Onset-sensitive stress in Iron Ossetian

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Introduction: This paper argues for the existence of a novel onset-sensitive stress system in Iron Ossetian (Eastern Iranian; Russia, Georgia; henceforth Iron). Typical quantity-sensitive stress systems determine syllable weight on the basis of properties of the nucleus and the coda (Hyman 1985; Hayes 1995). Onset sensitive systems have been observed in a number of languages, but in such languages, codas are generally banned or the stress systems that are also coda-sensitive (Everett & Everett 1984; Davis 1988; Hyde 2007). Recent work suggests some languages, such as Arrente (Topintzi & Nevins 2010), are onset sensitive and coda insensitive but lack sensitivity to properties of the nucleus. We demonstrate that stress in Iron is sensitive to *nucleus quality* and *onset complexity*, but *not* coda complexity, filling yet another typological gap.

Methods: Data for this analysis was collected from a native speaker of Iron. Stress in Iron was determined by speaker intuition in addition to acoustic cues such as vowel length and pitch (Dzaxova2010). The syllable structure of Iron is moderately restrictive. CVC syllables are most common. Onset clusters are allowed when they contain either [ʃ ʒ] in first position, [w] in second position, or the liquids [l r] in the second position. Coda clusters are less restrictive and include CC clusters of nasals, stops, and fricatives not allowed in the onset. CCC codas are allowed when they contain [ʃ ʒ], but CCC onsets are disallowed (Hettich, 2002). Syllable breaks in this paper are determined by adherence to phonotactic principles of Iron and the maximal onset principle. These judgments were confirmed by native speaker intuition.

Background: Previous work on Iron stress identified vowel quality as the primary factor in stress assignment. Iron features a two-syllable stress window at the left edge of the word, with rare deviations in loanwords and compounds. If the first syllable contains a *strong vowel* (i e a u o), it bears stress (1). If the first syllable contains a *weak vowel* (ɨ ə), the second syllable bears stress, regardless of the quality of its nucleus or the complexity of the coda of the first syllable (2) (Abaev 1964; Hayes 1995; Hettich 2002; Kager 2012; Kim 2003).

(1) Words with strong initial syllable

faraʃt ‘nine’
tʃinɨg ‘book’
gogɨʒ ‘turkey’
qomgəʃ ‘cowherd’
nʲeʃʲi ‘melon’
dusɨn ‘to milk’

(2) Words with weak initial syllable

əm**bał** ‘friend’
kʰər**do** ‘pear’
ər**tʰə** ‘three’
pʰɨ**rɨnz** ‘rice’
ləʁʒ**gə**nəg ‘polisher’
gə**dɨ** ‘cat’

Complex onsets contribute weight: Initial syllables with weak nuclei nevertheless bear stress if the syllable onset is complex. Evidence for this comes from three sources. First, words that lexically contain complex onsets with a weak vowel in the first syllable bear initial stress (3).

(3) Words with complex onsets in the root

ʃk'ərɨn ‘to drive’	cf.	tə**xɨn** ‘to fly’
ʃk'əfɨn ‘to snatch’		xə**rɨn** ‘to eat’
ʒməlɨn ‘to move’		mə**lɨn** ‘to die’

Second, plurals of monosyllabic nouns bear stress on the second syllable if the first syllable

consists of a weak nucleus and simplex onset, but bear stress on the first syllable if that syllable consists of a weak nucleus and complex onset. The latter pattern with plurals formed from monosyllabic nouns with strong nuclei.

