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Stress or intonational prominence?
Word accent in Kazakh and Uyghur

Öner Özçelik

This paper investigates word stress/prominence in two Turkic languages, specifically Kazakh and Uyghur, and challenges the widespread assumption that the Foot is a universal constituent of the Prosodic Hierarchy (see e.g. Selkirk 1995, Vogel 2009). Instead, as was proposed for Turkish and French by Özçelik (2014, to appear), it is argued here that some languages, such as Uyghur, are footless, and thus, that the presence vs. absence of the Foot is parametric, thereby extending Özçelik's proposal to additional Turkic languages. We present three types of evidence for this proposal: (i) phonetic, (ii) formal phonological and (iii) syntactic (from syntax-prosody interface). Phonetic evidence, for example, demonstrates, based on the results of an experiment with native Uyghur speakers, that final prominence in (at least the predominant variety of) Uyghur is accompanied only by an optional "pitch" rise, and not by greater "intensity" or "duration". This is in stark contrast with the situation in Kazakh, in which, as with true iambic languages (i.e. languages with head-final feet), final prominence is also accompanied by greater duration, as evidenced by the results of an experiment with native Kazakh speakers. Languages that mark prominence only by a pitch rise (like Uyghur and Turkish) are classified, by several researchers, as pitch-accent languages, and not as stress-accent. The latter use duration and/or intensity, in addition to pitch (see e.g. Beckman 1986, Ladd 1996, Hualde et al. 2002). That is, although, on the surface, most Turkic languages seem to be the same in that they have finally prominent words, the source and nature of this prominence are different: it is an iambic foot for Kazakh, whereas it is footless intonational prominence for Uyghur and Turkish.

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1. Introduction

It is commonly assumed that prosodic constituents are organized into a hierarchy, where syllables are formed into feet, feet into prosodic words (PWds), PWds into phonological phrases (PPhs), and finally, phonological phrases into intonational phrases (Is). Furthermore, although there are various different adaptations of the Prosodic Hierarchy, it is assumed that all of these main constituents are universally available in every language (see e.g. Selkirk 1995, Vogel 2009), i.e. that every language has feet, PWds, etc., just as every language is assumed to have morphological words. In this paper, I argue, contra previous approaches, that the presence/absence

of the Foot is parametric; that is, while some languages, such as English, require every prosodic word (PWd) to have at least one foot, other languages, such as Turkish and Uyghur, are footless in the default case, or at least, their grammar does not assign foot structure (although the grammar can keep a foot that was assigned lexically). That Turkish grammar does not, in the usual case, parse syllables into feet has already been proposed in previous research (Özçelik 2014, and was later extended to French (Özçelik, to appear). Whether it is true for additional languages, or whether this holds true for, for example, all Turkic languages, remains to be investigated, however.

The first candidates that come to mind for a footless language are, of course, other Turkic languages, which share many linguistic characteristics with Turkish, and are generally assumed to have similar prosodic properties, e.g. in that prominence falls on the final syllable of words in most Turkic languages (see e.g. Johanson 1998, Schiering & van der Hulst 2010). Furthermore, as Johanson (1998) notes, there is a difference in many Turkic languages in the manifestation of regular final vs. (exceptional) non-final prominence; whereas final prominence is realized as pitch, non-final stress is dynamic stress-accent (which can also bear pitch), which can be taken to imply that final prominence may not involve stress to begin with. This phenomenon is, in fact, one type of evidence, among others, that Özçelik (2014, to appear) presents for the footless status of Turkish (final stress) based on experimental findings from Konrot (1981) and Levi (2005). The situation in other Turkic languages could be very similar to that in Turkish, as is predicted by Johanson's (1998) observations. However, although much research has been done on Turkish stress (see e.g. Johanson & Csató 1998, Hayes 1995, Inkelas 1999, Inkelas & Orgun 1995, 1998, Kaisse 1985, Kabak & Vogel 2001, Lees 1961, Lewis 1967, Özçelik 2014, to appear, Sezer 1983, Underhill 1976, van der Hulst & van de Weijer 1991), stress/prominence in other Turkic languages has rarely been studied. And the little research that is available does not present any experimental findings, or an in-depth discussion of cases that diverge from the norm, such as exceptional stress (see e.g. Alpysbaeva, Ismagulova & Turguzhanova 1995, Балақаев & Исқақов 1954, Баскаков et al. 1966, Batayeva 2013, Кайдаров 1997, Kirchner 1998, Krippes 1993, Muhamedowa 2016, Pratten & Omarova 1994, Somfai-Kara 2002 on Kazakh; Comrie 1997, Hahn 1991, Jiang et al. 2010, Liang 2009, Liang & Zhang 2008, 1998, Muti 2007, Yakup 2013 on Uyghur; Johanson 1998 on general Turkic). This paper aims to close this gap, and makes an initial attempt to shed light on the status of stress/prominence in two Turkic languages: Kazakh and Uyghur. In doing so, as much as it answers some previously unanswered questions, it also poses additional ones for future research to address.

The assumption that the Foot is a universal constituent of the Prosodic Hierarchy is held despite the fact that even when learning languages with foot structure, children's initial utterances do not contain any evidence of feet. In fact, children's initial outputs are not in the form of (the unmarked) binary feet; they are rather monosyllabic (Jakobson 1941/68), and critically monomoraic, utterances (see e.g. Fikkert

1994, Demuth 1995, Goad 1997). These findings do not receive a reasonable explanation under the assumption that the Foot comes as part of the Prosodic Hierarchy, and thus UG, given that children receive positive evidence containing foot structure from the beginning of the acquisition process. Thus, if the Foot is universal, it is not clear why children would not produce the unmarked form of prosodic words (PWds) from the very beginning, words composed of binary feet. If, on the other hand, the presence/absence of the Foot was parametric, and thus the Foot was available only in some languages, children could start the language acquisition process with footless utterances, and then add the Foot to their grammar based on positive evidence in learning a language that has foot structure, such as English. This would solve the problem posed by child language acquisition research, but would require the existence of footless languages, i.e. languages whose *grammar* does not assign feet, such as Turkish (Özçelik 2004, to appear).

In this paper, I argue that such languages do exist, and are not limited to Turkish. For example, having both regular and exceptional stress, Uyghur presents *formal* (as well as acoustic) evidence of lack of foot structure, both from the PWd-level and from facts at the syntax-prosody interface (PPh-level and beyond). In addition to formal evidence, I also present evidence in the form of acoustic correlates of prominence in reporting the findings of an experiment. Kazakh, on the other hand, I argue, differs from both Turkish and Uyghur in that it is a truly iambic language, one in which heads of feet are heavier in weight than dependents. Further, I also demonstrate, for Uyghur, that there are three different varieties as far as stress/prominence is concerned; although the footless Turkish-like variety is the predominant one, it is by no means the only variety, thereby partially accounting for the conflicting proposals raised for Uyghur stress in previous literature.
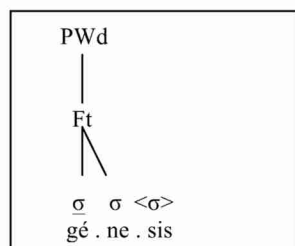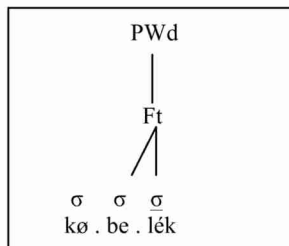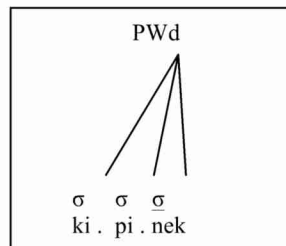
(1) a. English: b. Kazakh: c. Uyghur:
 /dʒɛnəsiz/ 'genesis' /købelek/ 'көбелек' /kipinek/ 'كىپىنەك'

On an account that views the presence/absence of the Foot as parametric, prosodic representations of the world's languages can be summarized as follows: Whereas (1a) illustrates the internal structure of a PWd for a footed trochaic language like English, (1b) demonstrates the same thing for the iambic counterpart of footed languages, i.e. languages like Kazakh. Finally, (1c) presents the prosodic representation of words for Uyghur, in which words are footless in the default case. Thus, although

in both Kazakh and Uyghur (or Turkish), primary prominence falls on the final syl-
lable of prosodic words, being iambic (and thus footed), Kazakh is more like Eng-
lish with respect to having feet than other Turkic languages.

