TAIKOMOJI KALBOTYRA/ APPLIED LINGUISTICS

Structure of Thematic Monologues in Spontaneous Speech Translation

Anna Isaeva

Abstract. The paper deals with the possibility of spontaneous speech translation that is based on the linguistic analysis of the certain structure of thematic monologues. Spoken language translation presents considerable challenges being complicated by syntactically and grammatically ill-formed speech, human and non-human noise, and speech recognition errors. The spoken utterance does not provide unambiguous markers indicating the phrase's boundaries, and frequently contains irrelevant information. A successful system/ interpreter must therefore interpret the speaker's intent and deliver an appropriate message in the target language by extracting words of interest or by defining a certain structure according to which the spontaneous speech could be organized.

In the course of our thesis within the framework of psycholinguistics and phonetics we discovered the certain cognitive – phonetic structure of spontaneous thematic monologues similar in Russian and English. It may appear useful at developing translation strategies and spontaneous speech translation systems. It can also help to increase the speed of information processing, to simplify the process of speech recognition and to develop schemes of translation's examples in translation of spontaneous speech.

Key words: *spontaneous speech, structure of monologues, translation.*

Introduction

CMU (Carnegie Mellon University) computer science professor Alex Waibel, who directs the International Center for Advanced Communication Technologies, mentioned that existing speech-to-speech translation systems allow for translation of spontaneous speech in limited situations such as making hotel reservations or shopping. But we all know that multilinguality may appear not only in the textual but also in the spoken form when information services, like public service operators (emergency, police, etc.), are to extend beyond national boundaries or across language groups when dealing with customers from different countries. However, they don't allow for translation of lectures, TV broadcasts, telephone conversations or other large, open-ended forms of communication that involve complicated vocabularies and peculiarities of everyday speech.

Spoken language translation presents considerable challenges as it is complicated by syntactically and grammatically ill-formed speech, human (cough, etc.) and non-human (telephone rings, etc.) noise, and has to contend with speech recognition errors, hesitations, false starts and other disfluencies found in spontaneous speech. The spoken utterance does not provide unambiguous markers indicating the sentence or phrase's boundaries, and frequently contains irrelevant information, that need not or should not be translated. A successful system (as an interpreter) must therefore interpret the speaker's intent – instead of translating the words – and deliver an appropriate message in the target language. For a speech recognition system high accuracy is not the primary area of concern, but understanding that may be achieved by selectively extracting words of interest, and/ or by attempting to define the certain structure according to which the thematic spontaneous speech could be organized.

1. Difficulties of speech processing

The difficulties of speech processing are compounded with multilingual systems and few if any commercial multilingual speech services exist to date. Yet intense research activity in areas of potential commercial interest is underway. They are aiming at:

- **Spoken Language Identification.** By determining a speaker's language automatically, callers could be routed to human translation services. This is of particular interest to public services such as police, government offices (immigration service, driver's license offices, etc.) and experiments are underway in Japan and some regions of the US.

- **Multilingual Speech Recognition and Understanding.** Future Spoken Language Services could be provided in multiple languages. Dictation systems and spoken language database access systems, for example, could operate in multiple languages, and deliver text or information in the language of the input speech.

- **Speech Translation.** This ambitious possibility is still very much a research area, but could eventually lead to communication assistance in the form of portable voice activated dictionaries, phrase books or spoken language translators, telephone based speech translation services and/ or automatic translation of foreign broadcasts and speeches. There is a wide spectrum of possibilities, but their full realization as commercial products still requires considerable research well into the next decade and beyond.

2. Translation of spontaneous speech

The problem of spontaneous speech translation is closely connected with the understanding of spontaneous speech generation and its recognition. It has been researched in a number of disciplines: psycholinguistics, sociolinguistics, and communicative theories of language, pragmalinguistics and many others. But thus spontaneous speech from the point of view of its parameters has rarely become an object of linguistic research.

2.1 Aim of the Research

The **aim** of the research conducted by us was to discover whether there is a certain structure in spontaneous thematic monologues of Russian and English speakers that can be defined by 4-step linguistic analysis developed by us of the formal phonetic parameters of speech, such as volume of the text, time of monologues, tempo of speech, and the number of pauses. In our opinion that could be helpful for training interpreters (aiming at developing anticipation of possible development of a thematic spontaneous monologue). The reference to socio-cultural parameters of speakers was caused by insufficient study of their influence on the character of formal parameters of spontaneous monologues.

