MULTIFACTOR ANALYSIS OF DISCOURSE TURN IN GREEK

Antonis Botinis[1,2], Aikaterini Bakakou-Orphanou[2], Charalabos Themistocleous[1,2]

[1]Department of Linguistics, University of Athens, Greece
[2]School of Humanities and Informatics, University of Skövde, Sweden
abotinis@phil.uoa.gr, aimpakak@phil.uoa.gr, themistocleousx@hotmail.com

ABSTRACT

The present article reports on an experimental study of turn structures in telephone conversations during Greek news broadcasts. Discourse segmentation was carried out based on turn constructional units (TCUs). Turn-taking and turn-leaving alternations of TCUs were analyzed in terms of speaker's prosodic characteristics, syntactic structures and lexical discourse markers. The results indicate that the speaker's TCU tonal onset and TCU tonal offset along with global tonal variations, as well as word order are discourse correlates of turn-taking and turn-leaving.

Keywords: discourse turn, intonation, Greek.

1. INTRODUCTION

This article is a study of prosodic, syntactic and lexical correlates in TCU structuring in Greek. We assume that the basic discourse unit is the Turn Constructional Unit (TCU), which is the speech material produced by a speaker up to the other speaker's turn-taking in a turn-transition process within a conversation. A TCU may be segmented in variable linguistic units as a function of prosodic, syntactic and lexical correlates which organize spoken discourse into meaningful units.

The article presents turn-organization and turn-signaling strategies, which are related to TCU segmentation patterns, i.e. from a TCU onset to a realized transition to an interlocutor, either in a transition relevance point (TRP), which is a syntactic boundary where a turn-change may take place, or in a place that can not be associated with a TRP. An experimental study was carried out in accordance with two main questions:

(a) What is the correlation between each prosodic, syntactic, and lexical factor and turn structures and turn transitions?
(b) What are the interactions between prosodic, syntactic and lexical factors and turn-taking and turn-leaving signals?

Significant work has been carried out on discourse structure and turn regulations involving several disciplines and alternative methodologies, which concentrate as a rule on specific factors (e.g. [1], [2], [3], [4], [5]). In our research framework, the main discourse factors as well as interactions between them are investigated in the framework of a multifactor analysis of discourse structures.

2. METHODOLOGY

The speech material of this study consists of two news broadcast telephone conversations from Greek radio stations. The first conversation is 1024,4 seconds long and involves three middle-aged male participants whereas the second conversation is 520,64 seconds long and involves two middle-aged participants.

The speech material was transcribed in standard Greek orthography and was segmented in TCUs, in accordance with each speaker's turn-transaction.

Turn-taking labeling:

(a) smooth turn-taking (ST): a turn-taking that takes place after an address from one speaker to an other interlocutor in discourse process.
(b) self-selection (SS): a turn-taking that takes place on the initiative of an interlocutor with no specific address from the speaker.
(c) backchannel turn (BE): a turn-taking to a TCU consisting of background elements, such as "yes, oh, sure" etc.
(d) continuation (CT): a turn-taking to a turn that creates a cohesive unit with a previously intervened turn by background elements.

Turn-leaving labeling:

(a) smooth turn-leaving (TL): a turn-leaving takes place after an address from one speaker to another interlocutor.
(b) interruption (IT): a turn-leaving takes place with no address from the speaker in a TRP.
(c) disruption (DS): a turn-leaving takes place with no completion of the corresponding TRP.
(d) intervention (IV): a turn-leaving takes place after an intervention by an interlocutor, usually with background elements.

Each turn initial and turn final sentence or phrase was also labeled with regards to the parts of speech, the type of clause and sentence function. Turn tonal onset and turn tonal offset were labeled as a rising or falling tonal slope. For each TCU the following measurements were carried out:

(a) TCU duration
(b) Pause duration between turn alternations; according to witch a negative number indicates speech overlapping.
(c) Turn tonal onset and turn tonal offset as well as tonal range.
(d) The tonal difference between the tonal offset and the tonal onset of the next TCU.

The speech material was directly recorded on a PC with AverTV STUDIO 303 cart and the speech analysis was carried out with the Praat 4.5.06 software package at the Athens University Phonetics Laboratory. The statistical analysis was carried out with SPSS 11.0.1.

