DEP-IO(µ) (42).

*CODA is also ranked above GRAMWD=PRWD, as forms undergoing epenthesis also undergo fusion (43).

At first glance it might seem as if FTBIN (Φ) would successfully rule out the losing candidate in the above tableau. However, FTBIN (Φ) is ranked below DEP-IO(µ), as evidenced by the failure of vowels to lengthen in monosyllabic phrasally stressed feet, i.e. \{\{('s)\}_\omega\}_{\phi} \not\{\{('s)\}_\omega\}_{\phi}

It thus must be a constraint ranked above DEP-IO(µ), namely *CODA, that is responsible for the downfall of the losing candidate in (43).

*CODA is ranked below certain markedness constraints. The fact that the deletion of final schwa in polysyllabic forms creates a coda consonant means that the ban on final schwa is ranked above *CODA. Futhermore, the failure of final schwa to change to a different vowel indicates that *CODA is ranked below IDENT-IO. Both of these rankings are illustrated in (44).
(44)

<table>
<thead>
<tr>
<th></th>
<th>/q\textsuperscript{w}e + f\textsuperscript{\textacute{a}}/ ‘pig + good’</th>
<th>IDENT-IO</th>
<th>*FINAL \textael</th>
<th>*CODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\varepsilon)</td>
<td>q\textsuperscript{w}ef\textsuperscript{\textprime}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q\textsuperscript{w}ef\textsuperscript{\textacute{a}})</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>(q\textsuperscript{w}ef\textsuperscript{\textacute{a}}\textsuperscript{\textprime})</td>
<td></td>
<td>!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consideration of an additional challenger to the winner in (45) reveals a further crucial ranking that only emerges after the constraint rankings required to produce the correct epenthesis patterns are integrated into the analysis of forms involving schwa deletion without epenthesis. This candidate \(\{((q\textsuperscript{w}e))\}_\omega \{(f\textsuperscript{\textacute{a}}\textacute{\textacute{a}}))\}_\omega f\) \(\textphi\), in which the schwa in the second root is preserved and the two roots are parsed as separate prosodic words, would appear to be eliminated by the ranking of FtBIN \(\langle \Phi \rangle\) over GRAMWD=PRWD. However, the winning candidate violates two constraints ranked above FtBIN \(\langle \Phi \rangle\) which the failed candidate does not violate: MAX-IO and *CODA, thereby precluding the possibility that FtBIN \(\langle \Phi \rangle\) is the constraint that blocks \(\{((q\textsuperscript{w}e))\}_\omega \{(f\textsuperscript{\textacute{a}}\textacute{\textacute{a}}))\}_\omega f\) \(\textphi\). We now consider why MAX-IO and *CODA are ranked above FtBIN \(\langle \Phi \rangle\). The ranking of *CODA, and thus MAX-IO, above FtBIN \(\langle \Phi \rangle\) is the result of a series of transitivity relations as follows. We have already seen that MAX-IO outranks *CODA (see tableau 39). *CODA is ranked above DEP-IO(\(\mu\)) (see tableau 42), which, in turn, is superordinate to FtBIN \(\langle \Phi \rangle\), as evidenced by the failure of vowels to lengthen in phrasally stressed CV feet, i.e. \(\{((f\textsuperscript{\textacute{a}}))\}_\omega f\) \(\textphi\) not \(*\{((f\textsuperscript{\textacute{a}}))\}_\omega f\) \(\textphi\). This means that the constraint that knocks out the non-fused challenger \(\{((q\textsuperscript{w}e))\}_\omega \{(f\textsuperscript{\textacute{a}}\textacute{\textacute{a}}))\}_\omega f\) \(\textphi\) must be ranked above both MAX-IO and *CODA. The correct constraint is *FINAL \textael, which is violated by the challenger but not the winner, as shown in (45).

