



Max Planck Institute  
for Evolutionary Anthropology



## Does Even have ATR?

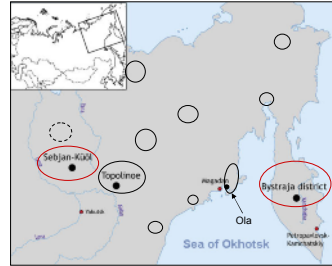
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1

## The current language situation



- Even is a Tungusic language of the Altaic language family
- About 7,000 native speakers (census 2002) – an overstated number
- Dialectal diversity: from 11 to 14 dialectal varieties
- Most dialects are endangered (three of them are being documented within DoBes-project)
- The dialect of Ola was chosen as a basis for literary Even

2

## The vowel harmony in Even

- all vowels are divided into two sets

Set 1	i i:	u u:	o o:	e e:	ie
Set 2	ɨ ɨ:	ʊ ʊ:	ɔ ɔ:	a a:	ja

- within one word vowels of only one set are possible
- stem vowels determine suffix vowels

### Set 1

toŋer-e-ńdʒe-le  
lake-EP-AUG-LOC  
on the big lake

### Set 2

hjakɨta-ńdʒa-la  
larch-AUG-LOC  
on the big larch

(Novikova 1960: 53)

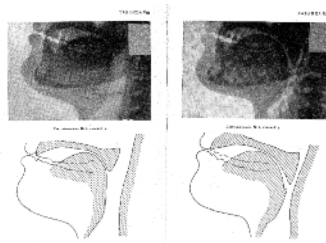
3

## The previous research of Even vowel harmony

- Only descriptions of some individual dialects are available
- Different terminology describing vowel classes
  - Okhotsk dialect (Benzing 1955):  
“light” vs. “dark” vowels
  - Moma dialect (Lebedev 1978):  
“soft” (palatal) vs. “hard” (guttural) vowels
- The most detailed phonetic description concerns Ola dialect (literary Even, Novikova 1960)
  - Pharyngealization  
→ lack of acoustic data

4

## Pharyngealization in the Ola dialect



- Novikova (1960) provides x-rays for each pair of vowels
- The settings of the experiment are not clear (speakers, wordlist, sustained vowels?, technique of recording)

Set 1 non-pharyngealized u    Set 2 pharyngealized uʷ

Ladefoged & Maddieson (1996): “we should be cautious in fully accepting the validity of the rest of the indicated vocal tract shape”

5

## ATR / RTR in Tungusic Languages

- first proposed by Ard (1980)
- relies mainly on the data of Even (Novikova 1960 and other descriptions) and other Tungusic languages in comparison with data from West African languages
- Pharyngealization in the Ola dialect is explained by decrease of the pharynx size, triggered by tongue root retraction
- generally accepted

6

## comparison with other vowel harmony systems

- Vowel inventory and vowel oppositions
    - widespread ATR system of African model
- [+ ATR] [i e a o u]
- [- ATR] [ɪ ɛ ɔ ʊ] (Local & Lodge 2004)
- Even
- [Set 1] [i a o u ie]
- [Set 2] [i e ɔ ʊ ia] (Novikova, 1960)

7

## Research questions

- Is there a distinction between two sets?
  - auditorily hard to distinguish vowels of different sets
- What kind of distinction is it?
  - No clear pharyngealization attested in the examined dialects
- Is it the same for all varieties of Even?

8

## Data

- Two dialects (Sebian-Küöl and Bystraja district)
- Two male and two female speakers in each dialect
- About 5 words of each vowel quality and length
- Recorded three times in isolation and three times within a carrier phrase
- 3367 items in total

9

## Data

- The dataset included minimal pairs and near-minimal pairs
- unbalanced
  - number of vowel qualities
    - E.g.: 201 items of short Set 1 u
    - 255 items of long Set 1 u
  - number of consonant contexts
    - E.g.: 1269 vowels in onset
    - 796 vowels after velar consonant

