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Towards a Phonological Characterisation of Unacusatives in English

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Abstract

In the last decades, the syntax-phonology interface has attracted the attention of both generativists (Miller *et al* 1997, Pullum & Zwicky 1988, Selkirk 1995, 2001) and systemicists (Halliday & Matthiessen 2004, Halliday & Greaves 2008). Scholars within both frameworks have posited the existence of a correlation from syntax to phonology so that every structural syntactic property must have a reflection on a structural phonological property. However, to my knowledge, there is still little empirical work that analyses the syntax-phonology interface at sentence level. The aim of the present study is to provide wide-scale empirical evidence that supports the generativists / systemicists view of the syntax-phonology interface. The study addresses the phonological characterisation of bare unaccusative / unergative constructions, with the aim of capturing the phonological correlation of the syntactic differentiation between unaccusatives and unergatives (Chomsky 1981, Levin & Rappaport Hovav 1995). Additionally, the study provides wide-scale empirical data to contribute to the characterisation of the phonology of English unaccusative constructions and to contrast the phonology of unaccusative constructions with that of unergative constructions. The corpus for the analysis has been drawn from non-scripted utterances produced by 87 native speakers of American English in response to visual stimuli. The analysis follows the theoretical framework of the Autosegmental Metrical Model (Pierrehumbert 1980, Beckman & Pierrehumbert 1986, Beckman *et al* 2005, Ladd 2008).

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To establish the equivalence of some patterns and the contrastiveness of others, exacting experiments are required. Even now, only a few of the experiments that would be relevant have actually been carried out. (Pierrehumbert 2000: 12-14)

0. Introduction

Since Perlmutter (1978) published his seminal paper on the Unaccusative Hypothesis positing a subcategorisation of intransitive verbs into unaccusatives and unergatives, a massive number of works have explored both the semantic and syntactic properties of unaccusatives and have contrasted them with those of unergatives. Among the former group it is worth citing Levin (1986), Wilkins (1988), van Valin (1990), Dowty (1991), Levin & Rappaport Hovav (1994), Hatch & Brown (1995), Mendikoetxea (1999), Alexiadou *et al*. (2004), Pylkkänen (2008), among many others. Among the latter, it is worth mentioning Chomsky (1981), Burzio (1981), Hale & Keyser (1991), Grimshaw (1991), Radford (1997), Alexiadou *et al* (2004), Gallego (2006), Secci (2006), to name but a few.

However, one apparently neglected area in the study of the differentiation between unaccusative and unergative predicates seems to be that of Phonology. What is more, both phonologists and scholars working within the syntax-phonology interface found exceptions to the accentuation rules they proposed in which unaccusative predicates are involved. For example, despite not making connections with the Unaccusative Hypothesis, Cruttenden (1997) and Wells (2007) propose 'event sentences' as one of the exceptions to the rule of stress on the last lexical item of a declarative sentence[1]. If the examples provided by these authors are analysed, it can be seen that most[2] of them contain unaccusative verbs. Examples (1) and (2) appear in Cruttenden (1997:75) and examples (3) to (5) have been adapted[3] from Wells (2007:174).

(1) Watch out! The CHIMney's falling down.
(2) (What happened in the afternoon?) A WIND got up.
(3) The PHONE's ringing.
(4) The CAR won't start.
(5) The BRAKES have failed.

The examples shown above constitute exceptions to the accentuation rule of stressing the last lexical item of a declarative sentence in broad focus[4], since the nuclear stress of each of these sentences falls on the respective argument in subject position, which precedes the predicate. However, neither Cruttenden (1997) nor Wells (2007) provides an explanation for this exception.

Working within the syntax-phonology interface, Gussenhoven (1992) also found unaccusative predicates as exceptions to the accentuation rule he posited. He proposed his Sentence Accent Alignment Rule (SAAR), according to which, every predicate and argument must be accented when focused unless the predicate is adjacent to its argument[5]. As an appendix to his work, however, Gussenhoven leaves a long list of ten unexplained cases that SAAR fails to account for. One such case is that of topicalised arguments, because in his view these "arguments cannot form focus domains with their predicates" (1992:101). Again, from the analysis of the example provided by this author, transcribed as (6) below, it can be seen that it contains an unaccusative verb.

(6) JOHN died.

1. It has been traditionally accepted that "in cases where the intonational phrase is wholly new, the nucleus falls on the relevant syllable of the last lexical item" (Gimson & Cruttenden 1994:241). In actual fact, this is the Nuclear Stress Rule (NSR) already posited by Chomsky and Halle (1968), though these authors did not mention any counterexamples to such rule. Halliday (1963:252) had already noticed this property of "neutral tonicity" of the tone group.
2. The two additional examples cited by Cruttenden (1997) contain unergative verbs with an eventive reading.
3. I have followed Cruttenden's way of showing nucleus placement by capitalising the most prominent syllable in an utterance.
4. Sentences in broad focus are those in which the whole sentence is in focus. Conversely, sentences in which only part of them are focused are said to carry narrow focus. As stated above in footnote 1, the nucleus or sentence stress of an utterance falls on the last focused lexical item. Therefore, both sentences in broad focus with nucleus on the last lexical item and sentences in narrow focus with nucleus on a lexical item other than the last, are considered to be the rule. On the other hand, sentences in broad focus whose nucleus does not fall on the last lexical item are regarded as exceptions (Cruttenden 1997, Wells 2007).
5. This last tenet of Gussenhoven's theory derives from Gussenhoven's experiments on the production and perception of different structural utterances (Gussenhoven 1983). He predicts that in one group of these structures, that of a predicate followed by a final argument, it is possible that speakers produce an onset on the predicate but listeners will not signal this onset as in-Focus. In other words, listeners will consider this predicate unstressed. However, Gussenhoven does not consider a group wherein the argument is followed by a final predicate, which is the case of unaccusative/unergative intransitive verbs.

Also within the syntax-phonology interface, Selkirk (1995) revised her 1984 Syntax-Based Theory of Focus Projection, which allows the accentuation of non-final arguments in subject position together with the deaccentuation of their final intransitive predicates. Selkirk's theory very well predicts "that alternative pronunciations with additional accent on the verb […] are equally possible," so that examples (7) to (9) reproduced below can, in both versions (a) and (b), be stated as an answer to *what happened/is happening?*, which signals that the whole sentence in each case is in broad focus.

(7) (a) JOHNson died. (b) JOHNson DIED.
(8) (a) The SKY is falling. (b) The SKY is FALLing.
(9) (a) The SUN came out. (b) The SUN came OUT.

Both versions of each of the examples (7) to (9) above, Selkirk predicts, are appropriate where the internal arguments *Johnson*, *sky* and *sun*; and their respective predicates *died*, *falling* and *came out* are discourse-new. Thus in each of the six occurrences of examples (7a) through (9b), the whole sentence remains in broad focus. Although in her 1995 revised theory, Selkirk does not make mention of unaccusative predicates, she clearly makes reference to them by saying "argument[s] which [are] neither phrase-final nor sister[s] to [their] head[s] in surface structure" (1995:559).

However, few experiments have been conducted so far to test Selkirk's theory. In particular, the differentiation between the phonology of unaccusatives and unergatives is studied by Hoskins (1996), who measures the fundamental frequency and the duration of both the arguments and the predicates of intransitive constructions of the type subject + verb. Yet, his work concentrates only on the exploration of (de)accentuation of arguments in subject-position of unaccusative/unergative constructions[6]. Besides, Hoskins' prosodic study is designed with only few sentences (three unaccusatives and three unergatives), and few participants (15) and is carried out in a rather unnatural environment, since the sentences are read out in a laboratory, rather than naturally produced by the speakers.

Additionally, within the syntax-phonology interface, several scholars within the generative framework (Pullum & Zwicky 1988, Miller *et al* 1997, Selkirk 2001) and within the framework of Systemic Functional Linguistics (Halliday & Matthiessen 2004) posit the unidirectionality from syntax to phonology and reject the reverse influence of phonology on syntax. Selkirk (2001:8), for example, argues for the so-called "serialist, unidirectional input-output model," which predicts that syntactic structures determine the phonological realisation of their corresponding utterances, rather than the reverse directionality[7]. In practical terms, if the syntactic representation of a sentence S has a syntactic property SP, then there must exist a correlation between that property SP and a phonological property PP reflected in the phonological representation of sentence S. Therefore, it seems plausible to suggest that unaccusative predicates, which have a different syntactic configuration from unergative predicates (see sections 2.1. and 4. below), must have a different phonological configuration from unergative predicates.

However, to my knowledge, no grand-scale experiment has been carried out to capture such phonological differentiation or to characterise the phonology of unaccusative constructions. Therefore, this study will attempt to investigate the existence of recurrent patterns in the phonology of unaccusative constructions and to contrast such patterns with those of unergative predicates. The analysis will follow the theoretical framework of the Autosegmental Metrical Model (Pierrehumbert 1980, Beckman & Pierrehumbert 1986, Beckman *et al* 2005, Ladd 2008).

This study is divided into five sections. The first section outlines the hypotheses to be tested in this study together with the aims of the study. Section 2, which is subdivided into 2 subsections, defines key concepts and deals with the theoretical framework upon which the study is based. The first subsection provides a semantic/syntactic definition of unaccusatives and presents the reasons for the choice of theoretical framework. Subsection 2, which summarises the Autosegmental-Metrical Model, is in turn subdivided into 4 parts. The first part introduces Pierrehumbert's original model published in 1980; the second part is devoted to the innovations introduced in its revised version (Beckman and Pierrehumbert 1986); the third part, to the standard version known as ToBI –Tones and Break Indices – agreed in the 1990s; and finally the fourth part explains the technical concepts of scaling and declination, which will prove key notions in the analysis of the study.

6. He also explores the (de)accentuation of noun-subjects of passive constructions.
7. Cf., however, Schlütter (2009), who argues against this unidirectionality from syntax to phonology.

Section 3, subdivided into 5 subsections, explains the methodology used in the study. The subsections describe the design of the visual stimuli and the data collection, the orthographic transcriptions and the clause classification of the utterances produced by the participants, the delimitation of the corpus, the segmentation and normalisation processes, the characterisation of the intonation of the segments and the process of metrical measures obtained.

Section 4 reports the findings in terms of both the tonicity and tone systems, conducts the analysis of the metrical measures abovementioned and exemplifies each of the six relevant patterns of intonation – telic/atelic unaccusative constructions with H* !H* / L* L* pitch accents. Finally, section 5 presents the conclusions of the study and provides possible lines of exploration for further research into the syntax-phonology interface.

1. Hypothesis and Objectives

1.1. Hypothesis

This study starts from the following hypothesis:

It is possible to provide wide-scale evidence to support the unidirectional syntactic influence on phonology through the characterisation of the phonology of English unaccusative constructions and their phonological differentiation with English unergative constructions.

1.2. Objectives

In an attempt to prove the abovementioned hypothesis the objectives of the study are sketched in the following two subsections.

1.2.1. General Objective

To conduct a wide-scale study to contribute to the unidirectional syntax-phonology model, to determine a characterisation of the phonology of unaccusative constructions in English and to carry out a phonological contrast between unaccusative constructions and unergative constructions in English

1.2.2. Specific Objectives:

To provide wide-scale evidence to support the position that syntax influences phonology in a unidirectional fashion

To find grand-scale quantitative proportions in the intonational system of tonicity – or nucleus placement – in bare unaccusative constructions of type SV in broad focus uttered by native speakers of American English

To differentiate such proportions with those in bare unergative constructions

To find recurrent patterns in the intonational system of tone in sentences in broad focus containing unaccusative verbs in English

To contrast those recurrent patterns with those in unergative constructions

To quantify metrical parameters such as scaling and declination in bare unaccusative constructions of type SV in broad focus in English

To contrast the mean and the standard deviation of those metrical parameters with those of bare unergative constructions of type SV in broad focus in English

To determine the extent to which other variables such as telicity/aspect influence the metrical parameters abovementioned

2. Theoretical Framework

2.1. Semantic/Syntactic Definition of Unaccusatives

From the point of view of semantics, the distinction between unaccusatives and unergatives is realised in terms of argument selection. While unaccusative verbs select an internal argument, irrespective of the possibility of admitting an additional external argument[8], unergatives select only an external argument and no internal argument. Whereas the theta role assigned to the internal argument of unaccusative verbs is THEME or PATIENT, the theta role assigned to the external argument of unergative verbs is AGENT[9],

8. For example in the case of causative constructions like <<Carla54>>, *The candles melted the igloo*.
9. Cf. Levin & Rappaport Hovav (2002:9) who claim that semantic notions such as agentivity are not necessarily determinants

CAUSER, ACTOR or EXPERIENCER (Haegeman 2006, Hatch & Brown 1995, Pylkkänen 2008, van Valin 1990, Wilkins 1988). Dowty (1991) prefers the terms PROTO-PATIENT and PROTO-AGENT respectively since he argues that the semantic differentiation of predicates is not categorical but one of distribution along a continuum.