(45)

|        | /q\textsuperscript{w}e + f\textsuperscript{\textacute{a}}/ ‘pig + good’ | *FINAL \textael | MAX-IO | *CODA | FtBIN \(\langle \Phi \rangle\) | GRAMWD=PRWD |
|--------|----------------------------------------------------------|................|----------|-------|----------------|------------|
| \(\varepsilon\) | \((q\textsuperscript{w}ef\textsuperscript{\textprime}\))\_\omega f\textphi |           | *        | *     |               | \(*\)      |
| \(\{((q\textsuperscript{w}e))\}_\omega \{(f\textsuperscript{\textacute{a}}\textacute{\textacute{a}}))\}_\omega f\) \(\textphi\) |               | !        |           |       |               | \(*\)      |

The ranking of *FINAL \textael over GRAMWD=PRWD has implications for the characterization of the prosodic domain referenced by *FINAL \textael, which bans phrase-final schwa (see Flack 2009 on markedness constraints bounded by different prosodic domains). If *FINAL \textael were bounded by the word rather than the phrase, there would be no way to ensure that a final schwa in a word followed by a word larger than CV within the same phrase is not deleted. For example, the
phrase $\{(l^\prime \sigma)\}_{\omega} \{({}^*u_r)\}_{\omega} \phi$ ‘skinny man’ would be incorrectly predicted to undergo fusion and surface as $\ast\{\{(l^\prime \sigma)\}_{\omega} \{({}^*u_r)\}_{\omega} \phi \}$ given the ranking of $\ast\text{FINAL } \sigma$ over $\text{GRAMWD}=\text{PRWD}$. By constraining $\ast\text{FINAL } \sigma$ to refer to phrase-final position, the schwa at the end of the first word in $\{(l^\prime \sigma)\}_{\omega} \{({}^*u_r)\}_{\omega} \phi$ is allowed to surface and fusion is correctly blocked.

The final constraint rankings (produced within OTSoft using Graphviz, version 2.22, www.graphviz.org) are summarized in (46), where crucial rankings are indicated by arrows pointing from the higher ranked to the lower ranked constraint.

(46)

7. Kabardian and the typology of minimality effects

Kabardian minimality effects differ in two ways from those observed in other languages. First, the minimality requirement in Kabardian is scalar. Words consisting only of consonants are completely banned, while monomoraic words are avoided wherever there is the possibility of
fusion to a preceding word. This process of fusion ensures that words consist minimally of a single heavy syllable where the necessary prosodic and morphosyntactic conditions for fusion are present. The scalar nature of minimality in Kabardian has been attributed here to a combination of a foot-binarity constraint operating over phrasally stressed feet coupled with a higher ranked foot monomoronicity constraint requiring that feet contain at least one mora.

This latter constraint is likely universally inviolable, as a violation of it would entail the existence of a word consisting of a single non-syllabic consonant. Although there are languages in which certain words may consist of only consonants, e.g. Berber (Dell and Elmedlaoui 1984, 2002), Bella Coola (Bagemihl 1991), words in these languages invariably contain a consonant that functions as a syllable nucleus, thereby honoring the requirement on foot monomoronicity.

7.1. Kabardian and the typology of minimality

Languages differ in their minimal word requirements. For example, whereas the smallest prosodic word in Chickasaw (Munro and Willmond 1994) is CVV, in Mongolian (Hangin 1986), both CVV and CVC monosyllables are well-formed (as are disyllables), In Lardil (Hale 1973, Wilkinson 1995), on the other hand, words are minimally disyllabic. When conflated across languages, the minimality hierarchy in (48) emerges (Garrett 1996), in which the existence of prosodic words of a given shape implies the occurrence of prosodic words to the left within the hierarchy, assuming that independent restrictions, e.g. a ban on closed syllables, the absence of long vowels, etc. do not preclude any of the permitted templates.

