THE PROBLEM OF STRUCTURAL AMBIGUITY IN PSYCOLOGUÍSTICS

Abstract: The present article is devoted to the investigation of structural ambiguity in English. Investigation has been carried out on specifically selected sentences containing structural ambiguity. Ambiguity is the inner feature of every language. We come across the process of ambiguity in both spoken and written discourse. Ambiguity has been a topic of interest not only for linguists but also for psycholinguists. The interest in the study of the decoding of the meaning of the sentence can be considered a new sphere in general linguistics. Here a great attention has been paid to the experimental-phonetic analysis of the ambiguous sentences.

Keywords: Psycholinguistics. Structural ambiguity. Acoustic parameters of syntagm. Syntactic units. Experimental-phonetic method.

Resumen: El presente artículo está dedicado a la investigación de la ambigüedad estructural en inglés. Se ha investigado sobre frases seleccionadas específicamente que contienen ambigüedad structural. La ambigüedad es la característica interna de cada idioma. Nos encontramos con el proceso de ambigüedad tanto en el discurso hablado como en el escrito. La ambigüedad ha sido un tema de interés no solo para los lingüistas sino también para los psicolingüistas. El interés por el estudio de la decodificación del significado de la oración puede considerarse un nuevo ámbito en la lingüística general. Aquí se ha prestado gran atención al análisis fonéticoexperimental de las oraciones ambiguas.


Resumo: O presente artigo é dedicado à investigação da ambigüidade estrutural em inglês. A investigação foi realizada em sentenças especificamente selecionadas contendo ambigüidade estrutural. A ambigüidade é a característica interna de cada linguagem. Encontramos o processo de

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ambigüidade tanto no discurso falado quanto no escrito. A ambigüidade tem sido um tópico de interesse não apenas para linguistas, mas também para psicolingüistas. O interesse pelo estudo da decodificação do sentido da frase pode ser considerado uma nova esfera da lingüística geral. Aqui, grande atenção foi dada à análise fonética experimental das sentenças ambiguas.


1. **INTRODUCTION**

   The research of the term “ambiguity” has been a central problem not only in linguistics, but also in psycholinguistics. “Many psycholinguistic studies have noted that sentences which are ambiguous, exhibit processing differences in a variety of tasks. For example, they may differ from normal unambiguous sentences in such tasks by usually taking longer to process or deal with in the manner prescribed by the experimental task” [Kess J.K. 1981, p. 3].

   Ambiguous sentences being more difficult to deal with, as various experiments play a great role in psycholinguistics, we made an attempt to give a detailed psycholinguistic explanation of structurally ambiguous sentences by means of phonetical-experimental method.

   Nowadays experimental-phonetic method is considered to be one of the most valuable methods in linguistics. Application of experimental-phonetic method in decoding the sentence intonation gives us an opportunity to express our thoughts, emotions. Being a powerful means of communication intonation plays a great role in the creation of phonological, pragmatic, rhetorical and stylistic nature of the sentences. Conveying the information of an utterance, it highlights the most important content of the utterance and gives an opportunity to distinguish the rheme and theme. Being an important element of a sentence, intonation helps to express different kinds of emotions of the speaker, through coding and decoding the content of the sentences. It is impossible to imagine a sentence without intonation.

   In linguistics mainly four types of ambiguity - lexical, categorical, grammatical and referential can be observed. The results of investigation will be tested by experiment. The experiment has been fulfilled by means of PRAAT Computer program. The main objective of our research is:
   - to investigate the nature of ambiguity and the cause of emergence of structural ambiguity in language,
   - to analyze the structurally ambiguous sentences,
   - to give experimental-phonetic analysis of their use in communication.

2. **SCOPE OF STUDY**

   The main point in investigating of structural ambiguity is to find an answer to “what goes with what” [Andrian-H. (2009)]. To understand the meaning of a sentence, first of all it is necessary to parse the words within the composition of a sentence. Parsing, being a complex process involves a number of features: 1) analysis of sentences of different types; 2) analysis of ambiguity [Daniel R.1997, p.367].

