### Background

We provide an Autosegmental-Metrical analysis of the patterns of acoustic marking of Phonological Phrases (σs) in Ossetic, an understudied East Iranian language of North Ossetia, Russia:

- Iron Osset, consistently marks left σ-edges with stress-aligned rising pitch accents.
- The distribution of pitch accents, which we label $\sigma L^+ H$ and $\sigma L^+ H^*$, depends on the moraic structure of the stressed syllable.
- We propose a monostratal Optimality Theory account for these facts by extending the existing analyses of rising pitch accents [1], [2].

### Methods

Two production studies:

1. 13 speakers (8M, 5F, 20-60 y.o.) were recorded producing WW and SW stimuli. The study was run in Vladikavkaz (North Ossetia, Russia) in 2019, as part of an exploratory study on the prosody of Iron Ossetic.
2. 13 speakers (3M, 10F, 20-65 y.o.) were recorded producing SS, WS, and some WS stimuli. The study was run in Vladikavkaz in 2021.

The recordings were manually annotated in Praat, following the segmentation guidelines in [5].

### Stimuli

- Stimuli (total for both studies): 36 nominal phrases of the four stress window types ($SS = 9; SW = 8; WW = 9; WS = 10$).
- Nominal phrases: a noun + 1–3 modifiers (adjectives, demonstratives, numerals, and possessive clitics).
- Nominal phrases acted as subjects or objects in pre-constructed SOV clauses. Subsequent analysis: no significant tonal differences between the realizations of subjects and objects ⇒ subjects and objects considered together.

### Results and Discussion

- Nominal phrases of all sizes map onto single σs.
- Signature property of a σ: a single rising pitch accent, realized on the leftmost prosodic word.
- The distribution of pitch accents tracks the size of $\sigma$ as an instrumental validation to the existing descriptions.
- Pitch accents consist of two tonal targets: $L$ & $H$.
- In all stress windows types, the post-tonic syllable carries a rise in $F_0$.
- The tonal realization of the stressed syllable varies by stress-window type.
- If the stressed syllable is final, the rise is on the initial syllable of the next prosodic word.

### SS & SW stress windows

- **SS**: the stressed syllable may also carry a rise in $F_0 \Rightarrow$ a continuous rise throughout the stressed and post-tonic syllables. We label this pitch accent $L^+ H^*$.
- Alternatively, the stressed syllable may be low and flat. We label this pitch accent $L^+ H^*$.

![Fig. 1: A SW stress window with $L^+ H^*$](image1)

- **WS**: stress windows also can carry $L^+ H^*$ or $L^+ H^*$.

![Fig. 2: A WS stress window with $L^+ H$](image2)

### WW stress windows

- In contrast, in WW stress windows, the stressed syllable carries a low flat contour, followed by a rise on the post-tonic syllable: the $L^+ H^*$ pitch accent.

![Fig. 4: A WW stress window](image3)

### OT Analysis

- We propose two groups of constraints: (i) those that ensure the correct metrical parsing of a word, and (ii) those that derive the correct alignment of the tones.

### Parsing into Feet and Placing the Stress

- Strong vowels are bi-moraic ($\ddot{S} \equiv \mu$), and weak vowels are monomoraic ($W \equiv \mu$).
- Iron Ossetic has binary iambic feet, under a moraic analysis; unfooted vowels, both strong and weak, are monomoraic.
- The constraints that ensure the correct parsing are given in (2).

1. **FT-TEMP**
   - The foot type is iambic.
2. **FT-BIN**
   - Feet are binary (under a moraic analysis).
3. **ALIGN-FT**
   - Feet are aligned with the left edge of a prosodic word.
4. **PARSE-SYLL**
   - All syllables should be contained in a foot.

### Tonal alignment

- To ensure the correct tone alignment, we adopt the following constraints [2], [6]:

1. a. $\text{CONTOUR}(\mu)$
   - No mora can be associated with more than one tone.
2. b. $\mu \rightarrow T$
   - No mora can be tone-less.
3. c. $\text{H}(\mu)$
   - A high tone cannot be realized on one mora.

- The winning candidate among the tied winners in $S \rightarrow \mu$ is determined based on an additional criterion (e.g., a discourse-related one).

### References