THE PROSODY OF DOUBLE SUBJECT SENTENCES

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Introduction

The purpose of this paper is to analyze the specifics of the prosody of the double subject sentences. This topic has never been addressed, at our best knowledge, but the wider subject of linking prosody and other spoken language characteristics to the meaning of the oral message has been addressed by other authors too. For example, Daniel Hirst says "The way in which prosody contributes to meaning is still, today, a poorly understood process corresponding to a mapping between two levels of representation for neither of which there is any general consensus. It is argued that annotation of prosody generally consists in describing both prosodic function and prosodic form, but that it would be preferable to clearly distinguish the two levels." [4]. In fact, as Hirst emphasizes, "Everybody agrees that prosody contributes to the meaning of an utterance", yet there is little known about how the prosody works at the phonetic level to enhance – or even change – the meaning expressed by the natural language words and phrases.

All languages, as far as we know, use appositions to emphasize a specific meaning the speaker wishes to convey. Some languages, like the Japanese and the Korean languages use for similar purposes specific constructions, named "double subject constructions", but most modern languages, like English or French, do not use such constructions. In the Romanian linguistic community there has been in recent years a debate on some types of sentences which are considered by several researchers [1] and by us as being a double subject construction.

Analysis and annotation of double subject sentences

The semantic arguments of a predicate (the subject, the direct object and the indirect object) can be doubled, in the Romanian language. While the objects are commonly doubled by clitic pronouns (the doubling is sometimes mandatory, like in *L*-am văzut *pe Ion*), the subjects receive, occasionally, and

mainly colloquially, a doubling pronoun (not only in Romanian, as [10] shows[1]). The doubling of the subject for the Romanian language is a controversial phenomenon: after having long been considered an apposition, Alexandra Cornilescu [3] has reopened the doubling problem, Verginica Barbu [1] has modeled it using HPSG instruments, but until today, there is no unitary consensus, especially from a phonologic point of view. What supplementary information the pronouncing brings, from a descriptive perspective, in double subject phrases, remains an open question.

Some examples of sentences with double subject are:

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(a)  Vine ea mama!
(b)  „A trecut el aşa un răstimp" (Sadoveanu)
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The first author proposes that the double subject sentences convey different meanings, depending on the prosody, for example:

- a neutral pronunciation indicates a non-determination of the time interval.
- a pronunciation accentuating the pronoun "el" indicates that the speaker has an idea about the time interval duration, and that the focus is on the passing of that time, and not on the duration.
- if the sentence is further developed, it can bring a further specification of the interval. For example, in the development „A trecut el aşa un răstimp de lung, încât...", the duration of the interval is specified in a certain way.

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(c)  O şti el careva cum să rezolve asta.
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Different pronunciations may mark either the fact that the speaker does not know who is the person mentioned („el"), either that he knows, but has no intention on telling the auditorium (when the accent is on „careva"), or clearly specifies, by an apposition, whom is envisaged, if the sentence is developed as „O şti el careva, Ionică, cum să rezolve asta".

For the examples b) and c), the interpretation is that the information must be partially known by the auditorium (knowledge at the generic level, but not at the level of instantiation with a concrete individuality).

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(d)  Mama vine şi ea mai târziu.
(e)  Mama ştie ea ce face.
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Examples d) and e) are considered by some linguists [1] as constructions with doubled subject, while other authors [3] consider them particular structures of the Romanian language. We intend to compare them to see if there are differences in their prosodic realizations.

In this context, we recorded a set of sentences bearing doubled subject for a comparative analysis of the prosody in sentences with doubled and simple subject and to observe the modifications involved by the doubling of the subject. The main objectives of our study are:

- To compare the prosody for simple subject and double subject sentences;
- To clarifying the prosodic aspects and differences, if any, between the standard double subject constructions (examples (a)-(c)) and the non-standard structures (examples (d) and (e));
- To study the modifications induced by the doubling of the subject in the sentence prosody;
- correlating the semantic charge with the pronunciation (different accentuation of the sentences with doubled subject);
- To determine if the spoken language brings distinctions that may change the sentence behavior closer to a simple subject construction or a double subject one.

