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The intonation of interrogation in Palermo Italian

Implications for intonation theory

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Contents

Acknowledgements	xi
 Chapter 1 - Introduction	1
1 Standpoint and objectives.....	1
2 The concept of the nucleus.....	2
3 Chapter outline.....	3
 Chapter 2 - The British nucleus-plus-head approach	7
1 Introduction.....	7
2 The tone unit.....	8
3 Componentiality.....	9
3.1 The prehead-head distinction.....	10
3.2 The nucleus-tail distinction.....	11
3.2.1 The nucleus, the nuclear syllable and the nuclear tone.....	12
3.2.2 The domain of the nuclear tone.....	13
3.2.3 Couper-Kuhlen: Steep slope, gradual slope and flattening.....	16
3.2.3.1 Steep slope.....	16
3.2.3.2 Gradual slope.....	17
3.2.3.3 Flattening.....	18
3.2.4 The interdependence of nuclear syllable and tail.....	19
3.3 The head-nuclear syllable transition.....	20
4 A working model.....	21
 Chapter 3 - A British-style analysis of Palermo Italian	23
1 Introduction.....	23
1.1 Corpus details.....	24
2 Transcription.....	25
3 Formal analysis of the core corpus.....	25
3.1 Nuclear tones.....	25
3.1.1 Simple tones.....	26
3.1.1.1 Falling tones.....	26

3.1.1.2 Level tones.....	27
3.1.1.3 Rising tones.....	28
3.1.2 Complex tones.....	29
3.2 Types of prehead.....	29
3.3 Types of head.....	29
3.3.1 Falling 1.....	30
3.3.2 Falling 2.....	30
3.3.3 Falling 3.....	30
3.3.4 Falling 4.....	30
3.3.5 Falling 5.....	31
3.3.6 Low.....	31
3.3.7 High.....	31
3.3.8 Mid.....	31
3.3.9 Rising.....	32
3.4 Frequency of occurrence of prenuclear contours.....	33
4 Functional analysis of the core corpus.....	33
4.1 Questions and statements.....	33
4.1.1 Complex tones.....	34
4.2 Lists.....	35
5 Main observations and conclusion.....	35
 Chapter 4 - Auditory studies of Italian intonation.....	37
1 Introduction.....	37
1.1 Varieties of Italian.....	37
1.2 Auditory treatments of Italian intonation.....	38
2 Agard and Di Pietro.....	39
2.1 Descriptive framework.....	39
2.2 Basic patterns.....	40
2.3 Location of distinctive pitch.....	41
3 Chapallaz.....	41
3.1 Descriptive framework.....	42
3.2 Basic patterns.....	42
3.3 Location of distinctive pitch.....	44
4 D'Eugenio.....	47
4.1 Descriptive framework.....	47
4.2 Basic patterns.....	48
4.3 Location of distinctive pitch.....	49
5 Canepari.....	50
5.1 Descriptive framework.....	50
5.2 Basic patterns.....	51
5.3 Location of distinctive pitch.....	52

5.4 Canepari's account of "Sicilian Italian".....	52
6 Fogarasi.....	53
7 Conclusions.....	54
7.1 BP I.....	54
7.2 BP II.....	54
7.3 BP III.....	54
7.4 Distinctive pitch.....	55
7.5 Relation to analysis of Palermo Italian.....	55
7.6 Final remarks.....	55
 Chapter 5 - Association in intonation models	 57
1 Autosegmental association.....	57
1.1 The theory.....	57
1.2 Universal and language-specific phenomena.....	62
1.3 Downstep.....	64
2 Post-autosegmental work on association.....	65
2.1 Association at different levels.....	65
2.1.1 Pitch Accents.....	66
2.1.2 Downstep.....	66
2.1.3 Levels above the pitch accent.....	66
2.2 Specific models.....	66
2.2.1 Pierrehumbert (1980).....	66
2.2.2 Ladd (1983) and subsequent work.....	69
2.2.3 Hirst (1983, 1986, 1988).....	74
2.2.4 Bruce (1977, 1983, 1987).....	78
2.2.5 Beckman and Pierrehumbert (1986) and Pierrehumbert and Beckman (1988).....	82
3 Concluding remarks.....	89
 Chapter 6 - Alignment	 93
1 Kingdon.....	94
1.1 (A) Complex tones.....	94
1.2 (B) Contrastive and homosyllabic preheads.....	95
1.3 Comparison of two types of delay: (A) and (B).....	98
2 Autosegmental pitch accent theories.....	99
2.1 Complex tone.....	100
2.1.1 Ladd.....	100
2.1.2 Pierrehumbert and colleagues.....	102
2.2 "Homosyllabic preheads" and other phenomena.....	104
2.2.1 Ladd.....	104

