

## Tonal Segmentation and Tonal Binding in Discourse Interpretation

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### ABSTRACT

*The present paper deals with two major aspects of prosodic organisation in speech: segmentation and binding. It is argued that variable tonal strategies at prosodic boundaries may imply tonal bindings with distinctive coherent structures and discourse interpretation. Furthermore, it is argued that intonation structures spoken discourse into information constituents in a wider information structure, thus increasing the textual information of the message in accordance with the speaker's wishes as to how his message should be interpreted by the listener.*

### INTRODUCTION

The present paper deals with tonal segmentation and tonal binding, and their function in areas of major significance in the interpretation of spontaneous discourse such as phrasing and coherence. Our work is related to two projects on Greek discourse prosody: KIPROS, carried out at Lund University (1988-90), and LOGOS, carried out at Athens University (1991-1993). Speech is neither monotonous nor continuous and thus prominence and phrasing are often reported as basic functions of prosody (e.g. Bruce 1985), and aspects of intonation dealing with accentuation and phrasing have been presented for a great deal of languages (see Hirst and Di Cristo in press). However, our recent research (Botinis 1993, 1994) has brought into light tonal binding distinctions for different cohesion structures. We thus consider tonal binding to be a basic function of intonation, along with prominence and segmentation, for structures and distinctions in cohesion, accentuation, and phrasing respectively. This presentation is based on the study of actual tonal contours abstracted from spontaneous conversations recorded from radio broadcasts. We shall not present an analysis of raw material but we shall rather discuss our viewpoint on intonation functions in discourse communication based on our recent research (Botinis 1993, 1994). Four archetypes of tonal coherence are exemplified, namely, Tonal Adjunction, Tonal disjunction, Tonal Conjunction, and Tonal Cohesion.

### TONAL SEGMENTATION AND TONAL BINDING

The mainstream of current prosodic research is focused on two major themes: prominence and grouping (see Hirschberg 1993). Prominence primarily refers to a range of prosodic distinctions such as stress, accent, and focal applications with reference to semantic weighting and information correlates (Bruce 1977, Beckman 1986, Botinis 1989a). Grouping refers to acoustic correlates of segmentation and its

mapping to syntactic parsing and discourse structure (Brown et al. 1980, Botinis 1989b, Wichmann 1993, Wightman et al. 1992, Bruce et al. 1991). This approach suffers from two theoretical drawbacks: first, the relation of prosodic and information correspondence and the role of intonation to determine the boundaries of the information units is largely overlooked, and second, the sequence of information units into larger information structures by means of intonation is not taken into consideration.

It has been argued (Botinis 1993, 1994) that intonation may set the boundaries of speech units and raise the material they are aligned with into information units. Furthermore, information units set off by intonation may be realised with different binding structures and denote distinctive coherent structures and discourse interpretation. Here we shall concentrate on four intonation archetypes for which we have solid phonetic evidence in Greek and we shall relate them to information processing and coherence structuring.

Figure 1.1 demonstrates a tonal adjunction archetype in which tonal gestures are rather symmetrical with a regular distribution across the speech unit. This type of intonation contour appears as a rule in neutral utterances in prepared read speech as well as in spontaneous discourse, although much less in the latter case. Each tonal gesture forms a Tone-Up, the onset of which is aligned with the beginning of the stressed syllable and reaches its maximum on the post-tonic syllable(s), followed by a smooth Tone-Down to the end of the stress group, to repeat the cycle. We regard lexical items with tonal gestures on the corresponding stress groups as basic information units in speech, each of which the speaker intends to be interpreted as a single information constituent by the listener.

Figure 1.2 demonstrates a tonal disjunction archetype with two tonal constituents: the left constituent is characterised by a major Tone-Up at its boundary, the onset of which may be at one of the last syllables, regardless of the stress distribution, whereas the right constituent is characterised by an abrupt tonal change at a low level. This type of tonal structure appears often in spoken discourse and may repeat itself for several speech units. At tonal disjunction, the speaker conveys two-channel information by prosodic means: first, he sets up the boundaries of a speech unit to be interpreted as one information unit by the listener, and, second, he assigns an autonomous information constituency to the speech unit in its wider information structure.