While these hypotheses are not yet validated, this paper aims to bring clarifications on the change of prosody in double subject sentences in comparison with simple sentences.

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[1] There is no definite explanation why not all languages accept the double subject structure. For these languages, in most of the cases, the doubling of the subject is realized as an apposition. Romanian language considers both double subject and apposition structures.

Method

In order to realize a correlation between the semantic charge of a sentence and the representation of its subject, the speakers have recorded several variants of the sentences: neutral tone, accentuation of the doubling pronouns, focuses on the words next the pronouns, or the development of the sentences. The sentences have been annotated using the Praat[TM] software [5] at several levels: phoneme, syllable, word, sentence, subject position, and articulation type. The recordings (sound files) corresponding to the simple sentences and the double sentences have been processed according to the methodology explained in the documentation to the Romanian Sound Archive [9] and have been included in that archive, which is freely available on the Internet.

In order to distinguish the differences between the spelling of the double subject and the spelling of the simple subject sentences, we calculated the central values for the formants and the duration of the vowels in several brief sentences with simple and double subject constructions. Unfortunately, various analysis tools provide different results. This is due to the fact that there is no single definition for these parameters for non-stationary signals as the speech signal is, and consequently various tools use different *ad hoc* definitions. Therefore, we have used several programs, namely Praat[TM] [5], Klatt analyzer[TM] [6], GoldWave[TM] [7] and Wasp[TM] [8] to determine the acoustic parameters. The obtained results are discussed in the next section.

Double subject sentences analysis

The hypothesis that motivated this analysis is that the double-subject constructions are related in a specific way to the emotion and inter-relationship representation. We analyzed therefore the values of the formants and duration of the vowels for five subjects (three female and two male) from our database[2] for the sentence "Vine mama" (simple subject) vs. "Vine ea mama" (doubled subject). The recorded subjects belong to the same age bin (25-30 years), have higher education and came from the same geographic area.

Figure 5 presents the analysis of the F0 for two subjects (subject #5 – male and subject #12 – female). The values have been computed using four programs (Praat[TM], Klatt analyzer[TM], GoldWave[TM] and Wasp[TM]).
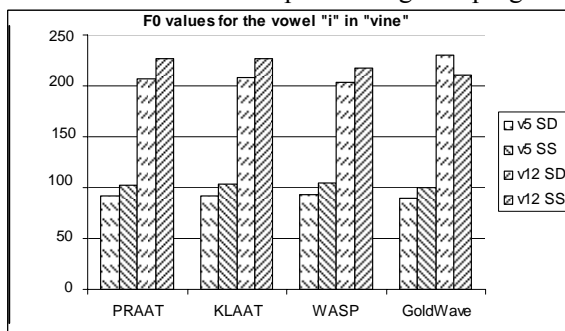

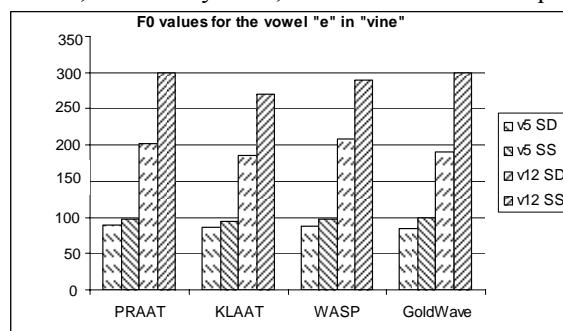**Figure 5a.** The F0 evolution for the vowel "i" in "Vine mama"

