INTONATIONAL UNIVERSALS IN TEXTUAL CONTEXT

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ABSTRACT

This paper reports the results of an experimental research of universals in emotional speech. Intonational universals were studied at a textual level in reference to general emotional colouring and expression of particular emotions. Intonational universals were also analysed in a new aspect-communicative orientation of emotional texts.

INTRODUCTION

For some decades contrastive studies have gained much attention in linguistics. Contrastive studies of systems and functions are particularly useful when languages with different structures are compared. The results reported in literature show that on the one hand languages can differ from each other without limit and in unpredictable ways, and on the other hand, "The existence of deep seated formal universals, ... implies that all languages are cut to the same pattern" (Chomsky N., 1965). Thus among its other goals, contrastive typology is largely concerned with revealing linguistic universals. Various proposals have been put forward as to what constitutes universals. Many of them have taken the form and function of the rules of grammar.

The universals that have been studied best in phonetics refer to phone-mic systems. Studies of prosodic universals are relatively scarce, although intonation systems manifest more universal features than other linguistic categories.

Available descriptions of intonational typology disregard its emotional aspect, despite the fact emotionally coloured speech contains more universals than neutral speech; this evidently should be explained by the common biological nature of emotions. "I hypothesized that of the parts of the human vocal system that are used linguistically intonation respond more closely than any other to states of organism. ... there are tendencies in the repetition of intonational forms in the most widely separated languages" (Bolinger D., 1980).

The aim of this paper is to reveal universals in emotional speech intonation at a textual level.

SPEECH MATERIAL AND SUBJECTS

An experimental study of textual prosody was carried out on emotional and corresponding neutral texts recorded by 30 native speakers of English, German, French, Russian and Ukrainian. Whereas our previous investigation of emotional speech (Nushikyan,1987) was based on 3 languages - English, Russian and Ukrainian, this one involves 2 more languages - German and French. Here attention has been spread from the single utterance to the longer units - texts. These texts expressed 16 positive and negative emotions (Nushikyan,1986). The speech signal was instrumentally analysed by Visi-Pitch, IBM speech program, which enabled graphical presentation of fundamental frequency and intensity. Spectrograms were made on Sona-Graph of the Kay Elemetrics Corporation using the wide band filter (300 Hz).

Emotional speech prosody is described as a complex of acoustic features that includes features of melody, intensity, duration and spectrum. The description was made both for a whole text and a separate utterance. Investigation of textual prosody provides a deeper analysis of its intonation structure and reveals differences in integration of emotional tension.

Prosodic features and intonation patterns of utterances in a text were analysed and compared on a set of structurally important syllables: the unstressed preceding the first stressed, the first stressed, the nuclear, and the unstressed post-nuclear syllables. All acoustic features were analysed and compared in relative units in order to level individual differences and put together data obtained from 30 different speakers.

DATA ANALYSIS AND RESULTS

Intonational universals in emotional speech were studied in reference to general emotional colouring and expression of particular emotions.

Comparison between emotional and neutral texts revealed universal features of general emotional colouring. Thus, in all the five languages emotional texts differed from neutral in variations of fundamental frequency intervals and range, velocity of fundamental frequency changes, energy of the whole phrase and of its nuclear syllable, mean syllable duration, and, more conspicuously, nuclear syllable duration.

Speech prosody of particular emotions in the five languages was also characterized by some common features. They were: higher fundamental frequency, greater intensity and longer duration, along with wider F_2 , F_3 and F_4 bands and a more complicated structure of their harmonics, the greater role of the high frequency noise regions of consonants in texts expressing **anger, indignation** and **threat** ; wider formant bands of F_2 ,F_3 , F_4, the shift of the intensity of formant frequencies of semantically important words into higher regions, smaller formant energy of unstressed syllables, greater role of high frequency noise regions of affricates, longer duration and greater intensity of key and thematic words, higher fundamental frequency pitch in all structural parts of communicatively strong utterances of texts expressing **delight, joy, admiration** ; longer duration of all structural parts of an utterance, lower intensity level, smaller formant energy of unstressed syllables, and wider F_3 band, greater role of high frequency noise regions of affricates, lower frequency pitch in texts expressing **sadness** ; higher fundamental frequency pitch of all the structural parts of an utterance and the decrease of their intensity, smaller formant energy of F_1 and F_2 , lower frequencies of F_3 in texts involving **surprise** ; etc.

Some common features in speech prosody of particular emotions can also be observed through the study of their intensity.

The acoustic analysis of the intensity difference between emotional and neutral texts reveals a significantly greater total energy of most emotional texts.

The ratio of the total energy of emotional and neutral texts proves to be universal in the prosodic structuring of emotional speech. The quantity of this ratio depends on the type of emotion expressed in the text (see Table 1).