2.2.2 Pierrehumbert and colleagues.....	106
3 The domain of the nucleus.....	109
3.1 Introduction.....	109
3.2 Downstep.....	110
3.2.1 Distribution.....	110
3.2.2 Shape of downstep.....	110
3.2.2.1 Calling contours.....	113
3.3 The early peak contour.....	114
4 Alternative pitch accent analysis.....	117
4.1 Truly low L tone in H+L*.....	117
4.2 Downstep.....	117
4.3 Calling contours.....	118
4.4 Leading and trailing tones - their differing status.....	120
5 Representation of English pitch accents with the extended structure.....	124
6 Validation of the new pitch accent inventory and structure.....	125
6.1 L-L* pitch accent.....	133
6.2 Neutralisation.....	133
6.3 Downstep in only the second tone of a bitonal pitch accent - implications.....	135
6.4 Validation - conclusion.....	135
7 Conclusion.....	136
 Chapter 7 - Reanalysis of interrogative intonation in Palermo Italian	 139
1 Precursors to the analysis.....	139
2 Implications for the analysis of Palermo Italian.....	140
2.1 Type of utterance needed.....	140
2.2 Elicitation method.....	141
2.3 Sentence material.....	141
2.4 Speakers.....	144
3 Description of "nuclear" contours found in the corpus.....	144
3.1 Yes-no interrogatives.....	144
3.1.1 Late focus.....	144
3.1.2 Early focus.....	145
3.2 Non-final items in lists.....	146
3.3 Declaratives.....	147
3.3.1 Late focus.....	147
3.3.2 Early focus.....	148
3.4 A note on the "head" contours.....	171

4	Analysis of "nuclear" intonation patterns.....	171
4.1	Interrogative contours.....	171
4.1.1	Number of structural positions.....	172
4.1.2	Type of structural position.....	173
4.2	Non-interrogative utterance types.....	176
4.2.1	"Listing" contours.....	176
4.2.2	Declaratives.....	178
5	The prosodic tree in Palermo Italian.....	180
5.1	Central association.....	182
5.2	Peripheral association.....	183
5.3	Secondary association.....	184
5.3.1	Additional evidence for secondary association.....	186
6	Timing considerations.....	187
7	How is interrogation signalled?.....	191
7.1	Location of the interrogative marker on the tone tier.....	191
7.2	Association of the interrogative marker on the prosodic tier.....	193
7.3	Pitch accent structure.....	198
8	Relation to auditory analysis in Chapter 3.....	200
9	Analysis of contours - summary.....	204
 Chapter 8 - Summary and Conclusion		207
1	Summary.....	207
2	Conclusion.....	209
 Bibliography		215

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I. Introduction

1 Standpoint and objectives

The development of a theory of intonation often involves recourse to a body of data comprising a set of contours used more or less consistently by a group of speakers. A phonological analysis of such a body of data might treat it as a manifestation of an independent system, and adopt a method of analysis which follows the phonemic principle, viz. one which captures all the functional distinctions within that system whilst ignoring any formal characteristics which have little or no functional value. However, if the aim of intonational research is to discover facts about intonation as a universal system, it is worthwhile to develop a system of primitives which accounts adequately for the intonation patterns used in a number of different languages. In both cases, the forms described must be perceivable by ear if they are considered to be potential linguistically perceivable categories. For this reason, consideration is given to auditory impressions as well as to fundamental frequency records extracted by machine.

One of the aims of this thesis is to provide taxonomic information on features of Palermo Italian. This is not only so that an analysis of this particular variety can be performed, but also so that a new body of data can be made available as a testing ground for theories of intonation which have been derived from the analysis of other systems. It is also deemed necessary to take another look at a number of accounts of English intonation (developed by, amongst others, Pierrehumbert and Beckman, and Ladd) and to investigate their advantages and shortcomings regarding the analysis of (i) the contours currently described in the literature, and (ii) a number of contours which have been referred to in past work and have since been largely ignored. The main purpose here is to build on the foundations laid by the above authors, in order to provide a framework of intonational analysis which is flexible enough to account for both Palermo Italian and (at least British RP) English. Optimally, such a framework should at once provide for a phonological analysis of the intonation of each language as a system, and shed light on the nature of the differences between the two systems. In this way, the above mentioned universal aim would be adhered to.

