LINGUISTICS

Nizhny Novgorod Dobrolyubov
State Linguistics University,
Associate Professor of the
Chair of German Philology
e-mail: samozh@lunn.ru

S.N. Samozhenov

CONNOTATIVE ASPECT OF PROSODY IN THE GERMAN AND RUSSIAN LANGUAGES

The paper summarizes the results of the research in experimental phonetics. It outlines the prosodic features of modal-and-emotional connotations in the German and Russian languages. The author analyzes a prosodemic phenomenon in terms of the phonological systems realization theory.
Key words: realization theory, norm, phoneme, intoneme, prosodic structure, modal-emotional connotation.

The modern stage of social development is characterized by cultural globalization and intense development of the information field, "which allows for much faster contacts between different peoples..." [1, p. 287]. In this connection, instrumental investigation of speech activity on the material of various languages is becoming increasingly important from the viewpoint of linguistic scholars. The experimental phonetic investigation of the connotative prosody aspect in the German and Russian languages, which was performed in the framework of the above-said research line, was based on the initial notions of R.R. Kaspranskiy's theory of realization of phonologic systems [2, p.26]. According to this theory, the realization process is directed from abstract-system emic units toward material-individual speech products as follows:

Speech chain (sequence of acoustic signals)

A--B

System

Only acoustic phenomena in the form of a time sequence are represented as directly observed, which are a result of their realization; what lies below the AB line is unobservable, i.e., one can make only abstract assumptions about it, by tracing the path from specific material units of speech to abstract linguistic units and, vice versa, from abstract linguistic units to specific material ones. Relationships of realization between abstract system units and material units of the speech chain can be direct or one-to-one units, when only one ethic unit (speech sound, prosodic structure) corresponds to each emic unit (phoneme, intoneme). Such are the relationships that link, e.g., phonemes (system units) with transcription symbols in phonemic transcription: only one transcription symbol (representant) corresponds to each phoneme and is correlated with it at all times, the numbers of phonemes in the system and representants in the phonemic transcription are identical, and the utterance is realized as sequential explication of a chain of representants in strict correspondence with the phonemic scheme of the utterance.

The same relationships link abstract intonational models (intonemes) with specific auditory images of the utterance in its neutral realization, see, e.g., the well-known experimental phrase used by E. Stock and K. Zaharias: *"Gisela May singt am Montag in Paris"* [3, p. 9]. This utterance, when it is pronounced by a speaker in a recording studio with no appellative situatio-

nal coordinates specified, will be a manifestation of the sequence of phonemes and the intoneme structure, which are realized in a specific prosodic structure. An intoneme that exists at the system level consists of at least three components, without which verbal communication is impossible in principle. They are a distinct intonation pattern and a specific main-stress syllable, an obligatory time continuum, and a necessarily preset volume level (in decibels, conditionally); "an intoneme is a bundle of prosodic meanings" [4, p. 20]. An utterance will be heard as something said loudly, quietly, rather softly, etc. It will sound for a certain time and with a certain melodic pattern, and the auditor will note the timbral coloring of the speaker's voice.

There are no one-to-one direct relationships between emic and ethic units during natural verbal realization of the system. In this case, the realization process has a much more complicated character, when the transition from the abstract-system notions to the material ones obeys complicated transition rules, very much alike to modification of individual details, elements, characteristics of a digital photo with appropriate software. A phoneme as a system unit of the phonological level is represented only by phonologically relevant indicators or a bundle of distinctive characteristics, which are relevant from the viewpoint of the phonologic and language system, i.e., of the distinctive function. However, in natural speech, a phoneme cannot function purely in the form of a framework which consists only of phonologically relevant framework. In the process of its implementation, i.e., realization, it is filled with many properties of the acoustic character, which have no purpose from a purely linguistic, semiotic viewpoint. This is confirmed by N.S. Trubetskoy opinion: he believed that sounds are never phonemes per se, since a phoneme cannot contain any phonologically irrelevant features, whereas this is inevitable for a sound of speech [5, p. 45]. The relationships of implementation, which relate a phoneme with a sound of speech are not straightforward and are determined not only in the system-functional way. In the realization process, the bundle of the distinctive characteristics that form the phoneme should be supplemented with those phonologically irrelevant characteristics, which are "omitted" in the framework of system analysis. Non-phonologic, but unavoidable and obligatory sound properties and characteristics are supplemented in accordance with historical rules of a specific language, which exist in the language structure as realization norms, i.e., the codified literary norm, everyday speech norm, dialect norm, etc.