10

## Methodology: linear mixed model

- allows to deal with relatively small, unbalanced datasets

11

## Methodology: analysis factors

- | fixed effects                      | random effects |
|------------------------------------|----------------|
| • ATR-group (advanced/retracted)   | • word         |
| • vowel quality (I, U, E/A, O)     | • speaker      |
| • vowel height (high/non-high)     | • repetition   |
| • <i>gender</i>                    |                |
| • <i>dialect</i>                   |                |
| • <i>proficiency/fluency (age)</i> |                |

12

## Methodology: linear mixed model

- to handle a number of fixed and random factors at the same time
- lme4-package (Bates & Maechler, 2009) and languageR-package (Baayen, 2009) for R (R-Project, 2010)

13

## Acoustic analysis of ATR

- Akan** (Stewart 1967, Lindau 1979, Ladefoged & Maddieson 1996)
- Degema** (Fulop et al. 1998)
- Maa** (Guion et al. 2004)
- Kalenjin** (Local & Lodge, 2004) ... etc.
- Mongolian** (Svantesson 1985, 2005)
- Solon** (Svantesson 1985)
- Oroqen** (Lulich & Whaley, ms.)

14

## acoustic parameters

Parameters	Hypotheses for ATR
<b>FORMANTS</b>	
F1	lower F1 for +ATR
F2	indifferent F2
F3	lower F3 for -ATR
<b>SPECTRAL SLOPE</b>	
Amplitude difference A1-A2	A1-A2 lower for -ATR
<b>FUNDAMENTAL FREQUENCY</b>	
F0	F0 higher in +ATR
<b>DURATION</b>	
vowel duration	

15

## Results

16

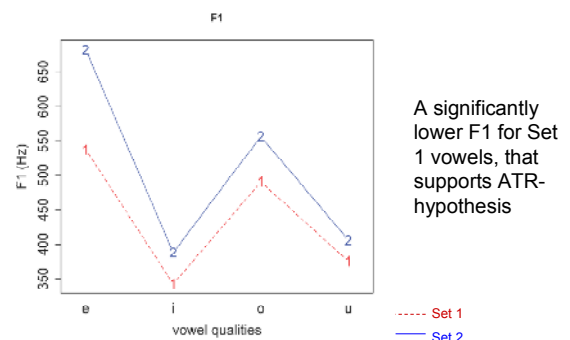
## Results

Parameter	main effects				interactions		
	set1/set2 (advanced vs. retracted)	dialect (Sebian vs. Kamchatka)	vowel height (high vs. non-)	gender (male vs. female)	set: dialect	set: vowel-height	set: gender
F1	***	n.s.	*	**	*	***	n.s.
F2	***	**	***	***	n.s.	*	n.s.
F3	***	**	***	**	***	***	**
A1-A2	***	n.s.	***	n.s.	n.s.	***	n.s.
F0	n.s.	***	***	***	n.s.	n.s.	*
duration	**	n.s.	n.s.	n.s.	*	****	n.s.

Signif. codes: 0 '\*\*\*\*' 0.001 '\*\*\*' 0.01 '\*\*' 0.05 '\*'