To the author's knowledge, there has so far been no published analysis of the intonation of Italian spoken in Palermo. As a result, a number of corpora have been drawn up to form the basis of the descriptive and theoretical parts of the thesis. These corpora involve a relatively homogeneous group of speakers, all born and currently living in Palermo, of middle class and with a university or equivalent further education. Such a homogeneous group was chosen because, even within Palermo itself, there is a considerable degree of geographical and sociological accentual variation. It is the theoretical aims stated above which motivate the concentration in the investigations on a set of contours used consistently by a group of informants, rather than on data obtained from an exhaustive sociolinguistic survey.

According to Lindsey (1985:3), intonation is "no more than the intersection of a set of phonological (specifically tonal) structures and a set of semantic-pragmatic functions (here termed p-functions)". Here, as in Lindsey's study, the p-function under investigation is interrogation, specifically as it is manifested in polar (yes-no) questions. Whilst English has the choice of using either tonal or other morpho-syntactic means to realise this p-function, Italian relies solely on tonal means. This makes it possible to perform a more consistent analysis of the realisation of this function. For instance, the phrase "Glielo porta domani" may be used as an information-seeking question ("Is she bringing it to him tomorrow?"), or as a statement of fact ("She's bringing it to him tomorrow."); their differentiation relies on the intonation contour. Provided with the opportunity straightforwardly to investigate the intonation contour whilst keeping segmental factors constant, the majority of Italian analysts have taken the distinction between statements and polar questions as a starting point, a lead which will be followed in the present study.

Palermo Italian differs in a number of ways from what has been described in text books as Standard Italian, specifically with regard to its manifestation of the interrogative p-function; it exhibits a terminal fall in polar questions which in Standard Italian have terminal rises. However, this terminal fall is preceded by a rise, and, in certain contextually-determined situations, the terminal fall is altogether absent. It will be shown that, alongside Standard Italian varieties, as well as alongside English, it is the rising element which signals interrogation. The ability to formally account for the contextually-dependent absence of the terminal fall is one of the challenges a theory of intonation must be able to meet.

2 The concept of the nucleus

There has always been some debate in intonological circles as to the existence or otherwise of a nucleus. However, it has never been denied that in many languages, the final accented syllable and unstressed adjacent syllables have some special form, and often express some special function.

Although Palmer (1922) is the originator of the term "nucleus" which is the "stressed syllable of the most prominent word in the Tone-Group", Cruttenden (1990) points out that Alexander Melville Bell and David Charles Bell, (the first of whom taught Henry Sweet) had used the term "emphasis" with a meaning very close to the term "nucleus" as it is used within the British school today:

"Thus, as it were in a picture, the more essential parts of a sentence, are raised, as it were, from the level of speaking; and the less necessary, are, by this means, sunk into comparative obscurity."

[punctuation as in original] (A. Bell, 1835:xlII-xlIII, quoted by Cruttenden, 1990:3).

Since it is specifically claimed that it is the intonation contour on and around the "nucleus" which differentiates polar questions from statements, the focus in the following chapters will be on that part of the intonation contour.

3 Chapter outline

The British-school definition of the "nucleus" is discussed in chapter 2 with respect to its domain. It is examined within a componential analysis of the Tone-Group, proposed by Palmer (1922). Such an analysis of the Tone Group (or Tone Unit as it is often referred to), although with a slightly different inventory of component parts, continues within the school today; see Crystal (1969), O'Connor and Arnold (1973), Gimson (1980), Couper-Kuhlen (1986) and Cruttenden (1986). However, an area of little consensus is the mapping of the nuclear tone onto the nuclear syllable and tail. In order to reach a maximum intersection across the studies investigated, a single indivisible component in place of the latter two is therefore proposed as the domain of the nuclear tone.

This structural analysis is adopted in chapter 3, where a first attempt is made at describing Palermo Italian intonation. Two questions are addressed: (i) what intonational form is used to signal interrogation? and (ii) can this form be adequately described using the model proposed? A partial answer is given to (i) and a negative answer to (ii), which leads to the investigation in chapter 4 of whether a more appropriate model has been adopted by Italian auditory analysts. In the selection of Italian studies surveyed, the intonational form signalling interrogativity is shown to differ from one variety to another and, in all but one case, from Palermo Italian too. All of the studies appear to rely on models which are rooted in the tradition of analysis in other languages, predominantly English or French.

