

## Computer Technologies in Acoustic Analysis of English Television Advertising Discourse

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### Abstract

Research studies in a variety of linguistic areas indicate that scholars often refer to computer technologies that become popular as a tool to reinforce the findings and provide the validity of the experimental results. This paper discusses the use of computer technologies in the acoustic analysis of speech prosody focused on the English television advertising discourse. The article aims to determine what the main prosodic characteristics of English advertising discourse are, and how they contribute to the maximum influence on the television audience. Therefore, the study relies upon the acoustic analysis using sound processing software WaveLab, Cool Edit Pro, SpectraLAB, Wasp, Sound Forge to ensure the reliability and validity of the obtained results. Moreover, the computer programs used in this research allowed us to measure the pronunciation accuracy and present results based on many experimental data, not only on the assumptions. Besides, the linguistic interpretation of the data of the perceptual and acoustic analysis of the English television advertising discourse prosody proves a strong correlation of these data. The obtained results indicate that detailed analysis of the quantitative prosodic characteristics of speech enables to get a clear picture of the prosodic organization of the English television advertising discourse. The research proves that the prosody of the English advertising discourse closely correlates with its pragmatic potential and some sociolinguistic features, namely, the social status of the viewer, contribute to the maximum influence on the television audience.

*Keywords:* Acoustic analysis, English advertising discourse, pragmatic potential, prosody, sound processing software

**Cite as.** Valigura, O., Kozub, L., & Sieriakova, I.(2020). Computer Technologies in Acoustic Analysis of English Television Advertising Discourse. *Arab World English Journal (AWEJ) Special Issue on CALL (6)*. 38-48. DOI: <https://dx.doi.org/10.24093/awej/call6.3>

## Introduction

The present language study is so tied to technology that it has become a fact of life with important implications for applied linguists. A variety of computer programs used for phonetic investigations helps to detect regularities about the sound structure of the language, determine word and sound frequency, compare word frequency between written and spoken language, etc.

Carrying out the research of different linguistic phenomena, many scholars addressed software that ensured the accuracy of the obtained results (Conklin, Pellicer-Sanchez, & Carrol, 2018, Phakiti, De Costa, Plonsky, & Starfield, 2018; Quinn, & Hannan, 2012; Rankinen, 2014). Meanwhile, many phoneticians (Hagiwara, 2009; Singh, 2019; Thomas, 2001; Wayland, 2019) pay much attention to computer programs in their investigations, though they might neglect the application of special sound processing software in prosodic differentiation of English discourse modes. Despite considerable advances in learning and researching language through computer technology, there have been very few works that have provided studies at the interface between prosody, discourse, pragmatics, and Computer-Assisted Language Learning (CALL).

Therefore, this research aims to study the main prosodic characteristics of English TV advertising discourse and to determine how they contribute to the maximum influence on the television audience, using sound processing software to reinforce the findings and provide the reliability and validity of the experimental results. Conducting the acoustic analysis of English TV advertisements, we tried to confirm the results of the auditory study and prove a strong correlation of these data.

Due to the tasks of the given research, the following sections cover the analysis of the pragmatic nature of TV advertising discourse and the discursive correlation of prosody and pragmatics in English oral speech, which contributes to a better understanding of the crucial role of prosody in determining the success of TV advertising influence. Since the adequate choice of prosodic means of any discourse largely depends on many factors, the research of the English TV advertisements prosody takes into account some social factors, namely, the social status of the addressee.

Finally, the paper discusses the results of the experimental phonetic research and linguistic interpretation of the obtained data of the perceptual and acoustic analysis. As a result, the interdisciplinary study of the English television advertising discourse prosody using special sound processing software has obtained broader scope and perspectives.

## Theoretical Background of the Research

### *Pragmatic Value of TV Advertising Discourse*

The research of TV advertising discourse is the focus of studies of many linguistic and non-linguistic disciplines such as semiotics, pragmatics, sociology, the psychology of advertising (Fennis & Stroebe, 2016; Fischer, 2016; Kaburise, 2011). Scholars regard it as a persuasive social discourse, supported by multimodal and multimedia techniques, produced with the intention to influence the addressee (Fennis & Stroebe, 2016). In this case, we perceive the discursive activity of the television communicator as an interaction process.