Figure 5b. The F0 evolution for the vowel "e" in "Vine mama"
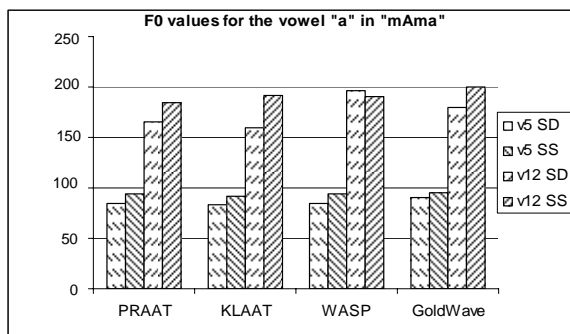

Figure 5c. The F0 evolution for the vowel "a1" in "Vine mama"
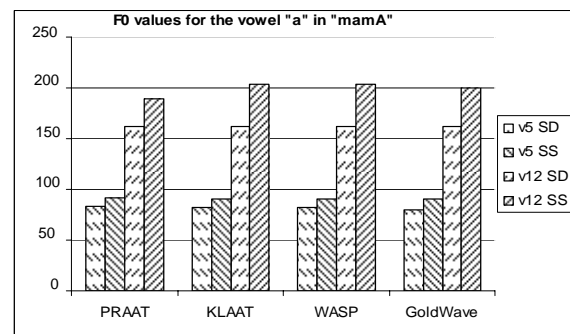

Figure 5d. The F0 evolution for the vowel "a2" in "Vine mama"

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[2] We realize that an analysis over five subjects can have no claims on generality, but it represents a good start for the pioneering Romanian double subject phonetic analysis.

In the graphic, the first two bars for each program represent the values for the male subject (double subject sentence vs. simple subject sentence), while the last two are the F0 values for the female subject. When looking at the F0 values for the vowels of the analyzed sentence (namely the vowel *i* in Figure 5a, *e* in Figure 5b, the first *a* in mama in Figure 5c and the second a in Figure 5d), we noticed that all the four programs show an increasing of the F0 values for all the vowels in the sentences with simple subject.

We have computed the mean of the values presented in figure 5 and the standard deviation, in order to see how significant the increasing of the pitch is. The obtained values are presented in table 8.

Tabel 8. The mean for the F0 and the standard deviation

	Vine ea mama				Vine mama			
	I	e	mAma	mama	I	e	mAma	mamA
	F0	F0	F0	F0	F0	F0	F0	F0
subject 12 ST DEV	12	10	17	0	8	14	6	7
subject 12 MEAN	212	196	175	161	220	290	192	199
subject 5 ST DEV	1	2	3	1	2	2	1	0
subject 5 MEAN	92	87	85	82	102	98	94	91

We observed that the major differences in the mean pitch values were for the unaccented vowels. Thus, the vowel *e* in *vine* decreases in the simple subject structures by 93.53 Hz for subject 12 and by 10.27 Hz for subject 5, while the last *a* in *mama* decreases by 36.84 Hz for the female subject and by 8.81 Hz for the male speaker. In the accented vowel case, the decreasing is lower (8.28 Hz for the *i* in *vine* for subject 12 and 10.13 Hz for subject 5, and respectively 16.65 Hz for the first a in mama for subject 12 and 8.35 Hz for subject 5). A possible cause that deserves a further detailed analysis may be the location of the unaccented vowels at the end of the words.

The growing tendency of the F0 values is obvious also for the other subjects. For the same sentences, the mean values obtained for the pitch for the vowel *a* are shown in table 9.

Table 9 Values for the last two vowels in the subject of "Vine mama" vs. Vine ea mama"

	Vine ea mama				Vine mama			
	a1 in mAma		a2 in mama		A1 in mAma		a2 in mamA	
	F0	duration	F0	Duration	F0	duration	F0	duration
subject 1	200	0.086	215	0.082	211	0.103	223	0.098
subject 2	189	0.101	179	0.137	215	0.067	206	0.098
subject 12	162	0.099	162	0.135	188	0.127	196	0.136
subject 5	84	0.094	83	0.084	93	0.122	91	0.138
subject 7	76	0.080	71	0.079	77	0.089	82	0.070