(47) Word minimality hierarchy (Garrett 1996)

<table>
<thead>
<tr>
<th>Larger</th>
<th>Smaller</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCV</td>
<td>CVV</td>
</tr>
<tr>
<td>CVC</td>
<td>CV</td>
</tr>
</tbody>
</table>

Minimal word requirements may either exist as static restrictions on the lexicon, as in Chickasaw and Mongolian, or may induce phonological processes that conspire to ensure that words meet the minimality requirement. For example, glottal stop is inserted to ensure that underlying CV words meet the CVC minimality requirement in Cupeño (Crowhurst 1994), as in (48).

(48) Glottal stop epenthesis in Cupeño (Crowhurst 1994):

/tʃi/  tʃiʔ ‘gather’
/hu/   huʔ ‘fart’
/kwa/  kwaʔ ‘eat’
The strategy taken to bolster words to meet the binarity requirement in Kabardian is typologically unusual compared to that observed in Cupeño. In most languages, the requirement that a word consist minimally of a bimoraic foot is satisfied either through syntagmatic constraints on the lexicon or through active word-internal phonological processes. Three types of processes for satisfying minimality at the word level are observed depending on the stringency of the minimal word requirement. One strategy exemplified by Cupeño is epenthesis of a consonant if both CVV and CVC are minimal words. In some languages, a vowel may be lengthened in monosyllables in order to satisfy a minimality requirement. Thus, in Northern Sámi (Nielsen 1926), short vowels in monosyllabic function words lengthen if they stand as independent prosodic words rather than prosodically adjoining to an adjacent word.

In other languages imposing a more stringent disyllabic minimality requirement, vowel epenthesis is employed to repair words that would otherwise be monosyllabic. For example, the disyllabic minimality restriction holding of verbs in Minto (Hargus and Tuttle 1997) is satisfied by insertion of a pleonastic schwa in otherwise unprefixed monosyllabic verbs (49).

(49) Vowel epenthesis in Minto (Hargus and Tuttle 1997):
- ʈx ‘he/she is crying’ (cf. dnx ‘the man is crying’)
- ʙæ ‘it’s cooking’ (cf. ſk’æbæ ‘fish is cooking’)
- ʃɑʃ ‘it’s melting’ (cf. ſk’о ſk’о ʃ ‘bear fat is melting’)

In other languages with a disyllabic minimality requirement, an otherwise regular process of vowel deletion may be suspended if it would create a subminimal monosyllabic word. For example, a process of final vowel deletion (Hale 1973, Wilkinson 1995) is blocked in Lardil in disyllables so that they do not become monosyllabic.

All of these strategies for satisfying minimality requirements ensure that a grammatical word retains its prosodic independence. In constraint ranking terms, these strategies all entail a highly ranked foot binarity constraint as well as a highly ranked GramWd=PrWd, which ensures that the mapping between grammatical words and prosodic words is one to one. The foot binarity constraint can be operative at either the moraic or syllabic level depending on whether the language allows words consisting of a single heavy syllable or requires that words be minimally two syllables. These languages differ in the faithfulness constraint that is violated by the repair operation employed to satisfy minimality. In all languages that do not employ
fusion to satisfy minimality, \textsc{dep-\textit{io}(\mu)} is ranked low and \textsc{ram wd}=\textsc{pr wd} is ranked high. These languages differ in the ranking of three other constraints: a constraint against long vowels, *\textsc{longv}, a constraint against vowel insertion, \textsc{dep-\textit{io}(v)}, and a constraint against consonant insertion, \textsc{dep-\textit{io}(c)}. In languages that insert an epenthetic consonant, e.g. Cupeño, \textsc{dep-\textit{io}(c)} is low ranked. In languages adding an epenthetic vowel, e.g. Minto, \textsc{dep-\textit{io}(v)} joins \textsc{dep-\textit{io}(\mu)} at the bottom tier of the constraint hierarchy. Languages such as Northern Sámi, that employ vowel lengthening to honor minimality, rank *\textsc{longv} and \textsc{dep-\textit{io}(\mu)} low in the constraint hierarchy. Finally, the Kabardian response to employ fusion as a means to satisfy minimality results from ranking \textsc{ram wd}=\textsc{pr wd} below the other four pertinent constraints. The various language-specific strategies for satisfying minimality and the rankings they instantiate are summarized in table 2.