Table 1. The ratio of total energy of emotional and neutral texts.

Emotions expressed in the text	Ratio of total energy				
	English	German	French	Russian	Ukrainian
joy	1,65	1,71	1,58	1,26	1.37
sorrow	0,86	0,92	0,83	0,76	0,87
anger	1,78	1,86	1,65	1,68	1,49
fear	0,75	0,91	0,74	0,86	0,89
despair	1,19	1,31	1,29	1,28	1,26
threat	2,23	1,96	1,84	1,81	1,69
surprise	1,11	1,19	1,09	1,12	1,14
shame	0,95	0,98	0,84	0,79	0,81
offence	1,55	1,51	1,31	1,24	1,16
contempt	1,83	1,87	1,61	1,42	1,36
suspicion	1,56	1,58	1,41	1,02	1,09
irony	1,56	1,65	1,54	1,42	1,51

The data of the table show that such emotions as **anger, contempt, threat, irony** greatly increase the total textual energy in all the studied languages. In English and German a significant increase of energy is observed in texts expressing offence and suspicion. In Russian and Ukrainian the increase of total energy is not so great. The decrease of

textual energy is observed in texts expressing **sorrow, fear, shame**.

Research based on acoustic data presents evidence that for languages under study variations in speech rate are mainly due to variations of pauses and the type of speech and emotion that is being used.

Identical and non-identical elements of prosodic systems of different languages can also be established from phonetic division of texts pronounced emotionally and neutrally.

Extensive experimental data from the five languages shows that phonetic division boundaries mostly coincide with syntactic division boundaries both in neutral and emotional texts, and so this feature may be considered universal.

Another regularity in phonetic division is that pauses are more frequent in emotional texts than in neutral. An analysis of pauses in identical texts in English, German, French, Russian and Ukrainian provides their uniformity, which indicates the universal character of this prosodic feature.

The results of the experiment are interesting from the point of view of speech communication which is a continuous and complex process of transmitting not only ideas but also emotions, attitudes. Communicative approach to the study of emotions reveals that emotional information is often organized in larger suprasentential units - texts. Each text presents a speech act with a concrete pragmatic aim. The components of speech act are described in a well-known R. Jackobson's scheme-addressor (speaker) - message - addressee, recipient (listner).

The study of communicative orientation of emotional texts show that such emotions like **tenderness, sorrow, offence, shame** are connected with the **addressor** as they express the emotional state of the speaker; **anger, indignation, threat**, reproach are directed to the recipient-to the listner; new information in the message arouse **surprise, delight**; absence or delay of message leads to **fear** and **despair** ; **contempt, irony, suspicion** are connected with the character of the received message.

The data of experimental study show that the same communicative orientation of emotional text in different languages leads to common acoustic parameters in them.(see Table 2).

Table 2. The comparison of acoustic parameters of emotional and neutral texts.

Components of speech acts	Emotions expressed in speech acts	Acoustic parameters F_0	I	t
addressor (speaker)	sorrow tenderness offence shame	$F_e < F_n$	$I_e < I_n$	$t_e > t_n$
addressee recipient (listner)	anger indignation threat reproach	$F_e > F_n$	$I_e > I_n$	$t_e > < t_n$
message: receipt	delight surprise	$F_e > F_n$	$I_e < I_n$	$t_e > < t_n$
message: absence delay	fear despair	$F_e > < F_n$	$I_e > < I_n$	$t_e > < t_n$
message: character	contempt irony suspicion	$F_e m > F_n m$	$I_e m > I_n m$	$t_e n > t_n n$

Where $F_x m = F_x max$, $I_x m = I_x max$
$t_x n = t_x$ nuclear syllable

The data in the table prove that texts expressing emotional states of the speaker are characterized by the decrease of fundamental frequency and intensity and longer duration. Emotional texts directed to the listner basically increase all the acoustic parameters. Emotional texts connected with the receipt of the message are characterized by a sharp increase of fundamental frequency, decrease of intensity and great variations of their temporal structures.

Absence or delay of message leads to great variations of all the acoustic parameters. Texts, which are reactions to the character of the message received increase all the acoustic parameters of semantically important words in them.

CONCLUSIONS

The study has attempted to elucidate one aspect of prosody in the textual function-universal character of emotional expression. It shows that there are large areas of overlap between even the most diverse languages in the use of common features of prosodic patterning. A contrastive analysis of emotional and neutral text intonation in English, German, French, Russian and Ukrainian has revealed common means of emotional expression. Emotions are expressed in speech signal through a complex of acoustic features. The particular set of the features, however, depends of the type of emotion and degree of emotional colouring.

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