Thus, the phoneme is realized in accordance with the requirements of the phonologic system, one of realization norms, and stylistic features of realization as shown in the following scheme:

system (phonemes)
↓
norm (sound classes)
↓
style (variants of sound classes)
↓
speech chain.
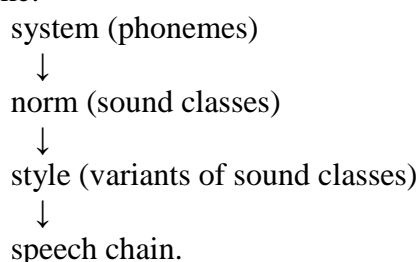
The phonologic (distinctive) frame is filled with non-phonologic characteristics in accordance with the rules of the norm, i.e., in keeping with the sound classes, which are typical of the given language and are linked to the phonologic units by the implementation relations. The array of these relations creates the phonetic norm of the language. Realization of the phonologic system obeys rigid realization norms, whether such norms are codified or not.

In exactly the same way, intonemes are realized in speech in accordance with the laws of the phonetic norm. For example, «*Gisela May singt __am Montag__ in Paris».*

In speech, the same intoneme manifests itself as in the neutral realization of a phrase. However, since it is determined by the communicative situation, it is represented as a slightly different prosodic structure, which is related to it via the same relationships as the phoneme and its variant. If *«am Montag»* is pronounced very softly in a large crowd, or shouted extremely loudly in an ear of not absolutely deaf person, then it is not a phonetic norm, not a style of pronunciation, but a deviation. If one pronounces *« Gisela May singt am Montag in Paris? »,* the meaning of the phrase changes, as well as its suprasegmental image, and, therefore, a different intoneme is realized here, as compared with the previous example. Which of the prosodic meanings in their bundle plays the role of the distinctive characteristic here? With no doubt, it is the motion of the intonation in the main-stress syllable. Whereas in the first case, where information is communicated, there is a fall in the tone of the voice at the word *«Paris»*, in the second case, there is a rise at the same word. Thus, meaning distinction takes place. On this basis, a hypothesis was advanced that connotative meanings of a phrase are realized in accordance with a similar scheme in different languages.

The experimental phonetic study was performed on the material of suprasegmental characteristics of the utterances containing modal emotional connotations of irony, which follow theoretically from the grammatical category of subjective modality [6, p. 51; 7, p. 101]. This assumption is supported by E.S. Gotovtseva's statement that "making the ironical meaning is conditioned by the producent's intention to express his own attitude towards actions and utterances of the recipient" [8, p. 58-59]. It is our opinion that the modal emotional connotation is a speech phenomenon, which contains both the speaker's attitude to the contents of his or her utterance (obviously, allowing for appellative coordinates of the communicative situation), and the emotional coloring of this attitude. In this case, modality is treated in the wording of N.E. Petrov [9, p. 145] in a wide sense as

- understanding or qualification of the contents of the entire utterance by the speaker from the viewpoint of evaluation of its trustworthiness;
- the speaker's attitude to the predicative characteristic of the utterance, evaluation of the character of its realization, understanding, representation of the action as desirable, necessary, obligatory, potential, or uncertain;
- expression of the emotional attitude, reaction of the speaker, which is caused by the general fact, the fact of the utterance from the viewpoint of evaluation and emotional interpretation of the utterance contents;
- volitional attitude of the speaker to his/her interlocutor and him/herself;
- the speaker's attitude to the goal of the conversation.