(2) below presents the settings of the parameters of prosody that are assumed in
order to reach these assumptions. These will be motivated in the rest of this paper.

(2)	*English*	*Kazakh*	*Uyghur/Turkish*
a. Footedness	Yes	Yes	No
b. Extrametricality	Yes	No	N/A
c. Directionality	R-L	R-L	N/A
d. Foot Binarity	Yes	Yes	N/A
e. Headedness	Left(Troc)	Right(Iamb)	N/A
f. Iterativity	Yes	Yes	N/A

2. "Stress" in Turkic languages: the case of Turkish, Uyghur and Kazakh:

2.1. Regular stress

It is commonly assumed that "stress" in Turkic languages falls on the final syllable
of prosodic words (see e.g. Johanson 1998, Schiering & van der Hulst 2010).[1] (3)
below illustrates this for Turkish, the Turkic language whose stress pattern has most
commonly been investigated (see also Inkelas & Orgun 1998, Kabak & Vogel 2001,
Özçelik 2014, Sezer 1983, van der Hulst & van de Weijer 1991).

(3)   a. *kedí*   b. *kedi-lér*   c. *kedi-ler-ím*   d. *kedi-ler-im-dé*

      cat   cat-PL   cat-PL-POSS1SG   cat-PL-POSS1SG-LOC

      'cat'   'cats'   'my cats'   'on my cats'

Uyghur works very similarly to Turkish, as is illustrated in (4) below. As with Turk-
ish, each time a suffix is added, prominence moves to the rightmost syllable, demon-
strating that, as with Turkish, prominence is word-final in Uyghur. This is the line
held by most previous research on Uyghur prominence (e.g. Engesaeth et al. 2009,
Jiang et al. 2010, Liang & Zhang 2008, Muti 2007, Yakup 2013).

(4)   a. *müʃük*   b. *müʃük-lér* c. *müʃük-lir-ím*   d. *müʃük-lir-im-dé*

      cat   cat-PL   cat-PL-POSS1SG   cat- PL-POSS1SG-loc

      'cat'   'cats'   'my cats'   'on my cats'

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1   There are Turkic languages that do not comply with this generalization, such as Chuvash,
    which is a Default-to-Opposite Edge stress language, in which leftmost light syllable is
    stressed in words that are composed only of light syllables, and when a heavy syllable is
    available, the rightmost heavy syllable bears stress (Krueger 1961, Dobrovolsky 1999,
    Gordon 2000).

One widely cited account that differs from mainstream descriptions of Uyghur, and posits Uyghur to be rather different from other Turkic languages is that of Hahn (1991) (see also Comrie 1997, among others), according to which stress is assigned to the last heavy syllable (CVC or CVV) in ultimate or penultimate position (e.g. LLH́, LHH́, LH́L), and if no such syllable exists, then primary stress is assigned to the final syllable of the word (e.g. LHLĹ, LLĹ, HLLĹ). To date, the differences between the two contrasting descriptions of Uyghur stress have not been addressed.

On the surface, Kazakh looks very similar to Turkish and Uyghur, as is illustrated in (5); the only apparent difference in Kazakh is the fact that the final open syllable is lengthened, as illustrated in (5d).

(5)   a. *almá*   b. *alma-lár*   c. *alma-lar-ím*   d. *alma-lar-im-dá:*
             apple   apple-PL   apple- PL-POSS1SG   apple- PL-POSS1SG-LOC
             'apple'   'apples'   'my apples'   'in my apples'

Closer investigation, however, reveals some interesting differences, all seemingly motivated by weight and complementing the picture of final lengthening observed in (5) (though see below). Examine the forms in (6).

(6)   a. *kép.ka*   b. *ʃe.gírt.ke*   c. *der.ba.zá:*   d. *sa.rim.sák*
             'hat'   'grasshopper'   'door'   'garlic'

These data indicate that, at least in some varieties of Kazakh, syllable weight is crucial in determining which syllable bears stress within a given word; that is, heavy syllables attract stress, whether they are heavy due to the length of the nucleus vowel (i.e. CVV) or by means of having a coda consonant (i.e. CVC). Although, at a first look, these forms seem to be exceptional in the same way that Turkish and Uyghur have exceptional (non-final) stress (see (7) and (8)), I will argue in Section 5.2 that these are in fact part of the norm in Kazakh, and are thus different from Turkish and Uyghur. This is because weight plays a crucial role in the assignment of stress in this language, as will be revealed by experimental findings. Before moving on to a more detailed explanation of these forms in Kazakh, we first present a description of exceptional stress in the three languages.

2.2. Exceptional stress

When stress is non-final in Kazakh, Turkish and Uyghur, it is said to be exceptional. In general, there are two types of exceptional stress in these languages. One involves roots, and the other, which has been more commonly studied, involves a small set of suffixes. These suffixes, when available, cause non-final stress. In general there are two types of non-final stress driving suffixes. One involves pre-stressing suffixes, and the other stressed suffixes.

2.2.1. Pre-stressing suffixes

(7), (8) and (9) below illustrate pre-stressing suffixes in Turkish, Uyghur and Ka-
zakh respectively. (Pre-stressing suffixes are underlined throughout the paper.) No-
tice that these suffixes, when available, cause stress to fall on the immediately pre-
ceding syllable, irrespective of where in the word they are located.

(7) a. *dinle-dí*   b. *dinle-dí-mi*   c. *dinlé-me-di*
         listen-PAST   listen-PAST-Q   listen-NEG-PAST
         '(He) listened.'   'Did he listen?'   'He didn't listen.'

(8) a. *aŋli-dí*   b. *aŋli-dí-mu?*   c. *aŋlí-mi-di*
         listen-PAST   listen-PAST-Q   listen-NEG-PAST
         '(He) listened.'   'Did he listen?'   'He didn't listen.'

Note that these suffixes are (almost) always monosyllabic in Turkish and Uyghur,
and monosyllabic exceptional suffixes never exceptionally bear stress themselves
(i.e. are stressed despite other suffixes/syllables following); they are always pre-
stressing. The two languages do indeed have some suffixes that exceptionally bear
stress, but these are always bisyllabic (see section 2.2.2 below).

    Kazakh is also stated to have exceptional pre-stressing suffixes, most notably
pronominal agreement suffixes, examples of which are presented below in (9):

(9) a. *oqitiwʃí-min*   b. *oqitiwʃí-ma?*   c. *oqitiwʃi-lar-dán-biz*
         teacher-COP1SG   teacher-Q   teacher-PL-ABL-COP1PL
         'I am a teacher'   'teacher?'   'We are some/among the teachers'

2.2.2. Stressed exceptional suffixes

Turkish and Uyghur also have a set of suffixes that are exceptionally stressed, and
these are always bisyllabic. In addition, it is always the initial syllable of a bisyllabic
exceptional suffix that is stressed:

(10) Turkish
      gel-íyor-du
      come-CONT-PAST
      '(X) was coming'

(11) Uyghur
      kel-íwat-idu
      come-CONT-PRES
      '(X) is coming.'

Kazakh also has some stressed exceptional suffixes, but unlike Turkish and Uyghur, these can also be monosyllabic, such as the present suffix, which gets stressed, whether or not it is followed by a person agreement suffix, as is exemplified in (12).

