Auditory-Perceptual Recognition of the Emotional State of Aggression

Rodmonga Potapova and Liliya Komalova(✉)

Moscow State Linguistic University,
Moscow, Russia
{RKPotapova,GenuinePR}@yandex.ru

Abstract. The authors propose several stages to research verbal-cognitive mechanisms regarding the formation and development of verbal realization of the emotional state of aggression. This paper describes an experimental study which investigates the auditory-perceptual analysis of male scenic speech experiencing the emotional state of aggression (for Russian, English, Spanish and Tatar languages). The results statistically confirm the detected auditory-perceptual "passports" of the emotional state of aggression and demonstrate differences in auditory perception of verbal aggressive behavior by groups of male and female listeners.

Keywords: Aggression · Verbal aggression · Prosody · Speech · Verbal-cognitive mechanism · Verbal behavior · Social learning theory

1 Introduction

Aggressive behavior as a whole communicative process requires interaction of an actor and a recipient. Thereupon carrying out an investigation of aggression a researcher should analyze not only the mechanisms of cognitive-communicative behavioral patterns of an aggressor but also peculiarities of perceptual sphere of a victim, observant and the aggressor itself. Social psychologists confirm that an act can be considered aggressive as well as the recipient perceives it aggressive, which means this particular communicative or physical act corresponds with ascriptions of aggression in recipients point of view [2, p. 113–156].

For example, "there are different rules for interpreting verbal abuse as opposed to physical abuse. < . . . > It appears that people perceive verbal aggression differently when not paired with other types of aggression" [4, p. 76]. Also "past behavior as a predictor of future behavior is a central tenet of behavioral psychology with empirically demonstrated applicability to intimate partner violence and other forms of aggression" [15, p. 29]. Meanwhile, "age and educational level were both negatively related to tolerance for aggression, and Anglo vs. Hispanic ethnicity was also associated with perceptions of aggression" [5, p. 1] and "the subjective perception of aggression from others appears to be more strongly influenced by the gender role, rather than gender, of an aggressor" [3, p. 441].

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2 Method, Procedure, and Results

We continue our survey of verbal-cognitive mechanisms of formation and development of the emotional state of aggression by auditory-perceptual and quantitative analyses.[1] The purpose of the present stage of the study is to determine similar and specific prosodic characteristics that can be used as support in recognition of the emotional state of aggression (on the material of Russian, American English, Castilian Spanish and Kazan Tatar languages).

The hypothesis of the research is that representing a complex of negative emotional and emotional-modal states of a person from any lingua-culture aggression might have similar prosodic features with reference to languages from different language families.

Native Russian speakers (n = 50, 19–23 years old, humanitarian students, study linguistics and understand English) were asked by method of auditory perception to analyze 40 samples of authentic speeches of males delivered in scenic situations modeling the emotional state of aggression.[2] Ten samples of male monologues in each of the languages under investigation were selected. There were two stages of the experiment.

At the first stage we were interested in quantitative description of emotional-modal complex aggression. The listeners were divided in two groups: the first one was given instructions to mark phonograms containing representations of the emotional state of aggression. The second group was asked to designate what emotional and emotional-modal state speakers experienced on the same phonograms.

The experiment showed that on average in 98 % of cases the listeners of both groups recognized that the speakers manifested one or another type of aggression (99,69 % of matches for Russian phonograms, 97,5 % for American English, 98,13 % for Castilian Spanish, and 99,06 % for Kazan variant of Tatar language).

We assume that the background for the emotional-modal complex aggression is formed of the emotional state of irritation that in combination with anger and malice provokes rage. On the whole this complex in the aggregate with other states-satellites (such as causticity, guilt, disgust etc.) is evaluated by the listeners as aggressive verbal behavior.

At the second stage of the experiment the listeners were asked to evaluate the same 40 phonograms based on prosodic characteristics of speakers (pitch,

[1] Results of previous stages of the survey see in [7,8]. Results of acoustic analysis see in [10]. For more details about auditory-perceptual method regarding audio-visual analysis of emotional foreign speakers speech see [11].