One problem with the British analysis is shown to be the fact that each component is characterised by a combination of perceived pitch and stress, there being no strict separation between the pitch contour and the rhythmic structure arising from the choice of words. An alternative approach to the componentialisation of intonation contours, the theory of autosegmental phonology, is discussed in chapter 5. Goldsmith (1976) lays out the principles of this theory, developing his analysis with examples from "tone languages", and tentatively applying the approach to English as an "intonation language". One of the main tenets of the theory is a formal separation between tune and text; tones in the tone tier and vowels in the phoneme tier are synchronised at strategic points by means of the principle of association. This has instigated a considerable body of subsequent work in which attention is directed not only to the underlying phonological association but, more specifically, to the alignment of the segmental structure with peaks in fundamental frequency (and, to a lesser extent in perceived pitch). In this chapter, work by Hirst, Ladd, Bruce and Garding and Pierrehumbert and Beckman is surveyed with the intention of distilling the aspects of each study which might prove useful in accounting for the Palermo data.

Chapter 6 returns to the domain of the "nucleus", first discussed in chapter 2. This time, however, the assumption that the nuclear tone is mapped onto the nuclear syllable and what follows it (the tail) is brought into question. It is shown that, even within the British school, the left edge of the nuclear domain is not as fixed as is often suggested. Kingdon (1958) observed that a contrastive prehead, which enhances the already emphatic nature of certain nuclear tones, can be realised in the absence of a prehead syllable. The preaccentual initial pitch excursion in nucleus-initial tone units cannot, in fact, be treated as contrastive by the majority of analysts within the British school; such pitch movement is considered to be an onglide and has no phonological status.

This is also shown to be true for a number of autosegmental pitch accent analysts. Ladd, for instance, is in accord with the British view, allowing only for trailing tones in bitonal pitch accents (i.e. the first tone in the pitch accent is always associated with the stressed syllable). However, certain analysts within this tradition (such as Pierrehumbert and colleagues) can accommodate this initial pitch as a leading tone of a bitonal pitch accent, viz. $L+H^*$ and $H+L^*$. Whereas in the particular context he discusses, Kingdon considers the contrastive pitch to be prenuclear, delaying the onset of the nuclear tone, Pierrehumbert (1980) incorporates the leading tone into the domain of the final pitch accent (which involves what British analysts call the nuclear domain). The fact that the functional load borne by leading tones is smaller than that borne by trailing tones is given as the reason why many analysts ignore contrastive pitch in this early position.

A solution is proposed for English Pitch Accents, allowing the nuclear domain to be extended to the left, but treating this leftwards extension as a proclitic element. This is achieved by means of an enriched Pitch Accent structure consisting of two levels: Supertone and Tone. A leading Tone in a Pitch Accent is dominated by a weak Supertone, whereas starred and trailing Tones are always dominated by a strong, branching left-headed Supertone. The strong Supertone is considered to be the core of the Pitch Accent.

In Chapter 7, a corpus is discussed whose aim was to record a number of statement-question pairs which differ only as a function of their intonation contour; such recordings were carried out in order to maximise naturalness. A number of utterances are singled out for detailed description, especially with regard to the synchronisation of peaks and troughs in the fundamental frequency traces with segmental landmarks in the utterance. In certain cases, such peaks are taken to correspond to H and L tones within the autosegmental pitch accent approaches referred to in chapters 5 and 6. Such an approach is shown to account for the data presented, as well as for phenomena noted in chapter 3. A model is developed within the autosegmental framework which captures both "contextually determined" variation and distinctive contrasts within the language. Such a framework makes full use of leading as well as of trailing tones.

The Pitch Accent structure proposed for Palermo Italian reflects the high functional load borne by leading tones; they are shown to be better accounted for as part of the core of the Pitch Accent (the part dominated by the strong supertone) rather than as proclitic elements. Thus, in Palermo Italian, the Pitch Accent node does not branch; it dominates one Supertone

node which, in turn, dominates maximally two Tones. The Supertone may be right or left headed, and Pitch Accents with leading tones are represented with a right-headed Supertone. Furthermore, differences in detail between the alignment of tones in Palermo Italian and English are accounted for by the differing Pitch Accent structures proposed in chapters 6 and 7.