(12)   Kazakh
        a. *ket-é-siŋ*   b. *bar-á-dɨ*
            leave-PRES-COP2SG   go-PRES-COP3SG
            'You (will) leave.'   'He goes/will go.'

3. Current account

This paper proposes a unified account of regular and exceptional stress in the two Turkic languages of Uyghur and Kazakh. The analysis for Kazakh is the simpler one and is very straightforward from the perspective of phonological theory: It is a typical iambic language, which is weight-sensitive, as is true for iambic languages in general, which are arguably always weight-sensitive (see e.g. McCarthy & Prince 1986, 1993, Hayes 1991, 1995, but cf. Altshuler 2009). Final stress in Kazakh words would then be ensured through Right-to-Left footing, meaning that a single weight-sensitive iambic foot is built at the right edge of a word, leading to word-final stress, e.g. [LL(LH́)].

The analysis for Uyghur is very different; though with its regular word-final prominence, it looks very similar to Kazakh. In Uyghur, we have noticed three different patterns of stress, depending on the speaker, all essentially different from Kazakh. In the most predominant pattern, as opposed to Kazakh, regular word-final "stress" is best analyzed not as stress, but as intonational prominence falling on the final syllable of prosodic words; i.e. it does not involve foot structure. Exceptional stress, however, does involve foot structure in Uyghur, and is trochaic. The idea here is very similar to that of Özçelik (2014, to appear). As with Turkish, the grammar of the predominant variety of Uyghur (according to our data) does not assign foot structure at all, but if certain morphemes (i.e. exceptional stress driving suffixes) are already footed in their underlying representation/lexicon, then they will be footed in the surface representation too (i.e. the output of the grammar in Optimality Theoretic terminology). In this proposal, the whole grammar is trochaic; it is just that Trochaicity is vacuously satisfied for words that do not have any feet at all (regularly stressed words), since there are no feet in these words to begin with. In sum, Turkish/Uyghur and Kazakh are very different under this proposal, with the former two being trochaic languages and the final one, Kazakh, iambic.

The prosodic grammars of the two types of Turkic languages are presented in the form of an OT style constraint ranking in (13) and (14) below.

(13) Kazakh: iambic with weight sensitivity
      IAMBIC, FT-BIN >> WSP² >> TROCHAIC

(14) Uyghur and Turkish: trochaic with no weight sensitivity
      TROCHAIC, FT-BIN >> FINAL-PROMINENCE >> IAMBIC

That is, Kazakh is a typical iambic language on this proposal, as is also illustrated in the following OT tableau.

(15)

	/alma:/	IAMBIC	FT-BIN	WSP	TROCHAIC
☞ a	[(almá:)]				*
b	[(álma)]	*!			
c	[(álma:)]	*!		*	*
d	[(almá)]			*!	
e	[al(má)]		*!	*	

Turkish and Uyghur, on the other hand, are both trochaic. The question that arises then is how a trochaic language receives prominence on the final syllable in the usual case (i.e. the so-called regularly stressed words). This is because regular "stress" in these two languages is not stress but is instead intonational prominence, and, as such, is not assigned through feet, but rather via an independent constraint FINAL-PROMINENCE, which places intonational prominence on the final syllable of PWds in the absence of foot structure. This is illustrated in (16) below for Uyghur (the predominant variety).

(16)

	/müʃük-lér/	TROCH	FT-BIN	FINAL-PROM	PARSE-σ
a	[mü.(ʃúk.ler)]			*!	*
b	[mü.(ʃük.lér)]	*!			*
c	[mü.ʃük.(lér)]		*!		**
☞ d	H% | [mü.ʃük.lér]				***

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2   Weight-to-Stress Principle (WSP) dictates (i) that stressed syllables are heavy, and (ii) that unstressed syllables are light, although not all linguists argue for both of the conditions, and there are variations in the literature (see e.g. Prokosch (1939), Chomsky & Halle (1968), Hayes (1981), Halle & Vergnaud (1987), Kager (1989), Prince (1990), Prince & Smolensky (1993), Burzio (1994), and Hammond (1999).

That is, although the language is trochaic, trochaicity does not become obvious unless one of the exceptional stress driving suffixes are available, as the language cannot assign foot structure to begin with.

When an exceptional suffix is available, however, things are a little different, because these suffixes already come footed in their UR, and given certain prosodic faithfulness constraints, they are footed in the SR, too. So we will need to update our constraint ranking presented above in (14) as follows.

(17)   TROCHAIC, FT-BIN >> ANCHOR-RIGHT >> ANCHOR-LEFT, FINAL-PROMINENCE
       >> IAMBIC

The Anchor constraints here basically ensure that whatever is footed in the input/UR is footed in the output of the grammar/SR. To be more specific, ANCHOR-RIGHT ensures that a foot edge that is at the right edge of a syllable in the input should surface at the right edge in the output. ANCHOR-LEFT is its left counterpart; that is, material that is at the left edge in the input should surface at the left edge in the output. Of course, all this assumes inputs that are already footed in the lexicon, in the sense of Özçelik (2014), as illustrated below for Uyghur for monosyllabic and bisyllabic exceptionally stressed suffixes respectively.

(18)   a.   Inputs (URs) for pre-stressing suffixes:
            (mi)$_{Ft}$
            NEG

       b   Inputs (URs) for stressed suffixes:
            (iwat)$_{Ft}$
            PRES-CONT

The fact that ANCHOR-RIGHT and Ft-BIN both rank above ANCHOR-LEFT ensure further that monosyllabic exceptional suffixes, such as (18a), surface as prestressing, i.e. not stressed, nor post-stressing, as illustrated in (19) below.

(19)   Monosyllabic exceptional suffixes: prestressing

	/aŋli-(mi)-di/	TROCH	FT-BIN	ANCHOR-RIGHT	ANCHOR-LEFT
a	[aŋ.li.(mí).di]		*!		
b	[aŋ.(li.mí).di]	*!			*
c	[aŋ.li.mi.dí]			*!	*
d	[aŋ.li.(mí.di)]			*!	
e	[aŋ.(lí.mi).di]				*

Here, since the suffix is monosyllabic, there is a violation of one of the Anchor constraints (i.e. ANCHOR-LEFT), so that a higher-ranking constraint, Ft-BIN, is satisfied. If both ANCHOR constraints were satisfied, as in (19a), it would lead to a violation of FT-BIN, as the foot would no longer be binary.

Indeed, for bisyllabic exceptional suffixes, we see a violation of neither constraint, as they are bisyllabic, and therefore keeping the underlying foot edges as they are will not incur a violation of FT-BIN, which is the reason why monosyllabic exceptional suffixes surface as pre-stressing (not ever stressed), whereas bisyllabic exceptional suffixes are stressed on their initial syllable. Examine (20).

(20)   Bisyllabic exceptional suffixes: stressed on the first syllable

/kel-(iwat)-idu/	TROCH	FT-BIN	ANCHOR-RIGHT	ANCHOR-LEFT
a [kel(íwat)idu]				
b [(kéli)watidu]			*!	*
c [keliwatidú]			*!	*

4. Experimental and acoustic evidence

The hypothesis put forward above rests on the premise that whereas Kazakh is a truly iambic language, both Turkish and Uyghur are footless. If this proposal, for which we presented formal evidence above, is correct, one type of empirical evidence would be supplied by acoustics. While iambic languages tend to be uneven in that the head of a foot is heavier than the dependent, which usually surfaces in the form of greater duration for stressed syllables (e.g. Bolton 1894, Woodrow 1909/1951, Hayes 1991, 1995), neither duration nor intensity are correlates of prominence in languages without stress; prominence in these languages is cued only by an F0 rise at the most (see e.g. Beckman 1986, Ladd 1996, Hualde et al. 2002). Languages without stress are, in turn, good candidates for being footless (Özçelik 2014, to appear).

