

Theoretical and Experimental-Phonetic Approach To Text Intonation in English

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Abstract. In English, tone forms a well-developed, relatively independent subsystem of intonation. The interest in the study of the tone features of intonation is explained by the fact that the speaker can consciously realise it in important segments in terms of the meaning, which form the centre of the syntagma and where the other parts are located around it. The study of the semantic structure of tone within the constituent functions of intonation reveals the deep meaning realised in the text. In addition to the scientific-theoretical issues presented in the text, an experimental-phonetic analysis was conducted to accurately determine the role of intonation on the acoustic parameters of speech. The frequency, strength and time of the main tone were also analysed here. In addition, the melody, emphasis, tempo, timbre, intensity and rhythm of the text are also analysed. The purpose of the experimental-phonetic analysis is to determine the text intonation on three parameters – frequency, strength, and time of the main tone, by using the *PRAAT* program. Complex acoustic (localisation of acoustic parameters, frequency, intensity, time of the main tone) analysis was carried out with the help of experimental-phonetic analysis. The article provides oscillograms and spectrograms of selected language materials. The results of the experiment are presented in a diagram at the end of the article. In the experiments, specialised methods of mathematical-statistical and contextual analysis were employed.

Keywords: experimental-phonetic analysis; acoustic parameter; frequency; intensity; time of the main tone.

INTRODUCTION

The movement of the tone within the discourse provides the basis to determine the main content of the text and discover the initial motive of the information, as well as creates a basis to distinguish the degree of importance of the individual components in the speaker's mind. Turayeva [11, 116] accepts suprasentential units as units of text: suprasentential units are parts of text characterised by a single, relative content and functional completeness, with logical, grammatical, and lexical connections that closely combine their components. Accordingly, the listener can adequately decode the information transmitted by the speaker through specially identified components, such as intonation. Galperin [2, 71] evaluates a sentence as constitution of a suprasentential unit as a constituent of the text. Just as a sentence can indicate the interaction and interdependence of its components, the meanings of words so that a

suprasentential unit indicates the interaction and interdependence of its components, the meanings of sentences. The conclusion is that communication is a joint activity of the brain and language. The expression of events and objects in speech, which are the sources of information generated during thinking, undergoes several processes – the components of intonation form the structure of speech. The phonetic phenomena that occur between words, syllables, and phonemes during speech are clarified by conducting experimental-phonetic analysis. The linguistic materials presented in the article are extensively and accurately analysed in three parameters (frequency of the main tone, intensity parameter, and time parameter) through an experimental-phonetic analysis, in addition to a theoretical analysis.

METHODS

The "PRAAT" program was used in the experimental-phonetic analysis. The study employed a complex semantic-intonation analysis of language units (electroacoustic), a comparative analysis method, mathematical-statistical calculation methods, and descriptive and contextual analysis methods. Here, the "Sightseeing" text was used as the language material. Analysis of the language material using the "PRAAT" program revealed that the acoustic parameters of the speech signals, specifically the frequency, strength, and duration of the main tone, were accurately analysed for the voiced material. The International Phonetic Alphabet [7, 204] was used in the transcription of the language material.

RESULTS AND DISCUSSIONS

One of the primary features of modern experimental-phonetic research is its focus on speech perception, specifically through experiments that target speech perception. 'The experimental phonetics, in general, characterises the melody in intonation and its main component in the perception and the clarity of information by the listener in a live speech' [5, 58].

The instrumental study of the language material is one of the distinguishing features of the most modern methods of analysis. This fact enables linguists-experimenters to obtain detailed, objective information, primarily for studying the acoustic parameters of live speech in its dynamic aspects. In contrast to the statistics of the written text in which the language structures are recorded, the description of the dynamics of the monologue or the dialogic speech is accompanied by certain difficulties. 'In natural speech, a single phonetic segment may have many different acoustic representations, depending on the context in which it is spoken. An extensive body of research over the last 30 years has focused on identifying acoustically invariant properties of phonemes that mediate speech perception [3, 210-218]. Veysalli [12, 126] writes: 'The most difficult point in the spectrographic and the oscillographic analysis is the segmentation of the speech act, because there are no regular curves for this or that sound. However, the accuracy of the analysis results depends on the precise delimitation of the sounds, as defining the boundaries allows us to distinguish one sound from another and thus determine the calculation of the parameter values. The oscillograms and the