(4) Plurals - simple onset		*(5) Plurals - complex onset*		*(6) Plurals - strong nuclei*	
ləg 'man'	ləg**tʰə** 'men'	ʃt'əlf 'dot'	**ʃt'əl**fitʰə 'dots'	quʃ 'ear'	**quʃ**tʰə 'ears'
mɨʃt 'mouse'	mɨʃ**tɨ**tʰə 'mice'	dwar 'door'	**dwər**tʰə 'doors'	bon 'day'	**bon**tʰə 'days'
ʒəng 'leg'	ʒəng**tʰə** 'legs'	bwar 'skin'	**bwər**tʰə 'skins'	ʃin 'back'	**ʃin**tʰə 'backs'
kalm 'snake'	kəl**mɨ**tʰə	ʃt'ol 'table'	**ʃt'əl**tʰə 'tables'	zug 'flock'	**zug**tʰə 'flocks'
maʁʒ 'brain'	məʁʒ**tʰə** 'brains'	ʃtəg 'bone'	**ʃdʒɨ**tʰə 'bones'[1]	arm 'hand'	**arm**tʰə 'hands'

Finally, Iron possesses a suffix *-ag* used to form agentive nominals (AN) out of verb roots. When applied to a root with a weak nucleus and simple onset in its first syllable, stress falls on the second syllable, as expected (7). However, roots with a weak nucleus and complex onset in the initial syllable exhibit initial stress (8), just like roots with initial syllables containing strong nuclei (9). Because of the presence of the strong vowel [a] in the agentive suffix, this piece of evidence shows that syllables with weak vowel nuclei and complex onsets are at least as heavy as syllables with strong vowel nuclei.

(7) AN - simple onset		*(8) AN -complex onset*		*(9) AN - strong nucleus*	
təx 'fly'	tə**xag** 'flier	ʃk'ər 'drive'	**ʃk'ə**rag 'driver'	kaf 'dance'	**ka**fag 'dancer'
kəw'cry'	kə**wag** 'crier	ʃk'əf 'snatch'	**ʃk'ə**fag 'snatcher	liz 'flee'	**li**zag 'fleer'
xər 'eat'	xə**rag** 'eater'	ʒməl 'move'	**ʒmə**lag 'mover'	dus 'milk'	**du**sag'milker'

Based on this evidence, we propose that syllable weight in Iron is dictated by two factors: *vowel quality* & *onset complexity* and state the following generalizations about Iron syllable weight (10). This allows us to maintain the generalization on Iron stress stated in previous work (11).

(10) Syllable Weight in Iron

$CV_{[weak]}(CC)$ syllables are light.
$CV_{[strong]}(CC)$ & $CCV_{[weak]}(CC)$ syllables are heavy.

(11) Stress assignment in Iron

Stress the 1st **heavy** syllable in a two-syllable window at the word's left edge. If both syllables are light, stress the 2nd syllable.

Implications: The Iron stress system exemplifies a typologically rare onset sensitive, coda insensitive system that is complicated by nucleus. Additionally, onset complexity (not presence) determines syllable weight. The existence of such a system was first hypothesized by Hyman (2011) as a typological mirror image of such languages that contain moriac codas, but not onsets (e.g. Malayalam, Selkup; Tranel 1991). Iron adds to the growing list of languages that challenge the assumption of non-moraic onsets. Gordon (2005) claims that onset sensitive languages tend to also carry rimal weight, which supersedes onset effects. Additionally, vowel length is often a factor in onset sensitive languages. Iron differs significantly from previously studied onset-sensitive systems and the generalizations found in Gordon (2005): many languages with onset-sensitive stress systems, like Pirahã do not permit codas, but the quality of the onset and vowel length affect stress. (Everett & Everett, 1984; Gordon, 2005). Others, like Mati-Mati, assign weight to both codas & onsets (Davis 1988). Iron is the first language known to assign weight to onsets of a particular length (CC only) which interacts with vowel quality (rather than quantity), in addition to exhibiting coda insensitivity. In these ways, our study of Iron stress not only expands the typology of quantity-sensitive stress systems generally but also reveals new

[1] **ʃtə**dʒɨtʰə is a variant plural of 'bones', but the stress follows expected assignment according to this analysis.

challenges for the theoretical representation of onset-sensitive systems.