Figure 1.3 demonstrates a tonal conjunction archetype with two tonal constituents as well: the left constituent has the same structure as the one of the tonal disjuncture, i.e. a major Tone-Up at its final boundary. At the conjunctive structure, however, the Tone-Up of the preceding tonal constituent forms a symmetrical tonal gesture which crosses over prosodic boundaries into the following tonal constituent, which carries the Tone-Down of the tonal gesture. Tonal conjunction may also repeat itself for several speech units and carries two-channel information as well: first, information concerning the boundaries of a speech unit to be interpreted as one information unit by the listener, and, second, information concerning the attachment and addition of successive information units into a larger information structure.

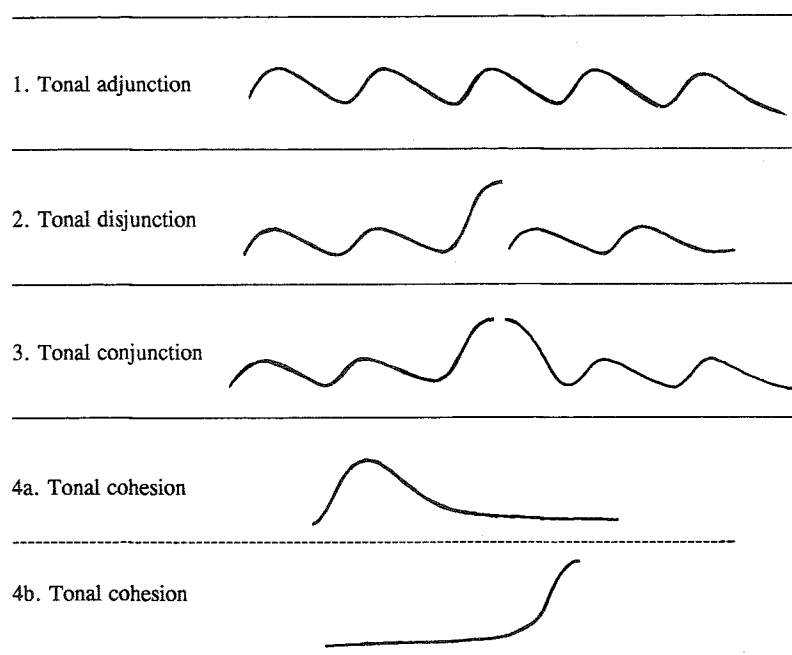


Figure 1. Stylised tonal contours of four intonation archetypes with distinct cohesion and information constituency.

Figure 1.4 demonstrates two tonal cohesion archetypes. First, what is often referred to as postfocal tonal flattening (1.4a), (e.g. Botinis 1989a), in which there is hardly any tonal inflection on the right of a major tonal gesture associated with focal applications. Second, a pre-boundary tonal flattening (1.4b), in which there is hardly any tonal inflection on the left of a major Tone-Up, usually at the prosodic boundaries associated with tonal disjunction structures. Tonal flattening in both cases signify prosodic coherence and may be considered as one information unit with no sub-constituent information structure.

We attribute major significance to prosodic boundaries and, apart from a precise acoustic analysis and distribution of prosodic parameters, we put main emphasis on distinctive functions of tonal structures at prosodic boundaries. We argue that tonal segmentation process sets up information units in speech, and that tonal binding structures information in distinctive coherent structures even at an inter-speaker level (Botinis 1991, 1992). Variance of prosodic decisions and morphological as well as syntactic representations are attributed to the multi-functional nature of speech and the parallel transmission of information through the different components of the language.

## OUTLOOK

We regard speech communication as a multiple transmission process in which tonal contours may correlate with linguistic components such as lexis and syntax at variable degrees and have thus a variable functional load. We may set a principle of "maximum parallel information", according to which intonation carries additional and in principle independent information from the text when it is at variance with other linguistic components of the message. We have presented tonal segmentation and tonal binding as tonal processes at prosodic boundaries which determine the number of information constituents in a speech unit as well as their structure into larger information structures. Our immediate research concerns the function of intonation in speech, with particular reference to the interplay of tonal realisations and information structure and the role of prosodic decisions in discourse interpretation.

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