spectrograms vary from one sound to another, from individual to individual, depending on their position in the speech chain. In the text, all of a person's emotions are revealed through the intonation of their speech. The study of the expression of emotion in the text through the intonation is also reflected in Sherba's work: 'We can express the various affects in the most subtle shades: hatred, anger, indifference, irony, caress, elegance, tenderness, distrust, excitement, and so on' [10, 327]. Experimental phonetic analysis involves the study of sounds and speech units, specifying the processes that occur in the pronunciation of phonemes and all speech units through computer programs available worldwide. "If the perceptive analysis allows us to discover the perceived acoustic features of the sound speech at the perceptive level, the acoustic analysis reveals the physical correlations of the perceived qualities. This provides a basis for linking the two aspects of sound speech, as one of the main stages of the experimental-phonetic study of speech sounds, directed at instrumental acoustic analysis of sound events and at auditory-perceptive analysis aimed at detecting perception of speech signals at the perceptual level. This serves to increase the accuracy of the achieved results of the study" [9, 2]. This scientific and analytical field plays a major role in the detailed study of segmental and supra-segmental units of phonetics. Experimental phonetic analysis enables precise analysis of speech acoustic parameters.

The purpose of the experimental-phonetic analysis is to determine the text intonation on three parameters – frequency, strength and time of the main tone—the background of the experiment, the intonation of the text (dialogic text). The texts in British English (RP), based on materials from the London Linguistic Institute, are vocalised by one male and one female native speaker. The movement of the tone within the syntagma – rising or falling – creates the pattern of speech, reveals its syntactic structure, and showcases its semantic capacity. The speaker's expressions of emotions, psychological state, and intensity are integral components of communication. It is the intonation that is directly related to the speaker's subjective attitude – encompassing emotions, expression, will, and various acts of evaluation. We want to add that the emotional function of intonation can be attributed to its communicative function, as communication involves the transmission of information through language or another system of signs. Thus, the emotional function of

intonation is to convey information about the speaker's emotional state and their attitude towards evaluating any object.

Jones [8, 7] notes that there are special devices that compare the sounds of English with those of other languages and study and show their differences. This research is carried out by a special branch of phonetics, the instrumental and "experimental phonetics. The experimental phonetics studies the correct pronunciation of a foreign word in speech. The "PRAAT" computer program offers a wide range of opportunities, including the ability to perform oscillographic and spectrographic analysis of language materials and to obtain indicators of tonal frequency, intensity, and length, among others. The given computer program provides learners with the opportunity to learn speech fragments with recording times ranging from several minutes to 12 hours [4, 229-240]. Oscillographic and spectrographic analysis of the experimental material was carried out using the computer program "PRAAT", and the acoustic parameters of the text, including the frequency, intensity, and duration of the main tone, were calculated and analysed.

In the English text 'saitsi · ɪŋ', the speaker gives information about himself. At the beginning of the text, the acoustic parameters are expressed by the following indicators: aɪ əm 'pi:-tə, ʃɑ:-ltən// (*I am Peter Chalten*). (See: Appendix for the whole text "Places of interest").

The base tone frequency: V1f -201 hs, V2f-180 hs, V3f-161 hs, V4f-170 hs, V5f-110 hs;

The intensity parameter: V1i -77 db, V2f -68 db, V3i -66 db, V4i-76 db, V5i-60 db;

The time parameter: V1t - 180 m/s, V2t - 87 m/s, V3t - 70 m/s, V4t - 148 m/s, V5t - 56 m/s (see: Figure 1).