Chapter 8 sums up the findings of the previous chapters and points to the wider implications of the research undertaken.

II. The British nucleus-plus-head approach

1 Introduction

The purpose of this chapter is to describe the approach to intonation adopted by the British school, and to point out its advantages and disadvantages for the description of a corpus in a language which has hitherto not been analysed.

The British approach to intonation, which has been used extensively for the transcription not only of English but of a number of other languages, relies on a long tradition of auditory analysis. It is taken as a starting point here because auditory perception is a useful tool for finding linguistically relevant categories. The term 'nucleus-plus-head' refers to the development within that approach in which tone units are analysed into component parts ('functional units') rather than indivisible tunes. Such componentialisation began with the work of Palmer (1922) who subdivided intonation contours into a prenuclear portion which he called the 'head', a 'nucleus' and a 'tail'. Further subdivisions of the prenuclear portion of the contour into 'prehead' and 'body' were introduced by Kingdon (1958); O'Connor and Arnold developed the theory for didactic purposes, reconstituting the components into a number of typically occurring 'tunes', whilst acknowledging the importance of the constituent analysis as a starting point. Gimson's (1980) introductory text on English pronunciation also takes a didactic line in his chapter on intonation, although he does not do any reconstitution. For the description of fine phonetic detail of the kind found in spontaneous corpora, the whole theory was elaborated by Crystal (1969). The most recent comprehensive work, that of Couper-Kuhlen (1986), continues along similar lines to Crystal, describing recorded conversations, but to a greater degree of precision. Another recent study by Cruttenden (1986) describes and develops the British approach in the context of a number of other theories.

Common to all but the very early work within the British school outlined above, is the definition of the tone unit. This will be our starting point. We shall then take pairs of constituents in turn and examine the evidence for a clear-cut componential analysis, both in terms of whether the distinction between them is unambiguous, and whether it is appropriate to disregard any transitional phenomenon which, by definition, occurs outside the domain of both of the adjacent constituents. Finally, we shall discuss which aspects of the theory are retained, and which are modified, for the analysis of Palermo Italian reported on in the following chapter.

2 The tone unit

According to Crystal the tone unit is a stretch of utterance consisting of an obligatory element, the nucleus, and three optional elements, the prehead, the head and the tail. He represents the structure of the 'tone unit' as

(Prehead) (Head) Nucleus (Tail)

where the optional elements are in brackets.

The definitions of the four components of the tone unit rely on a set of underlying assumptions concerning the rhythmic structure of English, in particular, a distinction between unstressed, stressed and accented syllables. Crystal makes this distinction explicit. A 'stressed' syllable is a syllable which is perceived as prominent in relation to the other syllables in a given tone unit. This prominence is due to any or all of a number of phonetic features including increased loudness (acoustic correlate: amplitude), increased length (acoustic correlate: duration) and unreduced vowel quality (acoustic correlate: spectral profile), and may involve pitch prominence (acoustic correlate: F0).

Crystal (1969:162) points out that we probably " 'read in' rhythmic regularity" when we hear an utterance, i.e. the fact that we expect a relatively regular rhythm leads us to perceive regular peaks of prominence which may have no acoustic correlate at all. He warns the reader not to be sidetracked into a detailed discussion of rhythmic prominence. This is probably because his approach is auditory, and an investigation into the complex interactions between acoustic correlates of stress would be well beyond the scope of such a study¹.

Crystal also distinguishes syllables which are simply stressed from those which have the additional specification of being accented. An accented syllable is considered more prominent than a plain stressed syllable by virtue of the fact that it involves a pitch obtrusion - either a jump or glide. The extra acoustic correlate of accent is thus F0 change. Unstressed syllables may be pitch prominent, but these are not considered accented. This will be discussed further in section 3.1.

A tone unit with the full complement of Prehead (P), Head (H), Nucleus (N) and Tail (T), as in the example below, can be used to illustrate the domain of each component².

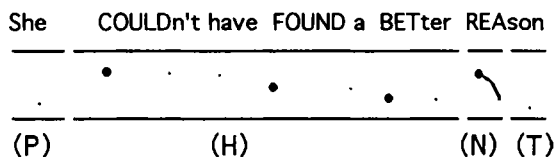
The 'nuclear syllable'³ is generally said to be the last accented syllable in a tone unit from which or upon which there is a pitch change; it is usually, although it need not necessarily be, a lexically stressed syllable, (i.e. a syllable marked in the lexicon as potential bearer of promi-

¹ It is also a reflection of the fact that the rhythmic structure of English, stress-timed with the head of the foot on the leftmost syllable, is taken for granted.