The communicator, devoid of feedback from the addressee while producing a discursive practice, primarily directs its message to a specific image of the addressee, predicts the possible reaction of the audience and simulates the process of the speech perception by the recipient (Armstrong, 2010; Belch & Belch, 2017; Fletcher, 2008).

The study of TV advertising discourse allows us to assert that pragmatic tasks of the addresser of the oral information are universal, i.e., the influence on the addressee, where prosody plays an important role. The addresser chooses specific strategies that involve the implementation of general pragmatic plans of impact on the addressee. One should bear in mind that when we talk about the pragmatics of the advertising discourse, we mean the influence of a rather high degree of intensity, the existence of both intellectual and emotional means of evaluation. Therefore, carrying out the acoustic analysis of English TV advertising discourse, we consider its pragmatic potential in correlation with prosody and social factors contributing to the maximum influence on the addressee.

### *The Discursive Correlation of Prosody and Pragmatics*

Defining the relationship between prosody and pragmatics, it is necessary to emphasize the complex nature of the prosodic components, i.e., pitch, volume, tone, stress, pause in any given utterance. In defining prosody, Crystal (2003) asserts that psycholinguistic acoustic properties of sounds are the source of the main linguistic effects: pitch and loudness, which, along with those arising out of the distinctive use of speed and rhythm, are known as prosodic features of a language. Considering their sphere of usage, many linguists express the view that modern English makes more elaborate use of prosody to signal meaning and pragmatics than do most other languages (Hall & Hastings, 2017; Pickering, 2018). Among different functions of prosody, the pragmatic one is the most important.

Prosodic means of realization of speech influence in TV advertising discourse include such intonation components as speech range, melodic intervals, tempo, pauses, etc. (Crystal, 2010; Féry, 2016). The use of maximum (melodic range in the nucleus, slow tempo in a particular syntagm, length of syllables, pauses, etc.) and minimum (level of melodic contours, loudness, duration, etc.) values of intonation components contribute to the optimization of speech influence. Hence, combining the minimum and maximum values of the specified parameters creates the maximal degree of speech influence.

We can assume that a pragmatically oriented message influences the emotional and volitional behavior of the recipient of information through the speech prosody. Thus, we regard the process of implementing the pragmatic function of TV advertising discourse due to the integrated interaction of pragmatic and prosodic means used to influence the target audience.

### *Prosodic Means in English TV Advertising Analysis*

Numerous studies of advertising texts (Gélinas-Chebat, Chebat & Vaninsky, 1996; Goddard, 2002) that convey the specific, concise information to the addressee pinpoint the leading role of prosody in ensuring their coherence. Prosody performs an integrative function and helps to organize a text as a hierarchy of functional units that express meaning. The prosodic means actualize the segmental composition of the text and connect individual segments into integral semantic units. Besides, the prosody divides the speech flow into suprasegmental units, phrases,

syntagms according to the syntactic structure of the utterance, and correlates it with a specific communicative type of the sentence.

Phoneticians agree (Rodero, Potter & Prieto, 2017; Wichmann, 2000), that there is no constant composition of prosodic parameters even in one type of text. The combinations of different features of the fundamental frequency peak values and frequency interval, intensity, and duration of structural elements of the utterance, influenced by the lexical and grammatical structure of the analyzed text usually form its prosodic organization.

Thus, we can assume that among the most relevant characteristics of English TV advertisements is the variations of such prosodic parameters as melodic range, tempo, volume, and descending and ascending tones. We can trace the periodicity of prosodic features in the texts under study using various software, which ensures the accuracy, reliability, and validity of the obtained results.

### Research instruments

At higher stages of phonetic studies, there arises the necessity to look deeper into the nature of different sound phenomena and involve more sophisticated methods of speech analysis. The research focuses on the following computer programs: *Sound Forge*, *WaveLab*, *Cool Edit Pro*, *SpectraLAB*, *Wasp*, used for the acoustic analysis of English TV advertisements.