From a syntactic point of view, the difference between unaccusatives and unergatives is understood in terms of selectional restrictions or what is equivalent, in terms of the underlying syntactic function fulfilled by the argument that the verb selects. Unaccusatives select a complement that can remain in situ, if an expletive is inserted in subject position, or that can be moved out of this position into the specifier position of the verb to satisfy the requirements of an external-projection-principle feature of such verb (Grimshaw 1991, Gallego 2006). Unergatives, on the other hand, do not select a complement[10] but another argument that originates in the canonical position of specifier of vp shell[11] (Radford 1997, Secci 2006). According to Mendikoetxea (1999:1579) unaccusative verbs share properties of transitive verbs and unergative verbs. Both unaccusatives and unergatives select only one argument, but while the argument selected by an unergative verb is both a syntactic and a notional subject, that selected by an unaccusative is a syntactic subject and a notional object. Chomsky (1981), Alexiadou *et al*. (2004) and Levin and Rappaport Hovav (1994:58) represent the syntactic configuration of unaccusatives and unergatives in the following scheme[12]:

(10) Unergatives: NP [$_{VP}$ V]
(11) Unaccusatives: __ [$_{VP}$ V NP]

The difference between the syntactic/semantic properties of unaccusatives and unergatives is illustrated by the following two examples. (12) and (13) below seem to have the same surface structure and be subject to the same analysis. However, while in (12) *John* does originate in the canonical position of subject and receives the theta role AGENT, in (13) *John* is assigned the theta role THEME and originates as complement of the verb and is subsequently raised to the syntactic position of subject. Example (12), unlike example (13), can be uttered as an answer to the question *What did John do?* Example (13) can be more appropriately thought of as an answer to the question *What happened to John?* Whether due to syntactic[13] or semantic reasons, it can be concluded that the verb *lie* is unergative and *die* is unaccusative.

(12) John lied.
(13) John died.

Therefore, unaccusatives can be defined along the following terms:

An unaccusative verb is an intransitive verb that selects an internal argument or underlying object, i.e. a verb whose subject is thematic rather than agentive, not originated in subject position but in complement position and later raised to subject position for syntactic requirements, unless an expletive fills in this subject position.

Unlike the semantic and syntactic fields of unaccusatives/unergatives, which have extensively been investigated, the phonology of unacccusatives and its phonological contrasts with unergatives have been relatively unexplored. Therefore, this study will attempt to analyse the phonology of unaccusative bare constructions of type SV in English from the theoretical framework of the Autosegmental-Metrical Model. This choice is grounded on the following three reasons. First, the model is based on a description of FØ target levels rather than FØ changes proposed by the British school. According to Pierrehumbert (1980: 54-58) FØ target levels can better account for the disambiguation between the declarative terminal fall and the vocative falling contour, the former of which falls right to the bottom of the speaker's pitch range – or baseline – while the latter falls to a pitch well above the baseline. Besides, the labelling of downstepped tones (see subsection 2.2.3 below) provides a simpler account of the phonology of long utterances with a

of unaccusativity. They alternatively propose "event complexity" as the determinant factor of argument expression and predicate categorisation.

10. Some authors consider that unergative verbs are formed through the process of 'incorporation' whereby the complement of a light verb is incorporated into this light verb, giving rise to a denominal verb (Baker 1988, Hale & Keyser 1991, Kornfeld & Resnik 2000, Radford 1997).

11. Larson (1988) introduced and Chomsky (1995, 2001) elaborated on the distinction between VP core and vp shell in order to solve the syntactic analysis of three-place verbs such as *give* and *put* without violating the Chomskyan binary principle.

12. For an alternative representation, see Rosen (1984: 42-43).

13. For a discussion of the syntax-morphology interface and the role of each in the characterisation of words, see for example Embick & Noyer (2007).

number of prenuclear tones than that explained in terms of an FØ change theory, which would otherwise call for a succession of falls and rises within the same utterance.

The second reason is that the Autosegmental-Metrical Model focuses on the characterisation of FØ contours, which "are the most accessible data […] relevant to a quantitative description of intonation" (Pierrehumbert 1980:12). In actual fact, the model "insistently draws […] attention to pitch level as a problem for investigation" (Ladd 2008:72). Nowadays, FØ contours are easily and accurately "obtained with the aid of a computer program for pitch tracking," such as SpeechAnalyzer 3.0.1. This program allows the exact measure of the height of tones – or scaling – at points of interest in the pitch contour and the distance of the alignment of such tones from the onset of the recording, and therefore the distance between the respective alignments of two successive tones. This will make the Autosegmental-Metrical Model together with the valuable help of the abovementioned computer program a highly appropriate theoretical model and a key instrument for this study.

Finally, the third reason for choosing this theoretical framework is that this model allows future research on the phonology of unaccusative constructions in further languages with the aim of investigating whether the findings arrived at in this study capture a universal property of the phonology of unaccusatives or rather are characteristic of those inflexible word-order languages like English. Since one of the advantages of the Autosegmental Model is its flexibility, this has led to the development of standard descriptions of the intonation of a number of languages/varieties. Complete systematic descriptions have been agreed and detailed publications, training materials and intertranscriber consistency tests have been issued for Mainstream American, RP and Australian varieties of English and the standard varieties of German, Japanese and Korean. For Spanish, though the system has not yet reached the full-status development, there have been partial agreements aimed at developing a Pan Spanish ToBI. The first of these agreements was reached after the first Sp_ToBI workshop held at the Ohio State University Department of Spanish in 1999 (Beckman *et al* 2002). Previous contributions have either concentrated on cross-variety descriptions (Sosa 1991, 1999) or on some feature of intonation present in some variety of Spanish (Prieto *et al* 1995, Prieto 1998). The following subsection outlines the Autosegmental-Metrical Model, its revised version and the Standard ToBI (Tone and Break Indices) version.

2.2. The Autosegmental-Metrical Model

2.2.1. Pierrehumbert's Model (1980)

The Autosegmental-Metrical Model has its origins in the works of Leben (1973), who analysed suprasegmental features in some West African tone languages and some nasalisation phenomena in three South American languages, and of Goldsmith (1976), who from a detailed analysis of a Nigerian tone language develops a good account of the intonation of English. Yet, it is the PhD theses by Liberman (1975) and most importantly by Pierrehumbert (1980) that established the foundation of a complete description of the intonational structure of English later adapted for many other languages. Pierrehumbert's theory, together with its revised version (Beckman & Pierrehumbert 1986) was given the name Autosegmental-Metrical Model by Ladd (1996, 2008), taken from Goldsmith (1976). The theory departs from previous Fundamental Frequency (FØ) change analysis and designs an FØ level theory based on two tones, namely H (High) and L (Low). The reduction from a four-tone inventory (Liberman 1975) to two contributes to the reduction of ambiguity of analysis in L H L[14] sequences of varying degrees of pitch range (Pierrehumbert 2000:14). In non-tonal languages like English, these tones are assigned by speakers producing an utterance to both the lower hierarchical parts of the utterance – prominent syllables and words, and to the upper hierarchical parts of the utterance – the Intonational Phrase (IP) and the intermediate phrase (ip).

As Gussenhoven (2002b:272) very well points, one of the merits of Pierrehumbert's theory is "the idea that speech reflects a phonological representation consisting of hierarchically organized constituents." Let us then start with a description of this structural hierarchy. Each utterance U consists of one or more Intonational Phrases (IP). In its turn, each Intonational Phrase is made up of one or more intermediate phrases[15] (ip). The Intonational Phrase and the intermediate phrase comprise the upper constituents in the

14. Liberman resorts to four tone levels: L, LM, HM and H. One of the most serious problems of a four-tone model is that in long declarative utterances with 5 pitch accents, which are attested in English, the intermediate tones are difficult to characterise. There is no possible way to distinguish whether the intermediate tones are to be classified as LM or HM, or how to differentiate two distinct HMs with a different scaling. A model based on only two tones, on the contrary, avoids this problem (Pierrehumbert 1980, 2000).
15. Truckenbrodt (1999:221) provides a great deal of alternative labels proposed by different authors for the intermediate phrase.

intonational hierarchy. Below them are the lower constituents so that we can go down in the phonological hierarchy from the intermediate phrase to the phonological word (ω), from this to the foot (f), from this to the syllable (σ), to reach the lowest constituent in the structure, the phoneme (ph). The phonological hierarchy can be seen graphically in Figure 1 below, which represents an example taken from our corpus.

A further virtue of the Autosegmental-Metrical theory is that it posits that the melody or tone modulation of an utterance is orthogonal to or independent from the remaining phonological features. The tones associated to each intonational contour constitute a limited set of elements paradigmatically contrastive, which can combine to display the whole range of the complex contours that characterise each language or variety. In non-tonal languages like English, these tones are associated either to prominent syllables in prenuclear or nuclear position, or to the borders of a phrase. The former constitute the pitch accents and the latter, the edge tones.

Pitch accents can be monotonal, consisting of an only tone represented as either H or L; or bitonal, made up of a combination of two tones in either order, H+L or L+H. The centrality of one of the tones in the case of the bitonal pitch accents and of the only tone in the case of the monotonal ones is represented with the diacritic star or asterisk (*). The starred tone of both a monotonal and a bitonal pitch accent is associated to the accented or prominent syllable(s) in a phrase (Pierrehumbert 1980:23). In the case of bitonal pitch accents, the starred tone is accompanied by a preceding unstarred pitch accent, the leading accent; or by a following unstarred pitch accent, the trailing accent. All in all, the range of pitch accents available for the description of languages like English offers a display of two monotonal possibilities and four bitonal possibilities[16].

(14) The phone's ringing and she's scared. <<Johanna39>>
ðə fəʊnz rɪŋɪŋ n ʊi:z skeəd fonemes

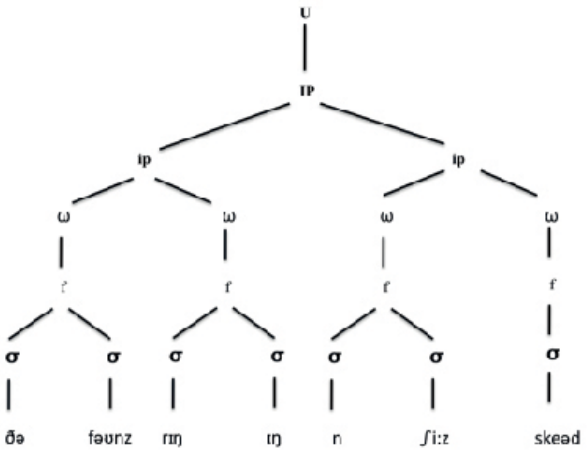

Figure 1: Phonological Hierarchy in an Utterance

Edge tones can be of two types: phrase accents and boundary tones and both types of accents are always monotonal (H or L). Boundary tones are associated with the end, and in some languages/varieties also with the beginning, of Intonational Phrases. Phrase accents in their turn are associated with the end of intermediate phrases. While the presence of the boundary tone is undisputedly accepted in the literature and the diacritic that accompanies this boundary tone is unanimously represented by a percentage symbol (%), the presence and representation of the phrase accent has been much more controversial. For example, Sosa (1999) and Gussenhoven (2007) do away with the phrase accent altogether. Besides, of the authors that incorporate phrase accents in their work, some represent it with no distinctive diacritic (Pierrehumbert & Hirschberg 1987, Pierrehumbert 1993, Gussenhoven 2002a); and others (Pierrehumbert 1980, Ortiz Lira 1999, Gussenhoven 2002b, Selkirk 2002, Toledo 2008) represent it accompanied with a hyphen (-).

A combination of all possible pitch accents, phrase accents and boundary tones gives us the whole range of the intonational phonology of a language. Pitch accents, unlike phrase accents and boundary tones, can be recursive, in the sense that they can theoretically appear in any number in an intermediate

16. In the original model, Pierrehumbert (1980) considered a seventh pitch accent for English (H*+H), which was later discarded for lack of experimental validation.

phrase. Intermediate phrases with one, two or three pitch accents are attested in English and many languages. However, intermediate phrases with as many as five pitch accents are extremely unusual (Pierrehumbert 2000:21). Conversely, phrase accents and boundary tones are non-recursive. The former appear only once per intermediate phrase, and the latter, mark the end on Intonational Phrases and, in some cases, also their beginnings. An additional difference between edge tones is that phrase accents are not locally constrained to the limits of the phrase but can rather spread over several unaccented syllables after the nuclear accent, whereas boundary tones are necessarily placed at the border of the Intonational Phrase with no room for leftward movement. Table 1 below shows all the possibilities of the intonation of an Intonational Phrase made up of only one intermediate phrase, which also contains an only nuclear accent and no prenuclear accents.

Boundary Tone	Pitch Accent	Phrase Accent	Boundary Tone
H%	H*	H-	H%
L%	L*	L-	L%
	L*+H		
	L+H*		
	H*+L		
	H+L*		

Table 1: Combination of Pitch Accents and Edge Tones

Figure 2 below displays the inventory of possible combinations of tones for an utterance made of one intermediate phrase, irrespective of its complexity. The first toneless arrow from left to right indicates that the boundary tone to the left of the utterance is one of the (un)conscious choices that a speaker makes but its presence is not necessarily compulsory. The backward arrow at the top of the pitch accents signals the recursiveness of pitch accents. That is to say, every utterance must contain at least a pitch accent, but theoretically can contain as many pitch accents as possible. If there is only one pitch accent, this is also called the nuclear accent; if there are many, the rightmost one will be the nuclear accent and the previous ones will be the prenuclear accents[17].

Before turning to explain the different pitch accents, let us remark that it is pitch distances rather than absolute pitch that contribute to the characterisation of the melody of the intonational contour so that the interpretation of a certain tone as H (or L) does not lie in the recognition of the absolute frequency with which a certain syllable is pronounced. It is rather a paradigmatic comparison between the frequencies with which the neighbour syllables within a certain intonational contour that contributes to the characterisation of its melody. Besides, as already mentioned, pitch accents are associated to only (some of the) prominent syllables in an intonational contour. Weak syllables are not characterised by pitch accents and the frequency with which they are pronounced can be fairly predicted by interpolation between the fundamental frequencies of the pitch accents associated to their neighbouring stressed syllables. Additionally, stressed syllables can lack pitch accents when they belong to non-prominent words in the phrase, e.g., because they contain given information (Pierrehumbert 1993:270).