The initial language material was a set of utterances from works of Russian literature of the XX-XXI centuries and their German translations. The experimental material was chosen in accordance with recommendations of R.K. Potapova and V.V. Potapov, leading specialists in the fields of germanistics, slavistics, and experimental phonetics [10, 126]. The body of experimental data consisted of 100 utterances, 30 of which were chosen as ultimately corresponding to the objectives of auditorial and acoustic observation. The bulk of the experimental material for each speaker consisted of 60 utterances: thirty were modally colored, and thirty were realized in the context with no modal emotional marker. The experimental material was recorded digitally and then processed and transferred to a computer in the recording studio of the Institut für Sprechwissenschaft und Phonetik an der Martin-Luther-Universität Halle-Wittenberg, Germany, and in the recording studio of the N.A. Dobrolyubov State Linguistic University of Nizhny Novgorod (LUNN), Russia. Six male and six female native speakers of each language, respectively, aged from 20 to 35, having no diction deficiencies, were engaged in the studies as speaker-informants. The informants were senior students of the Institut für Sprechwissenschaft und Phonetik an der Martin-Luther-Universität Halle-Wittenberg and

students of the LUNN German Department. All of them have the literary pronunciation norm and belong to the same social group. The final variant of the recording was accepted after a test recording with consent of the informant. The body of experimental material was realized quasi-spontaneously, in a specified extralinguistic situation, with a preset modal emotional setting defined for the speakers. They were requested to pronounce a text in a context, with the modal emotional marker "ironically" or neutrally, without a preset modal emotional connotation. The informants received the texts to be recorded beforehand and had the possibility to read it before the recording. The experimental phonetic study was performed by the method of complex analysis, which included:

1. Auditorial analysis: acoustic analysis of speech samples by auditors having the literary pronunciation norm;

2. Instrumental acoustic analysis:

- selection of speakers for making the recordings;
- digital recording of the selected material;
- study of the material using the PRAAT code for speech signal processing (measurements and analysis of temporal, dynamic, and tonal characteristics);
- mathematical statistical data processing.

3. Linguistic interpretation of the experimental results.

The auditorial analysis of the recorded material was performed in three stages. Its objective was to select the material which corresponded as much as possible to the goals of the study. At the first stage, we checked to what degree the utterances pronounced by thespeaker-informants corresponded to the specified speech situations. Six native German speakers and six native Russian speakers having the literary pronunciation norm and linguistic education (2 DAAD lectors teaching at LUNN and 4 senior students of the Institut für Sprechwissenschaft und Phonetik an der Martin-Luther-Universität Halle-Wittenberg, Germany, on the German side, and fifth-year students of LUNN, on the Russian side, were engaged at this stage.

The following objectives were set at the first stage of analysis:

- determine whether the written text corresponded to the current literary norms of the language;
- correlate the pronounced utterance with the modal emotional connotation "ironically";
- evaluate the degree of intensity of irony coloring in the utterance on a scale from 1 to 10.

In the process of the first stage of the auditorial analysis, each utterance of each speaker was evaluated on a scale from 1 to 10. The obtained results were entered in a table. A simple average was calculated for each utterance. The utterances having values of the simple average equal to or exceeding 8 points were selected for the following analysis stage.

The second stage of the analysis was performed jointly with post-graduate students and teachers from LUNN (Nizhny Novgorod, Russia). The following tasks were solved at this stage:

- isolation of the master component in the prosodic utterance structure, which realized the modal emotional connotation;

- evaluation of the speech tempo during a speaker's pronouncing the ironically colored utterance (slow, medium, or fast);

- detection of intellectual and emotive pauses in the utterance;

- identification of the prenuclear, nuclear, and postnuclear utterance syllables;

- determination of the tone change direction in the utterance;

- determination of the tonal range in each realization (narrow, medium, wide);

- evaluation of the intensity of the utterance pronunciation (low, medium, high).

It was found in the process of the auditorial analysis that:

- ironically marked utterances are characterized by a significant widening of the tonal range;
- the tempo is slightly slower in modal emotional realizations;
- an increase in the intensity is observed at the nuclear syllable of marked utterances;
- modal emotional colored utterances are characterized by the presence of emotive pauses;
- the temporal component of the utterance was singled out as the master component in expression of modal emotional connotations.

Basing on the results of the auditorial analysis, fourteen initial utterances (seven from each language) were chosen for the consequent instrumental acoustic analysis. The total duration of the utterances pronounced by 6 speakers was 28 minutes.

The speakers' realizations were processed with the PRAAT software code developed by Paul Boersma and David Weenink from the Phonetics Department of Amsterdam University. This code offers a set of functions for segmentation of the audio stream, analysis and synthesis of speech, graphical representation of the obtained data (figures and oscillogram plots, pitch-period contours, intensity envelopes, etc.) for publication of the research results (see the figures).