3. RESULTS

The results of turn-taking categories on tonal productions are presented first followed by turn-leaving and turn cohesive productions.

3.1. Turn-taking

Figure 1: Means of maximum, minimum, range and SD values in Hz in the vertical axis and turn-taking categories (Smooth Turn-taking, Self-Selection, Backchannel Element, Continuation Turn).

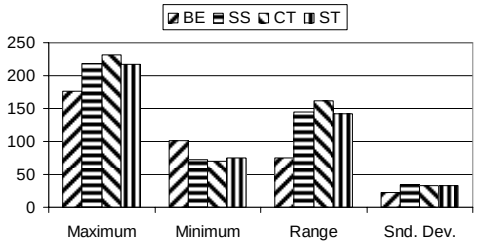

Fig. 1 shows the effects of turn-taking categories on tonal productions. ANOVA tests showed significant effects on each maximum (df =3, f=12,62, p<.0001), minimum (df=3, f=9,47, p<.0001) and range production (df=3, f=21,83, p<.0001). As a result of maximum and minimum differences, the backchannel element has the smallest tonal range followed by smooth turn-taking, self-selection and turn continuation.

Figure 2: Turn durations in secs in the vertical axis and turn-taking categories in the horizontal axis (Smooth Turn-taking, Self-Selection, Backchannel Element, Continuation Turn).

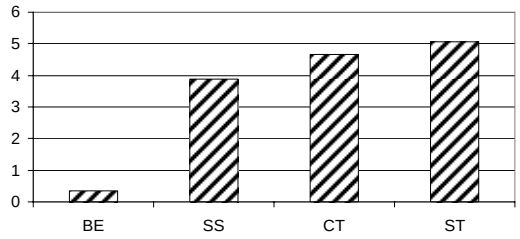

Fig. 2 shows the mean durations in seconds as a function of turn-taking categories. There is a large duration variability among the turn categories, i.e. ST>CT>SS>BE.

Figure 3: Mean pause durations in the vertical axis (where negative values indicate overlapping speech) and turn-taking categories in the horizontal axis (Smooth Turn-taking, Self-Selection, Backchannel Element, Continuation Turn).

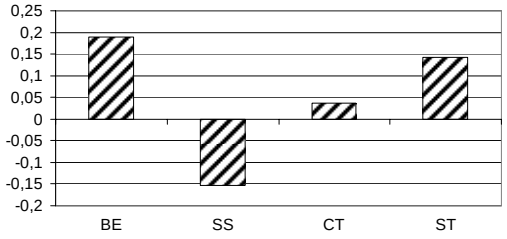

Fig. 3 shows pause duration in seconds as a function of turn-taking categories, which was shown to have a significant effect (df=3, f=7,24, p<.0001). There is a large pause duration variability among the turn categories, i.e. BE>ST>CT, whereas only the SS category shows significantly overlapping speech. On the other hand the BE category shows the greater duration values. However, the most frequent distribution of pauses in turn transactions is 0 (i.e. there is no pause). The maximum pause duration is 3,17s, whereas the maximum overlapping speech is 3,08s.

Table 1: Sentence type categories (Elliptical Clause, Main Clause and Subordinate Clause) as a function of turn taking categories (Smooth Turn-taking, Self-Selection, Backchannel Element, Continuation Turn).

	Total	BE	SS	CT	ST
EC	32,43	84,44	27,27	27,91	18,01
MC	62,93	15,56	65,45	68,75	78,37
SC	4,6	0,00	7,27	8,33	3,6
Total	100	100	100	100	100

Table 1 presents percentages of sentence types in relation to turn taking categories. MC has the most frequent distribution turn initially whereas the elliptical clauses follow in all cases but in backchannel turns, which mainly consist of elliptical sentences. Only 15,5% are MC categories in backchannels.

Table 2: Percentages of main part of speech categories in the vertical axis and turn-taking categories in the horizontal axis (Smooth Turn-taking, Self-Selection, Backchannel Element and Continuation Turn).