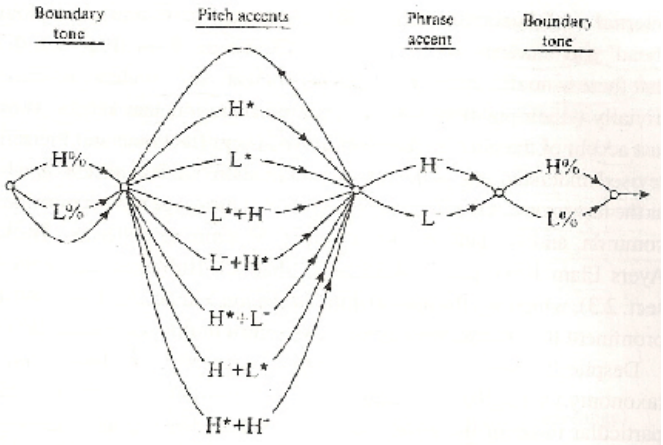

Figure 2: Possible Combinations of Tones of a One-*ip* Utterance (from (Pierrehumbert 1980:29), repeated in Ladd (2008:89))

17. Pierrehumbert (2000:22) includes in her Fig. 6 an additional backward arrow from the end of the phrase accent to the beginning of the pitch accents, better capturing the additional recursiveness of the intermediate phrase, as noted by Beckman & Pierrehumbert (1986).

Let us now turn to the explanation of the pitch accents associated with stressed syllables of an intonational contour after Beckman & Pierrehumbert (1986). The first two monotonal starred accents H* and L* correspond, respectively, to a peak and a valley that are completely associated, or more technically, aligned with a stressed syllable of a prominent word in a phrase. As it is well known, apart from the tonal prominence, a stressed syllable within a word is also characterised by a longer duration than the unstressed syllables in that same word, or if a certain word is differently stressed according to its grammatical category, the relative durations of the syllables of the respective homonyms will be different. For example, if we compare the first syllables of the nouns *permit*, *protest* and *segment* respectively with the first syllables the verbs *permit*, *protest* and *segment*, we will find that the former are longer. Conversely, the second syllables of the respective verbs will be longer than the second syllables of their noun counterparts. This effect of the relative duration of syllables, among many other phenomena that affect the graphic representation of the fundamental frequency (FØ) of an intonational contour must be taken into account for the correct interpretation of FØ.

In order to clarify the different pitch accents, I will provide examples taken from the ToBi website (www.tobihome.org), in particular from the downloadable utterances in the wav RIFF files that accompany and are explained in Beckman & Ayers Elam (1997), which I have analysed by means of the program SpeechAnalyzer 3.0.1. Each of the files will be referred to with its original basename represented as <<basename>>, which will be accompanied with the corresponding figure that represents the fundamental frequency obtained with the program abovementioned, together with its orthographic transcription and the tone description of the respective intonational contour. In some cases, a number in brackets after the orthographic transcription indicates the number of times that a phrase is uttered with different intonations for contrastive purposes. The corresponding files have also been recorded in the accompanying CDs at the end of this study.

The difference between the monotonal pitch accents H* and L* can be seen comparing the second and fourth versions of example (15) below. In the former, the fundamental frequency shows a peak aligned with the stressed syllable of *Marianna* (around 2.200 sec), which is represented with the tone H*. In the latter, the fundamental frequency shows a valley aligned with the stressed syllable of *Marianna* (around 6.700 sec), which is represented with the tone L*. In both cases, the only pitch accent present in the phrase is the one mentioned, which corresponds to the nuclear tone in the utterance. As Pierrehumbert (1980) points, a phrase can be uttered with only one or more pitch accents. The nucleus of an utterance is placed on the only pitch accent of a phrase or, if it is uttered with more than one pitch accent, on the last pitch accent of the phrase. In this case, the last pitch accent will be nuclear and the other(s) will be prenuclear.

The third version of example (15) below shows the presence of two pitch accents, one prenuclear aligned with the stressed syllable of *Marianna* (4.200 sec), and the nuclear one aligned with the stressed syllable of *marmalade* (4.750 sec). Both pitch accents are produced with L* tones, which can be seen in the valleys produced in the fundamental frequency. The last two versions of the previous examples, pronounced with sequences of L* pitch accents and H-H% edge tones are examples of interrogative contours, while the first two versions, pronounced with sequences of H* (or L+H*) pitch accents and L-L% edge tones exemplify the contours corresponding to statements. Moreover, while the first and third versions of example (15) have pitch accents aligned with *marmalade*, making it nuclear, the second and fourth versions have their only pitch accent on *Marianna*, leaving the remaining lexical items unaccented, probably because they represent given information.

(15) <<made3>>

Marianna made the marmalade. (4)

L+H*	!H*	L-L%
H*		L-L%
L*	L*	H-H%
L*	H-H%	

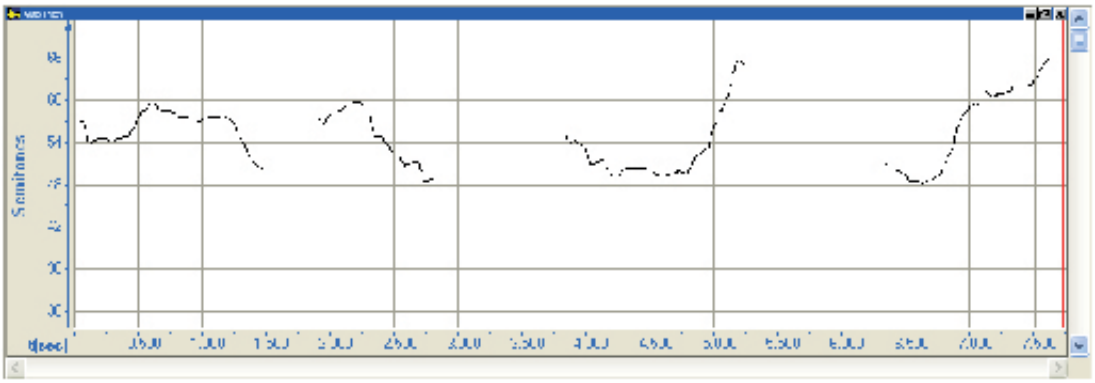

Figure 3: FØ Contour for <<made3>>

Unlike the monotonal accents, which represent a peak or a valley in the fundamental frequency, the bitonal pitch accents are characterised by a movement from a valley to a peak (L+H), or from a peak to a valley (H+L)[18]. Each of them is made up of a starred tone aligned with the accented syllable and an unstarred tone that leads to, or trails from the starred tone. For example, the first version of example (15) above shows a bitonal pitch accent L+H*, which rises from the offset of the previous syllable (0.400 sec) with 54.2 semitones to the very end of the stressed syllable of Marianna (0.650 sec) with almost 60 semitones. The difference between L*+H and L+H* can be clearly appreciated in the nuclear accents of the following example.

(16) <<millionaire>>

Only a millionaire. (2)

a) H* L*+H L-H% b) H* L+H* L-H%

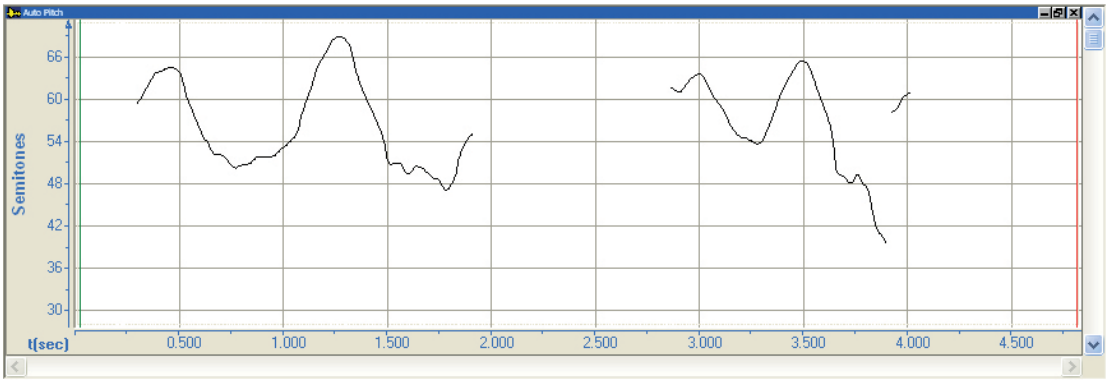

Figure 4: FØ Contour for <<millionaire>>

In this example, though the nuclear accents of both versions of (16) are represented by rises from low pitch to high pitch, the alignment of the first syllable of *millionaire* is different in each. In the first version, the syllable *mil* is produced between 0.800 sec and 1.125 sec and the syllable *lio* from this point to 1.275 sec. The rise from low to high pitch covers both syllables, so that the tone aligned with the stressed syllable is L* and the final peak is produced in the following syllable. This is represented with the bitonal L*+H, which is called 'scooped' accent. Conversely, in the second version, of example (16), the peak of the rise is produced a bit earlier. The syllable *mil* is pronounced between 3.300 sec and 3.500 sec, at which point the peak is already reached. The syllable *lio* is produced between 3.500 sec and 3.650 sec, when the fundamental frequency has already started to descend. This is represented by the tone L+H*. Besides, it can be seen that in both productions of example (16), uttered by the same speaker, the low pitch of the L*+H first version is lower than the low pitch of the L+H* second version. The contrast between the two pitch accents can be summarised in Table 2 below.

18. The two falling tones H*+L and H+L* used in both the original version by Pierrehumbert (1980) and the revised version by Beckman & Pierrehumbert (1986) have later been replaced by a downstepped H+!H explained below in the agreed ToBI (Tones and Break Indices) system for English.

Pitch Accent	Level of Low Pitch	Timing of H Peak	Name Given to Accent
L*+H	Low	Later	Scooped
L+H*	Mid	Earlier	--

Table 2: Contrast Between L*+H and L+H*

As for the meaning of the two different versions of example (16) above, while both imply a "scale evoked in the discourse" (Pierrehumbert & Hirschberg 1990:295-6), the pragmatic character of this scale has a distinct interpretation in each. Whereas the first version, the one with scooped pitch accent L*+H, conveys uncertainty (Ward & Hirschberg 1985) or incredulity (Ward & Hirschberg 1986), the second version, the one with L+H* pitch accent, expresses a correction or contrast (Pierrehumbert & Hirschberg 1987). Let us provide a contextual question to disambiguate the two different interpretations of (16), repeated below:

(17) A: Is that famous actor a happy father?
B: He's only a millionaire.

Utterance B, pronounced with L*+H scooped pitch accent implies uncertainty or incredulity as to the scalar categories evoked by the nominal phrase *a happy father* in A's question. In this way, B expresses uncertainty / incredulity as to whether *a happy father* is a hyponym of, a hyperonym of, or a competing category with a *millionaire*. In other words, B is uncertain or incredulous (as to whether) that A's question has the intended meaning that all happy fathers are millionaires, all millionaires are happy fathers, or that some happy fathers are millionaires. On the other hand, if B's utterance is pronounced with L+H* pitch accent, B corrects or contrasts A, substituting a new alternative scalar value, which overtly excludes the one offered by A's question. In this case, B conveys that no millionaire is a happy father.

2.2.2. The Revised Version (Beckman & Pierrehumbert 1986)

There have been a number of innovations in the model since Pierrehumbert submitted her PhD thesis in 1980, some of which have effects on the phonological structure of the intonational contour, and some that have offered reinterpretations of the tones associated to the edge tones and the pitch accents. As regards the phonological structure and the possible edge tones associated to each of its constituents, in the original model, Pierrehumbert (1980) does not make any reference to the "intermediate phrase," which is later introduced in the revised version (Beckman & Pierrehumbert 1986). In the original model then, "the well-formed tunes for an intonation phrase are comprised of one or more pitch accents followed by a phrase accent and then a boundary tone" (Pierrehumbert 1980:22). The introduction of the intermediate phrase(s) between the Intonational Phrase and the phonological word(s), and the phrase accents associated to this/these intermediate phrase(s), allows for the disambiguation of conjoined constructions and transitive constructions from their intransitive reading with a final vocative. The following example, taken from Beckman & Pierrehumbert (1986:291) has two possible readings.

(18) A pale orange and yellow ballgown.

In one interpretation, only the *orange*, not the *yellow*, is pale. The utterance is pronounced with two intermediate phrases, the first of which covers the nominal phrase *a pale orange* and the other covers *and yellow ballgown*. In this reading the edge tones will be constituted by a first phrase accent after the accented syllable of *orange*, a second phrase accent after the accented syllable of *ballgown* and a final boundary tone at the end of the utterance.

In the other reading, both the colours *orange* and *yellow* are *pale*. The intermediate phrases and their associated edge tones will be located in different positions. The first intermediate phrase will cover the adjectival phrase *a pale* and the second intermediate phrase will cover the nominal phrase *orange and yellow ballgown*. The phrase accents placed at the end of each of these intermediate phrases will contribute to the unambiguous interpretation of the utterance. The following example taken from Beckman & Pierrehumbert (1986:294) also has two different interpretations in spoken English, though when written, each of them will be clearly told apart by the presence or absence of a comma after *marry*.

(19) Mary will marry Manny.

In one possible reading, the one without a comma after *marry*, the verb is interpreted as a transitive one and the intonation phrase is thus pronounced with only one intermediate phrase and, correspondingly only one phrase accent after the accented syllable of *Manny*. The other interpretation, which in written English is clearly disambiguated by the presence of a comma after the verb, consists of a subject accompanied by an intransitive verb followed by a vocative. In this case, the intonation phrase is made up of two intermediate phrases with their corresponding phrase accents. It is the presence of the first phrase accent that conveys in oral English the same effect as the comma of its written version.