The **purpose** of the research consisted in carrying out the comparative analysis of spontaneous thematic monologues of Russian and English speakers from the perspective of phonetic parameters of speech to reveal the structure of spontaneous monologues. Thus, it has determined phonetic and psycholinguistic type of the research.

During the research we used the **methods** of auditive and perceptive analysis.

Dynamics of change of formal parameters of spontaneous speech reflects the composite structure of thematic spontaneous monologue of native speakers in their universal and national-specific attributes.

Modern methods and models used in the analysis of a text (discourse, statements) have highlighted the necessity of combining in the analysis not only linguistic but also psycholinguistic and socio-cultural methods. The psycho-linguistic approach to studying speech specificity was also highlighted in the works of A. Leontiev and N. Gorelov.

The basic unit of the analysis of speech is a whole text represented as communicative means of "realization of the integrity of the substantial part of cognitive structures". It comprises as though everything is "a picture of a situation of a dialogue" (A. Shahnarovich, V. Golod). One of the most actual problems is allocation and research of features of the generation of monologues.

In the part devoted to the study of influence of national and personal characteristics on the type of generated texts, such an important factor of generation of spontaneous thematic monologues by Russian and English speakers, as mutual relation of social and personal properties of communicants and types of colloquial discourse (S. Aristov, I. Susov) was considered. The national specificity of communication was shown both in social interactions of communicants as well as in their speech.

The research was conducted on the basis of the Harriot-Watt University, (Edinburgh, Scotland, the Great Britain) and the Voronezh State University (Russia) among 200 teachers and students (98 – British and 102 – Russian) that allowed to systematically study spontaneous thematic monologues in the speech of Russian and British people and to reveal some universal and national-specific features of their speech. Aiming at defining a connection between formal parameters of speech and structure of spontaneous thematic monologues during psycholinguistic experiment the participants were asked to speak without preparation on a theme "Unexplained phenomena".

2.2 Steps of the Research

The research consisted of four stages. At the first stage the spontaneous monologues were analyzed from the point of view of their semantic structure with the purpose of defining certain composite structure. As a result, in spontaneous thematic monologues of Russian and English-speaking participants the composite structure consisting of 4 elements was discovered defined by us as follows:

1. Definition of the topic of speech,
2. Giving an example,
3. Reference to the source of information,
4. Expression of the personal attitude to the topic.

Examples of Spontaneous Monologues

The following samples of spontaneous monologues by Russian and British people are given as an example:

V/ v – volume of a monologue of a/structural element, *T/ t* – time of monologues of a monologue/ a structural element, *S/ s* – tempo of speech in a monologue/ a structural element, P – number of pauses in a monologue;/ – a pause, // – a long pause. _____ – a stressed word.

<u>Text 2, Student, female, 21 years, Russian</u>

(1) *Во-первых,/ необъяснимые <u>явления</u>,/ как мне кажется, это – <u>то</u>, что человек не может <u>объяснить</u>./ То есть,/ может быть, когда-то люди знали что-то, но уже <u>забыли</u>, и они это еще не <u>изучили</u>,/ поэтому они называют это <u>необъяс-нимыми</u> явлениями. //*

(2) Примеров может быть очень много,/ паранор-мальные явления, сейчас очень много фильмов,/ пишут статьи очень популярные.//

(4) *Может быть, конечно, это все <u>выдумывают</u>./ Но, то, что случается на <u>самом</u> деле, я считаю, это очень <u>редко</u>, и люди обычно <u>не любят</u> делить-ся /этим./ Поэтому,/ необъяснимые <u>явления</u> – ну, это, в общем, такая/ <u>touchy</u> problem.//*

Data of the perceptive analysis of the text 15_rus:

V – 206 syllables, T – 36 sec., S – 343 syllables/ min., P – 6,3 pauses/ 100 syllables.

1) v – 87 syllables, t – 15 sec., s – 348 syllables/ min.

2) v – 40 syllables, t – 8 sec., s – 300 syllables/ min.

3) v – 79 syllables, t – 13 sec., s – 365 syllables/ min.