	BE	SS	CT	ST	Total
UN	6,67	16,36	14,58	24,32	17,76
Adverb	84,44	3,64	0,00	0,90	15,83
V	6,67	21,82	6,25	19,82	15,44
VO	0,00	12,73	27,08	12,61	13,13
V&Sub.Clause	2,22	12,73	14,58	2,70	6,95
OV	0,00	3,64	6,25	10,81	6,56

Table 2 presents the percentages of syntactic categories as a function of turn-taking categories. *Undetermined* (UN) refers to syntactic structures which are not concluded within a turn and usually have an inter-turn distribution. Verb is the most frequent part of speech, either with or without any complements. Other syntactic structures less than 2% are also found but not reported here.

The first syntactic unit, phrase or sentence, at (a) Smooth Transitions is a statement by 68,46%, a question by 19,82%, a request by 5,4% and a wish by 3,6%. (b) Self-selections is a statement by 78,18%, a question by 10,90%, a request by 5,4% and a wish by 3,6%. (c) Turn Continuation is a statement by 83,33%, a question by 10,41% and a request by 4,16% (d) Background turn is a statement by 95,55% and a question by 4,44%.

3.2. Turn-Leaving

Figure 4: Tonal values in Hz in the vertical axis as a function and turn-leaving categories in the horizontal axis (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

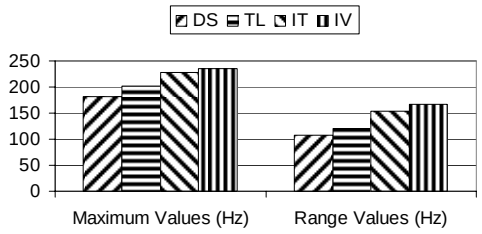

Fig. 4 shows the effects of turn-leaving categories on tonal productions. ANOVA tests showed significant effects on each maximum (df=3, f=7,75, p<.0001) and range production (df=3, f=8,74, p<.0001). Turn-leaving is correlated with a tonal fall by 74,9% and a tonal rise by 23,9%.

Figure 5: Pause durations in secs as a function of turn-leaving categories (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

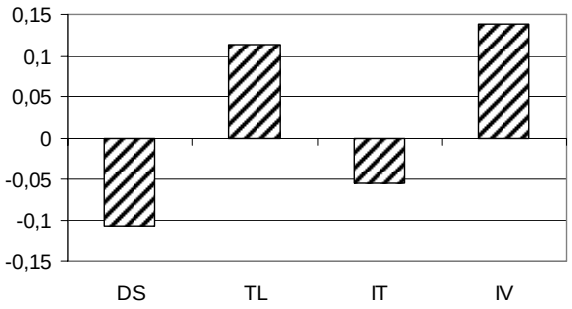

Fig. 5 shows pause durations as a function of turn-leaving categories, which has been found significant (df=3, f=2,78, p = .04). There is a pause duration variability between turn categories, i.e. IV>TL, whereas the DS>IT categories show a great deal of overlapping speech.

Table 3: Percentages of turn final sentence types (Elliptical Clause, Main Clause and Subordinate Clause) as a function of turn-leaving categories (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

	DS	TL	IT	IV
EP	60,00	37,91	21,21	20,00
MS	40,00	56,86	68,19	48,57
SS	0,00	5,23	10,61	31,43
Total	100,00	100,00	100,00	100,00

Table 3 presents percentages of turn final sentence types of turn-leaving categories. Main clause is the most frequent sentence type category followed by elliptical and subordinate clauses.

Table 4 presents the percentage of syntactic categories in turn-final position as a function of turn-leaving categories. Verb is the most frequent part of speech, either with or without any complements, which is fairly the same with the case of turn-initial syntactic categories.

Table 5 presents the sentence functions in turn final position in relation to turn-leaving categories. Statements are the most frequent categories. Other categories less than 2% are not reported.