2.2.3. The Standard Version: ToBI (Early 90s)

Further innovations were adopted after the proposed standard labelling system for English presented by Silverman *et al* (1992) at the Second International Conference on Spoken Language Processing. This system, known as ToBI (Tone and Break Indices) consists of multiple tiers (Pitrelli *et al* 1994, Beckman & Ayers Elam 1997, Beckman *et al* 2005). I will concentrate only on the tonal tier and its modifications to the transcription of tones of the revised version of the AM model (Beckman & Pierrehumbert 1986). The most important of these modifications is the reduction[19] from six to five pitch accent types, four of which have already been analysed since they have remained unchanged (H*, L*, L*+H and L+H*). The tone H*+L was eliminated and therefore every accent that was previously transcribed as H*+L has been from then on transcribed as H*. The remaining pitch accent, previously interpreted as H+L*, has been reanalysed as H+!H*, which is shown in the second version of the following example.

This H+!H* pitch accent in the second version represents a “fall from a preceding higher pitch onto a lower pitch level on the accented syllable” (Beckman *et al* 1997:24) and the reanalysis of the downstepped second element of the accent reproduces the fact that the fall does not reach an L pitch but rather a lower level than its first component. The diacritic /!/ indicates a downstep, which can be defined as a compression in the fundamental frequency that affects a lowered H tone triggered by the presence of an immediately preceding higher H tone. The meaning of the H+!H* pitch accent on *Theresa* in this case seems to convey compressed new information in the form of a statement, probably due to the elision of some shared information such as *an example can be*, which has already been mentioned by the speaker’s previous question. After the ToBI standard system, it has been agreed that the downstep diacritic used in this tone can be applied to every H tone, except H%, preceded by another H tone so that the expanded range of possibilities now also offers the downstepped pitch accents !H*, L*+!H, L+!H*, H+!H* and the phrase accent !H-.

(20) <<theresa>>

You want an example? How about Mother Theresa?
H* H* H-H% H* *? H* L-L%

You want an example? Mother Theresa.
H* H* H-H% H+!H* L-L%

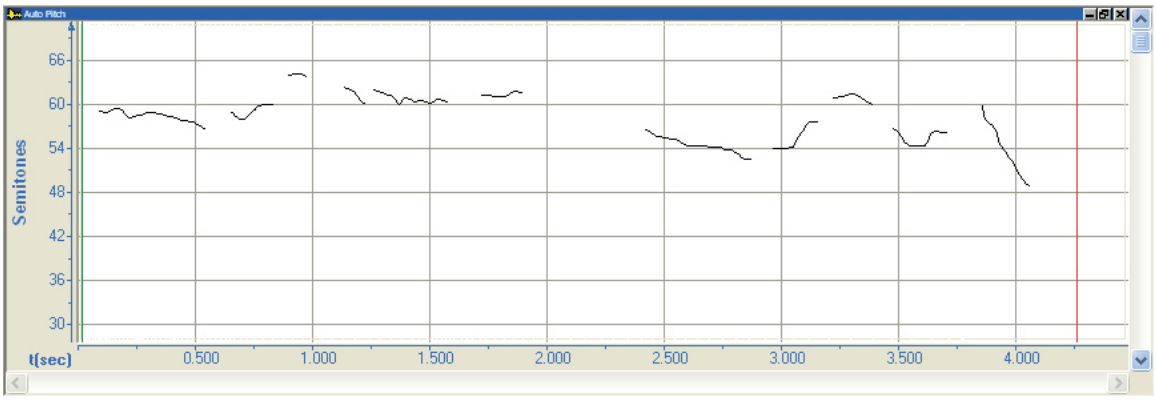

Figure 5: FØ Contour for <<theresa>>

19. This reduction was based on the grounds that, unlike the L*+H and L+H* distinction explained above, no phonology contrast was experimentally found between H*+L and H+L* (Pierrehumbert 2000).

A further innovation after ToBI has been the reduction of the two initial boundary tones to only one possibility, the H%, thus regarding the former initial boundary tone L% as a default option. The presence of a contrastive initial boundary tone H% is required when there is an initial fall in the Intonational Phrase from an unaccented syllable or word, as exhibited in the third version of the following example.

(21) <<loan1>>

You need a loan. (3)
H* H* L-L%
L* H* L-L%
H% L* H* L-L%

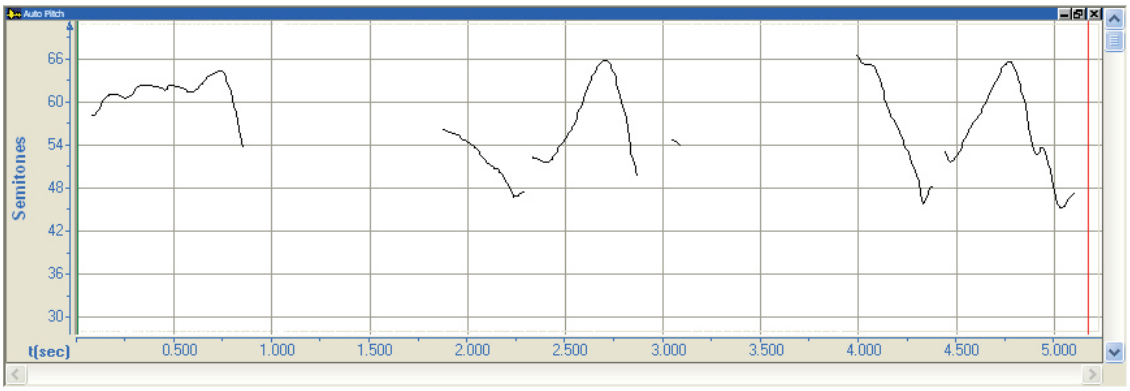

Figure 6: FØ Contour for <<loan1>>

It can be seen that while in the second version of the previous example, the intonational contour begins at mid level, the third version of the utterance starts at a much higher level, which makes it necessary to insert an initial boundary tone H%. This higher initial pitch seems to render the initial pronoun of the utterance more salient, thus conveying more interpersonal involvement with the interlocutor. Finally, the last important innovation that ToBI has introduced is the possibility to express the analyst's uncertainty as to the character of a certain pitch accent, phrase accent or boundary tone (X*, X- or X%) and even to the presence or absence of a certain tone (*?, -? or %?). The following subsection deals with the technical concepts of scaling and declination, the former being a metrical parameter of the fundamental frequency FØ; the latter an indication of the reduction of scaling along time in most statements. Both these concepts will prove to be key issues in the analysis of this study.

2.2.4. Technical Concepts

2.2.4.1. Scaling

Scaling is a metrical parameter along the vertical line of the fundamental frequency FØ, or of a certain tone of a stressed syllable in the intonational contour of an utterance. It measures the height of a tone of the fundamental frequency FØ and is usually expressed in Hertz (Hz). If both male and female speakers will be involved in the experiment to be carried out, a more appropriate unit will be required since the range of FØ is higher in females than in males. While for females this range is on average between around 180 and 400 Hz, for males FØ ranges between approximately 80 and 200 Hz. Therefore, in order to make pitch distances in females comparable with those in males, a normalisation process which converts pitch distances in Hz to pitch distances in semitones (st) is more appropriate. The semitone is a logarithmic scale derived from the Hz scale (Nooteboom 1997:8). Nevertheless, if the researcher is interested in a sociolinguistic study wherein the pitch distances of females are to be contrasted with those of males, the Hz scale should be approximated with the Equivalent Rectangular Bandwidth (ERB) proposed by Glasberg & Moore (1990).

2.2.4.2. Declination

Alan's in CAMbridge studying BOtany.

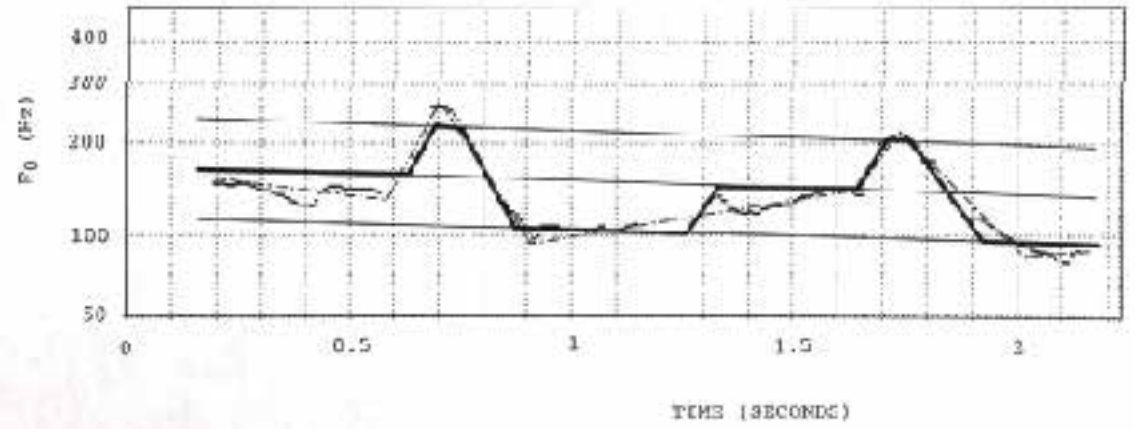

Fig 7: FØ, Topline, Midline and Baseline in a Short Utterance

Declination has been observed to be a characteristic of the intonation of declarative sentences (Liberman 1975, Pierrehumbert 1980) and refers to the slightly downward movement along the successive syllables of a statement uttered by speakers of many languages. Though it is not a perceivably universal feature of languages (Laver 1994:459), this phenomenon has been generally deemed non-voluntarily controlled by speakers of most Western languages[20]. The declination of the intonation of an utterance in actual speech is not an easily quantifiable phenomenon due to abrupt changes in pitch that occur in natural speech. Yet, within the local domain of short utterances, it can be captured by the slope of two tilting idealised lines called topline (Bruce & Garding 1978) or plateau (Vaissière 1983) and baseline respectively, which define the pitch-span for a certain speaker of a language. The topline is the line that joins the successive peaks of the H* tones of a short utterance. The baseline is the line that makes up the floor of the pitch-span and can be obtained joining the successive lowest points in the valleys of an utterance and the lowest boundary tone. Between these two lines there seems to exist a third line equidistant in tonal height from the topline and the baseline. While Maeda (1976) and Nooteboom (1997) consider these three lines to be parallel, Laver (1994) claims that they tend to converge, tapering the range of the pitch-span.

Figure 7 above, taken from Nooteboom (1997:9), shows these three lines for a short British-English utterance. Its orthographic transcription signals the two stressed syllables produced with an H* tone.

3. Methodology

In order to test the hypotheses mentioned in section 1 above, a qualitative-quantitative data-driven study was conducted. First, the design of visual stimuli and data collection took place. The following process was the orthographic transcription of the corpus and the clause classification of the utterances produced by the participants. The third process was a fine-grained delimitation of the corpus, followed by the intonation characterisation of segments and finally, by the metrical measurements of the slope of declination of the topline and baseline for each of the 3 types of construction, namely telic unaccusatives, atelic unaccusatives and atelic unergatives. Each of these processes is explained in the following five subsections.

3.1. Design of Visual Stimuli and Data Collection

A large number of voluntary native speakers of American English were asked to respond to visual stimuli that consisted of fifty-four carefully selected pictures presented in a PowerPoint file. The pictures/ cartoons were especially chosen with the aim of eliciting responses that contained preferably unaccusative predicates and unergative predicates in constructions with non-pronominal subject. Before starting the experiment, participants were asked to choose a pseudonym with the purpose of ensuring their anonymity. Participants were asked to look at each of the pictures and respond to the question *What (has) happened?* after each of them, since this question is the most appropriate to elicit utterances in broad focus (Steedman

20. Cf. Liberman & Pierrehumbert (1984), who argue that at least part of the declination is controlled by a voluntary downstep.

1991:17). The question headed each of the pictures in bold font so as to remind the participants what they were supposed to answer along the experiment without the intervention of the analyst.

Participants were expected to produce only one utterance in as natural and relaxed speech as possible but were indicated to feel absolutely free to make corrections, add information or even skip any pictures/ cartoons, if they felt the need to. Additionally, they were asked to produce the first utterance that came to their mind but they were told that they had no limit constraints as to the number of words they said or as to the time they took to cover all the pictures/cartoons so that they felt no pressure whatsoever. Participants were asked to pretend that they were not looking at pictures/cartoons but actual occurrences they were witnessing and reporting. Besides, they were assured that there existed no correct or incorrect responses to the visual stimuli since the experiment was intended to analyse the intonation of short English utterances.

Participants were native speakers of American English of both sexes in their late teens or early twenties, who were studying Spanish at the University of Belgrano. The recordings were obtained at the halls of the university during their class intervals or before or after their classes in February 2010. For the recording process a personal computer was used with the aid of the pitch tracking program SpeechAnalyzer 3.0.1. In this way a total of 87 participants were recorded. The average time span in which participants covered all the pictures[21] was 4 min 55 sec, amounting to a total of 7 h 15 min 23.75 sec.

3.2. Orthographic Transcription and Clause Classification

Once the recordings were gathered, they were orthographically transcribed following the relevant conventions of Conversation Analysis in Liddicoat (2007), reproduced in Figure 8 below.

[laughs]	Paralinguistic features in square brackets
(flipped)	Transcriber's best guess at an unclear word(s)
(robe/rogue)	Transcriber's doubt between two options
(...)	Unclear word(s)
uh, uhm, er	Voiced doubts
(0.9637)	Pause in seconds
//	Tone group boundary

Figure 8: Transcription Conventions

After the transcription, the clauses produced by the participants were grammatically classified into transitive, unaccusative, unergative, passive, existential, stative and nominal. Examples (22) to (28) below from the responses elicited after picture 20 by 7 different participants illustrate the classification. Table 3 below summarises the total number and the percentage score of each type of clause obtained.