Fig. 1.
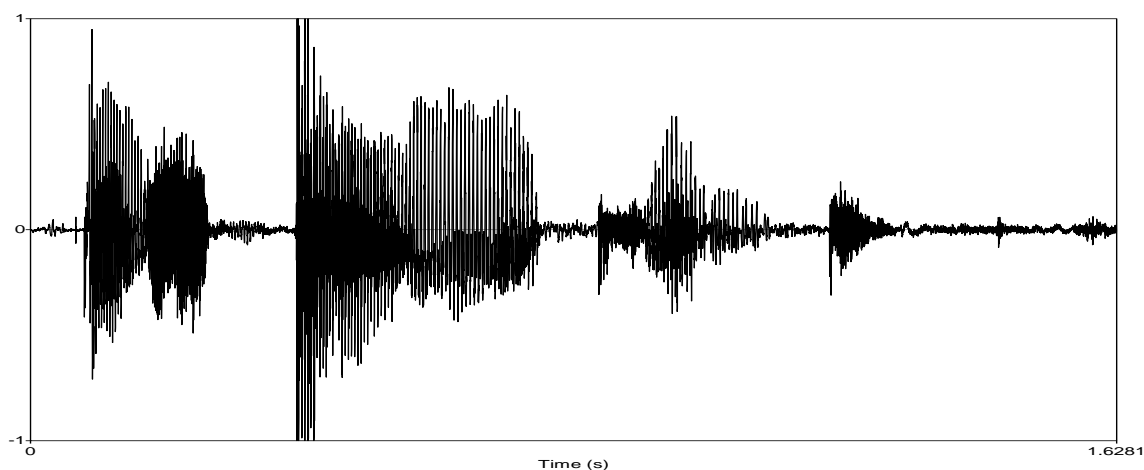Oscillogram of a speech signal

Fig. 2.
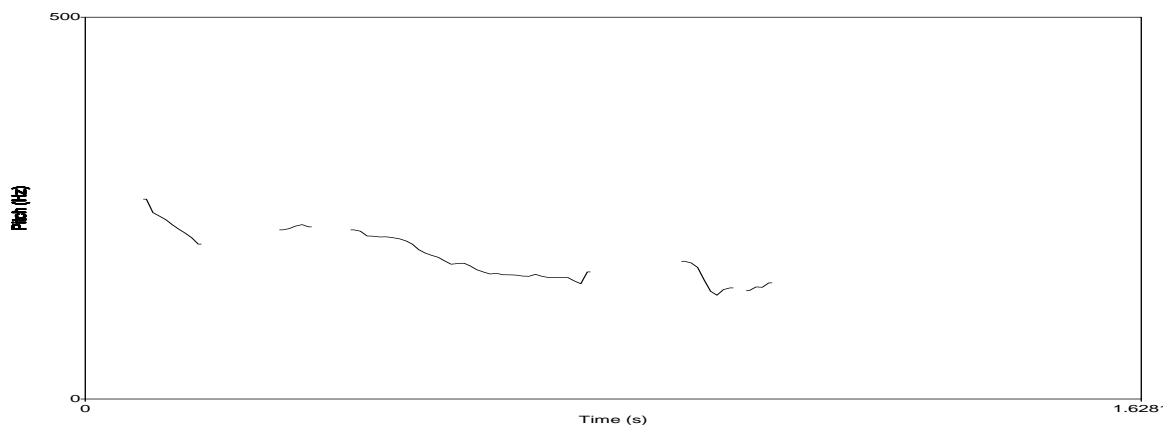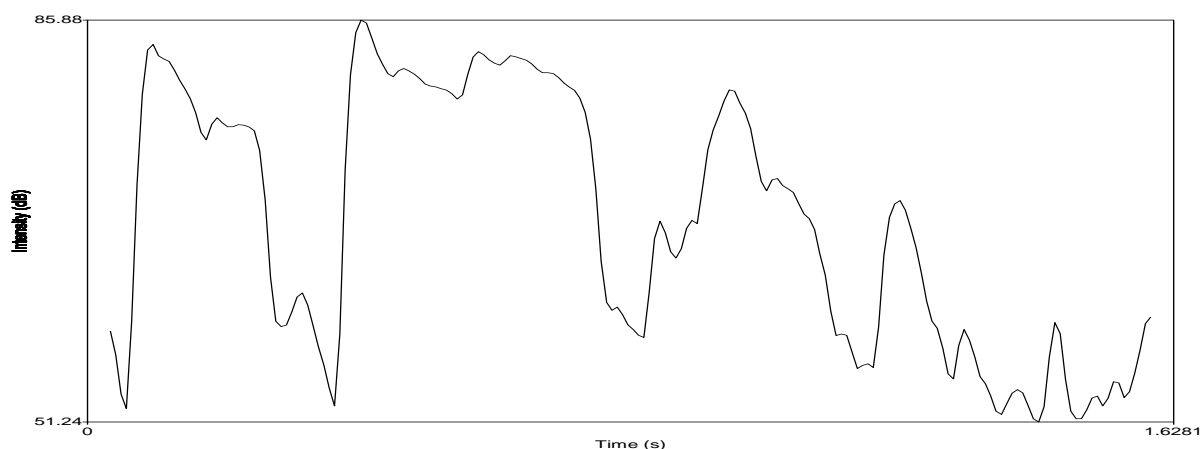Envelope of the base frequency of the speech signal