We use the software *Sound Forge* (2019) to convert the selected material to a \*.wav audio file format. The mentioned software made it possible to use the chosen experimental utterances in an audio format recognized by modern multimedia devices. Besides, the quality of the recorded material did not change significantly. However, the acoustic analysis of TV advertisements caused some difficulties due to background noises that influenced prosodic characteristics. For this reason, we carried out the preliminary auditory analysis of the experimental material and its segmentation.

A real-time sound processor *WaveLab* (2019), provides the possibility to perform advanced analysis on a selection of an audio file. With the help of this program, we divided the recorded speech fragments into segments corresponding to either sense units or separate phonemes. Then we analyzed each section for its duration (calculated automatically in milliseconds) and intensity (measured as total power in decibels). However, the program is not explicit enough for the fundamental frequency measurement, though it might be of interest while analyzing speech.

*Cool Edit Pro* (2020) is a Windows app with the capability to work with several tracks simultaneously. In addition to the essential functions described above, it is possible to display a two-dimensional spectrogram with the brighter areas corresponding to the higher amplitude values and vice versa.

However, the above-described programs still do not allow to regard the tone movement in the utterance. The program *WaveLab* lacks such a possibility at all, and the *Cool Edit Pro* embraces too wide a range of frequencies for an observer to differentiate between rises and falls. We can solve this problem with the Fast Fourier Transform (FFT) spectral analysis system *SpectraLAB* (2008). It possesses all the features mentioned above and makes it possible to examine the pitch

changes within the speech stretch of any convenient size. Here the lowest prominent band reveals the fundamental frequency behavior, while the upper bands reflect that of the corresponding harmonics related to the communicator's voice quality. The program is an ultra-high-resolution spectral analysis tool designed for research, audio test applications capable of performing complex signal analysis. It incorporates superior amplitude, frequency and time resolution, measurement accuracy, ultra sampling precision, as well as vivid visualizations. Moreover, *SpectraLAB* allows the researcher to view the time series (waveform), average spectrum, two- and three-dimensional spectrograms simultaneously in the corresponding windows. Thus, we can draw trustworthy conclusions concerning the sound phenomena under study.

## Results

### Acoustic Analysis

The analyzed programs helped us to carry out the acoustic analysis of English TV advertisements. All cases of fundamental frequency measurement were grouped depending on maximum tonal realization into *extra-high*, *high*, *medium-high*, *medium-low*, *low*, *extra-low* levels (Crystal, 2010; Rodero, Potter & Prieto, 2017). The comparison of the zones mentioned above in TV advertisements intended for addressees with different social status (high, middle, low) proved an increased use of the extra-high zone. Its function is to draw the viewer's attention to the keywords in advertising texts.

Thus, in TV advertisements addressed to recipients with high social status, we registered the extra-high zone of the fundamental frequency at the beginning and in the main body of texts of short duration (Table one). As the research proves, extra-high and medium-high zones usage is the same (38.46%) in the main body of these texts. Medium-low level (50.00%), as well as medium-high (25.00%) and extra-high (25.00%) levels, dominate in the ending of short texts.

Table 1. Variation of the fundamental frequency maximum in TV advertisements aimed at the recipient with high social status (%)

| Text characteristics |                       | Fundamental frequency maximum % |       |             |            |      |           |
|----------------------|-----------------------|---------------------------------|-------|-------------|------------|------|-----------|
| Duration             | Structural components | extra-high                      | High  | medium-high | medium-low | Low  | extra-low |
| Short                | Beginning             | 66,67                           | 33,33 | 0,00        | 0,00       | 0,00 | 0,00      |
|                      | Main body             | 38,46                           | 0,00  | 38,46       | 15,38      | 7,69 | 0,00      |
|                      | Ending                | 25,00                           | 0,00  | 25,00       | 50,00      | 0,00 | 0,00      |
| Medium               | Beginning             | 27,27                           | 63,64 | 0,00        | 9,09       | 0,00 | 0,00      |
|                      | Main body             | 27,59                           | 20,69 | 24,13       | 20,69      | 6,90 | 0,00      |
|                      | Ending                | 50,00                           | 33,33 | 0,00        | 16,67      | 0,00 | 0,00      |
| Long                 | Beginning             | 0,00                            | 0,00  | 0,00        | 0,00       | 0,00 | 0,00      |
|                      | Main body             | 17,39                           | 17,39 | 21,74       | 34,78      | 8,69 | 0,00      |

