

Prosodic patterns in male and female teacher discourse: evidence from classroom interaction corpus analysis

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Abstract

While teacher interaction competence is essential to teacher training, interaction quality assessment remains largely subjective. Existing annotated corpora of classroom speech focus primarily on linguistic dimensions, yet the issue of annotation combining linguistic and pedagogical aspects to create a dataset suitable for AI training remains unresolved. This study analyzes the Russian classroom speech corpus designed to train neural networks to evaluate teacher interaction competence focusing on the correlation between prosodic patterns in teacher discourse linked to their pragmatic functions. Specifically, the study examines how F0 range realization varies according to both intonational contours and teacher discourse tactics within tone groups in the speech of Russian-speaking male and female teachers.

The study included collection and processing of audio recordings of 7 Russian-speaking teachers, annotation of speech samples, auditory expert analysis and automatic data extraction. The 10-hours corpus was divided into shorter utterances, followed by adding tiers in Praat (orthographical transcription, intonation contours and interaction tactics).

The corpus analysis reveals the following prosodic patterns across male and female teachers. Overall, the dominant contour types shaping the discourse in male and female speech are rising (39%), falling (30%), and level (25%). Other realizations account for 6% and include the falling–rising and rising–falling contours. Series of rising or falling tones, as well as the special rise, were used by teachers considerably less frequently.

In women's speech, tone groups with level tone show the minimal F0 ranges (mean value – 77 Hz), particularly in opposition and speech transition tactics. Tone groups with rise–fall contours demonstrate the widest F0 ranges (mean value – 156 Hz), particularly in opposition and provocation tactics. Similarly, men demonstrate a parallel tendency towards minimal F0 variation in tone groups with level tones (63 Hz) and maximal variation in rising–falling patterns (mean value - 131 Hz). Notably, the widest F0 ranges are found in the opposition and provocation tactics in women and in highlighting opinions and provocation tactics in men. While a series of rising contours within a tone group was infrequent (less than 1%), it is characteristic of both male and female speech within the most frequent tactic – motivation of thinking tactic (34%). Overall, emphatic and argumentative tactics (provocation, opposition, motivation) correlate with broader F0 ranges, while neutral tactics (referring, understatement) associate with narrower ranges—demonstrating the link between F0 range and communicative assertiveness across genders.

The data demonstrate that prosodic contour type fundamentally constrains F0 range possibilities: level tones function as baseline minimizers across both genders, whereas melodically dynamic contours (rising–falling, falling–rising, series of falling) permit maximal F0 variation. This acoustic architecture suggests that teachers should view intonational contours not as categorical prosodic choices but as structural templates that either enable or restrict the acoustic realization of pragmatic meaning.

The study proposes that explicit prosodic training should be integrated into teacher education to help educators harness prosody's rhetorical power. The authors advocate for corpus-informed AI evaluation tools that can provide teachers with real-time, data-driven feedback on their interaction competence, thereby closing the gap between linguistic theory and professional development.