Fig. 3.
Envelope of the speech signal intensity

The data about acoustic parameters were entered in MS Excel 2007 spreadsheets and processed automatically according to formulas.

Analysis of the experimental material included the following stages:
1. Segmentation of the utterance into syllables and prenuclear, nuclear, and postnuclear parts;
2. Measurement of acoustic parameters (base frequency, intensity, duration) of the nuclear, prenuclear, and postnuclear syllables.

As a result of the instrumental acoustic analysis, absolute digital values of all prosodic characteristics were obtained.
Tonal characteristics, Hz:
- maximal and minimal value of the base frequency;
- tonal range of the phrase;
- direction of the base frequency change in the entire utterance;
- direction of the change in tone in the nuclear syllable;
- direction of the change in tone in the prenuclear syllable;
- direction of the change in tone in the postnuclear syllable;
- tone pitch at the beginning of the utterance.
Dynamic characteristics, dB:
- minimal peak (dip) of the utterance intensity;
- maximal peak (hump) of the utterance intensity;
- range of utterance intensity range;
- average intensity of the utterance;
- average intensity of the nuclear syllable;
- average intensity of the prenuclear syllable;
- average intensity of the postnuclear syllable;
- localization of the hump and dip of the intensity in the utterance.
Temporal characteristics, s:
- duration of the entire utterance;
- duration of the phonatory period;
- existence and duration of intellectual pauses;

- existence and duration of emotive pauses;
- average duration of the prenuclear syllable;
- average duration of the nuclear syllable;
- average duration of the postnuclear syllable.

In the process of the instrumental acoustic analysis, the data were processed using the methods of the probability theory and mathematical statistics. Application of these data processing methods to experimental phonetic studies is aimed at obtaining objective evaluations of these data, i.e., identification of regularities and random phenomena in speech.

The data were processed using the methods of mathematical statistics in the following order:
1. The simple average values of the parameters x and y were determined,

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n},$$

where
x is the parameter of an ironic utterance,
y is the parameter of a neutral utterance, and
n is the number of measurements.
We obtained n values of x_i and y_i in direct measurements with equal accuracy and, if the errors in the values of x and y obey the normal distribution law, i.e., the Gauss law, the most probable values of x and y will be their simple average values.
2. After the simple average x and y were determined, deviations of the observed values x_i and y_i of the parameters x and y from the simple average values (for each observation):

$$\varepsilon_{x_i} = x_i - \bar{x}, \text{ for } I = 1\ldots n;$$
$$\varepsilon_{y_i} = y_i - \bar{y}, \text{ for } I = 1\ldots n.$$