Findings of previous research already offer some insight into the issue, although exclusively from Turkish. It has been found that whereas the correlates of Turkish exceptional stress include both significantly greater intensity and F0 rise on the stressed syllable, final prominence is accompanied only by an optional slight rise in F0 (see e.g. Konrot 1981, 1987, Levi 2005, Pycha 2006; see also Kamali 2011, 2014, Güneş 2015, and Ipek 2015 for work that not only provides additional evidence for these findings, but also takes into account the effect of prosodic constituency on prominence as well as the effect of speech acts on intonational tunes; see also Özçelik (2014, to appear) for an interpretation of these facts (along with other evidence) as indicative of lack of foot structure for Turkish. Since the Turkish facts are better established, we will focus on a comparison between Kazakh and Uyghur in the remainder of this paper. The hypotheses are (i) that stressed syllables should be longer than unstressed syllables in Kazakh, potentially also accompanied by

greater intensity, and (ii) that no such pattern should be observed in Uyghur, i.e. that stressed syllables should be of equal duration and intensity as unstressed syllables.

In order to test these hypotheses, as well as to draw a general picture of stress/ prominence in Kazakh and Uyghur, we conducted two experiments, one in Kazakh and the other in Uyghur, focusing on words with regular stress/prominence for the purpose of this study.[3]

4.1. Subjects

A semi-controlled production experiment was conducted with seven Kazakh and eight Uyghur native speakers. As was determined by a background questionnaire and a read-aloud task in Russian (for the Kazakh speakers), Chinese (for the Uyghur speakers), and English (for both, as the subjects were located in the USA), these speakers were near-monolingual; although Kazakh or Uyghur was their first language, they also had some non-native knowledge of English in addition to Russian or Chinese. The subjects ranged in age from 25 to 47. All of them lived in the USA, but regularly continued to speak their native language every day. Finally, all of them had at least college education, or, at the time of testing, were attending college or university.

4.2. Stimuli

The task involved responding to stimuli of various syllable structure profiles. There was a total of 70 words, all of which were common nouns. 20 of these were bisyllabic, comprised of all possible combinations of open vs. closed syllables (i.e. five under each condition, see below), and 40 were trisyllabic, again equally distributed among all possible combinations of open and closed syllables. The remaining 10 were four- and five-syllable words, composed of various different syllable structure profiles.

Tables 1 and 2 below present an example of each condition with bisyllabic and trisyllabic stimuli in Uyghur and Kazakh respectively. L represents a light/open syllable, whereas H represents a heavy syllable (although, strictly speaking, these were not necessarily heavy, but rather closed). These, along with the rest of the stimuli, were all regularly stressed.

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3   The prediction is that exceptional stress should behave differently regarding acoustic correlates. In this paper, we focused on regular stress, but findings of research on exceptional stress in languages like Turkish (see above) confirm this prediction, as do some preliminary findings on Uyghur exceptional stress (see below).

Table 1. Uyghur stimuli

Bisyllabic words:

LL	LH	HL	HH
paqa	supun	alma	jastuq
frog	soap	apple	pillow
پاقا	سۇپۇن	ئالما	ياستۇق

Trisyllabic words:

LLL	LLH	LHL	LHH	HLL	HLH	HHL	HHH
tʃymyle	kipinek	tʃiketke	køzeynek	taʃpaqa	zendʒiwil	xizmettʃi	ytʃurgutʃ
ant	butterfly	grasshopher	glasses	turtle	ginger	servant	eraser
چۈمۈله	كېپىنەك	چىكەتكە	كۆزەينەك	تاشپاقا	زەنجىۋىل	خىزمەتچى	ئۆچۈرگۈچ

Table 2. Kazakh stimuli

Bisyllabic words:

LL	LH	HL	HH
baqa	qalam	alma	dɛpter
бақа	қалам	алма	дәптер

Trisyllabic words:

LLL	LLH	LHL	LHH	HLL	HLH	HHL	HHH
ʒygeri	købelek	jumirtqa	sarimsaq	tasbaqa	qolʃatir	ørmekʃi	erkekter
жүгері	көбелек	жұмыртқа	сарымсақ	тасбақа	қолшатыр	өрмекші	еркектер
corn	butterfly	egg	garlic	turtle	umbrella	spider	men

4.3. Task and procedure

Subjects were placed in an experimental condition where they saw pictures of each stimulus. They had to utter the name of each stimulus first in isolation and then once again in a carrier sentence. The carrier sentences used for Uyghur and Kazakh are presented in (21) and (22) below respectively.

(21)   بۇ رەسمىدە بىر _____ بار.
          'There is an __X__ in this picture.'

(22)   Бұл суретте _____ бар.
          'There is __X__ in this picture.'

The stimuli were presented in three steps: First, the subjects had to guess the name of the pictured item, whose first letter was provided in order to make this task easier. At the second step, they had to utter the stimulus again. And at the third and final step, they finally produced the name of the item in a carrier sentence. Only the stimuli in the carrier sentence were transcribed and analyzed for acoustic measures.

The steps of the experimental procedure are exemplified below in (23) for Uyghur and Kazakh.

(23)   Uyghur and Kazakh; experimental steps:
        Step 1: guess the name of the pictured stimulus and utter it in isolation
        Step 2: Utter the stimulus again in isolation
        Step 3: Utter the stimulus in a carrier sentence ((21) for Uyghur; (22) for Kazakh)

The reason for not analyzing the words uttered in isolation was to prevent potential confounding variables such as utterance-final lengthening and phrase-level accent, both factors that tend to happen utterance-finally (Gordon 2014; Hyman 2014).

Each subject was tested individually and in a sound-attenuated booth. They were audio-recorded using Audacity (http://audacity.sourceforge.net) onto a Mac computer, with the help of an external Sony microphone, which was placed approximately 20 cm from the speakers' lips. The tasks were administered in the following order: a background questionnaire, production experiment, and the read-aloud tasks (in English and Chinese and/or Russian). The entire procedure took about one hour per subject.

4.4. Analysis

The responses were transcribed and annotated for placement of stress/prominence using Praat acoustic analysis software (Boersma & Weenink 2013). For each experimental word, vowel and syllable duration (in ms), average and peak intensity (in dB), average fundamental frequency (F0, in Hz), and time of F0 peak were measured. In addition, the first and second formant frequencies (F1 and F2, in Hz) were noted with the aim of mapping the subjects' vowel space, because certain vowels (e.g. high vowels) inherently have lower duration than others (e.g. low vowels) (Fonagy 1966, Beckman 1988). Finally, sentences in which there was a pause between the syllables of the experimental word were excluded from the analysis.

Although all the words were analyzed for stress placement in order to get a general picture of stress/prominence in both languages, the acoustic analysis here focused on bisyllabic stimuli composed of two open syllables, i.e. the LL condition. There were several reasons for focusing on the LL condition in the phonetic analysis: First, acoustic cues in longer words tend to be affected more easily by extralinguistic factors such as word-internal pauses; such effects are best controlled in bisyllabic words. Second, since these words do not involve any syllables with codas, vowel duration alone is a good predictor of syllable length. In conditions that have syllables with codas, vowel shortening before codas (a phenomenon observed in many natural languages) might, otherwise, influence duration measurements since vowels in open syllables are normally longer than those in closed syllables. At the same time, closed syllables contribute to syllable length by virtue of the presence of the additional segment in the coda position, and some consonants, like continuants,

can sometimes arbitrarily be produced longer. Words composed only of open sylla-
bles are therefore ideal to keep the effects of context on vowel/syllable length under
control. Third, since both syllables in the LL condition are underlyingly short, this
condition allows us to best distinguish between a trochee and an iamb as well as a
footless representation, and, crucially, permits us to spot cases where syllable weight
is derived; certain syllables (such as final syllables) may, after all, be lengthened for
reasons of e.g. iambic lengthening, which may not as readily be observed if those
syllables already bear weight by means of having a coda. In sum, words under this
condition will best serve to distinguish the acoustic cues of trochaic, iambic, and
footless grammars. In iambic grammars, for example, heads of feet (the final sylla-
bles of LL forms) are typically longer than non-heads (see e.g. Hayes 1995), where-
as no such effect is expected in grammars that are footless. Similarly, in trochaic
grammars, heads (initial syllables in LL forms) are expected to bear higher intensity
than non-heads, which, again, is not expected in footless or iambic systems.