Table 4: Percentages of word order structures: V(erb), O(bject), S(ubortinate) C(lause), A(ttribute), Adv(erb) and turn-leaving categories (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

	DS	TL	IT	IV
Adv.	0,00	26,80	1,52	0,00
UN	20,00	16,99	18,18	14,29
V	40,00	15,03	10,61	5,71
VO	20,00	8,50	12,12	22,86
OV	0,00	7,19	10,61	5,71
V(SC)	20,00	3,92	10,61	20,00
SV	0,00	3,92	1,52	0,00
SVA	0,00	3,92	3,03	2,86
VS	0,00	3,27	4,55	5,71
VA	0,00	2,61	4,55	8,57
SVO	0,00	1,96	4,55	8,57

Table 5: Percentages of turn final sentence functions (Statements, Questions, Requests and Wishes) and turn-leaving categories (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

	DS	TL	IT	IV
ST	60,00	76,47	78,79	85,71
Q	20,00	15,69	9,09	11,43
R	20,00	2,61	7,58	2,86
W	0,00	3,92	0,00	0,00

Figure 6: Total number of turn-taking categories (Smooth Turn-taking, Self-Selection, Backchannel Element and Continuation Turn) and turn-leaving categories (Smooth Turn-leaving, InTerruption, DiSruption and InterVention).

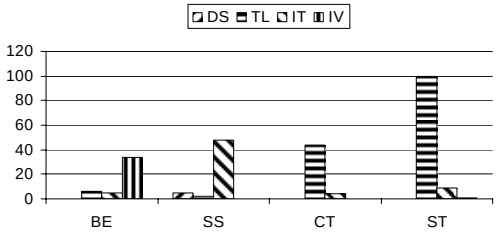

Figure 7: Tonal production values as a function of turn tonal onset and turn tonal offset (in Hz).

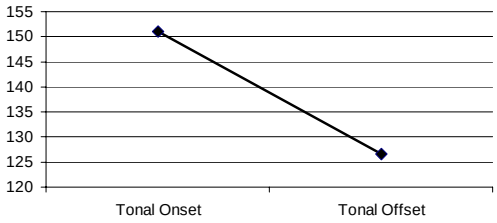

Fig. 6 shows distribution of turn-takings and turn-leavings. Smooth transition is mostly related to a typical turn-leaving, which is also the case for continuations. Self-selections (C), on the other hand, are mostly related to interruptions.

Fig. 7 shows the TCU's initial and final mean tonal values. The mean values of the tonal onset and the tonal offset are 150,9 Hz and 126,5 Hz, respectively, i.e. a difference of 24,4 Hz.

The difference between the tonal onset and the tonal offset assumes an interspeaker resetting tonal structure, according to which the tonal production of one speaker has a direct effect on the other speaker's tonal production.

4. DISCUSSION

The results of this study indicate that tonal onset and tonal offset structures as well as word order are turn-taking and turn-leaving discourse strategies in an inter-speaker communicative context.

Although much research has been carried out with reference to prosodic analysis and discourse structure (e.g. [1], [5], [6]), much remains to be done with regards to relations and interactions among different factors. The multifactor analysis in this study may be used for the development of descriptive models of turn regulations and discourse structure. In this framework, it is suggested that turn alternations may be correlated with several factors such as the ones investigated in the present study, i.e. tonal productions and pause durations, sentence types and syntactic structures.

A multifactor analysis, like this one, allows different measurements to create a stamp of turn construction in a cohesive model capable of projecting new turn constructions from different inputs of turn's context. Taking into account signals like pause, turn initial frequency and turn initial syntactic structure we can come to certain conclusions on TCU's turn-taking categories and project an upcoming turn-leaving cue using ongoing inputs, from syntax to tonal distributions.

5. REFERENCES

[1] Botinis, A. 1991. Intonation patterns in Greek Discourse. *Proc. 12th intern. congress of phonetics sciences*, vol. 4, 286-289, Aix-en-Provence, France.

[2] Sacks, H., Schegloff, E., Jefferson, G. 1974. A simplest systematics for the organization of turn-taking in conversation. *Language* 50, 696-735.

[3] Seedhouse, P. 2004. Conversation Analysis Methodology. *Language Learning* 54, 1-54.

[4] Selting, M. 2000. The construction of units in conversational talk. *Language in Society* 29, 477-517.

[5] Swerts, M., Bouwhuis, D.G., Collier, R.. 1994. Melodic cues to perceived 'fianality' of utterances. *J. Acoust. Soc. Am.* 96, 2064-2075.

[6] Witchmann, A., House, J., Rietveld, T. 2000. Discourse Constraints on F0 Peak Timing in English. In Botinis A. (ed.). *Intonation.* Dordrecht: KAP.