The data recordings we have annotated are not sufficient to draw statistically pertinent conclusions for the vowels duration changes. For now, we can only say that the tendency to increase or to decrease the duration of the vowels seems to be preserved similar in both construction types. Thus, if, for example, in a double subject construction subject 12 has increased the duration of the last vowel *a*, this increasing is to be also found in the simple subject structure. The effect is similar for subject 1, but with decreasing tendency. However, subject 5 disobeys this rule, and the values obtained for subject 7 are too close to be relevant.
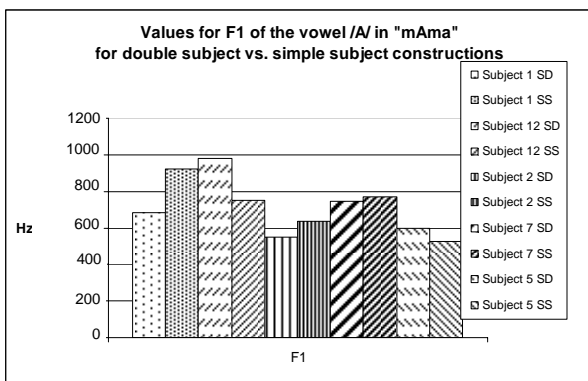

Figure 6a. The F1 evolution for the vowel "a1" in "Vine mama"
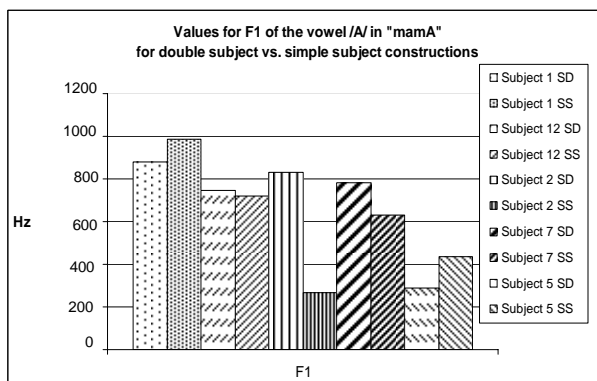

Figure 6b. The F1 evolution for the vowel "a2" in "Vine mama"

The first formant's values are presented in figure 6. Notice that, for the first *a* in the sentence (figure 6a), three subjects have increased their F1 values, while two have decreased them. For the second *a* (figure 6b), there is an inverse tendency: three values decrease, while two increase. We can therefore make no generalizations, until more subjects are considered. However, we may notice that the increasing / decreasing tendency is kept by the speaker for the two vowels, with the exception of the last two speakers (male). We have to validate this exception through for further analysis.

For the rest of the formants, the values show no regularities. We envisage therefore two directions for further analysis of the superior formants: one involves collecting more data and continuing the presented approach, the other intends to use a decision instrument to observe if there are regularities that haven't been noticed by human annotators.

After analyzing several double / simple subject constructions, we believe that the hypothesis we have started with is at least partly proved. The inter-relationship between the speaker and its auditorium becomes visible by the observation that the speaker has already a pattern (referring to the pith contour) when beginning to pronounce a structure (higher pitch for simple subject structures, lower values for double subject).

Conclusions and further work

We have analyzed the influence of the double subject construction on the prosody in the Romanian language. The analysis involved short sentences which are parallel in the sense that they are identical up to the use of single or double subject constructions. The main conclusion which can be derived from this preliminary research is that the pitch is changed in a consistent way in the two types of sentences. Namely, the pitch is lower in double subject constructions than in single subject sentences. A second conclusion is that the frequency of the first formant changes between the two constructions, but the way of changing and the change amplitude depend significantly on the speaker. The vowel duration also may change, but there is no a single type of change; yet, the intra-subject change tend to be consistent.

Future analysis will be devoted to contrast the prosody of parallel sentences with double subject constructions, appositions, and simple (i.e., no apposition, no double subject) constructions in the Romanian language.

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