As suggested by Peterson & Lehiste (1960), segmentation criteria were based on
an analysis of both spectrograms and waveforms cues. In particular, the following
criteria were used in determining syllable and vowel boundaries: (i) The first up-
ward-going zero crossing at the beginning of the waveform was used to isolate the
onset of the first syllable; (ii) for the offset of the first and the onset of the second
syllable, in words without a stop consonant as the onset of the second syllable, the
boundary between the offset of the first and the onset of the second syllable was
determined as the transition between the spectrographic pattern of the last segment
of the first syllable and the first segment of the second; (iii) in words with a stop
consonant as the onset of the second syllable, this boundary was defined as the start-
ing point of the silence of stop closure; (iv) second syllable/word offset was deter-
mined as the end point of the waveform at the final downward-going zero crossing.
These criteria were used, in making decisions on vowel/syllable length, in both the
initial transcriptions and TextGrid annotations, though syllable and vowel bounda-
ries were marked only in TextGrids, for statistical purposes.

5. Results and discussion

We present the results in two different ways. First, overall results are provided, with
illustrations of spectrograms, followed by more specific acoustic results on the LL
condition with statistical analyses.

5.1. Overall results

Before we present more specific results on the bisyllabic stimuli with two open
syllables (i.e. the LL condition), we take a quick look at the visual differences be-
tween Uyghur and Kazakh, as revealed through a spectrogram, and then do the same
for Uyghur regular vs. exceptional stress/prominence. The evidence offered in this
section is weaker than that in Section 5.2., where statistical information is presented
based on data from numerous responses generated from multiple speakers. Section

5.1. only serves to present a preliminary look at some of the patterns that hold and are crucial in understanding the arguments laid out in this paper.

5.1.1. A comparison of Kazakh vs. Uyghur: a preliminary examination

Figures 1 and 2 below illustrate duration, intensity and pitch values/tracks for the word /alma/ 'apple' for Uyghur (the most predominant variety) and Kazakh, which happens to be the same segmentally in both languages. As seen though, the two words appear quite differently at the suprasegmental level, mainly because the final open syllable is lengthened in Kazakh, unlike in Uyghur.

Figure 1: Uyghur /alma/ < ئالما > "apple"
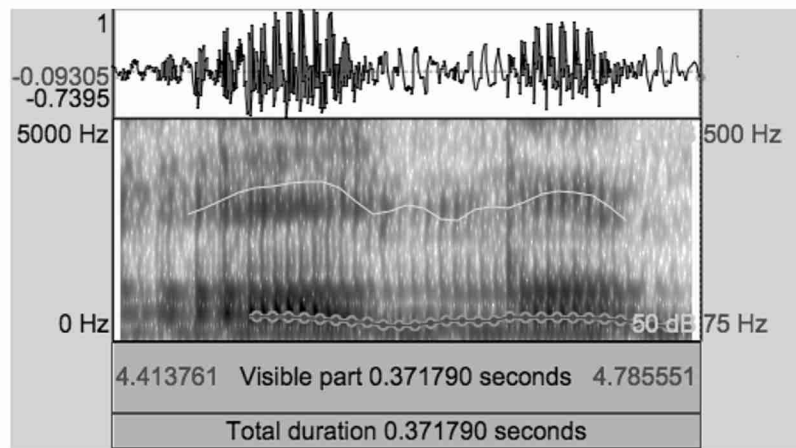
Figure 2: Kazakh /alma/ < алма > "apple"
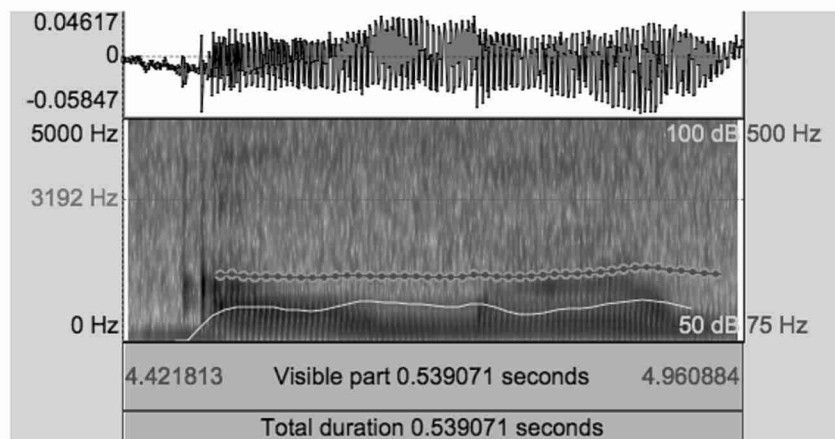
What these spectrograms show is that in Kazakh the duration of the second vowel (and thus the second syllable) is much greater than that of the first vowel (and the first syllable). This is in stark contrast to the situation in Uyghur, where the first and the final syllables are of about the same duration. That is, duration is an important correlate of stress in Kazakh, whereas it is not in (the predominant variety of) Uyghur. Regarding intensity and pitch, on the other hand, we see that neither language uses these as correlates of prominence. Intensity (as indicated by the solid curve on the spectrogram) is about the same on both syllables for both Uyghur and Kazakh, although the first syllable seems to be slightly higher in intensity in Uyghur, and the second syllable in Kazakh. As for pitch (which is indicated by the dotted curve), it seems more or less flat for both languages, although there seems to be a slight pitch rise on the final vowel for Kazakh. All in all, given only these two words (quantitative evidence to be given in Section 5.2), which are segmentally identical in the two languages, we could reach the preliminary conclusion that none of intensity, duration and pitch are correlates of prominence in Uyghur, whereas duration is an important correlate for Kazakh (to be investigated in more detail later). If the observation made based on these two words holds true more generally (see Section 5.2.), and given the criteria presented in previous formal phonological literature (see e.g. Beckman 1986, Ladd 1996, Hualde et al. 2002, Özçelik 2014, to appear), it follows that Uyghur regular stress is not really (foot-based) stress in accordance with the observation of Johanson (1998) for Turkic languages, but is, instead, intonational prominence, much like in Turkish (Özçelik 2014, to appear). Kazakh, on the other hand, seems to be a true (foot-based) iambic language, in that duration is an important cue in marking stressed syllables.

5.1.2. A preliminary comparison of regular vs. exceptional stress/prominence in Uyghur

If regular (final) prominence in Uyghur is not foot-based stress, the question that follows is whether exceptional stress in Uyghur is really (trochaic) stress, as we argued above in Section 3. Although this paper does not present an in-depth statistical investigation of this issue, a comparison of the two spectrograms below in Figures 3 and 4 is quite informative. Whereas Figure 3 depicts the representation of a verb that only has a regular suffix attached, Figure 4 has the same word with an additional exceptional suffix. In both words, the same syllable, i.e. -di, is the most prominent one, although the correlates of prominence are rather different.