(22) They're pumping air into the tyre.	<<Holly20>>	Trans.
(23) The tyre puffed.	<<Jake20>>	Unacc.
(24) Somebody was driving on the highway.	<<Molly20>>	Unerg.
(25) A car tyre's being inflated.	<<Kim20>>	Pass.
(26) There's a flat tyre.	<<Bless20>>	Exist.
(27) The tyre is flat.	<<Carla20>>	Stative
(28) A flat tyre.	<<Nicole20>>	Nom.

	Transitive	Intransitive			Existential	Stative	Nominal	**Total**
		Unaccusative	Unergative	Passive				
N°	666	2,132	322	136	219	965	632	**5,072**
%	13.13	42.03	6.35	2.68	4.32	19.03	12.46	**100**

Table 3: Total Number and Percentage Score of Clause Types

As shown in Table 3, a total of 5,072 clauses were elicited by the participants, most of which (over 42%) were unaccusative constructions. This clear majority of unaccusative clauses uttered by the

21. A few participants did not cover the whole pictures mainly because their class interval came to an end.

participants does not imply that speakers of English produce more unaccusative constructions than, say transitive constructions; but only reflects the fact that the pictures were carefully chosen for the elicitation of unaccusative responses. On the other hand, the low percentage of unergative constructions reveals the difficulty in eliciting this type[22] of clause by means of a visual stimulus. Additionally, the range of clause types and the wide variation of their percentage scores shown in Table 3 are indicative of the great freedom with which participants faced the experiment. This was one of the requirements of the study so as to ensure that the responses provided by the participants were uttered as naturally as possible[23].

3.3. Fine-grained Delimitation of Corpus

Once the clauses were classified, the focus was placed on the unaccusative and unergative constructions, in particular on the bare unaccusative/unergative constructions of type SV with a nominal phrase in subject position. That is to say, those constructions whose subjects were pronominal rather than nominal were discarded on the grounds that from the phonological point of view these utterances carry a –Focus feature on the subject. As regards the choice of bare constructions rather than constructions either followed by a complement (29), an adjunct (30) or those in which the predicate is a phrasal verb (31) instead of a lexical one, this choice was due to two reasons. The first one is the fact that they allow for more phonological words carrying stress. As seen in section 2.2.3. above, the pitch accents agreed for American English after the ToBI conventions are five. An utterance with two pitch accents increases the range of possible combinations of pitch accents to 25; and in an utterance with 3 pitch accents the number of possible combinations rises to 125. This would have complicated the picture unnecessarily.

(29) The apple went[24] bad. <<SteveN19>>
(30) A tree has fallen on a car. <<Natasha1>>
(31) The bomb has gone off. <<Lopako24>>

The second reason for selecting bare constructions from the whole display of responses available was that according to previous studies (Maeda 1976, Pierrehumbert 1979, Ohala *et al* 2004), the slope of declination is higher in shorter utterances than in longer ones. This will prove to be a vital feature for the present study since slope of declination will be one of the dependent variables to be analysed and the higher the slopes, the higher probability of finding higher differences of slopes between contrastive categories.

In addition to delimiting the corpus to bare constructions, a further independent variable was considered in this study, namely telicity[25] [26]. This was grounded on the fact that telicity is regarded as an important feature for telling unaccusative predicates and unergative predicates apart (Hoekstra 1988, Van Valin 1990). In a more analytic fashion, Levin and Rappaport Hovav (2002) posit that rather than telicity alone, event complexity is the determinant factor. Event complexity is a dynamic notion in which both predicate and argument properties such as telicity, incremental themehood[27] and measure interplay to characterise a construction. However, since complex structures like those in the resultative examples (32) and (33) below fall beyond the scope of this analysis, as explained above, telicity alone will be taken into account as an independent variable worth considering.

22. Nevertheless, it will be seen later that due to their regularity in tonicity and tone, the number of unergative clauses is still important in order to allow contrastive analyses with unaccusative ones.
23. The assumption implicit here is that freedom of grammatical choice entails freedom of phonological choice. I am aware that this is not necessarily the case, since participants may have well felt anxious, irrespective of the clausal choice made. However, this seems not to have been reflected in the recordings.
24. It can be argued that examples (29) and (31) contain light verbs rather than lexical verbs, which would suggest no need for stress on those items. Yet, the actual occurrences of these and other examples have proved otherwise.
25. Telicity refers to the property of a predicate – or a joint property of a predicate and its argument(s) – that denotes the completion of an event, so that a predicate that represents a complete event is considered telic, while one that lacks this property is regarded as atelic (Krifka 1998). For example, while *he has died* is telic, *he is running* is atelic.
26. See also Bosque & Gutiérrez-Rexach's (2009:400) for semantic connections between unaccusatives and (telic) achievements and between unaccusatives and (telic/atelic) accomplishments, according to the class of verb.
27. The notion of incremental theme, introduced by Dowty (1991), refers to the extent to which the internal argument of a predicate contributes to the aspectual characterisation of the predicate. For example, *mow* in *He's mowed* / *mowing the lawn* (1991:567) can have a telic or an atelic reading depending on whether the whole lawn has already been mowed or only part of it has been mowed, respectively. Similar arguments have been proposed by Krifka (1987), who posits a homomorphism (1987:80) between an event + argument construction such as *eating an apple* and the subevents like *eating bites of an apple* that make up the whole of the event. Along the same lines, Tenny (1992) argues that the internal argument of a predicate "measures out the event" that the verb describes so that e.g. the change described by the event *destroying a city* (1992:5) consists of partial changes along a certain scale.

(32) The tyre went flat. <<SteveN18>>
(33) The apple went bad. <<SteveN19>>

Therefore, in the corpus of this study, a separation between telic constructions and atelic constructions was carried out with the aim of finding whether and to what extent telicity influenced the results obtained in this study. Examples (34) and (35) show telic events while (36) and (37) show atelic events. Table 4 below exhibits the resulting number of bare unaccusative/unergative clauses after the scope was narrowed down as indicated above and after the separation between telic and atelic constructions was conducted. Additionally, percentage scores are shown.

(34) A bird died. <<Amy4>>
(35) Autumn has arrived. <<Ian3>>
(36) The snow is melting. <<Vanessa6>
(37) An ice cube is melting <<Ryan49>>

	Unaccusatives		Unergatives	
	Telic	Atelic	Telic	Atelic
N°	909	435	24	145
%	67,63	32,37	14,20	85,20

Table 4: Number and Percentage Score of Bare Constructions

3.4. Intonation Characterisation of Segments

After this fine-grained delimitation of the corpus took place, a process of intonation characterisation was carried out with the aid of a pitch tracking program. In this case the SpeechAnalyzer Program in its version 3.0.1. was used. First, the recordings produced by the participants, of an average length of 4 min 55 sec, were segmented into the responses elicited after each of the 54 stimuli. Each of the files thus obtained was named indicating the pseudonym chosen by the participant and the corresponding number of picture, so that for example the file ElNiño 38 indicates the segment produced after picture 38 by ElNiñodelaGuerra. In those few instances in which two participants chose the same name, an additional letter signalling their place of origin was added. For example <<KellyM23>> and <<KellyV23>>, indicated below as examples (38) and (39) respectively, designate the utterances elicited after picture 23 produced by Kelly from Michigan and Kelly from Virginia respectively. In this study, references to utterances are given a corresponding basename signalled by double angular brackets from which spaces were eliminated. Besides, a normalisation process was conducted with the aid of the abovementioned program to convert pitch distances in Hz to pitch distances in semitones[28], as explained in section 2.2.4.1.

(38) The wine glass broke. <<KellyM23>>
(39) The glass has broken. <<KellyV23>>

Once the segmentation and normalisation processes were carried out, a three-part process of tonality, tonicity and tone characterisation (Halliday 1963) was conducted. The tonality process, or separation into tone groups, was rather straightforward because most of the participants produced very short utterances in response to the visual stimuli with a clear cut and a long pause of around 1 to 5 seconds in between the utterances after two subsequent pictures. Besides, the program is very sensitive to the extent that the sound of the participants striking the computer key to turn to the next picture is clearly reproduced. The few participants who responded with rather long elaborated utterances, namely Lia, Chris, Amato and Justin, produced few occurrences of unaccusative / unergative constructions, most of which were instances of marked tonality in which the tone group covered less than one clause (Halliday 1963). For example, <<Lia8>>, transcribed below as example (40), is an utterance made up of 5 clauses, only the second of which would have been relevant for this study, since it is the only unaccusative construction within the utterance. This construction is preceded by a stative construction and followed by stative, embedded transitive and stative constructions, in that order. Yet, the unaccusative construction is chunked into three

28. Let us remember that this normalisation process allows the phonological comparison of utterances produced by female and male participants neutralising the effect of their different range of frequencies (Nooteboom 1997).

different tone groups, the third of which is an instance of locative adjunct, therefore falling beyond the scope of this study.

(40) // This guy looks angry at something or // (0.5081) // something odd something // must have happened // on his computer // or is // uhm something that he's watching. // I can see that he's angry. // <<Lia8>>

Subsequent to the tonality process, a two-part joint process of tonicity and tone characterisation (Halliday 1963) was carried out. The tonicity process is the process of nucleus placement. As already mentioned, the short utterances under scrutiny were bare unaccusative / unergative constructions of type SV with non-pronominal subject, leaving little room for variation of nucleus placement: either the nucleus fell on the subject or on the verb. That is to say, these utterances were plausible to carry only one nuclear pitch accent on the subject; or a nuclear pitch accent on the verb preceded or not by a prenuclear pitch accent on the subject. The second pattern was far more recurrent than the first. The utterances with the first pattern were corroborated by an external assessor specialised in English Phonology. Additionally, the utterances with more than one prenuclear pitch accent were discarded with the aim of reducing the range of possible combinations in the second pattern to 25, as explained above (See section 3.3).

The tone characterisation process was carried out with the aim of delimiting the utterances whose patterns were relevant for the determination of the slope of declination in each construction, rather than with the expectation of finding recurrent patterns of intonation of unaccusative constructions in English. After all, an English utterance can be pronounced with virtually all possible combinations of pitch accents and "most of the possible combinations of pitch accents [...] are attested" (Pierrehumbert 1993:272). For example, Pierrehumbert (1980) offers 5 different combinations for the word *Anna* and 5 different ones for the phrase *another orange*. However, it was expected that some metrical measures of the intonation of English unaccusative constructions were a function of the tone type distribution in the utterance. As for the categorical distinction, for example between H* and H+!H* tone types, the differential threshold of 1.5 semitones was taken into account, assuming that pitch differences below that level are not perceptible (Nooteboom 1997).

Table 5 below displays the number of occurrences and the percentage score for each of the possible combinations of pitch accents in telic unaccusative bare constructions. For ease of reference the few occurrences of tones L+H* in either prenuclear or nuclear position were joined with the corresponding L*+H, thus reducing the range of possible combinations from 25 to 16. Besides, downstepped tones are not indicated here for the sake of simplicity; and edge tones are not shown since most utterances collected are statements with L- L% edge tones[29], rather than polar interrogatives – or yes/no questions[30], which carry H- H% edge tones. Finally, the instances in which the transcriber was uncertain as to the tone characterisation were also discarded.

Tone	Telic Unaccusatives	
	N°	**%**
H* H*	143	21,50
H* L*	100	15,04
H* H+!H*	27	4,06
H* L*+H	50	7,52
H+!H* H*	29	4,36
H+!H* L*	28	4,21
H+!H* H+!H+	21	3,16
H+!H* L*+H	19	2,86
L* H*	77	11,58
L* L*	92	13,83
L* H+!H*	20	3,01
L* L*+H	34	5,11
Other	25	3,75
Total	**665**	**100**

Table 5: N° and Percentage Score of Tone Types for Telic Unaccusative Bare Constructions

29. Few occurrences of the so-called continuation rise were also detected.
30. Hirst (1998) considers three additional cases of rising patterns, namely statements with implications, requests and incomplete utterances.

As shown in table 5, ten from the possible combinations of pitch accents are proportionately highly infrequent – less than 5%. This is not to be regarded as characteristic of telic unaccusative bare constructions but a feature of statements in English (Pierrehumbert 1980, Ladd 2008).

3.5. Metrical Measurements

At a later stage, after the tonicity and tone characterisation process was carried out for the three types of bare intransitive constructions purpose of this study – telic unaccusatives, atelic unaccusatives[31] and atelic unergatives – the average declination of both the toplines and baselines for each construction was obtained. In order to do so, the scaling of both peaks in each of the occurrences of the H* !H* and of both valleys in the L* L* intonational contours for these constructions was measured with the aid of the pitch tracking program SpeechAnalizer 3.0.1. It must be acknowledged that extreme care must be taken in the scaling process of peaks by means of a pitch tracking program, since microprosodic factors tend to affect the visual display of FØ contours. For example, the FØ trace can be vertically displaced in the vicinity of obstruent consonants, can be interrupted in the presence of voiceless phonemes and can also be affected by the relative height of vowels (Ladd 2008, Ball & Rahilly 1999). However, because of the relatively large size of the sample of the study, it was expected that "the multiple interacting effects [would] cancel each other out" Ladd (2008).

Additionally, the distances from the onset of the intonational contour to the alignment of these peaks and valleys were measured. Once all these measures were obtained and copied into a spreadsheet file, the respective pitch distances in semitones between the successive peaks and successive valleys; and the time spans between the alignment of the respective successive tones were calculated. For each type of construction, both the average pitch distance and the time span between successive tones were obtained. Finally, the average slope of declination of the topline was obtained by making the quotient between the average pitch distance and the average time span of successive H* tones. By the same token, the average slope of declination of the baseline was obtained by making the quotient of the analogous measures of two successive L* pitch accents.