Text 4, Student, female, 22 years. British

(1) *The topic unexplained phenomena/ I do not really know. //*

(2) *I suppose there is a lot of evidence, just em possibly unexplained things in the world/ you know – aliens and that sort of things. //*

(3) *But I am a bit skeptical myself,/ perhaps. /I suppose they'll be giving a lot of press coverage recently because of/ programmes such as X-files and/ Outer Limits/ There've been a lot of interesting books./ Things like crop-circles,/ Roswell,/ sort of things like that. //*

(4) *Personally I think it's quite an interesting subject./ But the idea of ghosts and stuff like that/ – I'm a bit scared of. I would not like to have a house with a ghost/*
I've read stories from other people/ – who I trust/ – who say that they have ghosts and/
So,/ I think it just matters a part for some people more, who like to experience this phenomena than others/ I think it's something interesting – an idea to look into it/ Hypnotism/ and /things/ like witch-board –/ A lot of them are scary and they have to get proof to./ Sure, they exist,/ but not really/ I cannot think of any more! //

Data of the perceptive analysis of the text 4_eng.:

V – 289 syllables, T – 115 sec., S – 246 syllables/ min., P – 9, 7 pauses/ 100 syllables.

1) v – 19 syllables, t – 6 sec., s – 190 syllables/ min.

2) v – 40 syllables, t – 9 sec., s – 267 syllables/ min.

3) v – 78 syllables, t – 28 sec., s – 167 syllables/ min.

4) v – 152 syllables, t – 72 sec., s – 127 syllables/ min.

The second phase of the research consisted in measurement of formal phonetic parameters of speech; i.e.: volume of the text, time of monologues, tempo of speech, and the number of pauses. Basing on this data in Table 1 it is possible to draw a conclusion that spontaneous monologues on certain topic of Russian and English speakers have similar average indices on the following formal parameters: volume of the text: Russian-speaking participants – 178,2 syllables, English-speaking participants – 165,6 syllables, time of a monologue: Russian-speaking participants – 38 seconds, English-speaking participants – 46,6 seconds, number of pauses: Russian-speaking participants – 8,5 pauses/ 100 syllables of English-speaking participants – 7,8 pauses/ 100 syllables. Thus, it was noted that the tempo of spontaneous thematic monologues of Russian-speaking participants was more than the tempo of English-speaking participants – 274 syllables/ min./ 210, 8 syllables/ min.

Table 1. Comparative table of formal parameters of Russian and British spontaneous speech

Formal parameters of speech	Volume of the text, no. of syllables		Initial tempo of speech, syllables/ min.		Average tempo of speech, syllables/ min.		Time of monologues, sec.		Number of pauses/ 100 syllables	
Type of group	Russian	British	Russian	British	Russian	British	Russian	British	Russian	British
Average figures	178,2	165,6	283,0	239,2	274,0	210,8	38,0	46,6	8,5	7,8
Men	179,3	162,6	300,6	235,6	283,3	226,7	39,5	43,6	8,8	6,9
Women	177,6	167,3	278,0	249,5	271,0	215,8	37,8	65,6	8,5	8,2
Teachers	222,2	121,0	292,0	222,0	273,0	206,7	48,1	40,9	8,8	10,4
Students	164,0	176,1	279,6	233,7	273,4	223,8	35,0	49,2	8,5	7,3

Table 2. Change of formal parameters of spontaneous speech of Russian and English speakers versus an element of a thematic monologue's structure

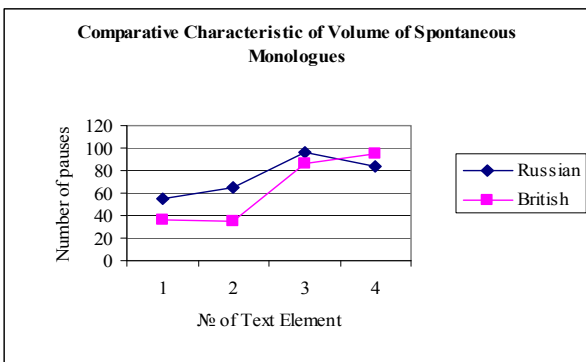| Number of test element	Volume, number of syllables		Time, sec.		Tempo of speech, syllables/ min.		Number of pauses/ 100 syllables	
	Russian	British	Russian	British	Russian	British	Russian	British
1	54,4	36,7	11,0	9,4	290,0	281,0	8,1	9,8
2	65,0	35,0	15,0	10,6	284,0	202,8	8,8	11,1
3	96,6	86,0	21,0	22,8	287,0	230,7	8,2	5,7
4	83,7	95,6	18,4	28,0	292,5	217,8	8,9	7,5