   It is necessary to note that any simple sentence in itself possesses the ability to express a temporary ambiguity. The initial part of the sentence gives a way to a number of interpretations.
For instance, /The secretary applauded for his efforts was soon promoted/ . At first view, despite the fact that the word “applauded” gives us the impression of the main predicate of the main sentence, it does not truly justify itself in this function. The main predicate of the sentence is “was promoted” and sentences of such types are called as the “garden-path” sentences.

As to some reasons “garden-path” sentences cause interest for the investigators. Such sentences on one hand sometimes stress a certain thought, but on the other hand they bear double meaning (ambiguity). Putting it in other words, one does not exhibit a neutral approach to the sentence which is heard or read. What are the factors causing parsing? First of all it is necessary to note that parsing makes its impacts on the secondary words and different morphemes used in a sentence.

For instance, while reading the sentence /The secretary applauded for his efforts was soon promoted/ many a man considers that “the secretary” is a woman and she applauds him (the man) for the work which he demonstrates. From here we can make a conclusion that in parsing semantic factors show their impact as well. The scope of study explores the investigation of structural ambiguity and its experimental-phonetic analysis serves to show precise understanding of the syntactic content of the sentence. In written discourse, depending on the type of the ambiguity there are a number of linguistic techniques that can be applied, such as, punctuation, local, minimal attachment, word order.

Touching upon the studied by us the problem Dallin D. Oaks writes: “Many expressions that would be ambiguous in print are not ambiguous in speech because we can clarify them through supersegmental features, such as intonation, pause and stress. Still, even when these supersegmental features are present, their role in classifying meaning can be neutralized when listeners allow themselves to mitigate these cues” [Dallin D.O.2010, p.39]. Dallin D. Oaks in the above mentioned research work speaks about different fields of ambiguity and his thoughts on structural ambiguity give us ground to investigate this problem thoroughly from phonetical point of view.

3. RESEARCH METHODOLOGY

In the process of investigation structurally ambiguous sentences are analyzed. For the successful realization of the goal of investigation a number of methods including structural-semantic and experimental analysis methods in the synchrone aspect are used.

4. NATURE OF VARIATION OF STRUCTURALLY AMBIGIOUS SENTENCES

The phenomenon of “ambiguity” is one of the most quarrelsome problems in linguistics. The existence of ambiguity in the language is not new. Ambiguity exists in all levels of the language, such as in phonemic, morphemic, lexemic, phrasemic and proposemic levels. Ambiguity is characteristic for all languages and every ambiguous word in the language has its own characteristic feature.

In linguistics we come across four types of ambiguity: lexical, categorial, grammatical and referential. Lexical ambiguity refers to homonymy and polysemy. Generally in linguistics there exist
some arguments concerning this problem. According some theorists homonymy is likely to create ambiguity, but polysemantic words and homonymic pairs create ambiguity.

Joseph F.Kess, Ronald A. Hoppe distinguish three types of ambiguity: lexical, surface structure and deep or underlying levels of linguistic structure. According to them lexical ambiguous sentences are the result of a word or word sequence having more than one distinct meaning. Surface structure ambiguity reflects two distinct syntactic groupings of adjacent words in the string. Deep structure ambiguity, on the other hand, reflects different logical relational sets between words or phrases in the sentence [Kess J.F.1981, p.30].

More than one syntactic interpretations are possible in structurally ambiguous sentences. Structural ambiguity creates confusion, i.e. in the context sometimes it is difficult to differ the word as to what parts of speech it belongs to - a noun or a verb.

“Linguists have noted that an understanding of communication requires that we look at not only the structure of an utterance, but also at the function that utterance has in discourse, in other words, the “speech act” that is being conveyed” [Dallin D.O. 2010, p.27].

For instance, in the sentence /Can you pass me the book?// directive speech act is performed rather than asking a question. Here the answer “yes” is not expected, only passing the book is expected.

Spoken language is more clearer than the written language. It is difficult to differentiate the ambiguity in spoken language. “Generally when one uses ambiguous words or sentences, one does not consciously entertain their unintended meanings, although there is psycholinguistic evidence that when one hears ambiguous language, generally its ambiguity is not intended” [Khawalda I.M. and Saidat E. M-Al. 2012].