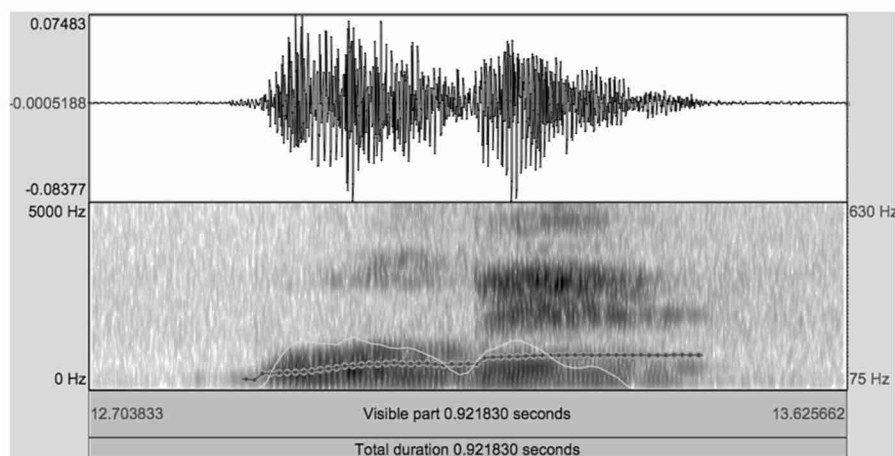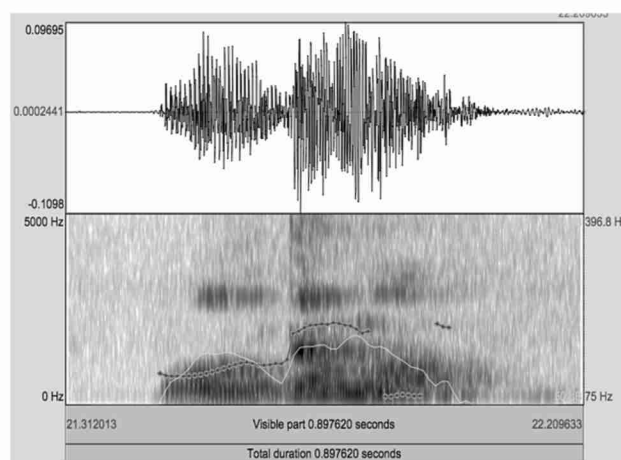Figure 3: Uyghur: regular/word final prominence: /bol-dí/ "(it) happened"

Figure 4: Uyghur: exceptional stress: /bol-dí-mu/ "Did (it) happen?"

Notice, in the regularly stressed word /boldí/ (Figure 3), that the first and second syllable have about the same level of intensity and duration, although pitch values rise slightly for the second syllable. For the exceptionally stressed word /boldí-mu/, on the other hand, the correlates of stress are manifested in strikingly different ways: The stressed second syllable has a very sharp rise in pitch, as well as much greater intensity than the first syllable. Intensity and especially pitch values then drop dramatically for the third syllable.

From these findings, it can be concluded, at least tentatively, in the absence of statistical data and data from other words/suffixes, that whereas regular final prominence in Uyghur is accompanied only by a slight pitch rise (which is optional, as will be shown later), exceptional stress is accompanied by both a sharp F0 rise, as well as greater intensity (similar to Konrot's (1981, 1987) and Levi's (1995) findings for Turkish), suggesting that, unlike regular prominence, exceptional prominence is trochaic, as is argued formally above in Section 3.[4] Once again, it should be emphasized, however, that this comparison should be taken with a grain of salt in the absence of quantitative data. More research is clearly needed, which can build on the insights provided here.

5.1.3. Three different varieties of Uyghur

The discussion above regarding word-level prominence in Uyghur is rather simplified, as our starting point was the research question of whether there are additional footless languages like Turkish, the most likely candidates for which, we hypothesized, would be other Turkic languages. The answer to this question was in the affirmative, with evidence coming from the most predominant variety of Uyghur found in our sample, but not from Kazakh.

This was, by no means, however, the only variety of Uyghur revealed in our data. Although the utterances of 5 of the 8 Uyghur subjects tested were consistent with this pattern, the remaining three behaved rather differently, illustrating two additional patterns: First, 2 subjects (interestingly comprising the only two female subjects in the group) consistently lengthened final open syllables, leading to a pattern that is in essence similar to that in Kazakh, but that also differs in that Kazakh does not *consistently* lengthen final open syllables with final stress each time; when a final open syllable is at times not lengthened, stress is nonfinal in Kazakh (see e.g. the data in (5)). For these two Uyghur subjects, however, stress was more consistently final, with final open (but not closed) syllables lengthened across the board.

For the remaining one subject, a pattern such as that described by Hahn (1991) arose. That is, this subject placed stress either on the final or the penultimate syllable depending on weight, but not on a preceding syllable even if that syllable was the only heavy one. In the grammar of this speaker, if both the penultimate and the final syllable were heavy, main stress fell on the ultimate syllable; if the penultimate syllable was heavy and the ultimate light, then, stress fell on the penultimate syllable. If neither were heavy, stress still fell on the final syllable, even if a preceding syllable was heavy, meaning that a two-syllable window existed for stress at the right edge, as in the pattern reported by Hahn (1991).

It follows from these findings that syllable weight in Uyghur was important for three of the eight subjects, whereas it played no role whatsoever for the remaining

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4   Note, however, that, as one reviewer correctly points out, the sharp F0 rise here may have been further bolstered by the fact that a question particle is used, and interrogatives in Turkish may have an extra pitch accent not found in declaratives (Kamali 2014).

five. These findings help account for the conflicting views on Uyghur stress reported in the literature, with most research suggesting that it is consistently word-final (Jiang et al. 2010, Liang & Zhang 2008, 1998, Muti 2007, Yakup 2013), but some suggesting that syllable weight plays a role within a window of two syllables at the right edge on the other (e.g. Comrie 1997 and Hahn 1991). Further, it is possible that these differences point to language change in progress, either from a weight-based footed language to a footless one or from a footless language to a footed one in which syllable weight is important. It is interesting in this regard that the two subjects whose utterances consistently exemplified word-final open syllable lengthening were female, which may point either to language change led by female speakers or a register used only by females, although the small sample size employed here is not sufficient to lead us to a definitive conclusion. Either way, additional research in the issue is needed, which may lead to important conclusions about our knowledge of footless languages, and whether footed languages lead to footless languages or vice versa, historically speaking. It may also have certain implications about language change. I leave further investigation of these issues to future research.

Regardless, the three varieties of Uyghur can be summarized as follows vis-à-vis stress/prominence, with example prosodic representations.

(24) a. Turkish-like (predominant) pattern, as in Özçelik (2014, to appear):
          intonational (footless) prominence on the final syllable:
          Ex: H%
                         |
                    [σ σ σ]

      b. Hahn (1991) pattern:
          stress on the final or penultimate heavy syllable, depending on weight:
          Ex: [L(LH́)], [(LH́)L], [H(LĹ)], [L(LĹ)]

      c. Final stress with final open syllable lengthening (Kazakh-like):
          Ex: [L(LH́)], [LH(H́)], [HL(H́)], [L(LH́)]

Now that we have outlined the general stress/prominence patterns of both Uyghur and Kazakh, the following section will focus on comparing the two languages by means of a quantitative analysis. In doing so, and in accordance with the research question posed at the beginning of this paper, the relevant sections will concentrate on the predominant (footless) variety of Uyghur found in our data (exemplified in (24a) and how it compares with Kazakh, which we have argued to be iambic.

5.2. Acoustic correlates of prominence: footed vs. footless outputs

One of the most important predictions made in this paper was that whereas (the predominant variety of) Uyghur grammar does not assign foot structure (for regularly stressed words), Kazakh does.

One main assumption behind this proposal is that for prominence to involve foot structure, it must be accompanied by intensity and/or duration at the word level. That is, neither pitch rise alone nor a flat structure (i.e. one that has no intensity, duration or pitch) involves foot structure, as in Turkish, where regular word-final "stress" is either flat, or involves a slight pitch rise on the word-final syllable (see Özçelik 2014, in press). The best way to determine whether subjects have foot structure or not is, then, to investigate the phonetic correlates of prominence to determine whether they include intensity and/or duration, in addition to pitch rise.

