A hierarchical approach to variation and sound change

Background
Distinctions among mid vowels are not stable across languages and leading to merger or near-merger (Clements 2006). Collapse of phonological distinction between stressed close-mid and open-mid vowels

Phonemic mergers under investigation:
- Front close-mid and open-mid vowels /e/ and /o/
- Words are transferred gradually from one phonemic category to another (Labov 1994)
- Back close-mid and open-mid vowels /u/ and /o/
- The hierarchical approach allowed to establish the relative type of the lower vowel

Phonemic merger in progress
From context-sensitive to context-independent merger
Reconstructed phonological system:
Consistent distinction between close-mid and open-mid vowel phonemes
Front close-mid & open-mid phonemes

Back close-mid & open-mid phonemes

Current phonological process
1st type speakers

There are three types of idiolects:
- transitional (1st, 2nd types), innovative (3rd)

Observation in apparent time:
Investigation of consecutive stages of phonological change as presented in the speech of different age groups.

Location:
- Villages of Kaj and Juzhaki, Voronezhskiy district, Kirov Region, 300 km from Kirov (North-East of European Russia).
- 10 speakers born between 1931 and 2000
- Approximately one hour of recording for each speaker

A hierarchy of conditions on intra- and inter-speaker variation based on statistical analysis of competing realizations

Research questions:
- What are the factors that condition a speakers' choices when two or more competing pronunciation variants are available?
- What are the mechanisms that account for the elimination of competing choices?

A hierarchical approach
Where the choice between close-mid and open-mid vowels is available, it may be probabilistically predicted on the basis of the following factors

Phrasal position
- Prominent position is associated with the focus and is established on the basis of pitch contour. Prominent positions favour open-mid vowels. Non-prominent positions favour close-mid counterparts.
- /e/ vs. /o/; "here" vs. "prominent position"; /e/ vs. /o/ - non-prominent;

Speaking style
- Speakers more frequently choose open-mid vowels in read speech and close-mid vowels in spontaneous speech.
- /e/ vs. /o/ in /m/ /e/ /t/ vs. /m/ /o/ /t/- "together" - read speech; /m/ /e/ /t/- spontaneous speech;

Consonantal context
- Front vowels:
  - Localized right context triggers higher vowels, /i/ vs. /e/ - "bread" /
  - /o/ /l/ /hi/ble/ /x/ /li/ /"about bread" - /CVC/
- Back vowels:
  - Labial, lateral and velar environment show stronger preference for close-mid vowels.
  - /e/ /l/ /v/ /e/ /i/ /r/ /u/ /"in the place" - the higher vowel falls below the average duration of allophones of given vowels; /e/- the lower vowel is above this value.

Relative magnitudes of factors

Front vowels:
- Predictions
  - 1st type (2 speakers)
  - 2nd type (3 speakers)
  - 3rd type (3 speakers)
- All instances of morpheme with variation
  - 32 morphemes (223 realizations)
  - 40 morphemes (304 realizations)
  - 5 morphemes (5 morphemes)

Phrasal position
- 24 morphemes (171 realizations)
- 33 morphemes (60 realizations)
- 2 morphemes (2 realizations)

Speaking style
- 8 morphemes (33 realizations)
- 21 morphemes (60 realizations)
- 2 morphemes (2 realizations)

Context
- 9 morphemes (12 realizations)
- 14 morphemes (26 realizations)
- 0 morphemes (0 realizations)

Duration
- 4 morphemes (6 realizations)
- 4 morphemes (6 realizations)
- 0 morphemes (0 realizations)

Back vowels:
- Predictions
  - 1st type (3 speakers)
  - 2nd type (3 speakers)
  - 3rd type (3 speakers)
- All instances of morpheme with variation
  - 15 morphemes (61 realizations)
  - 15 morphemes (67 realizations)
  - 14 morphemes (14 realizations)

Phrasal position
- 12 morphemes (51 realizations)
- 12 morphemes (49 realizations)
- 2 morphemes (2 realizations)

Speaking style
- 7 morphemes (7 realizations)
- 2 morphemes (2 realizations)
- 0 morphemes (0 realizations)

Context
- 3 morphemes (3 realizations)
- 2 morphemes (2 realizations)
- 0 morphemes (0 realizations)

Duration
- 0 morphemes (0 realizations)

Results
- The vowel system of dialect of Kaj is moving from a situation where one phonological position allows alternative choices (1st, 2nd types) to a situation with a one-to-one relationship between the phonological position and the allophone (3rd type).
- The hierarchical approach allowed to establish the relative magnitude of factors conditioning variation in the transitional (1st, 2nd types) and in innovative idioclects (3rd type).
- The impact of these factors is being gradually reduced as younger speakers lose an ability to distinguish between them and generalize one pronunciation variant across a number of conditions.

A Multifaceted data from:
- Spontaneous speech
- Production experiments (repetition of test items with open-mid and close-mid phonemes in a variety of positions)
- Categorial perception experiments

Aesthete analysis of "transitional vowel systems" (speaker VD), the dataset includes 871 vowels /6/ innovative vowel system (speaker AIA, the dataset includes 782 vowels). The data are summarized by labov's vowel-extric system.