Figure 1. Comparative characteristic of volume of spontaneous monologues
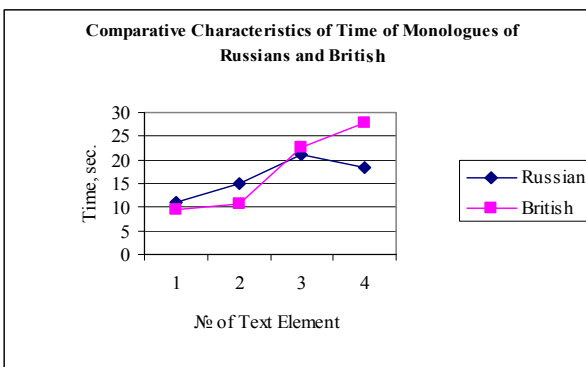

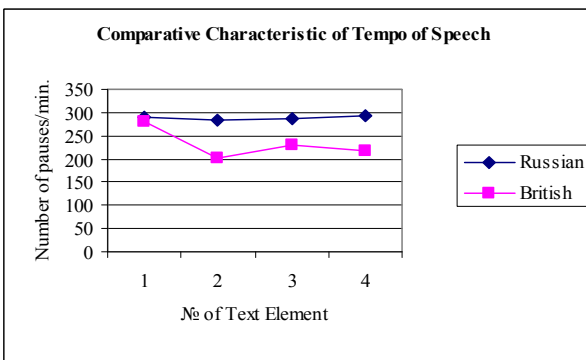**Figure 2.** Comparative characteristics of time of monologues of Russians and British

Figure 3. Comparative characteristic of tempo speech
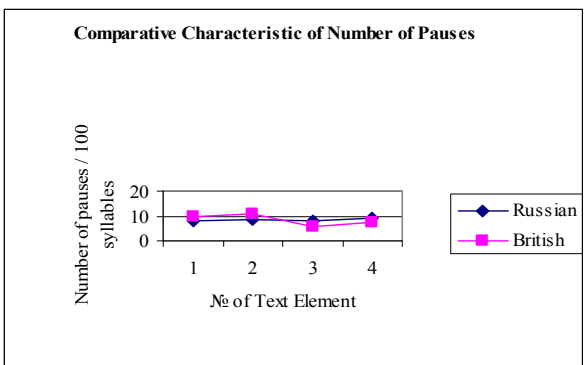

Figure 4. Comparative characteristic of number of pauses

At the fourth stage with the help of auditors we managed to solve the problem of confirmation of the limits of the elements of the monologues' composite structure by defining the location of pauses in the text.

Results

The results of the comparative analysis of spontaneous Russian and English thematic monologues lead to the conclusion that there are a number of **universal features** of the spontaneous monologue as follows:

1. Spontaneous thematic monologues of Russian and British people are characterized by the **uniform composite structure consisting of 4 elements** and reflected at the level of change of formal parameters.
We consider the second − "giving an example" (93, 5% R/ 73, 3% B) and the fourth element – "expression of the personal attitude to the topic" (82, 6% R/ 100% B) as obligatory elements of composite structure of the spontaneous thematic monologue, present at speech of the majority of participants.
The *first* element – "definition of a subject of conversation" (34,8% R/ 23,3% B) and the third element – "reference to the source of information" (28,3% R/ 40% B) in view of smaller rate of their occurrence in the were considered as optional.

2. Spontaneous thematic monologues of Russian and English speakers have similar average indices on the following formal parameters: volume of the text, time of a monologue and number of pauses.

3. Spontaneous monologues of Russians and British are characterized by increase in formal parameters (volume and time of monologues) within the four elements of the composite structure.

Spontaneous thematic monologues of Russian and English-speaking participants can be regarded from the point of view of categories of formal parameters of speech and psycholinguistic categories that allow to reveal the following *nationally specific features*:

1. The tempo of spontaneous thematic monologues of Russians was higher than the tempo of spontaneous speech of English speakers.

2. Within the elements of the thematic monologues' structure the variation of tempo of speech and number of pauses in the group of Russian-speaking participants, as a whole, was rather stable.
The variation of tempo of speech and number of pauses within the monologues' structure in the group of English-speaking participants was quite unstable.

3. In the group of Russians the dynamics of change of formal phonetic parameters (volume of the text and time of monologues) of spontaneous speech reaches its peak in the third structural element – "reference to the source of information". In the group of English speakers the dynamics of change of the formal parameters (volume of the text and time of monologues) of speech reaches its peak in the fourth structural element – "expression of the personal attitude to the topic".