[2] Phonograms are taken out of the data base of recordings of modern authentic scenic speech in Russian, English, Spanish and Tatar languages in conditions of family violence, criminal behavior, and corporative conflicts (author L.R. Komalova 2013). Each sample is a fragment of sound-tracks from a movie or TV-series without visual support, accompanied with script of actors speech; playing time varies from 10 to 90 s. The database consists of samples of male and female speeches: monologues, dialogues and polylogues.

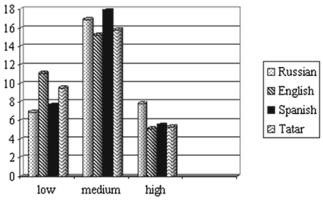

Fig. 1. Average evaluations of auditory-perceptual analysis of pitch

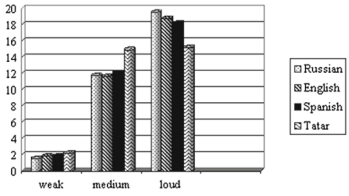

Fig. 2. Average evaluations of auditory-perceptual analysis of loudness volume

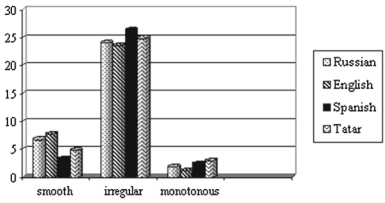

Fig. 3. Average evaluations of auditory-perceptual analysis of melodic contour

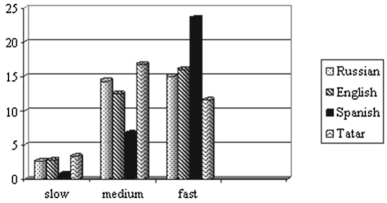

Fig. 4. Average evaluations of auditory-perceptual analysis of speech tempo

loudness volume, melodic contour of pitch, rhythm, tempo, speech breathing, duration of pauses etc.). We also asked the listeners to mark prosodic features which influence evaluation of the experimental material. The results of analysis are presented in Figs. 1, 2, 3, 4, 5, 6, 7 and 8.

As shown on the figures, both male and female listeners tend to perceive the emotional-modal complex of aggression in speech of male speakers in Russian, English, Spanish and Tatar languages without any visual support as loud, irregular, with indistinct rhythm, fast tempo, normal breathing and short pauses. Previously we revealed similar peculiarities researching conflictive communication [6,9]. We also have to mention that indicators that help the listeners recognize types of the emotional state of aggression differ: analyzing samples in native language (Russian) and the language they study (English) the listeners are guided by both prosodic and speech parameters, but analyzing unknown languages such as Spanish and Tatar they mostly take into account only prosodic parameters.

Then we proved our calculations with non-parametrical criteria: tendency L-criterion by Page and T-criterion by Wilcoxon to check validity of experimental evaluations concerning each parameter for each language under investigation; tendency S-criterion by Jonkir and Mann-Whitney U-test to check validity of distribution of dominant evaluations for Russian, English, Spanish and Tatar languages in comparison. The results are presented in Tables 1, 2, 3 and 4.

Table 1. Auditory-perceptual characteristics of male Russian speech for the emotional state of aggression.

Characteristics	Dominant parameter	$\rho \leq$
Pitch	medium	0,05
Loudness volume	loud	0,001
Melodic contour	irregular	0,001
Tempo	medium	0,01
Pauses	short	0,001
Rhythm	indistinct	higher than 0,05
Breathing	normal	higher than 0,05
Indicators	prosodic and speech	0,01

Table 2. Auditory-perceptual characteristics of male English speech for the emotional state of aggression.

Characteristics	Dominant parameter	$\rho \leq$
Pitch	medium	0,001
Loudness volume	loud	0,001
Melodic contour	irregular	0,001
Tempo	fast	0,001
Pauses	short	0,001
Rhythm	indistinct	higher than 0,05
Breathing	normal	higher than 0,05
Indicators	prosodic	0,01

Table 3. Auditory-perceptual characteristics of male Spanish speech for the emotional state of aggression.