² The two parallel lines represent the top and bottom of the speakers pitch range: the heavy dots a 'stressed' syllable and the small dots an 'unstressed' syllable. Accented syllables are not specially marked, because pitch obtrusion is determined relative to preceding or following stressed and/or unstressed syllables.

³ The fact that we use the term 'nuclear syllable' rather than 'nucleus' will be explained later.

nence). In the above example, this is the first syllable of 'reason', on which there is a pitch glide.



The nuclear syllable can be distinguished from plain accented syllables in a number of ways. Syntagmatically, it is the last accented syllable of the tone unit; paradigmatically, the nuclear syllable can carry a greater range of pitch movements (if no tail is present) than other types of accented syllable. However, it is more than just the last accented syllable: the nuclear tone, which it (partly) carries constitutes the 'peak of prominence' of the tone unit (Crystal:1969:209). This concept underpins the British work described here; the primacy of the nucleus (although involving the nuclear syllable *and* the tail) has led to the categorisation of tone units into major groupings according to nucleus type.

The tail is made up of all syllables following the nuclear syllable, which, in the above example, is only one, the last syllable of 'reason'.

The head begins on what Crystal refers to as the 'onset', the first accented syllable of the tone unit. In the above case the head begins on the syllable 'could' and extends up to but does not include the nuclear syllable; the end of the head is on the last syllable of 'better'.

The prehead comprises all the syllables before the onset; here there is only one syllable in the prehead, the syllable 'she'. It is possible for a stressed syllable to occur in the prehead provided that it is not accented. It is also possible for a prehead syllable to be pitch prominent, provided it is not stressed. A prehead may occur immediately before a nuclear syllable with no intervening head.

In the next section, we shall discuss the merits and demerits of this four-part componentialisation of the tone unit.

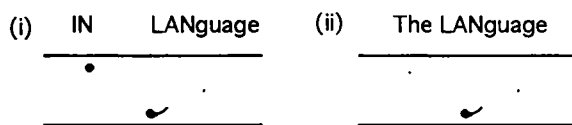
3 Componentiality

As we have seen, the definition of each component relies on prominence lent by a combination of rhythm and pitch. In the following section, we shall take each adjacent pair of tone unit constituents and examine whether they can be consistently distinguished and whether the boundary between them is clear cut.

3.1 The prehead-head distinction

The distinction between prehead and head is particularly problematic in cases where the pre-head has a different pitch height from what follows. The inherent difficulty involved in deciding whether a syllable is stressed or not, is increased if the pitch of the syllable obtrudes; pitch obtrusion lends prominence and can lead to the perception of stress. There is one case where this cannot happen: stress is precluded if the vowel quality of the syllable nucleus is reduced. However, since not all vowels undergo the same degree of reduction, there are often inconsistencies in transcription.

An example of such inconsistency is shown in the following two examples:



Although the configurations are similar in shape, they may have a different transcription simply because of the spectral quality of the vowel in the first syllable. In the first syllable of (i), 'in', the vowel quality is appropriate for either a stressed or unstressed syllable; the prominence lent to the syllable by the pitch obtrusion might therefore lead to the transcription of an accented syllable in this position, thus making the first syllable the onset of a head⁴. This cannot happen in (ii) because the reduced vowel quality in 'the' (with a schwa) precludes the analysis of the high pitched syllable as stressed. The pitch prominence cannot therefore be interpreted as an accent; the first syllable can only be a prehead.

Setting aside the problems in distinguishing stressed, unstressed and accented syllables, another question to be asked of a componential analysis is whether it has the facility for elements of a tune to be carried by different components. For instance, we take a look here at the interchangeability of the prehead and the head.

O'Connor and Arnold's (1973) tune, the 'Low Bounce' involves

<u>Prehead</u>	<u>Head</u>	<u>Nucleus</u>
	high	low rise
high		low rise

The prehead may be low only if followed by a high head:

low	high	low rise
-----	------	----------

⁴ This example is taken from the Esprit SAM project "numbers passage" on CD Rom (Eurom-0); transcriptions of the same recording by a number of analysts represented the intonation of "In" as either a high prehead or a high head. One analyst transcribed a fall-rise nuclear tone starting on "In". There was no consensus transcription.