Kazakh speakers' stressed syllables should, then, be accompanied by greater duration and/or higher intensity, whereas this should not be the case for the Uyghur-speaking subjects. Further, if they act according to cross-linguistic tendencies argued for by Bolton (1894) and Hayes (1985), Kazakh-speaking subjects' iambs should be accompanied mostly by greater duration, more so than greater intensity (since they are iambs, rather than trochees).

In order to test these predictions, a subset of the data, the five stimuli in the LL condition, were further analyzed using TextGrids. The results are reported below for each of duration, intensity and pitch respectively. We start with duration, which is the most important correlate to be discussed here, for it reveals significant differences between the Uyghur-speaking subjects and the Kazakh-speaking subjects.

5.2.1. Duration

Table 3 below presents the durations (in seconds, s.) of the first and second vowels in the LL condition (which included five tokens) for the Uyghur- and Kazakh-speaking subjects.

Table 3: Duration measurements in the LL condition (in s.)

	First Vowel Duration (s.)	Second Vowel duration (s.)	Difference (s.)	p-value
Kazakh:				
(n=7)[5]	0.084614	0.118771	0.034157	p < 0.0001
Uyghur (predominant variety):				
(n=5)	0.119684	0.121940	0.002256	p = 0.959

As Table 3 demonstrates, although the vowel of the second syllable was longer than that of the first syllable for both Kazakh- and Uyghur-speaking subjects, the differ-

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5   One Kazakh speaker was excluded from analysis as an outlier, taking the number of Kazakh speakers tested down from 8 to 7.

ence between the first and the second syllable was much greater for the Kazakh-speaking subjects. The first vowel was, on average, 0.085 seconds (s) for them, while the second vowel was about 0.119 s. In other words, the difference in duration between the first and the second vowel for this group was about 0.034 s. This difference is statistically significant, (F = (1, 68) = 91.968, p < 0.0001), as confirmed by the results of a one-way ANOVA. This is illustrated by the box plots in Figure 5 below. The horizontal line represents the first and second (final) vowels, indicated as 1 and 2 respectively, while the vertical line represents the duration of the corresponding vowel in s.

Figure 5: Durational differences between the first and second vowels for Kazakh-speaking subjects
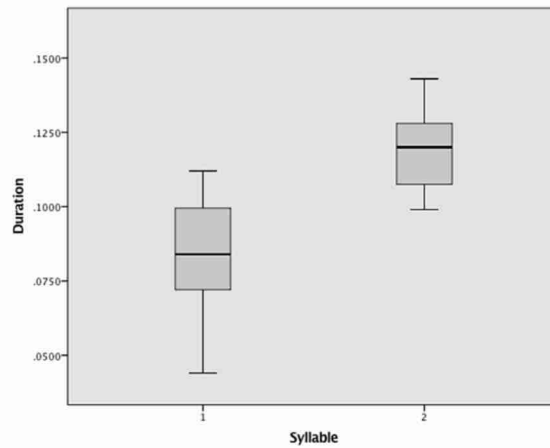
In short, the durational differences between the first and second vowels were not a chance factor for the Kazakh-speaking subjects, who had iambic systems; these subjects significantly lengthened the final vowels of words.

For Uyghur-speaking subjects, however, a different pattern emerged. In contrast to the Kazakh-speaking subjects, differences in the mean durations of first and second syllable vowels were much smaller for the Uyghur speakers; the first vowel was about 0.120 s. while the second vowel was about 0.122 s. The difference was, in other words, only about 0.002 s., and this difference was not statistically significant, F = (1, 48) = 0.003, p = 0.959. This is also illustrated by the box plots in Figure 6 below.

Figure 6: Durational differences between the first and second vowels for Uyghur-speaking subjects
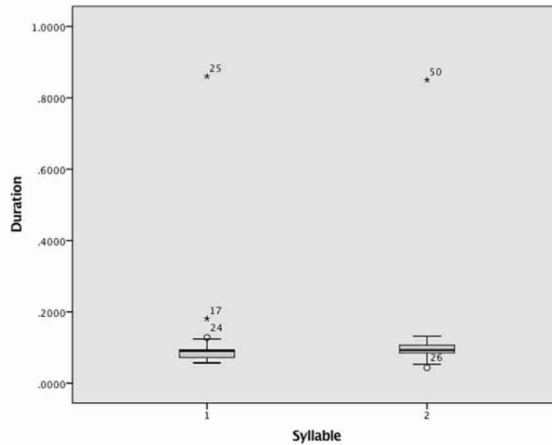
To summarize thus far, the average durations of the first and second vowels in target LL words differed significantly for the Kazakh-speaking subjects, who had an iambic grammar, whereas the means more or less coincided for the Uyghur-speaking subjects, who had footless representations (at least the five that were tested here). This presents strong evidence for the proposal made earlier in this paper; Kazakh speakers produce final prominence through foot structure, whereas Uyghur speakers produce footless utterances.

A well-known tendency in natural languages is that duration is a better cue than intensity for iambic systems, whereas the converse is true for trochaic systems (Bolton 1894, Hayes 1995). In sum, the Kazakh-speaking subjects who stressed the final syllables of LL forms did indeed have iambs; in their productions stressed syllables were accompanied by significantly greater duration than unstressed syllables. This was not the case with the Uyghur-speaking subjects, however; their final syllables were only slightly longer than nonfinal syllables. As opposed to the iambic Kazakh group, the durational differences between the two syllables for the Uyghur groups were statistically insignificant.

5.2.2. Intensity

Intensity was not found to be an important correlate in either group. Table 4 presents a summary of the findings for all Kazakh- and Uyghur-speaking subjects. The results are given in terms of maximum intensity (in dB).

Table 4: Intensity measures

	First σ (peak) Intensity (dB)	Second σ (peak) Intensity (dB)
Kazakh:		
(n=7)	69.003	68.857
Uyghur:		
(n=5)	81.873	82.068

As predicted, intensity was not an important correlate of final prominence for the Uyghur-speaking subjects, as was the case with duration (see section 5.2.1). As indicated in the last row of Table 4, the intensity of the second vowel was slightly higher, on average, than that of the first vowel, however this was not statistically significant, as the results of a one-way ANOVA indicate, $F = (1, 48) = 0.009$, $p = 0.925$.

The difference in intensity between the first and second syllables is illustrated, for these subjects, by the box plots in Figure 7.

It is not surprising for intensity to play no role for the Uyghur-speaking subjects; as was argued above, neither intensity nor duration is expected to play an important role for word-level prominence in footless languages, and the predominant variety of Uyghur (represented by 5 out of the 8 Uyghur subjects tested here), I argue, is footless.

Figure 7: Maximum intensity for Uyghur-speaking subjects
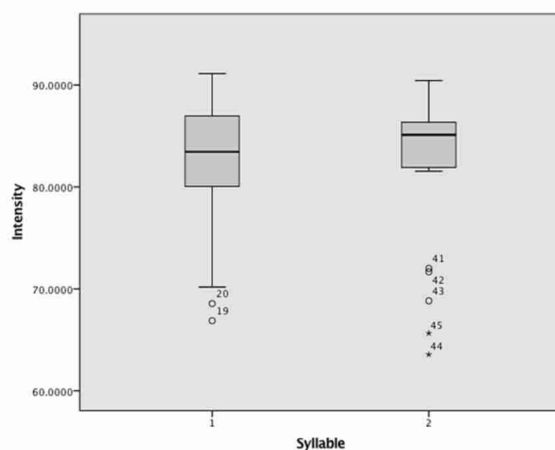
Intensity was not an important correlate for the Kazakh-speaking subjects, either. As first noted by Bolton (1894) and later argued by Hayes (1991, 1995) among others, iambic languages have elements contrasting in duration, not intensity, whereas tro-

chaic languages tend to have elements contrasting in intensity but not duration. The results of the current research parallel this finding. While the Kazakh-speaking subjects with iambic grammars consistently lengthened the final syllables of Kazakh PWds (see section 5.2.1), they did not rely on intensity as a correlate of prominence. In fact, as is illustrated in Table 4 above, initial syllables were slightly higher in intensity for these subjects than final syllables, although, as with the Uyghur-speaking subjects, this was not statistically significant, $F = (1, 68) = 0.008$, $p = 0.930$. This is illustrated by the box plots below in Figure 8.