|  |        |       |      |       |       |      |      |
|--|--------|-------|------|-------|-------|------|------|
|  | Ending | 16,67 | 0,00 | 16,67 | 66,67 | 0,00 | 0,00 |
|--|--------|-------|------|-------|-------|------|------|

The texts of medium duration are characterized by the fundamental frequency prevalence of high level (63.64%) at the beginning of the text and extra-high level in the main body (27.59%) and the ending (50.00%). Extra-high level (27.27%) is less recurrent at the beginning of the advertising texts, medium-high (24.13%) – in the main body, and high (33.33%) – in the ending.

TV advertisements of long duration are characterized by a high frequency of occurrence of medium-low level in the main body (34.78%) and in the ending (66.67%) with a smaller amount of medium-high level (21.74% and 16.67% correspondingly).

The extra-high level of fundamental frequency maximum remains prevalent (Table two) in TV advertisements for recipients with middle social status. In texts of short duration, it prevails within all structural components. Besides, at the beginning of TV advertising texts, we register the same (41.67%) frequency of actualization of extra-high and medium-high levels. The use of high and medium-low levels (8.33% each) at the beginning of the text, medium-high and medium-low levels (20.00% each) in the main body and high and medium-high levels (22.22% each) in the ending are less frequent.

Table 2. Variation of the fundamental frequency maximum in TV advertisements aimed at the recipient with middle social status (%)

| Text characteristics |                       | Fundamental frequency maximum % |       |             |            |       |           |
|----------------------|-----------------------|---------------------------------|-------|-------------|------------|-------|-----------|
| Duration             | Structural components | extra-high                      | High  | medium-high | medium-low | low   | extra-low |
| Short                | Beginning             | 41,67                           | 8,33  | 41,67       | 8,33       | 0,00  | 0,00      |
|                      | Main body             | 40,00                           | 12,00 | 20,00       | 20,00      | 8,00  | 0,00      |
|                      | Ending                | 44,44                           | 22,22 | 22,22       | 0,00       | 11,11 | 0,00      |
| Medium               | Beginning             | 20,00                           | 20,00 | 40,00       | 20,00      | 0,00  | 0,00      |
|                      | Main body             | 25,00                           | 25,00 | 31,25       | 12,50      | 6,25  | 0,00      |
|                      | Ending                | 41,18                           | 11,76 | 17,65       | 17,65      | 11,76 | 0,00      |
| Long                 | Beginning             | 63,64                           | 9,09  | 9,09        | 18,18      | 0,00  | 0,00      |
|                      | Main body             | 30,00                           | 17,50 | 10,00       | 27,50      | 15,00 | 0,00      |
|                      | Ending                | 75,00                           | 0,00  | 0,00        | 16,67      | 8,33  | 0,00      |

As for TV advertisements of medium duration, we observe the predominance of the medium-high level at the beginning and in the main body of the texts. Extra-high, high, and medium-low levels (20.00%) are less recurrent at the beginning of English TV advertising. Extra-high and high levels (25.00% each) are less frequent in the main body. The highest (41.18%) proportion of extra-high level with the lower (17.65%) amount of medium-high and medium-low levels characterize the ending of the text of medium duration.

In long TV advertisements, as well as in the texts of short duration, extra-high level of fundamental frequency maximum is prevalent in all their structural components. The following in terms of the number of realizations is the medium-low level.

The variation of the tone level of fundamental frequency maximum in TV advertisements for the recipients of low social status also indicates the predominance of extra-high level in the majority of structural components of short and medium duration texts (Table three).