This tune does not occur without a prenuclear component. For O'Connor and Arnold, the presence of high pitch just prior to the nucleus is necessary to functionally demarcate this tune from another, the 'Take Off', where there is no such high pitch: "...no criticism is implied, such as is found with the Take-Off..."(1973:62) and "when there is no head, the High prehead is used to avoid the scepticism of the Take-Off." (1973:65).

Thus, if four tone units are compared:

	<u>Prehead</u>	<u>Head</u>	<u>Nucleus</u>
(i)	high		low rise
(ii)	low		low rise
(iii)	high	high	low rise
(iv)	low	high	low rise

(i) would be considered functionally closer to (iii) and (iv) than to (ii). Even though prehead are identical in (ii) and (iv), (iv) is grouped with (i) which only has same nucleus. It is high pitch before nucleus which is important. This fact is not captured in a purely componential account, even though, intuitively, it appears to be the falling-rising combination which is important. In other words, whereas a holistic tune approach might describe a 'falling-rising' tune, a componential approach would proffer different analyses, depending on whether the rising movement were carried by stressed and/or unstressed syllables.

The advantage gained by applying the British nucleus-plus-head approach is that, by dividing tone units into component parts, all tone units with a particular nuclear tone can be grouped together. It is argued (inter alia, by Crystal:1969) that this is the most important generalisation to be captured. In other words, in

(v) - - low rise

there is only a rising movement, but this belongs to the same major class of tone unit as (i) through (iv)⁵. A holistic tune approach would not capture this.

In order to investigate the role of the nuclear tone in grouping tone units, a closer look at the part of the tone unit which carries the nuclear tone is in order. This is done in the following section.

3.2 The nucleus-tail distinction

In this section, we discuss the definitions offered by various intonologists of the nucleus, nuclear syllable and tail. We examine the distinction between the nuclear tone as a pitch movement and the domain over which it is manifested. Finally, we discuss the advantages

⁵ What happens just before the nucleus will be discussed in detail in chapter 6.

and disadvantages of a very narrow phonetic transcription method for the characterisation of nuclear tails.

3.2.1 The nucleus, the nuclear syllable and the nuclear tone

The literature on intonation makes use of the term 'nucleus' to denote either the nuclear tone, the tonal (or pitch) movement, or the nuclear syllable, described above as the syllable in the tone unit on which or from which there is a pitch change. Most analysts within the British tradition claim that the nucleus occurs on the word which is focussed, most important, new, etc. However, attention will be concentrated here on phonetic aspects of the nucleus rather than on the reasons a speaker might have for placing the nucleus in a particular position in a tone group. O'Connor and Arnold (1973) and Cruttenden (1986) consistently use the term 'nucleus' for the syllable and 'nuclear tone' for the tonal movement. However, Crystal (1969), Gimson (1980) and Couper-Kuhlen (1986) all use the term 'nucleus' to mean either. The following table shows how 'nucleus' and other terms are used:

<u>AUTHOR</u>	<u>SYLLABLE</u>	<u>TONAL MOVEMENT</u>
O'Connor and Arnold (1973)	nucleus (p14)	nuclear tone (p15)
Crystal (1969)	nuclear syllable (p142), nucleus (p208) ⁷	nucleus (p142) ⁶ , nuclear tone (p142)
Gimson (1980)	nuclear syllable (p267), nucleus (p267) ⁹	nucleus (p265) ⁸
Couper-Kuhlen (1986)	nucleus (p79) ¹⁰	nucleus (p86) ¹¹ , nuclear movement (p86)
Cruttenden (1986)	nucleus (p56) ¹²	nuclear tone (p57)

⁶ Crystal (p142): 'This obligatory, and usually kinetic tone I shall refer to as the nucleus of the tone unit (or nuclear tone)'

⁷ Crystal (p208): 'Prehead Head *Nucleus* Tail'

⁸ Gimson (p265): '... with the nucleus (falling, rising or a combination of the two) on the appropriate syllable'

⁹ Gimson (p267): 'When syllables follow the nucleus - the *tail*...'

¹⁰ Couper-Kuhlen (p79): '...the nucleus is the most prominent syllable in a tone unit'

¹¹ Couper-Kuhlen (p86): '...nuclei - unless they are monosyllabic - are more often than not 'spread' over the tail or part of it'

¹² Cruttenden (p56): '...The occurrence of similar tones starting from the nucleus'