

## **Auditory speaker identification of foreign language material**

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The paper gives an overview of auditory experimental methods at the Centre of Fundamental and Applied Speechology (the Centre). It outlines experimental research into the perception of foreign speech, particularly of languages of the former USSR (e.g. Chechen & Tadjik). This involves the identification of the language used by foreign (non Russian) speakers by means of the auditory perception of segmental and suprasegmental features of a range of languages. The intention behind this research is to equip Russian experts with tools to assist them in their work with these ethnic languages. Often in Russia auditory speaker identification is being carried out with languages with which the analyst is not familiar. Previous research carried out at the Centre shows that it is necessary to extend the list of features which could be useful for experts who are unable to speak the language being investigated. Our methodology identifies features which experts can rely on and to provide them a set of features typical for various languages. The paper presents some preliminary results. The methodology is being constantly developed and further research is in progress.

The research uses listening groups. The participants in these groups are normally native and non-native speakers of the languages being considered, and the listeners have knowledge of phonetics and phonology. Listener age, gender, and forensic experience is taken into consideration. Listener groups are divided into a number of categories depending upon the amount of experience of the group members, ranging from extensive experience to trainees. The recording presented to the groups is divided into sections according to the lexical content and semantic-syntactic cohesiveness of the text. In the course of the auditory analysis the participants are able to listen to the recording as many times as they wish. After the presentation of each section the listeners make an orthographic representation of it and mark accentuation, pauses, tempo, and pitch contours. The listeners used agreed Likert type scales for indicating tempo, pitch, pause duration, timbre and other speech features. The results of listening to the experimental material were statistically analysed and a set of auditory features derived. During these analyses factors such as the subjects' background in musical education were also considered. The results are considered to be positive when native and non-native speakers agree, and negative when these two groups of subjects differ greatly.

The subjects are presented with different durations of the stimuli. Each test group is represented in the material 3 times with various stimuli duration: short (2,8-5,6 sec), medium (8-15 sec), and long (18,2 – 30,8 sec). In addition the stimulus may be present in the test group, excluded from the test group or included twice in the test group. The experiment is conducted in three steps with a day interval. Preliminary listening to the experimental material showed that the optimal time parameters for the pauses between stimulus and test group material are 2 sec between the sample stimulus and the test group and 1.2 sec between the stimuli of the test group. The listeners also have to describe specific features of each speaker's voice and speech: pitch, tempo, duration of pauses, voice strength, timbre, speech rhythm, and differentiating features. The results are grouped according to the age and gender of the listeners, experience as experts, etc. It has been found that males, experts with more than one year's experience, and people in age group 25-29 years old perform best. The voice and speech characteristics that differ mostly between the groups are speech tempo, and speech rhythm.