Table 3. *Variation of the fundamental frequency maximum in TV advertisements aimed at the recipient with low social status (%)*

| Text characteristics |                       | Fundamental frequency maximum % |       |             |            |       |           |
|----------------------|-----------------------|---------------------------------|-------|-------------|------------|-------|-----------|
| Duration             | Structural components | extra-high                      | High  | medium-high | medium-low | low   | extra-low |
| Short                | Beginning             | 66,67                           | 0,00  | 0,00        | 33,33      | 0,00  | 0,00      |
|                      | Main body             | 26,67                           | 13,33 | 20,00       | 26,67      | 13,33 | 0,00      |
|                      | Ending                | 20,00                           | 40,00 | 0,00        | 20,00      | 20,00 | 0,00      |
| Medium               | Beginning             | 40,00                           | 20,00 | 20,00       | 20,00      | 0,00  | 0,00      |
|                      | Main body             | 33,33                           | 19,05 | 33,33       | 9,52       | 4,76  | 0,00      |
|                      | Ending                | 56,25                           | 0,00  | 18,75       | 18,75      | 6,25  | 0,00      |

Thus, the extra-high level (66.67%) dominates at the beginning of TV advertisements of short duration. We also observe the smaller (33.33%) amount of the medium-low level in the same structural component of short texts. The prevalence (26.67%) of extra-high and medium-low levels with a smaller (20.00%) amount of medium-high level characterize the main body of these advertisements. Besides, we register a considerable (40.00%) frequency of high-level occurrence with less (20.00%) recurrent extra-high, medium-low and low levels at the ending of the analyzed texts.

The prevalence of the extra-high level is peculiar to the beginning and ending of texts of medium duration. Also, we observe the same (33.33%) amount of extra-high and medium-high levels in the main body. The variability in the use of fundamental frequency maximum reflects the following distribution of their frequencies: at the beginning of TV advertisements the lower rate compared to the extra-high level is represented by high, medium-high and medium-low levels (20.00%), in the main body – by high level (19.05%), and in the ending – by medium-high and medium-low (18.75%) levels.

Therefore, a comparative analysis of different levels of realization of fundamental frequency tonal maximum within the structural components of TV advertisements aimed at addressees with different social status shows that, regardless of the text duration, the most frequently used zone is extra-high. At the same time, it is evident that high, medium-high, and

medium-low tonal levels of fundamental frequency maximum, which we register with different percentages in texts of varying duration, are typical for English TV advertisements.

The acoustic analysis confirmed the results of the auditory study and allowed to determine the following invariant features of English TV advertisements prosodic organization: positive narrow and medium intervals of tonal levels at the juncture of structural components of the text; extended and wide ranges of structural elements of the text; short and medium structural components duration; short and minimal pauses at the juncture of the structural components of the text; localization of the intensity maximum at the first rhythmic group of the syntagm and in the nucleus; narrow and medium intensity ranges of syntagms.

According to the results of auditory and acoustic analysis, we can single out differential features that allow distinguishing the variant realization of the prosodic organization of English TV advertisements intended for recipients with high social status, in particular: variation of terminal tone from descending medium to descending low and ascending low zones; changes in the range of the intonation group from broad to narrow levels; a variety of fundamental frequency maximum from extra-high to medium-low levels; volume changes from high to low.

Among specific features of TV advertisements intended for recipients with middle social status are the following: variation of the type of terminal tone from descending high to ascending low zones; changes in the range of the intonation group from broad to narrow levels; variation of the fundamental frequency maximum from extra-high to low levels; volume changes from moderate to high in the texts of short and medium duration.

Typical features that allow identifying TV advertisements intended for recipients with low social status are as follows: actualization of descending medium and descending low types of terminal tone in short texts and variation from descending high to ascending low tone in the texts of medium duration; actualization of the range of intonation groups in medium and narrow zones in short texts and their variation from a wide to narrow zone in medium texts; a variety of fundamental frequency maximum from extra high to low levels; realization of the increased and high volume in the texts of medium duration.