Figure 8: Maximum intensity for Kazakh-speaking subjects.
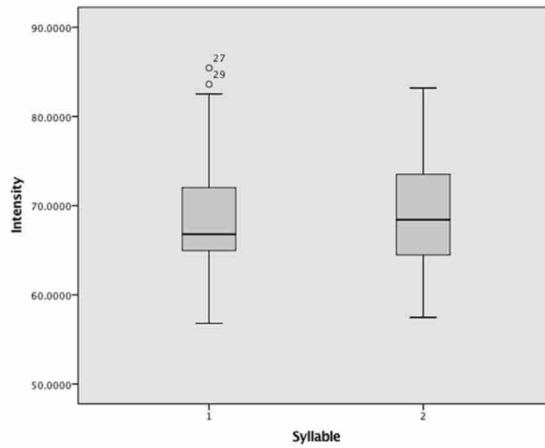
5.2.3. Pitch

For both Kazakh- and Uyghur-speaking subjects, pitch measurements were also taken for the LL condition. Table 5 below presents average maximum pitch values associated with the first and second syllables for both Kazakh- and Uyghur-speaking subjects.

Table 5: Pitch measurements

	First V Max Pitch (Hz)	Second V Max Pitch (Hz)
Kazakh:		
(n=7)	223.551	207.377
Uyghur:		
(n=5)	143.815	154.496

For the Kazakh-speaking group, maximum pitch was higher overall on the first syllable than the second, whereas for the Uyghur-speaking group, maximum pitch was higher on the second syllable. A one-way ANOVA was conducted in order to test for statistical significance. For the Kazakh group, the difference in pitch between the two syllables was far from significant: $F = (1, 68) = 0.832$, $p = 0.365$. Likewise, for the Uyghur group, there was no significant effect associated with (maximum) pitch; $F = (1, 48) = 0.701$, $p = 0.407$ for maximum pitch.

All things considered, unlike duration, and similar to intensity, pitch was not a significant correlate for stress/prominence for either group. It should be noted, however, that to a large extent this is true because, as with most similar research, overall results are examined here (i.e. individual results are all collapsed together under one language, Kazakh or Uyghur). Looking at individual subjects reveals alternate patterns; some subjects had higher pitch on the first syllable than the second, while others had higher pitch on the second syllable than the first, even within the same language. For example, as is illustrated in Table 5, although the Kazakh speakers as a group had higher pitch values overall on the first syllable than the second, three of them consistently placed higher pitch on the second syllable than the first, and this was true for these three subjects across all LL stimuli. Clearly, there is much individual variation when it comes to using pitch as a correlate of prominence in either language, and especially in Kazakh, and the issue thus requires further investigation. The presence of so much variation is of course in itself evidence that pitch values alone are not significant in determining the place of prominence in either language, although this does not exclude the possibility that pitch "shape", if not pitch values, may play a role in either language.

5.2.4. Summary and discussion of phonetic correlates

The results of acoustic measurements reported in Section 5.2 above indicate that whereas duration was a significant correlate of stress in the productions of the Kazakh-speaking subjects, none of duration, intensity or pitch was a good correlate for the Uyghur-speaking subjects (those who are speakers of the predominant variety—see Section 5.1 for other variants where weight and duration play a role). The acoustic findings with said variety of Uyghur are very similar to what was previously found to be the case with Turkish (see e.g. Konrot 1981, 1987, Levi 2005), and are in line with the observation made by Johanson (1998) regarding the status of dynamic stress vs. pitch in Turkic languages, although Kazakh diverges significantly from this pattern. One reason for Kazakh being so different could be the influence of Russian, which is a stress language (see below for more on this).

The finding that neither intensity nor duration was an important correlate of prominence in the grammars of the Uyghur-speaking subjects was predicted, since the variety of Uyghur they speak lacks foot structure, similar to Turkish, as was proposed above, and these two cues, duration and intensity, have been argued to be associated with the presence of foot structure (Özçelik 2013, 2014, to appear). Simi-

larly, the fact that Kazakh-speaking subjects relied to a great extent on duration was not surprising, since, as was argued above, Kazakh is an iambic language, and iambic languages generally rely on duration in marking stressed syllables. Seemingly more problematic is the fact that the Uyghur-speaking subjects did not rely on pitch either, raising the question of what was the cue for final prominence in their language. Although I do not have a definitive answer to this question, it may be that the specific shape of the pitch track is of some importance, or that a flat structure (regarding pitch) leads to perception as final prominence, as is argued for Turkish by Özçelik (2014), and alluded to for French by Ladd (1996) (see also Özçelik to appear on French). Either way, as with Turkish (Özçelik 2013, 2014), pitch seems relevant for some Uyghur speakers, those who consistently have higher pitch on prominent syllables, and irrelevant for others who have a flat structure regarding pitch, the combined result of which led to the lack of statistical significance vis-à-vis pitch for Uyghur speakers.

6. Conclusion

In this paper, we have examined word-level prominence in two Turkic languages, Kazakh and Uyghur. Using both formal and experimental evidence, we have argued that although Kazakh and Uyghur look alike on the surface, in that the word-final syllable is often the most prominent syllable within a word, the nature of this prominence differs. Although Kazakh is a typical iambic language that adheres to weight sensitivity, Uyghur, in its most predominant variety, is footless, unless certain morphemes come pre-footed in the lexicon, as in Turkish (Özçelik 2014, to appear). However, this was only the case for some of the subjects in our experiments, albeit the majority. Some Uyghur-speaking subjects demonstrated a pattern quite like that of Kazakh, whereas the behavior of one subject was consistent with the system described by Hahn (1991), who proposes a stress pattern for Uyghur that differs from most analyses of the language. In this regard, the current paper also offers some insight into the reasons behind the differing views on accent/stress/prominence in the Uyghur language.

Kazakh's apparent dependence on duration may be explained either by its historical development and subsequent divergence from other Turkic languages like Turkish and Uyghur, or by the greater influence of Russian, a stress language, unlike Chinese, which is tonal. After all, all the speakers in our experiments had at least some knowledge of Russian (in the case of the Kazakh) or Chinese (in the case of the Uyghur), although their native language (Kazakh or Uyghur) was clearly predominant. In other words, Russian may have influenced Kazakh speakers' productions by giving their Kazakh some characteristics of a stress language, such as stress syllables bearing greater duration, although the distribution of stress is still similar to that in other Turkic languages like Turkish and Uyghur, in that it is still mostly final. That is, it remains to be confirmed that these findings do indeed hold true for Kazakhs not influenced by Russian.

To sum up, relatively little research or scholarly analysis has been conducted on stress or prominence in Turkic languages, although Turkish, the most commonly taught Turkic language, has received a great deal of attention recently regarding its accentual pattern. It is commonly assumed that most Turkic languages behave like Turkish in demonstrating final stress. This paper has shown that the situation is much more complex in other Turkic languages, including those that are relatively better researched, such as Kazakh and Uyghur, and has made an initial attempt at a descriptively and theoretically accurate analysis of the accentual patterns of these languages. While the paper provided answers to many of the questions posed at the beginning of this paper, it has also raised additional questions. Clearly, more research needs to be done on the stress/prominence patterns of Turkic languages, including Kazakh and Uyghur.

Acknowledgments

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