3. To determine the dispersion of the normal error distribution law, the following formula was used:

$$\sigma^2 = \frac{\sum_{i=1}^{n} \varepsilon_i^2}{n-1}$$

4. Then, the standard deviation σ for x and y was determined using the formula

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} \varepsilon_i^2}{n-1}}$$

or basing on the simple average error which, in its turn, is found by using the formula

$$C = \frac{\sum |\varepsilon_i|}{\sqrt{n(n-1)}} \quad (1)$$

wherefrom
$$\sigma = \sqrt{\frac{\pi}{2}} \cdot C. \quad (2)$$

If the values of σ obtained by using the two above-said ways, i.e., by formulas (1) and (2), did not differ greatly, it was concluded that application of the normal distribution law in this case was correct.
5. The value of the Student criterion was calculated for statistical evaluation of the relevance or irrelevance of the deviations between average frequencies of the two compared series. The obtained value of the Student criterion was compared with the theoretical value from the table of the Student criterion values.

$$t = \frac{x_1 - \bar{x}_2}{s_{1,2}} \cdot \sqrt{\frac{k_1 \cdot k_2}{k_1 + k_2}}$$

Then, the obtained results were interpreted linguistically, which allowed making the following conclusions:

The intoneme, a system unit, having passed the process of normative regulation, is manifested in speech as a prosodic structure. The denotation-connotation spectrum of the prosodic structure is formed as a function of specific communicative situational coordinates, as well as of the connotative meanings, which the speaker puts into the meaning of his/her utterance.

Realization of the ironic attitude to the object of the utterance at the suprasegmental level in the German language differs from this process in the Russian language in the volume of variations in individual parameters of the prosodic structure. For example, Russian ironic utterances have a wider tonal range compared with the German ones (by 12%), the tone level at the beginning of the utterance is higher by 6.5%, and the direction of the tone is "rise-fall", unlike in German ("fall-rise"). In terms of the temporal characteristic, the Russian utterances also supersede their German counterparts qualitatively, i.e., the total duration of the utterance, and, therefore, durations of syllables and pauses, increase. Upon the whole, this parameter increases by 12.5%. Dynamic indicators of the Russian and German initial utterances largely coincide and differ only in localization of dips and humps of the intensity in the linear structure of the utterance.

Bibliographic list

1. Zajakin O.R., Samozhenov S.N. Jazyk i kultura v istoricheskih i aktual'nyh processah vnutrennej migracii i transformacii v mnogonacional'nom gosudarstve Rossija / O.R.Zajakin, S.N.Samozhenov // Mir nauki, kul'tury, obrazovanija. – 2010. – Vyp. 3(22). – S. 287-291.

2. Kaspranskij R.R. Realizacija fonologicheskih sistem v rechi: Avtoref. dis. …dokt. filol. nauk. – M.: In-t jazykoznanija AN SSSR, 1980. – 39 s.

3. Stock E., Zacharias Ch. Deutsche Satzintonation. – Leipzig, 1973. – 168 S.

4. Nikolajeva T.M. Frazovaja intonacija slavjanskih jazykov. – M., 1977. – 277 s.

5. Trubeckoj N.S. Osnovy fonologii. – M.: Izd-vo inostr. lit., 1960. – 371 s.

6. Kuzmicheva A.A. Dinamicheskij component vyskazyvanija kak suprasegmentnoje sredstvo realizacii ironii v nemeckoj rechi./ A.A.Kuzmicheva // Vestnik Nizhegorod. gos. lingvist. un-ta im. N.A.Dobroljubova. – 2011. – Vyp.15 – S. 50-57.

7. Martjanova E.V. Ironicheskie vyskazyvanija kak kosvennye rechevye akty aksiologicheskogo haraktera (na materiale nemetskogo jazyka). / E.V.Martjanova // Nauchnyj vestnik Voronezh. gos. arh.-stroit. un-ta. Sovremennye lingvisticheskie i metodiko-didakticheskie issledovanija. – 2006. – Vyp.6. – S. 101-112.

8. Gotovceva E.S. Ironija kak ritoricheskaja figura i diskurs. / E.S.Gotovceva // Nauchnyj vestnik Voronezh. gos. arh.-stroit. un-ta. Sovremennye lingvisticheskie i metodiko-didakticheskie issledovanija. – 2007. – Vyp.8. – S. 58-65.

9. Petrov N.E. O soderzhanii i objome jazykovoj modal'nosti. – Novosibirsk: Nauka, 1982. – 161 s.

10. Potapova R.K., Potapov V.V. Rechevaja kommunikacija: Ot zvuka k vyskazyvaniju. – M.: Jazyki slavjanskih kul'tur, 2012. – 462 s.