4. Analysis

In this subsection I will attempt to characterise the intonation of English bare unaccusative constructions of type SV and to contrast the intonation of bare unaccusative constructions with that of bare unergative constructions in English. Since English is an inflexible SVO intonation language it cannot resort to word-order change at surface level to indicate the different semantic/syntactic properties of the arguments selected by the predicates, unlike other more flexible SVO languages like Spanish. For example, the semantic property that unergatives and unaccusatives select different types of argument cannot be manifested by the word order at surface level in English. Let us remember that while the argument selected by an unergative predicate is both a syntactic and an underlying subject, that selected by an unaccussative predicate is a syntactic subject but an underlying object (Pullum 1988, Dowty 1991). Besides, if the syntactic configuration of unaccusatives and unergatives is truly different, as shown by (41) and (42) below (Chomsky 1981, Levin & Rappaport Hovav 1995); and if at the syntax-phonology interface, Selkirk (2002) is correct in predicting that there exists a unidirectionality from syntax to phonology so that all syntactic properties must have a correlation in phonological properties, it seems plausible to suggest that this distinct syntactic configuration must have a different correlative phonological characterisation.

(41) Unergatives: NP [$_{VP}$ V]
(42) Unaccusatives: __ [$_{VP}$ V NP]

Theoretically, the three available choices to native Speakers of English – tonality, tonicity and tone – "subsumed under the single heading of intonation" (Halliday 1963:247) are expected to contribute, although possibly in different degrees, to the different correlative phonological characterisation of unaccusative/unergative constructions. Let us remember that the system of tonality represents the selection of boundaries within an utterance or chunking of an utterance into tone groups; the system of tonicity establishes the number and position of tonics or pitch accents and therefore the nucleus placement within an utterance; and finally the system of tone determines the characterisation of these tonics or pitch accents together with their metrical physical realisations, for example in the scaling of these pitch accents.

31. Cf. Mackenzie (2008:59), who claims that all unaccusatives have a non-agentive telic interpretation.

4.1. Tonality

The tonality system seems rather limited to capture the abovementioned differentiation between bare unaccusative and unergative constructions at surface level since there seems to exist the same possibility of boundary choice in utterances of type SV for both unaccusative and unergative constructions. That is to say, while the underlying configuration of unaccusatives may be different from that of unergatives, at surface level these configurations have already been neutralised into the same representation SV. Therefore, for both bare unaccusatives and unergatives there seem to exist equal chances of chunking an SV utterance into only one tone group or into two tone groups, as indicated in (43) and (44) below.

(43) // SV // both unaccusatives and unergatives
(44) // S // V // both unaccusatives and unergatives

4.2. Tonicity

The tonicity system can better, though not completely, capture the expected phonological differentiation between the intonation of bare unaccusative and unergative constructions. If we recall the Nuclear Stress Rule posited by Chomsky and Halle (1968) that predicts that in a broad-focus utterance the nucleus will fall on the last lexical item, both in those bare unaccusative and unergative constructions with pitch accents on both subject and verb, the pitch accent on the subject will be prenuclear and that on the verb will be nuclear. To put it differently, in both cases the nucleus will fall on the verb, which exhibits the same tonicity in both cases for bare unaccusative and unergative constructions, as shown in (45) below, where the vertical inverted comma ‘ indicates a prenuclear pitch accent and the tilting inverted comma ` indicates a nuclear pitch accent.

(45) // ‘S `V // both unaccusatives and unergatives

However, if we accept the Syntax-Based Theory of Focus Projection posited by Selkirk (1995), which allows the accentuation of non-final arguments in subject position together with the deaccentuation of their final intransitive predicates when those non-final arguments have been raised into subject position from an object position, but not when those non-final arguments have canonically originated in that preverbal position, tonicity can have a role in telling unaccusatives and unergatives apart. Following Selkirk (1995), along with the possible tonicity expressed in (45) above, there exists an alternative choice of tonicity available to speakers of English, which can help them to unconsciously distinguish bare unaccusative from unergative constructions. The alternative tonicity choice is shown in (46) below for unaccusatives and in (47) for unergatives.

(46) // `S V // unaccusatives
(47) // S `V // unergatives

What (46) and (47) respectively represent is that while bare unaccusative constructions can accentuate the preverbal subject and deaccentuate the unaccusative verb[32], bare unergative constructions can deaccentuate the preverbal subject but must accentuate the unergative predicate. In other words, whereas bare unaccusative constructions allow the nuclear pitch accent to fall on the subject, bare unergative constructions must carry a nuclear pitch accent on the verb. Now, if we concentrate on utterances in broad focus which convey new information as regards both subject and verb, alternative tonicity (47) for unergatives must be left out on the grounds that the subject must carry certain pitch accent. Conversely, alternative tonicity (46) for unaccusatives is still available since the unaccusative verb has been deaccentuated because its non-final argument has been raised into subject position from an object position. Table 6 below summarises the display of tonicity choices for bare unaccusative and unergative constructions with broad focus available in English.

Unaccusatives	Unergatives
`S V	‘S `V
‘S `V	

Table 6: Tonicity Choices for Bare Constructions in Broad Focus

32. Selkirk (1995:559) claims that the possible deaccentuation of the unaccusative verb stems from the fact that the argument originates to the right of the verb and is later raised to subject position leaving a trace in object position. The trace left behind, and with it the whole phrase verb + object, is still in focus. When the argument is moved to subject position, the focus feature of this argument is copied onto the subject.

(48) <<Lucy16>>
A BRIDGE has collapsed.
H* H- H%

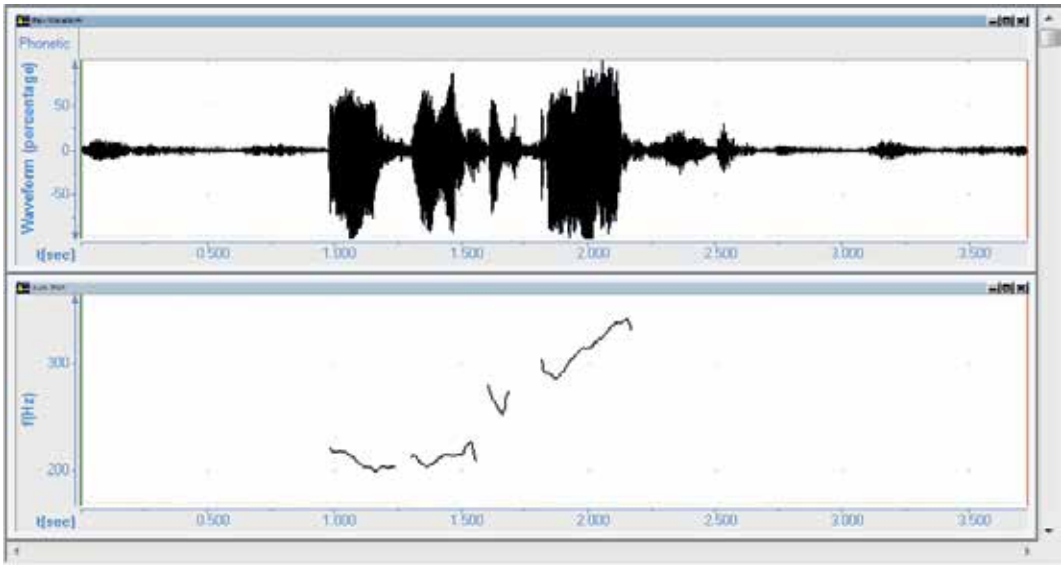

Figure 9: Waveform[33] and FØ Contour for <<Lucy16>>

In order to test the abovementioned predictions, the short utterances obtained after the fine-grained delimitation of the corpus were assessed for nucleus[34] placement. All patterns of tonicity were found in the corpus as shown in the following examples, all of which are in broad focus. (48) and (49) are instances of unaccusatives with nuclear pitch accent on *bridge* and *sun*, respectively whose respective predicates *collapsed* and *set* have been deaccentuated, so that (48) and (49) exemplify the tonicity choice of (46) – // ˋS V //. Examples (50) and (51) show the alternative tonicity choice for unaccusatives – // ˈS ˋV //, in which both the subject and the verb carry pitch accents. In (50) the noun *soldier* takes a prenuclear pitch accent H* and the verb *fallen*, a downstepped nuclear pitch accent !H*. In (51) the noun *movie* is uttered with a prenuclear pitch accent H* and the verb *ended*, with a downstepped nuclear pitch accent !H*.

Finally, (52) and (53) illustrate the only tonicity choice available for unergatives in broad focus: // ˈS ˋV //. In (52) the noun Pope is uttered with a prenuclear pitch accent H* and the verb *praying*, with a nuclear pitch accent L*. In (53) the noun *baby* is uttered with a prenuclear pitch accent H* and the verb *sleeping*, with a nuclear pitch accent H*.

(49) <<Jake30>> The SUN set.
L* H- H%

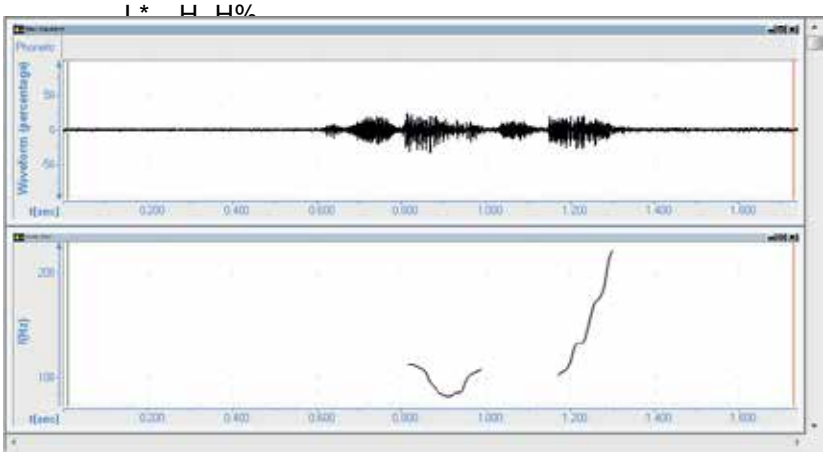

Figure 10: Waveform and FØ Contour for <<Jake30>>

33. For an extremely comprehensive account of the wave form representation of an utterance, see Halliday &Greaves (2008), especially chapter 2.
34. See Gussenhoven (1983) for different labels of nucleus / nuclear accent according to different theoretical frameworks.