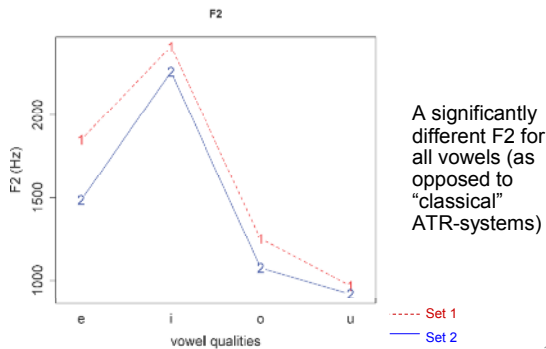
17

## Vowel quality: F1



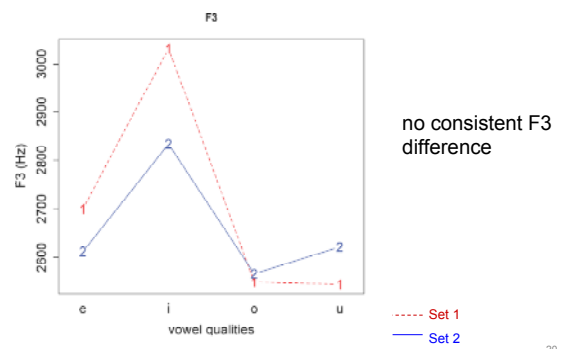
18

## Vowel quality: F2



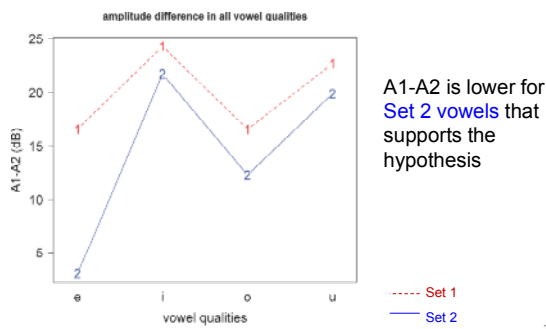
19

## Vowel quality: F3



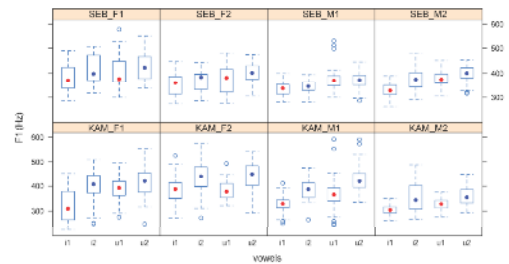
20

## Spectral Slope



21

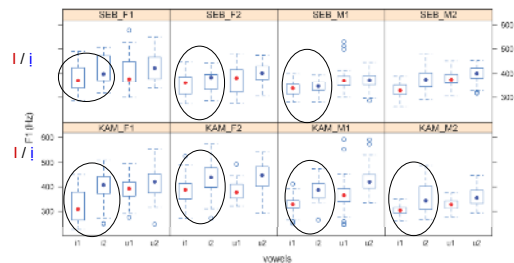
## Dialects & F1



- A smaller difference for Set 1 and Set 2 i and u for Sebian

22

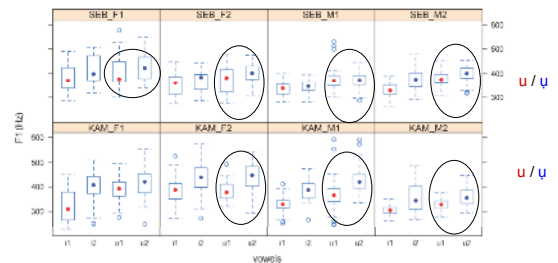
## Dialects & F1



- A smaller difference for Set 1 and Set 2 i and u for Sebian

23

## Dialects & F1



- A smaller difference for Set 1 and Set 2 i and u for Sebian

24

## Duration – Set interaction

- Significant duration distinctions on the speaker level for :
  - Set 1 and Set 2 short o (4 Speakers from Sebjan, 3 speakers from Kamchatka)
  - Set 1 and Set 2 short i (3 speakers from Kamchatka)

25

## acoustic parameters

Parameters	Hypotheses for ATR	
<b>FORMANTS</b>		
F1	lower F1 for +ATR	✓
F2	indifferent F2	?
F3	lower F3 for –ATR	✗
<b>SPECTRAL SLOPE</b>		
Amplitude difference A1-A2	A1-A2 lower for –ATR	✓
<b>FUNDAMENTAL FREQUENCY</b>		
F0	F0 higher in +ATR	✗
<b>DURATION</b>		
vowel duration		!

26

## conclusions

- There is a distinction between two sets
  - ATR justified?
    - not yet
    - only two parameters (F1, A1-A2) similar
  - No significant difference between two dialects
    - A tendency to reduce distinction in Sebian (F1 for high vowels)
- Duration might play a role for the distinction of vowels

27

## conclusion

- For Even further research in needed
  - other parameters
  - other factors
  - other dialects
  - perception tests
- Necessity of investigation the phonetic evidence of the label “ATR”
- An endangered language might show a complicated picture

28

## Aknowledgements

- Volkswagen Foundation, DoBeS Programme
- Bodo Winter, Luise Zippel, Evgeniya Zhivotova, Brigitte Pakendorf (Max Planck Institute for Evolutionary Anthropology)
- Speakers from Kamchatka and Sebian-Küöl

29

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30