Characteristics	Dominant parameter	$\rho \leq$
Pitch	medium	0,001
Loudness volume	loud	0,001
Melodic contour	irregular	0,001
Tempo	fast	0,001
Pauses	short	0,001
Rhythm	indistinct	higher than 0,05
Breathing	normal	higher than 0,05
Indicators	prosodic	0,01

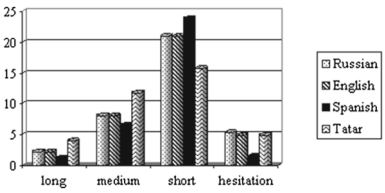

Fig. 5. Average evaluations of auditory-perceptual analysis of pause duration

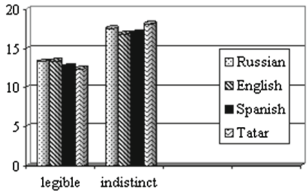

Fig. 6. Average evaluations of auditory-perceptual analysis of speech rhythm

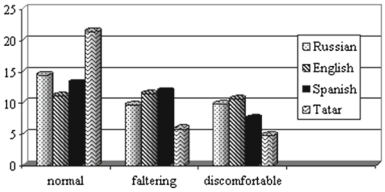

Fig. 7. Average evaluations of auditory-perceptual analysis of speech breathing

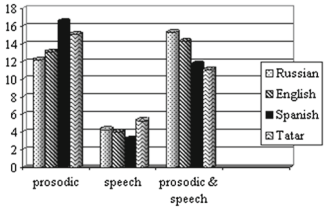

Fig. 8. Average evaluations of auditory-perceptual analysis of speech and prosodic indicators

Table 4. Auditory-perceptual characteristics of male Tatar speech for the emotional state of aggression.

Characteristics	Dominant parameter	$\rho \leq$
Pitch	medium	0,001
Loudness volume	loud	0,001
Melodic contour	irregular	0,001
Tempo	medium	0,001
Pauses	short	0,001
Rhythm	indistinct	higher than 0,05
Breathing	normal	higher than 0,05
Indicators	prosodic	0,01

As we can see the quantitative and comparative analyses statistically confirmed validity of the majority of results of the auditory-perceptual analysis. The validity of the obtained data was also confirmed for four languages under investigation (it's marked with italic type in the tables).

To specify our findings and exclude possible mistakes we divided the data into two groups of listeners by gender (5 males and 27 females) for each language. The discovered differences were analyzed using two-stages experiment procedure

described below. As a result of the analysis we didn't find any statistically valid differences in perception of male aggressive speech by groups of male and female listeners.

3 Conclusions

Thus, based on results of the auditory-perceptual experiments we can conclude that emotional-modal complex "aggression" for Russian, American English, Castilian Spanish and Kazan variant of Tatar language is characterized by medium pitch of voice, loud voice, irregular melodic contour, short pauses, indistinct speech rhythm, and normal speech breathing. These parameters are similarly fixed by male and female listeners.

Parameter more stable to influence of gender and language changes in detection of the emotional state of aggression by Russian native speakers by means of auditory perception without visual support is speech melodic contour; and more varying one is loudness volume of voice.

4 Discussion

As any experimental research our investigation has limitations. The listeners analyzed the whole phonogram without differentiation to initial, medium and final part of the statement [12–14]. We also took average evaluations of auditory-perceptual analysis that can modify the obtained data. We involved only Russian speakers of one age group.

Owing to the fact that movie and TV-speech is usually considered only as imitation of speech in real conditions, the results of the experiment can't be simply extrapolated when detecting the state of aggression of male speech in real conditions. But in defense of utility of our research says the Social Learning Theory of A. Bandura. It postulates that "learning is a cognitive process that takes place in a social context and can occur purely through observation or direct instruction, even in the absence of motor reproduction or direct reinforcement" [1]. As applied to our investigation, it's possible to learn (and subsequently reproduce) aggressive verbal patterns through auditory perception of models of aggressive verbal behavior of movie- and TV-actors.

5 Prospects of Investigation

Undoubtedly, it would be interesting to continue our investigation with auditory-perceptual analysis of the same samples but involving English (American and British), Spanish (Castilian regions and Latin America) and Tatar native speakers as listeners, males and females of different ages. Also it will be interesting to reveal whether the auditory perception of female actors voice and speech in state of aggression is similar for listeners of different gender, age and linguacultures under investigation.

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