Table 2. The typology of repair strategies for satisfying prosodic minimality

<table>
<thead>
<tr>
<th>RANKING</th>
<th>PATTERN</th>
<th>LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textsc{ram wd}=\textsc{pr wd}, \textsc{dep-\textit{io}(v)}, \textsc{dep-\textit{io}(c)}</td>
<td>Vowel lengthening</td>
<td>Northern Sámi</td>
</tr>
<tr>
<td>\textsc{longv}, \textsc{dep-\textit{io}(\mu)}</td>
<td>Vowel insertion</td>
<td>Minto</td>
</tr>
<tr>
<td>\textsc{dep-\textit{io}(\mu)}</td>
<td>Consonant insertion</td>
<td>Cupeño</td>
</tr>
<tr>
<td>\textsc{dep-\textit{io}(\mu)}, \textsc{dep-\textit{io}(v)}</td>
<td>Prosodic fusion</td>
<td>Kabardian</td>
</tr>
</tbody>
</table>

7.2. Kabardian prosodic fusion in relation to other word formation processes

Interestingly, the Kabardian minimality-driven process of fusion superficially resembles some other word formation processes, notably cliticization and compounding, though it differs from

\footnote{We are not aware of any languages that employ consonant lengthening to satisfy word minimality, though this is a logical possibility. In fact, many languages beef up stressed light syllables through consonant lengthening (Hayes 1995).}
these phenomena in certain important respects. We consider these other processes and their relation to fusion here briefly.

7.2.1. Fusion as cliticization

Kabardian prosodic fusion is similar in certain respects to cliticization, a process involving attachment of a function word, e.g. pronoun, adposition, to a content word that functions as a prosodic host. For example, pronouns in Spanish cliticize to verbs: *Dá me lo* ‘Give me it’ (=give + me + it) (see Miller and Monachesi 2003 for an overview of clitics in Spanish and other Romance languages). Similarly, the latching of unstressed prepositions, articles and pronouns onto open class lexical items in English may be viewed as another type of cliticization: *on cars, an axe, Read it!*

Clitic attachment is a cross-linguistically common phenomenon that shares with Kabardian fusion its grouping together of multiple grammatical words into a single prosodic word. Cliticization characteristically differs, however, from fusion in certain respects. First, the fused forms in Kabardian display stress patterns that conform to the regular word-level stress rules holding of non-fused forms. This means that roots surfaceing as a single consonant that has undergone fusion to a preceding root fall in a stressed syllable, e.g. *wənå-Z* ‘new house’. Typically, though not without exception (see Klavans 1985), clitics are unstressed. For example, monosyllabic function words in English often prosodically attach to an adjacent content word (Zwicky 1970, Selkirk 1984, 1995, Kaisse 1985). Thus, the article *an* in the sentence *He saw an ánt* is unstressed, as evidenced by its reduced vowel [ə], even though a comparable disyllabic noun ending in a C + coronal cluster (Hammond 1999) would be expected to have penultimate stress, e.g. *förest, légend*. Similarly, in the Spanish form *Vénde me lo* ‘Sell it to me’ (=sell + me + it) containing two postverbal clitics, stress falls on the first syllable of the verb root, the preantepenultimate syllable of the entire clitic group, even though stress in Spanish is typically restricted to one of the final three syllables of a word (Harris 1983).