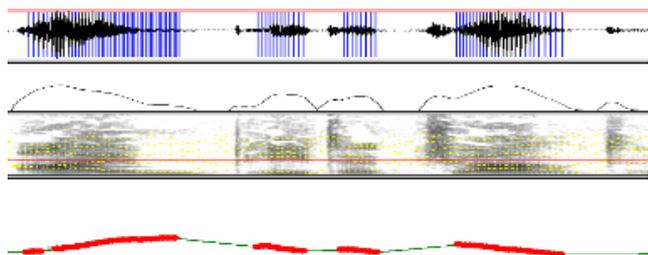


Figure 1 – The oscillogram and the spectrogram of the syntagm /aɪm 'pi:-tə, ʃɑ:-ltən//

In the second statement /aɪ əm ɪn ðə 'biədʒzli ho-tel(I am in the Biadzli hotel), the parameters analysed are:

The frequency of the main tone: V1f -160 hs, V2f -151 hs, V3f-146 hs, V4f-161 hs, V5f-170 hs, V6f -132 hs, V7f-126 hs;

The intensity parameter: V1i - 74 db, V2f - 75 db, V3i - 69 db, V4i - 73 db, V5i - 72 db, V6i - 64db, V7i - 71 db;

The time parameter: V1t -148 m / sec, V2t - 69 m / sec, V3t - 78 m / sec, V4t - 142 m / sec, V5t - 83 m / sec, V6t - 80 m / sec, V7t - 77 m / sec (see Figure 2).

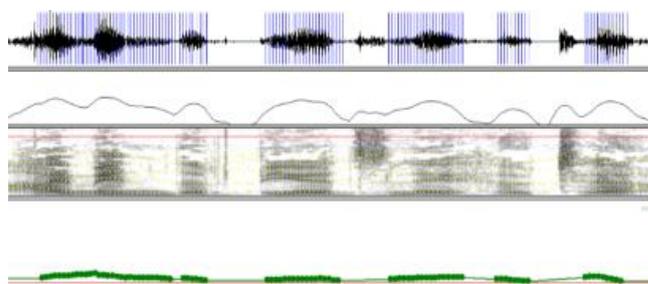


Figure 2 – The oscillogram and spectrogram of the syntagm /aɪəməɪn ðə 'biədʒzli hotel//

In the middle of the text. /maɪ 'pɛərənts,lɪv ðɛə tu: |ənd ðeɪ 'nou ðə 'hʌnts veri wel//(*My parents also live there, and they know Hunts very well*) this discourse has two syntagms.

The frequency of the main tone:

I sintagm - V1f -152 hs, V2f - 167 hs, V3f -128 hs, V4f -147 hs, V5f-142 hs, V6f-120 hs;

II sintagm V7f -150 hs, V8f -204 hs, V9f -175 hs, V10f -141 hs, V11f -142 hs, V12f -138 hs, V13f -110 hs, V14f -107 hs;

The intensity parameter:

I sintagm -V1i -77 db, V2f-74 db, V3i -63 db, V4i -65 db, V5i -70 db, V6i-65 db;

II sintagm -V7i -62 db, V8i -75 db, V9i -74 db, V10i -65 db, V11i -68 db, V12i - 61 db, V13i - 60 db, V14i - 59 db;

The time parameter:

I sintagm - V1t - 128 m/sec, V2t - 127 m/sec, V3t - 57 m/sec, V4t - 71 m/sec, V5t - 136 m/sec, V6t - 120 m/sec;

II sintagm - V7t - 58 m/sec, V8t - 123 m/sec, V9t - 132 m/sec, V10t - 70 m/sec, V11t - 76 m/sec, V12t

- 65 m/sec, V_{13t} - 70 m/sec, V_{14t} - 68 m/sec (Figure 3).

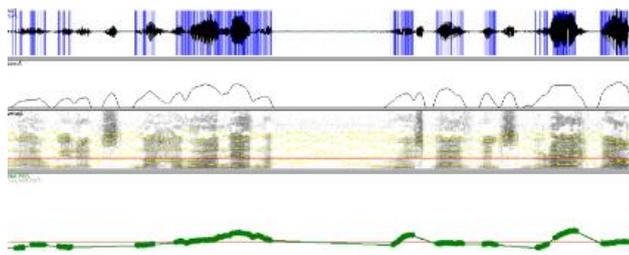


Figure 3 – The oscillogram and the spectrogram of the syntagm /maɪ 'pɛərənts lɪv ðɛə tu: | ənd ðeɪ 'nɒu ðə 'hʌnts veri wel//