It is essential to note that in the complex interaction of prosodic parameters, one of them is dominant. Therefore, we paid particular attention to phonation segments, which were characterized by significant fundamental frequency fluctuations, frequency range, and the number of intonation groups measured with *Wasp* (2019) software (Figure 1):

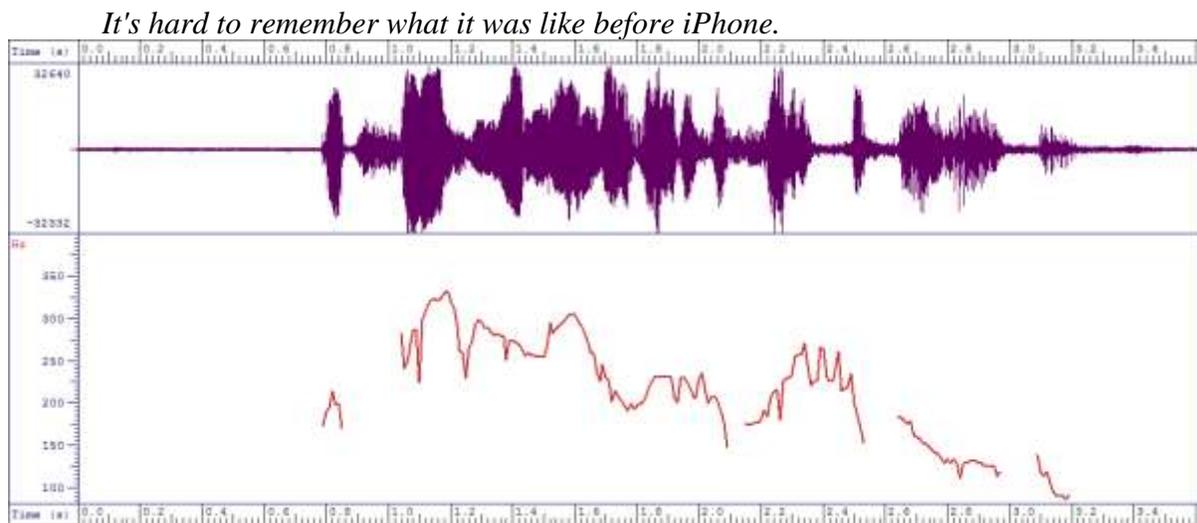


Figure 1. Spectrogram of the utterance *It's hard to remember what it was like before iPhone*

The following prosodic parameters characterize the analyzed segment: total duration – 559 ms, pause coefficient – 1,3 (which corresponds to the data of the previous phonation segment and proves a semantic connection between them), tonal range – 332.7 Hz, the number of intonation groups – 3, rate of change of fundamental frequency – 56.8, frequency range – 4.04. The results of the acoustic analysis prove that such a wide tonal range, alongside with the variety of fundamental frequency maximum, intensity, and duration, influence the customer's perception of the advertised brand.

It is essential to attain the pragmatic goal of the speaker, i.e., influence on the addressee, analyzing the pragmatic potential in correlation with prosody and social factors that contribute to the success of TV advertising impact. The study asserts that software applied in this phonetic investigation, ensure the reliability and quality of research findings. The sound processing software *WaveLab*, *Cool Edit Pro*, *SpectraLAB*, *Wasp*, *Sound Forge*, used in the analysis of English TV advertisements, provided the accuracy of the obtained results and increased the validity of the study.

## Conclusion

Thus, the linguistic interpretation of the data of the acoustic analysis of the English TV advertising discourse prosody proves a strong pragmatic potential of English advertisements addressed to recipients with different social status. The investigation covers the usage of computer technologies for automatic quantitative and visual analysis of speech prosody. The obtained results indicate that detailed analysis of the prosodic parameters of speech enables us to have an accurate and clear picture of the English advertising discourse prosody. In correlation with the pragmatic potential and certain sociolinguistic features (the social status of the recipient), prosody contributes to the maximum influence on the addressee.

The suggested methods have potential applications in sociophonetic studies. The focus is on how the discourse prosody can facilitate the task of adequately communicating the material to the addressee and creating an appropriate speech coloring. The discourse prosody proves to be one

of the most critical factors that determine the success of TV advertising pragmatic influence on the target audience. The obtained results and the described software can contribute to further analysis of advertising texts in various languages and different types of discourse.

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