A further feature of Kabardian fusion that differs from the prototypical case of cliticization is the fact that the words that undergo fusion in Kabardian are full-fledged content words. In contrast, cliticized elements are characteristically function words that do not occur prosodically independent of its host. There is, however, at least one other language that displays
cliticization of content words as in Kabardian. In Macedonian (Franks 1989)\(^\text{16}\), there are a few morphosyntactic constructions in which a content word adjoins to a preceding word to form a single expanded domain of stress, which in other circumstances is bounded by the word. Stress falls on the antepenultimate syllable of words with at least three syllables and on the first syllable of shorter words. Multi-word constructions that constitute a single stress domain include modifier + noun sequences, numerous pre, position + noun sequences, and (iii) negation/interrogative + optional clitic clusters + verb sequences. For example, in the adjective + noun construction *suvó grozje* ‘dry grapes’ = ‘raisins’ and the preposition + noun combination *prekú glava* ‘over (one’s) head’ (Franks 1989:555), stress skips over the second word entirely and instead falls on the antepenultimate syllable of the phrase. The rejection of stress by the second element in phrases like *suvó grozje* (*súvo grózje*) and *prekú glava* (*préku gláva*) bears close resemblance to Kabardian fused forms, which also end in an unstressed root. Another point of similarity between the two processes is the confinement of both phenomena to particular morphosyntactic contexts.\(^\text{17}\)

7.2.2. Fusion as compounding

One other process with which Kabardian fusion shares certain properties is compounding. Like fusion and unlike cliticization, compounding often involves the combination of two open class lexical items, e.g. *blackboard, steamship, football*. The similarity between the two processes, however, ends there. Unlike fusion, compound words may display phonological properties that are anomalous for non-compounds. Thus, compounds in many, though not all, languages stress both members of the compound, as in English, which usually places a stronger stress on the left element of the compound and a secondary stress on the right member, e.g. *bláckbòard, stéamshìp, fóotbàll*. Furthermore, it is common for phonotactic restrictions holding of non-compounds to be violated in compounds. For example, the [kb] cluster in *blackboard* and the [tb] cluster in *football* are unattested in monomorphemic words in English. In contrast, fused forms in Kabardian are phonologically indistinguishable from non-fused forms on the surface. The only difference between fused and non-fused forms is the epenthesis of schwa between the

\(^{16}\) Thanks to the associate editor for bringing the Macedonian data to our attention.

\(^{17}\) Unfortunately, it is not clear from the literature on Macedonian that we have been able to access if there are other phonological diagnostics of the prosodic word other than stress that could be used to diagnose whether the multi-word stress domains of Macedonian behave like single prosodic words in other respects.
two roots comprising fused forms, a process that is unattested in non-fused forms. Perhaps the most salient difference, however, between Kabardian prosodic fusion and compounding is the motivation behind the two phenomena: whereas compounding is morphologically driven, prosodic fusion serves a clearly phonological goal in avoiding subminimal words.

In summary, prosodic fusion in Kabardian shares certain properties with the word formation processes of cliticization and compounding. However, it differs from prototypical instantiations of both these processes in certain respects. The phenomenon to which it appears to bear closest resemblance is the formation of multi-word stress domains in Macedonian, although it is unclear whether the extended stress domains of Macedonian are prosodically identical to single words with respect to properties other than stress.

8. Conclusions

The process of prosodic fusion in Kabardian expands the typology of strategies employed to satisfy prosodic minimality, but in a way predicted by the mechanism of constraint re-ranking intrinsic to OT. By demoting the requirement that grammatical words map to prosodic words in one-to-one fashion below faithfulness constraints banning insertion of moras and segments, subminimal words are free to combine in order to honor a constraint on foot binarity. Interestingly, the relevant binarity constraint in Kabardian is specific to phrasal stress, which accounts for the unidirectional nature of fusion whereby a subminimal word can fuse to a word to its left but not to its right.

References


Franks, Steven. 1989. The monosyllabic head effect. *Natural Language & Linguistic Theory* 7,
551-564.


Hargus, Sharon & Siri Tuttle. 1997. Augmentation as affixation in Athabaskan languages. 

*Phonology* 14, 177-220.


Hayes, Bruce, Bruce Tesar, and Kie Zuraw (2003) *OTSoft 2.3 software package*,

[http://www.linguistics.ucla.edu/people/hayes/otsoft/](http://www.linguistics.ucla.edu/people/hayes/otsoft/)