(50) <<AnnCol43>> A soldier has FALLen.
H* !H* L- L%

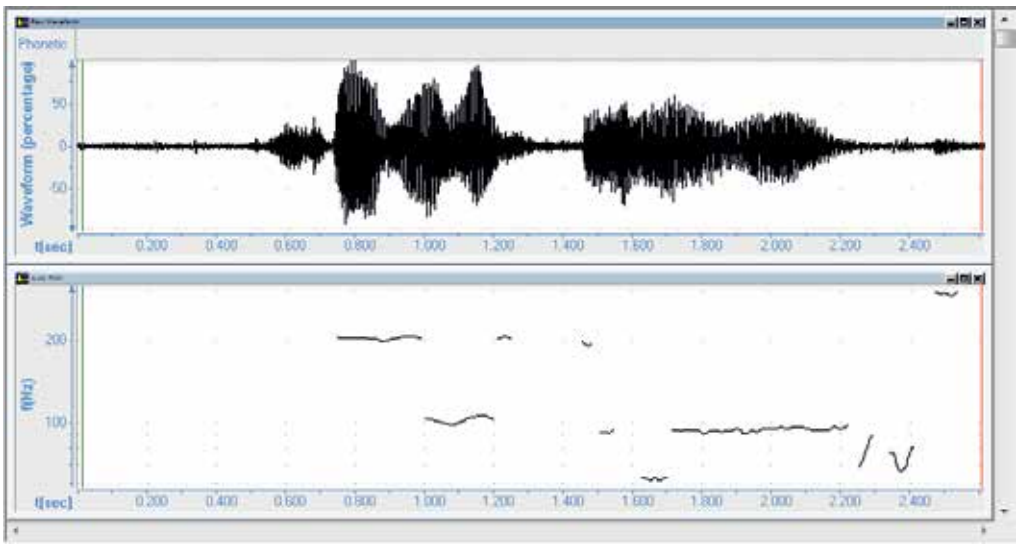

Figure 11: Waveform and FØ Contour for <<AnnCol43>>

(51) <<Brandon9>> A movie has ENDed.
H* !H* L- L%

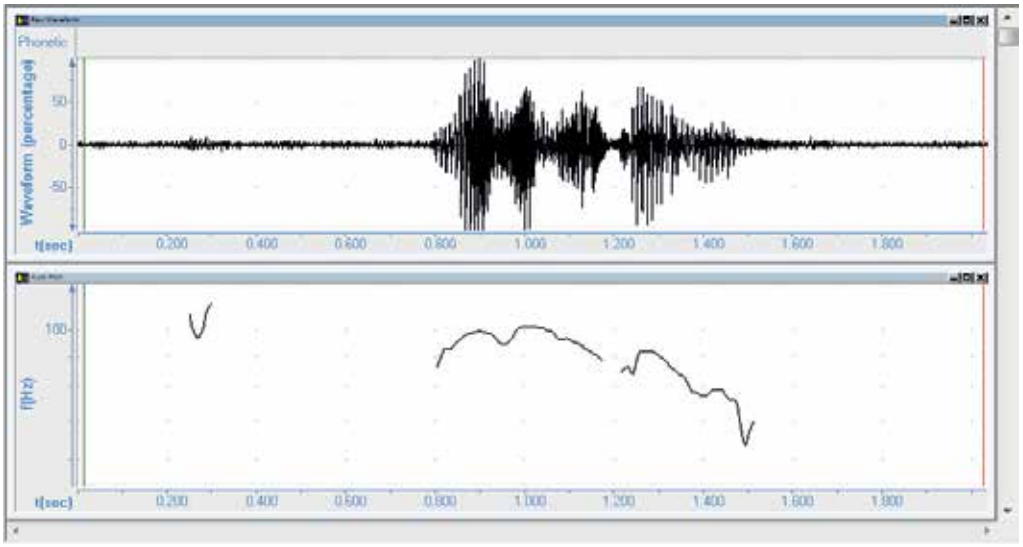

Figure 12: Waveform and FØ Contour for <<Brandon9>>

(52) <<Amy42>> The Pope is PRAYing.
H* L* L- L%

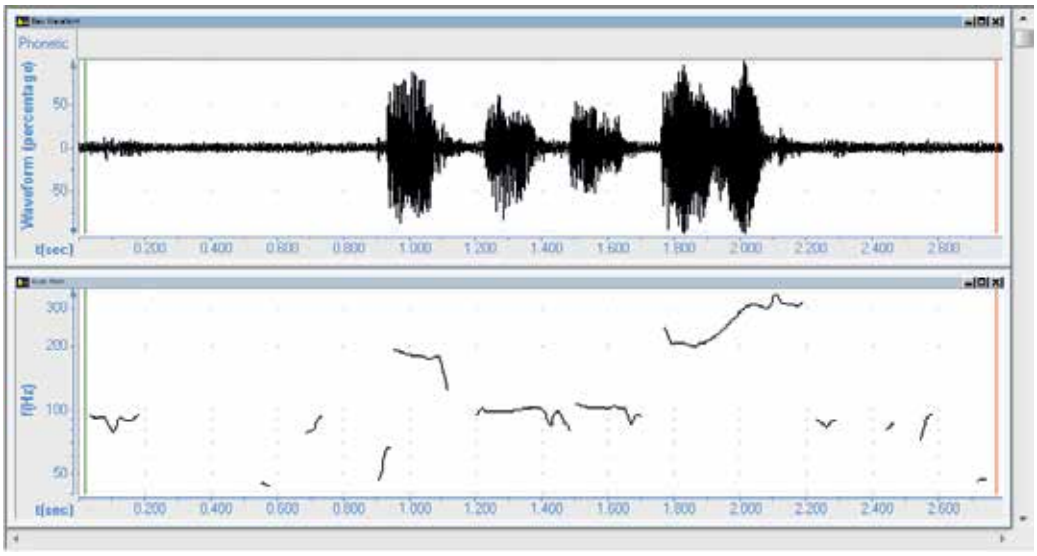

Figure 13: Waveform and FØ Contour for <<Amy42>>

(53) <<Monica11>> The baby was SLEEPing.
H* H* H- H%

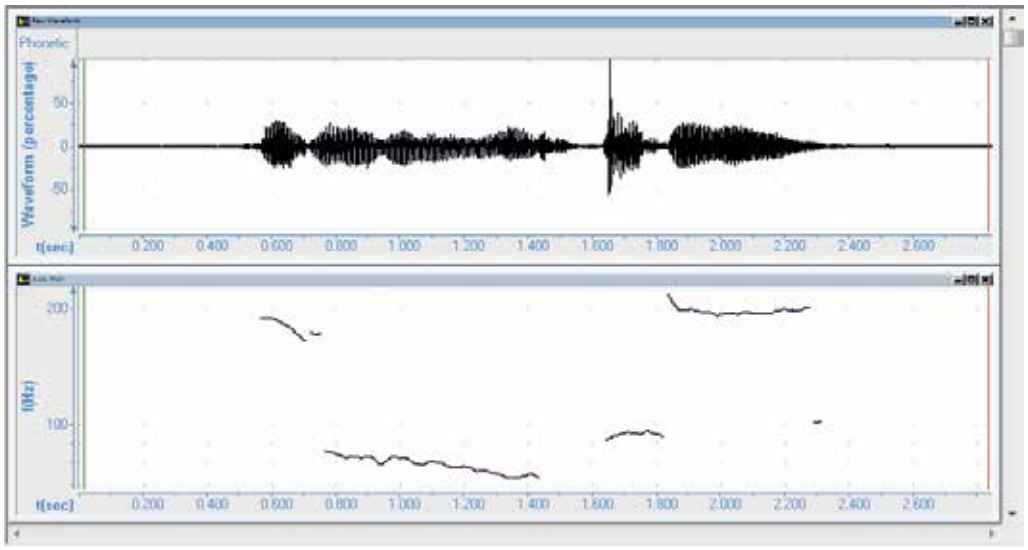

Figure 14: Waveform and FØ Contour for <<Monica11>>

However, in the case of bare unaccusative constructions in broad focus, while two alternative choices of tonicity are available, this does not entail that native speakers of English choose either of them with equal probabilities. In my corpus, the tonicity with pitch accents on both subject and predicate is far more frequent than that with an only pitch accent on the subject and no pitch accent on the verb. The former tonicity, wherein the nuclear pitch accent falls on the verb and a prenuclear pitch accent falls on the subject, was found in 97% (1,004 out of 1,032 occurrences) of the unaccusative constructions. The latter tonicity, wherein the subject carries the nucleus and the verb carries no accent, was found in 3% of the cases (28 out of 1,032 occurrences). These findings are only partially in line with those arrived at by Hoskins (1996). The minor similarity between my results and his is that both tonicity choices, nucleus on subject and nucleus on verb, are exploited by native speakers of English.

The big difference between both studies, however, lies in the extent to which speakers choose one alternative rather than the other. While Hoskins found that speakers accentuate bare unaccusative

constructions with a nuclear accent on the subject 71.1% of the times, my study has revealed the opposite trend of accentuation, only on 3% of the occasions native speakers choose to accentuate bare unaccusative constructions with a nuclear pitch accent on the subject. These different proportions in the findings may be attributed to differences in size of corpus, to different methodologies and procedural stage-by-stage analysis, and to different types of constructions. First, while Hoskins' study was based on only 3 unaccusative sentences uttered by 15 participants, amounting to a total of 45 utterances; I have gathered a far larger corpus of 1,032 unaccusative utterances. Second, while in Hoskins' study participants read out each of those utterances after a visual stimulus on a screen, the participants in my study responded to a visual stimulus with complete freedom of lexical items and grammatical constructions and in as natural speech as possible, i.e. they produced sentences of their own rather than reading out scripted sentences. Third, in my study, the procedure followed of separating the processes of characterisation of tonality and tonicity in subsequent stages contributed to the disambiguation of the intonation of unaccusatives, since it very frequently occurred that constructions with an apparent nuclear accent on the subject were rather, instances of two intermediate phrases with nuclear pitch accents on both the subject and the verb. Finally, while Hoskins' unaccusatives are instances of subordinating clauses that followed a main clause *I think ...* , the utterances considered in my study were those truly bare constructions of type SV, with no subordination or coordination, since all those instances were eliminated from the original corpus after a fine-grained delimitation process already explained in the Methodology section of my study.

4.3. Tone

Apart from the tonality and tonicity systems of intonation, the third paradigmatic system available to speakers of an intonation language is the system of tone choice. In this study, all combinations of pitch accents were found, which is in line with Pierrehumbert's (1993) observation that most possible combinations of pitch accents are attested in English. However, my findings exhibit striking different percentages for each of the possible combinations[35]. For example, the combinations of monotonal prenuclear accents and monotonal nuclear accents were far more frequent than the combinations of bitonal pitch accents in either prenuclear or nuclear positions.

Tone	Telic Unaccusatives		Atelic Unaccusatives		Atelic Unergatives	
	N°	%	N°	%	N°	%
H* H*	143	21,50	135	39,82	45	40,91
H* L*	100	15,04	39	11,50	13	11,82
H* H+!H*	27	4,06	10	2,95	6	5,45
H* L*+H	50	7,52	8	2,36	3	2,73
H+!H* H*	29	4,36	11	3,24	2	1,82
H+!H* L*	28	4,21	8	2,36	5	4,55
H+!H* H+!H+	21	3,16	8	2,36	1	0,91
H+!H* L*+H	19	2,86	3	0,88	0	0,00
L*+H H*	9	1,35	7	2,06	1	0,91
L*+H L*	7	1,05	8	2,36	0	0,00
L*+H H+!H*	5	0,75	0	0,00	0	0,00
L*+H L*+H	4	0,60	2	0,59	0	0,00
L* H*	77	11,58	40	11,80	14	12,73
L* L*	92	13,83	51	15,04	17	15,45
L* H+!H*	20	3,01	3	0,88	2	1,82
L* L*+H	34	5,11	6	1,77	1	0,91
Total	**665**	**100**	**339**	**100**	**110**	**100**

Table 7: Number and Percent Score of Possible Combinations of Pitch Accents

Table 7 above shows the number of occurrences and percentage scores for each of the possible combinations of prenuclear and nuclear pitch accents as a function of the type of bare intransitive pattern under study, namely telic unaccusative, atelic unaccusative and unergative constructions. Adding up the percentages of the four monotonal combinations (H* H*, H* L*, L* H* and L* L*) for each of these patterns, the percentage scores reach 62%, 78% and 81% for telic unaccusatives, atelic unaccusatives

35. See subsection 4.4. for methodological delimitation of possible combinations.

and unergatives, respectively. Additionally, if we join the possible combinations according to the prenuclear pitch accent characterisation, as indicated in Table 8 below, the highest score is that of prenuclear pitch accent H*, as is extensively cited in the literature (Pierrehumbert 1980, 2000; Estevas Vilaplana 2007; Ladd 2008). Still, it must be remembered that this is not a feature of intransitive constructions, but a feature of the phonological intonation of English statements.

Prenuclear Tones	All Constructions	
	N	%
H*	579	51,97
H+!H*	135	12,12
L*+H	43	3,86
L*	357	32,05
Total	**1114**	**100**

Table 8: Number and Percent Score of Prenuclear Tones

However, within the Autosegmental Metrical Model, the variety of tonicity for describing the intonational contour of a declarative sentence uttered with neutral intonation, which is described to carry H* !H* L- L% tones in English throughout the literature (Pierrehumbert 1980, Beckman & Pierrehumbert 1986, among many others), could pose a phonological problem. As Estevas Vilaplana (2008) argues, "the use of [...] different phonological categories to describe [...] FØ patterns which do not trigger a contrastive opposition" is phonologically problematic and therefore if these utterances convey the meaning of a neutral unmarked declarative, they should be realised with the same pattern of tones or otherwise convey a further meaningful contrast. In actual fact, all languages resort to phonology to establish meaningful contrasts[36]. The natural assumption in this study then is that most, but by no means all, elicited responses were obtained with a neutral intonation. Still, this does not represent a phonological problem for the scope of this study, since it will be seen that the focus of the study will be the slope of declination of the topline of the H* !H* L- L% contours, which is the characteristic representation of neutral unmarked declaratives. The other declination of interest in this study, that of the baseline of L* L* L- L% contours, not necessarily describes a neutral unmarked declarative, but at least the marked tonicity used must convey the same phonological contrast within the category described, for example, expressing the speaker's surprise at the event observed and reported (Pierrehumbert 2000). Additionally, as Pierrehumbert & Hirschberg (1990) explain, even within neutral unmarked declaratives, certain contrasts can be conveyed through the choices of different tones. For example, while the H* pitch accent is "used to mark focused information which is to be added to the mutual beliefs [,] the L* accent marks information which is salient but which is for some reason not proposed as an addition" (Pierrehumbert 2000:23). Therefore, this study will concentrate on the analysis of intracategorial tonicity.

4.3.1. Metrical Measures

Within the tone system, since it is not tone typology that characterises the phonology of unaccusative constructions, or contrasts it with that of unergative constructions, it seems plausible to suggest that unaccusatives will be phonologically characterised by a metrical measure of the pitch accents that delineate the intonational contour. In this study, the metrical measure that proved to characterise unaccusative constructions phonologically was the scaling of the prenuclear pitch accent, which was naturally reflected in the slope of declination of the topline and the baseline of the fundamental frequency of the utterances produced by the participants.

Thus, this subsection determines the average slope of declination of the topline and the baseline for each of the three bare SV patterns, telic unaccusative constructions, atelic unaccusative constructions and atelic unergative constructions. This will be carried out by measuring the scaling of both the prenuclear pitch accent and the nuclear pitch accent, along with time span from the onset of the intonational contour to the scaling of each of the pitch accents in the utterances produced by the participants. The measures obtained subsequently will be the pitch distances between two successive tones, in semitones, and the time span between them, in seconds. The quotient between these two figures determines the slope

36. In tone languages like Chinese, this contrast is a lexical manifestation, whereas in intonation languages like English, this contrast represents syntactic-pragmatic information such as meaningful mood choices. For example, phonological contrasts between English statements and questions are well-known facts of English intonation (Hadding-Koch & Studdert-Kennedy 1964). Additionally, phonological contrasts may convey emotional or attitudinal meanings (Roach 2010).

of declination of the utterance. The following examples taken from my corpus explain the procedure graphically. The first examples are realisations of telic unaccusative constructions with H* !H* pitch accents, which determine the slope of declination of the topline in this pattern. There follow examples of atelic unaccusative constructions with H* !H* and unergative constructions, so that the respective slope of declination for the three types of constructions can be obtained and compared. Analogously, instances of telic unaccusative constructions, atelic unaccusative constructions and unergative constructions with L* L* pitch accents, which allow us to obtain the slope of declination of the baseline in these patterns, are shown in subsequent examples. In order to obtain the slopes of declination in each of the patterns abovementioned, I have followed Gussenhoven (1983), who discards the segments wherein the scaling of the nuclear accent is higher than or at the same level of the prenuclear accent, since those upsteps are either due to emotional overreaction of the participants or result from effects of the continuation rise tone applied. Thus, the scope of 323 constructions with H* H* and 160 constructions with L* L* pitch accents has been reduced to 234 and 118, respectively. Table 9 below exhibits the whole display of downstepped configurations to be analysed for metrical measures.