Conclusion

Thus, this work represented the first attempt to define the composite structure of spontaneous thematic monologues, displayed at the level of the formal parameters of speech with the help of 4-step linguistic analysis from the psycholinguistic point of view. The data received during the experimental research and presented in conclusions can be used in the theory and practice of teaching interpreting and cross-cultural communication.

As scientists are currently aiming at developing a system that combines speech translation with human-to-machine translation these results can be helpful, in view of the fact that longer-term the researchers are looking for ways to deal with spontaneous speech that is not limited to a certain domain and the presence of a certain structure in spontaneous monologues can be used to develop the mechanism of anticipation in the mind of human interpreters as well as in machine-interpreting.

To meet the challenges in developing multilingual technology, an environment and infrastructure must be developed. Contrary to research fostered and supported at the national level, multilingual research tends to involve cooperations across national boundaries to build complete speech translation systems for their languages. Moreover, better evaluation methodology over common databases is needed to assess the performance of speech translation systems in terms of accuracy and usability. A useful speech translation system should be able to notice misunderstandings and negotiate alternatives. Such ability requires better modeling of out of domain utterances, better generation of meta-level dialogues and the revealed structure of spontaneous monologues on the level of phonetic parameters of speech, as we may hope, could be an effective means therein.

References

1. Aristov, S., Susov, I., (2002) Communicative-Cognitive Linguistics and Spoken Discourse [retrieved at http://homepages.tversu.ru/~susov/Aristov.htm]
2. Gil, O. (1999) Speech as a Source of Information about a Person [retrieved at http://www.utmn.ru/frgf/No5/text7.htm]
3. Gorelov, I. (1999) Psycholinguistics Basis, Nauka, Moscow.
4. Leontiev, A. (1999) Psycholinguistic Problems of Utterance Generation [retrieved at http://flogiston.df.ru/arch/p_lingvist.html]
5. Shahnarovich, A. Golod, V. (1986) Cognitive and Communicative Aspects of Speech Activity // Linguistics Issues, 2.
6. Speech Translation Research at SRI International, cited from http://www.sri.com/ [retrieved at 2005].
7. Susov, I. (2000) Language and Processes of Generation and Recognition of Speech, cited from http://homepages.tversu.ru/~susov/8_04.htm]
8. Vitt, N., (1988), Emotional Regulation in Speech and Thought Processes. // Psychological Magazine, 3, 52-61, Moscow.
9. Waibel, A, 2004, Multilingual Speech Processing [cited from http://cslu.cse.ogi.edu/HLTsurvey/ch8node8.html]

Anna Isaeva

Teminių monologų struktūra verčiant spontanišką kalbą

Santrauka

Šiame darbe nagrinėjama spontaniškos kalbos vertimo galimybė, pagrįsta lingvistine tam tikros teminių monologų struktūros analize. Sakytinės kalbos vertimas sukelia nemažų sunkumų, nes pasižymi sintaksės ir gramatikos taisyklėms nepaklūstančia kalba, pašaliniu triukšmu ir kalbos atpažinimo klaidomis. Ištartam sakiniui nebūdingos aiškios frazės ribos, jame yra nereikšmingos informacijos. Todėl profesionalus sistemos vertėjas turi perteikti kalbėtojo tikslus ir tinkamai išversti tai į tikslinę kalbą, pabrėždamas reikšminius žodžius ar nustatydamas struktūrą, pagal kurią galima būtų susisteminti spontanišką kalbą.
Darbe remdamiesi psicholingvistikos ir fonetikos metodais, mes atradome tam tikrą spontaniškų teminių monologų kognityvią-fonetinę struktūrą, panašią į rusų ir anglų kalbas. Šis atradimas gali būti naudingas kuriant spontaniškos kalbos ar apskritai vertimo sistemas. Atradimas taip pat gali padėti padidinti informacijos apdorojimo greitį, supaprastinti kalbos atpažinimo procesą ir kurti spontaniškos kalbos vertimo pavyzdžių schemas.

The Author

Anna Isaeva, PhD, Voronezh State University, Russia.
Area of research interests: psycholinguistics and spontaneous speech, publications in Moscow State Linguistic University, St. Petersburg State University, Voronezh State University, Russia.
Address: Faculty of Romance and Germanic Philology, 10, Lenin sq., Voronezh, Russia, 394006.
E-mail: etoile@mail.ru, anna.isaeva@gmail.com