Only in written form the exact or the intended meaning of the sentence can be clarified. The meaning of the sentences /I saw the actor’s performance // or / I saw the actors performance // is clear only in written form, in spoken form they lead to confusion.

Ambiguity may exist between verbs and clauses. In the sentence /The students are demonstrating // the word “demonstrating” can be understood as a verb or as an adjective. If the word “demonstrating” is understood as a verb, then the form of the auxiliary verb “to be” (are) must be the main part of the sentence. In this case the sentence must consist of S+V. If the word “demonstrating” is understood as an adjective, then “are” is the main verb and the sentence part will consist of a subject+verb+subject complement (S+V+S/c).
In the sentence /The University demands change // the word “change” can be understood as a noun and as a verb.

If “demands” is a verb, “change” is a noun, the word order of the sentence must be CVO, if “demands” is a plural noun, then “change” is the verb and the word order is SV. It shows that these sentences are ambiguous and have two structural interpretations.

In structurally ambiguous sentences tense and aspect categories also play a great role. Present Progressive is formed by means of the auxiliary verb “to be + v + ing” and the main verb is mainly dynamic in this tense form. But there are cases that –ing causes confusion, i.e. –ing - gerund forming ending, - ing noun forming suffix, - ing adjective forming suffix, - ing –preposition forming suffix. For instance, hammering – n., aspiring –adj., notwithstanding – preposition.

E.g./She gave the room a good sweeping// - sweeping – verbal noun.

The use of the suffix -ing as a gerund or as a participle depends on the syntactical function and their positions in the sentence.

For instance, in the sentence /The passengers suggested telephoning the hospitals before asking the police to look for him //. The words “telephoning” and “asking” are gerunds.

In the sentence / Writing his name in the list, a familiar voice attracted my attention //. – “writing” is a participle [Khanbutayeva L.M. 2007, p.68-71].

B.Ilyish spoke of the suffix –ing forms as of two different homonymous forms: the gerund and the participle. According to him,there is no external difference between the two sets (they are complete homonyms), the question may arise whether there is reason enough to say that there are two different sets of forms, that is whether it could not be argued that there is only one set of forms (we might then call them the suffix –ing forms), which is a different context, acquires different shades of meaning and performs different syntactical functions” [B.Ilyish 1971, p.135].
Structural ambiguity is found among perfect tenses but they are not as common as progressive tense forms.

In ambiguous sentences the use of adverbials also plays a great role. For instance, in the Present Perfect tense in this sentence /I have done my work// the time of doing the action is not reported, it only shows that the action took place before the moment of speaking or the completed action.

To differentiate the homophones is also possible in ambiguous sentences. For instance, the sentence /They can fish // is ambiguous in writing. “Can” may denote modality, otherwise it can be used as a part of a compound verbal modal predicate, if it (can) is a notional verb, then “fish” will be a noun.

“Ambiguity is a property of either sentences or perhaps the speech acts in which the sentences are used. There is no guarantee that every utterance of an ambiguous sentence will result in an uncertainty regarding what was expressed or meant by the speaker” [https://plato.stanford.edu/entries/ambiguity].

5. EXPERIMENTAL, PHONETIC ANALYSIS OF THE STRUCTURALLY AMBIGUOUS SENTENCES

A sentence in a certain situation can be used for a special purpose and can receive an adequate form of intonation and express a different meaning. Accordingly the same sentence in different contexts cannot be expressed with the same intonation.

In this research three structurally ambiguous sentences are analyzed with the experimental-phonetic method.

Ex.: (1) I am taking a course in Modern English Grammar. This sentence can be interpreted like:
   a) I am taking a course in Grammar of Modern English.
   b) I am taking a course in Modern Grammar of English.
(2) Enough rest and exercise will help you recover. This sentence can be understood like:
   a) enough rest and enough exercise will help you recover.
   b) Exercise and enough rest will help you recover.
(3) He left her in tears. In this sentence the following interpretations are possible:
   a) In tears he left her, or He left her while he was in tears.
   b) He left her while she was in tears.