The acoustic parameters in the text with 2 syntagms at the end of the text / |ɑ:ft-ə, dɪ-nə | wɪ · ə 'gou-ɪŋtu ə 'kon-sɜ:-t tə 'ðə 'fes-tɪ-vəl hɔ:l // (After dinner we go to a concert in the Festival Hall):

The Progreadiens syntagm - / 'ɑ: ftə, dɪnə /:

The frequency of the main tone: I syntagm -V_{1f} - 166 hs, V_{2f} -150 hs, V_{3f} -116 hs, V_{4f} -142 hs;

The intensity parameter: I syntagm -V_{1i} - 76 db, V_{2f} -63 db, V_{3i} -59 db, V_{4i} -67 db;

The time parameter: I syntagm -V_{1t} - 78 m/sec, V_{2t} - 62 m/sec, V_{3t} - 75 m/sec, V_{4t} - 80 m/sec.

Terminal syntagm /wɪ·ə 'gou-ɪŋtu ə 'kon-sɜ:-tət ðə 'fes-tɪ-vəl hɔ:l//

The frequency of the main tone: II syntagm - V_{1f} - 155 hs, V_{2f} -146 hs, V_{3f} -135 hs, V_{4f} -153 hs, V_{5f} - 168 hs, V_{6f} -106 hs, V_{7f} -121 hs, V_{8f} -129 hs, V_{9f} - 117 hs, V_{10f} -110 hs, V_{11f} -116 hs, V_{12f} -126 hs;

The intensity parameter: II syntagm - V_{1i} - 71 db, V_{2f} -72 db, V_{3i} -69 db, V_{4i} -66 db, V_{5i} - 73 db, V_{6i} - 52 db, V_{7i} -57 db, V_{8i} -58 db, V_{9i} -63 db, V_{10i} -56 db, V_{11i} -57 db, V_{12i} -61 db;

The time parameter: II syntagm - V_{1t} - 118 m/sec, V_{2t} - 130 m/sec, V_{3t} - 66 m/sec, V_{4t} - 123 m/sec, V_{5t} - 83 m/sec, V_{6t} - 70 m/sec, V_{7t} - 63 m/sec, V_{8t} - 64 m/sec, V_{9t} - 75 m/sec, V_{10t} - 63 m/sec, V_{11t} - 70 m/sec, V_{12t} - 86 m/sec.

Table 1 – The variation of the main tone frequency within the text

Variation of the main tone frequency	Speaker 1	Speaker 2
Rising	29	27
Falling	88	91
Continuous tone	18	17

Table 2 – The variation of the intensity value within the text

Variation of intensity	speaker 1	speaker 2
Rising	30	27
Falling	84	89
Straight intensity	21	19

Table 3 – The variation of time value within the text

Variation of time values	speaker 1	speaker 2
Increasing	91	96
Decreasing	34	33
Equal time	10	6

CONCLUSIONS

The experimental-phonetic analysis of the acoustic parameters in the study determined the frequency levels at the beginning and end of the English text, as well as syllable counts with text stress, which are relevant for intonation information. With reference to the acoustic results, it can be observed that English texts exhibit different intonation contours depending on the communicative type, purpose, number of syntagms, and their position within the text (pre-, post-, and middle positions), as well as the speaker's subjective attitude. The results of the experiment show that the tonal range of syntagms in the text is 75-165 Hz. As a result of the experiment, the average dynamic range of syntagms was determined to be around 62-71 dB. It was noted that in the analysed segments (syntagms), the pronunciation rate in the nuclear syllables is prolonged. In English, the short and the medium intervals between the syntagms of the text are observed in 180-240 m/s. In English, the length of the emphatic-emotional interval between the syntagms of the text units was noted as relatively high compared to the neutral interval, a range of 240-680 m/s.

Taking all the above into consideration, we applied experimental-phonetic analysis to determine the characteristics of intonation in the perception of English texts. As a result, a female reads texts faster than a male. Therefore, the time of the main tone is either long or short. The male voice is more intense and stronger when reading texts. In the male voice, the time parameter of the main tone was recorded equally. The woman read the texts in a mostly rising and continuous tone. The man read the texts in a mostly falling tone. This different reading depends on the emotional excitement of both readers. According to the

recipients, the female speaker's voice had a more emotional reading style than the male speaker's when reciting texts.

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