The grammatical form of the sentence consists of the formal-syntactic and intonation aspects. The grammatical form of the sentence is its scheme, i.e. the indication of the thought by means of the language. Intonation is the grammatical form of the syntactic organization of the sentence. F.Y.Veysalli explaining the determination of a sentence stresses the role of intonation as well. He writes: “A sentence is such a structure in which intonation possesses its own role” [Veysalli F.Y. 2013, p.226].

Intonation is considered a prosodic means, ensuring the formation of a sentence syntactically. As to this reason intonation is considered to be a syntactic means formulating internal
relations among the words, composing the sentences or among the sentences, setting up the text. It is necessary to stress the fact that syntactic structure formulating the internal relations possesses the ability to express the foreign links of distinctive language units in conformity with context.

For instance, in English the sentence /I am taking a course in modern English Grammar/ [ai æm `teıkæn ə `kɔ:s ɪn mədə(r)n `ɪŋlɪf ɡræmə(r)] has been put to the experimental-phonetic analysis in different structures. In this sentence the word combination /modern English Grammar/ in different phonetic structures has been analyzed. Generally the announcers have spent to the pronunciation of the sentence 3.0825 m/san. In the first variant the acoustic parameters of the sentence have been estimated like that:

time: 92-73-132-76-78-160-75-103-91-79-74-98-67 m/san (see: Graph 1.1.1).

Picture 1.1
The oscillogram and the spectogram of the sentence will be: [ai æm `teıkæn ə `kɔ:s ɪn mədə(r)n `ɪŋlɪf ɡræmə(r)]

In the sentence /I’m taking a course in grammar of modern English/ [ai æm `teıkæn ə `kɔ:s ɪn ɡræmə(r) əv mədə(r)n `ɪŋlɪf] the duration of the announcer’s middle pronunciation is 3.1256 m/san. In this variant the acoustic parameters of the sentence have been shown like that:

time: 108-77-130-70-78-75-146-73-98-102-70-81-63-82 m/san (see: Graph 1.1.1).

Picture 1.2
The oscillogram and the spectogram of the sentence will be: [ai æm `teıkæn ə `kɔ:s ɪn ɡræmə(r) əv mədə(r)n `ɪŋlɪf]
In the variant of the analyzed sentence /I’m taking a course in modern grammar of English/ the indicators of the acoustic parameters according to the intonation contour doesn’t differ from the indicators of other variants.


The syntactic arrangement of the sentence is not closely connected with its intonation: the same intonation can be observed in different syntactic structures. According to the result of the acoustic parameters the general intonation of the sentence is not completely connected with the lexical composition. The proof lies in the fact that the three variants of the same sentence are marked with falling tone characteristic to the declarative sentences, namely, they are pronounced with the intonation of completion of the sentence. Maximum tone frequency is conspicuous in all three variants in the starting syllables: 193-183-193 hs. It is enough to look through intonogramms of the sentences (see: Graph 1.1, 1.2, 1.3).

Picture 1.3

The ossillogram and the spectogram of the sentence will be /I’m taking a course in modern grammar of English/ (see: Graph 1.1.1).
<table>
<thead>
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<th>Acoustic parameters</th>
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<td>165</td>
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<tr>
<td>intensity(db)</td>
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</table>

| utterance           |   |   |   |   |   |   |   |   |   |    |    |    |    |    |
| main tone frequency (hs) | 161 | 158 | 185 | 163 | 168 | 166 | 162 | 159 | 74 | 65 | 58 | 67 | 64 | 60 |
| intensity (db)      | 65 | 61 | 68 | 64 | 66 | 62 | 59 | 74 | 65 | 67 | 64 | 60 | 57 |
| time (t)            | 108 | 77 | 130 | 70 | 78 | 75 | 146 | 73 | 98 | 102 | 70 | 81 | 63 | 82 |

| utterance           |   |   |   |   |   |   |   |   |   |    |    |    |    |    |
| main tone frequency (hs) | 193 | 182 | 167 | 161 | 148 | 143 | 136 | 146 | 142 | 126 | 150 | 123 |
| intensity (db)      | 67 | 65 | 71 | 63 | 62 | 61 | 71 | 54 | 63 | 57 | 59 | 59 | 65 |
| time (t)            | 9272 | 128 | 67 | 152 | 60 | 108 | 58 | 99 | 73 | 74 | 64 | 83 |   |

In different structural variants of the sentence /I am taking a course in modern English Grammar/ an average tone frequency had been 157-177-145 hs, dynamic parameters – 63-82-80 db, an average pronunciation speed 85-65-61 m/san (see: picture 1.4). We must mention that in all analyzed variants the descending intonation contour has been realized. The fact that maximum fall of the syntactic structure is conditioned by the main tone frequency is noted by F.Veysally as well: “In the methodical description the peak may be placed at the beginning or in the middle, but the general movement of direction of the main tone remains as a falling tone” [Veysalli F. 1970, pp.131-134].

Scheme 1.01
In the sentence /Enough rest and exercise will help you recover// [ɪˈnʌf rest ænd eksə(r)səz wil help ju: riːˈkʌvə(r)] acoustic parameters have been noted like that:

Main tone frequency: 154-201-181-154-165-146-154-192-161-164-150-134-121 hs;
time: 80-90-96-70-80-71-167-76-80-85-96-74-86 m/san (see: Graph 1.1.2).

Picture 1.4

The oscillogram and the spectogram of the sentence will be:

[iˈnʌf rest ænd eksə(r)səz wil help ju: riːˈkʌvə(r)]

In the same sentence acoustic parameters are the followings: /Enough rest and enough exercise will help you recover// // [ɪˈnʌf rest ænd eksə(r)səz wil help ju: riːˈkʌvə(r)]

Main tone frequency: 154-183-197-150-208-177-154-147-130-140-150-153-132 hs;
time: 78-91-98-78-102-109-86-70-156-73-76-90-67-84 m/san (see: Graph 1.1.2).
The oscillogram and the spectogram of the sentence will be: [iˈnʌf ɒst ænd eksə(r)səɪz wɪl hɛlp jyuː rɪːˈkʌvə(r)]

In the third variant of the sentence /Exercise and enough rest will help you recover/ [ eksə(r)səɪz ænd iˈnʌf rest wɪl hɛlp jyuː rɪːˈkʌvə(r)] the acoustic parameters are the following:

- Main tone frequency: 189-177-193-161-164-178-169-128-149-165-149-132-128 hs;
- Time: 102-77-170-79-83-88-104-62-81-102-70-75-70 m/san (see: Graph 1.1.2).

The oscillogram and the spectogram of the sentence will be: [eksə(r)səɪz ænd iˈnʌf rest wɪl hɛlp jyuː rɪːˈkʌvə(r)]

The results of oscillographic analysis in all three variants acoustic variants of parameters speak of the intonation of the declarative sentences. In all three variants, melodic contour all through the sentence is in the descending direction. In the first sentence tone frequency is 201-221 hs, in the second sentence it is 208-132 hs, but in the third sentence it is comparatively 193-128 hs. In the performance of the both announcers melodic peak is situated at the beginning of the sentence.

Graph 1.1.2
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<tr>
<th>Syllables</th>
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Scheme 1.02
In the ossillographic analyzed sentence the acoustic parameters are like that: /He left her in tears// [hi: `left hə:(r) in `tea(r)z].

Main tone frequency: 154-195-171-166-138 hs;
intensity: 58-77-70-65-58 db;
time: 103-93-115-75-211 m/san (see: Graph 1.1.3).

Picture 1.7

The ossillogramme and the spectogramme of the sentence [hi: `left hə:(r) in `tea(r)z]

[hi: `left hə:(r)in `tea(r)z]

The acoustic parameters of the same sentence are the following: /In tears he left her// [in tea(r)z hi: `left hə:]

Main tone frequency: 151-189-150-161-135 hs;
intensity: 62-71-52-67-53 db;
time: 74-146-90-93-120 m/san (see: Graph 1.1.3).

Picture 1.8

The ossillogram and the spectogram of the sentence [in tea(r)z hi: `left hə:]

[in tea(r)z hi: `left hə:]

In the analysed sentence /He left her while she was in tears// [hi: `left hə: waij i: waz in tea(r)z] the acoustic indications have found their reflection in the following marks:

Main tone frequency: 177-212-168-152-142-152-168-153 hs;
intensity: 67-70-67-61-57-60-53-57 db;
time: 116-164-90-78-86—78-176 m/san (see: Graph 1.1.3).
The oscillogramme and the spectogramme of the sentence will be like that: [hi: 'left hə: wəi ŋəz in teə(r)z]

[hi: 'left hə: wəi ŋəz in teə(r)z]

Graph 1.1.3

<table>
<thead>
<tr>
<th>Syllables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>I utterance</td>
<td>Main tone frequency (hs)</td>
<td>154</td>
<td>195</td>
<td>171</td>
<td>166</td>
<td>138</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>intensity (db)</td>
<td>58</td>
<td>77</td>
<td>70</td>
<td>66</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>time (t)</td>
<td>103</td>
<td>93</td>
<td>115</td>
<td>75</td>
<td>211</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II utterance</td>
<td>Main tone frequency (hs)</td>
<td>151</td>
<td>189</td>
<td>150</td>
<td>161</td>
<td>135</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>intensity (db)</td>
<td>62</td>
<td>71</td>
<td>52</td>
<td>67</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>time (t)</td>
<td>74</td>
<td>146</td>
<td>90</td>
<td>93</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III utterance</td>
<td>Main tone frequency (hs)</td>
<td>177</td>
<td>212</td>
<td>168</td>
<td>152</td>
<td>142</td>
<td>152</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>intensity (db)</td>
<td>67</td>
<td>70</td>
<td>67</td>
<td>61</td>
<td>57</td>
<td>60</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>time (t)</td>
<td>96</td>
<td>116</td>
<td>164</td>
<td>90</td>
<td>78</td>
<td>86</td>
<td>78</td>
</tr>
</tbody>
</table>

Scheme 1.03
In two variants of this sentence acoustic components attracted to analysis must be obligatorily placed in the final position. Only in one variant it must be realized at the beginning of the sentence.

Distinctive positions in the sentence structures have also found their reflections in the acoustic parameters of the analyzed components.

For example, the indication of the average tone frequency (while 170hs at the beginning of the sentence) at the end of the sentence are marked as 152 hs and 157 hs. Intensiveness at the beginning of sentence is 66,5 db, but at the end of the sentence it is 61 db and 57 db. The average speed of pronunciation of the announcers at the beginning of the sentence is 110 m/sec., but at the end it is 143 and 101 m/sec.

It is necessary to mention that the acoustic parameters in all three variants reflect the realization of the intonation of completion. In all three sentences the least tone level lies on the last syllable of the closing syntagm 135-138-153 hs. Lingering of the speed of articulation is characteristic not only for the sentences consisting of one syntagm. The intemporal analyses of sentences with one syntagm indicates the slow level of the tempo.

So, it becomes clear from the syntagmatic analysis, based on the distribution of the vowels within the syntagm that in the terminal syntagms the solving of the tempo bases upon an objective law [Zinder L.R. 1979, p. 276].

6. CONCLUSION

The results gained from the discussed issues can be generalized as follows:

It is necessary to note that the problem of ambiguity is not a new problem at all. As it is mentioned in the article, a number of scientists have devoted their research works to the problem
of ambiguity. But their approaches to the problem cardinaly differ from one another. In the formulation of ambiguity grammatical means along with syntactic structure play a great role as well.

As an example to the given thesis the suffix “-ing” has been illustrated in the article. The suffix “-ing” having different grammatical meanings (as –ing + gerund, -ing + participle I, -ing + verbal noun) also change the semantic meanings.

Being the inner specific peculiarity of every language and a fact of linguistic study, ambiguity takes place when the faulty arrangement of words and phrases or the omissions of a necessary word occur. Each language has its peculiar feature in expressing ambiguity.

Experimentally analyzed sentences show that the same intonation can be observed in different syntactic structures and it proves that the general intonation contour does not directly depend on the lexical content.

Maximum tone frequency and descending intonation contour are observed in all analyzed sentences.

All the disputable problems have been tested through ossillogram and spectrogram to prove the truth fullness of the uttered theses.

REFERENCES


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