	Telic Unaccusatives	Atelic Unaccussatives	Atelic Unergatives	**Total**
H* !H*	113	89	32	**234**
L* L*	69	37	12	**118**
Total	**182**	**126**	**44**	**352**

Table 9: N° of Contours for Metrical Analysis for Each Category

4.3.1.1. Topline Declination

4.3.1.1.1. Telic Unaccusative Constructions with H* !H* Pitch Accents

Examples (54) to (56) show instances of the metrical measures obtained in telic unaccusative constructions with a prenuclear pitch accent H* and a downstepped nuclear pitch accent !H*. Prenuclear accents are clearly anchored within the tonic syllables of the subjects of the utterances, whereas nuclear accents are clearly anchored within the tonic syllables of the verbs. This is usually the case in short utterances in English, especially in those with only one prenuclear accent (Estebas Vilaplana 2007, 2008). In (54) the prenuclear accent is clearly anchored within the first syllable of *Flowers*. The begin cursor and the end cursor, the vertical green line and the vertical red line, respectively, in Figure 15 indicate the anchoring of this syllable. The corresponding pitch accent is an H*, which is paradigmatically flanked by valleys to the left and to the right.

(54) <<Fallon19>> Flowers wilted.

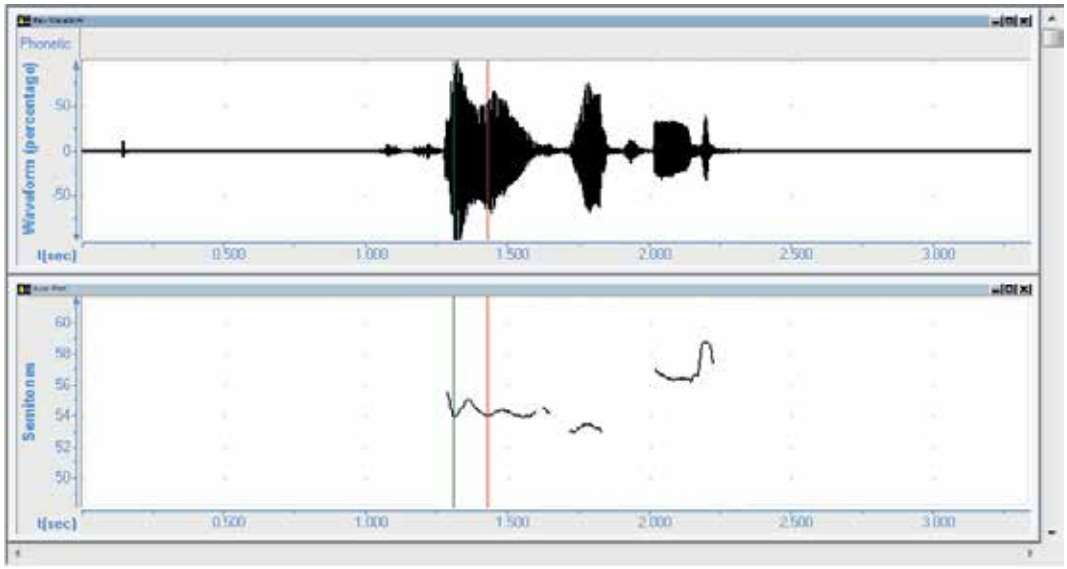

Figure 15: Waveform and FØ Contour for <<Fallon19>> Anchoring of Tonic in Subject

It must be remembered that the apparently descending line to the left of the syllable in the FØ contour of Figure 15 is not to be taken into account because visual FØ trace of the fricative obstruent /f/ of *Flowers* is not to be trusted (Ladd 2008). The syllable develops between around 1.3 and 1.43 seconds, measured from the onset of the intonational contour. The alignment of the peak H* is shown in Figure 16. All peak alignments are obtained with the aid of the pitch tracking program, which allows the displacement of the begin cursor to the position of the peak and the copy of the measurements of interest to a spreadsheet file for their subsequent processing. In this case, the scaling of the peak is 55.03 semitones and its alignment occurs at 1.360 seconds.

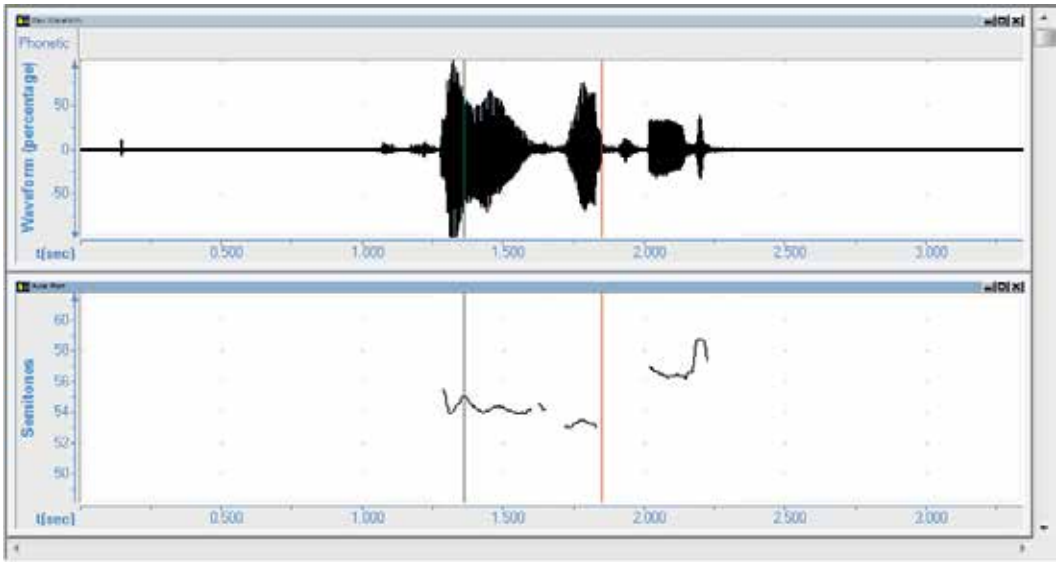

Figure 16: Waveform and FØ Contour for <<Fallon19>> Peak Alignment in Subject

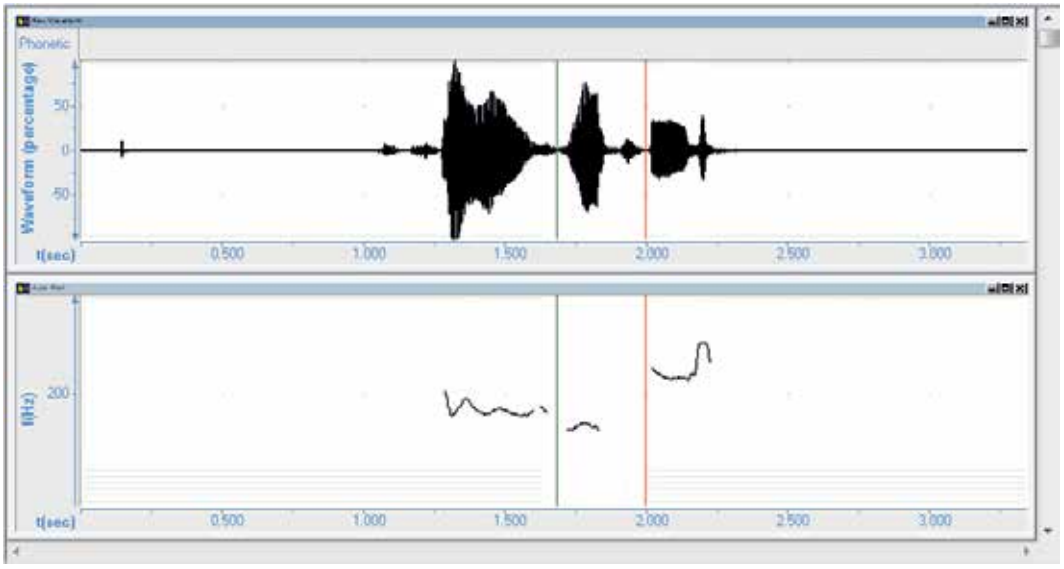

Figure 17: Waveform and FØ Contour for <<Fallon19>> Anchoring of Tonic in Verb

The locus of the H* peak of the tonic syllable of *Flowers*, as shown in Figure 16, is 1.36 seconds from the onset of the intonational contour and its scaling is of 55.03 semitones.

Figure 17 exhibits the anchoring of the tonic syllable of the verb *wilted*, between around 1.7 and 2 seconds from the onset of the intonational contour. To the right of this syllable, the display of the FØ reveals a voiceless interruption caused by the closing stage of the voiceless plosive /t/ in *wilted*. Figure 18 shows the alignment of the downstepped !H* peak in the syllable, which is produced at 1.784 seconds from the beginning, and the scaling of this peak, at a level of 53.4 semitones. The continuation rise manifested in the phrase accent L- that extends through the second syllable of the verb, and the boundary tone H% does not influence the slope of declination of the topline, so that these tones are not metrically important in this study.

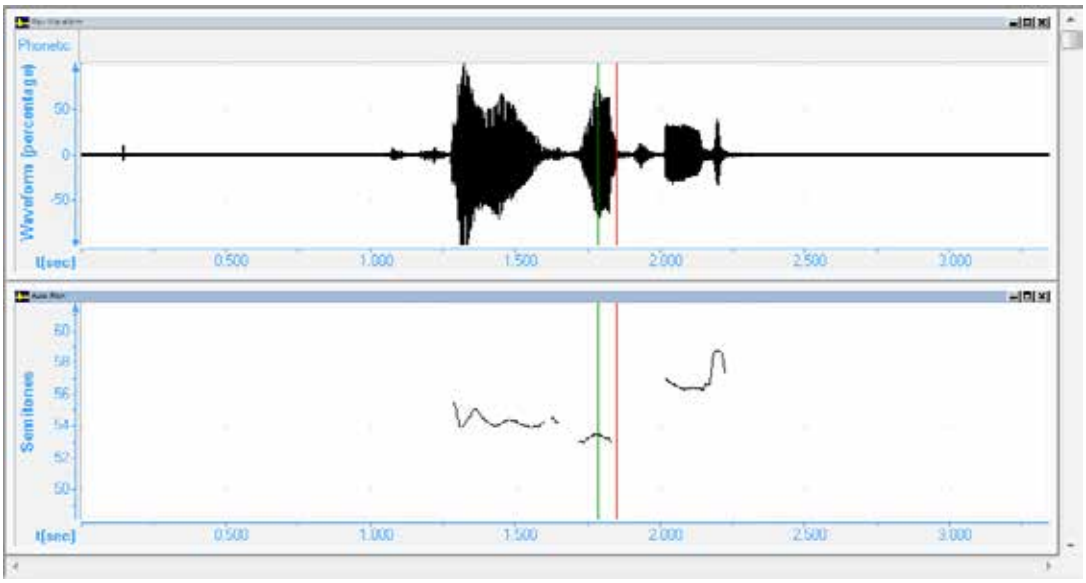

Figure 18: Waveform and FØ Contour for <<Fallon19>> Peak Alignment of Verb

(55) <<Joe10>> The chain broke.

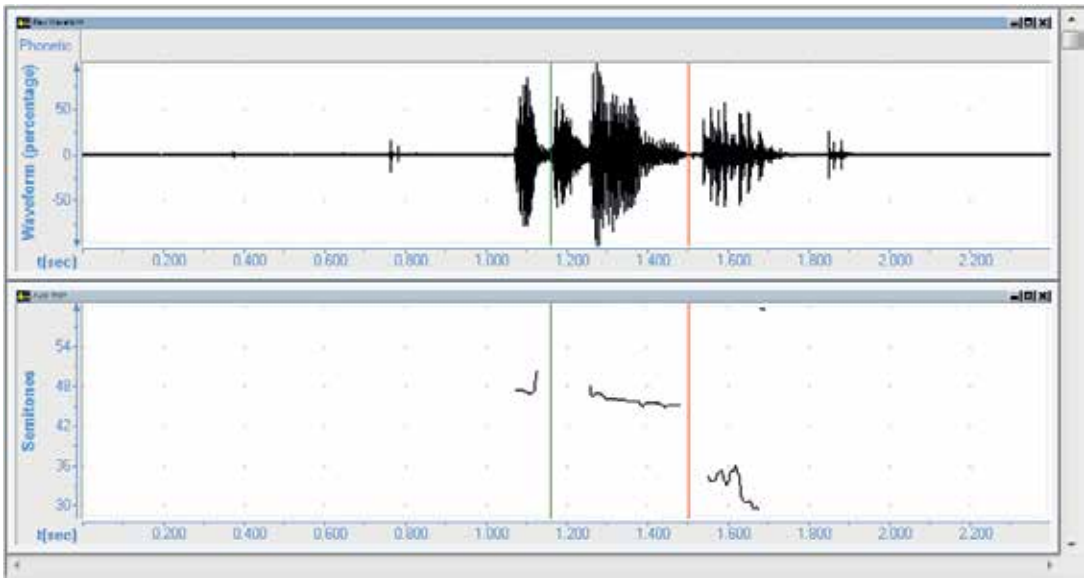

Figure 19: Waveform and FØ Contour for <<Joe10>> Anchoring of Tonic in Subject

Example (55) illustrates a further instance of telic unaccusative bare construction with H* pitch accents. Figure 19 indicates the anchoring of the tonic syllable of the subject, between 1.15 and 1.5 seconds, measured from the onset of the intonational contour. The presence of an affricate obstruent at the onset of the syllable produces an interruption in the FØ contour but does not affect the metrical measures of the H* peak. The scaling and alignment of this peak in the syllable are shown in Figure 20. Probably due to the diphthongal vowel glide in this syllable its duration is comparably long and the trace of its FØ is visually a plateau, which may cause uncertainty as to the alignment of the peak in the syllable. Conventionally, in this case the peak alignment has been taken in the middle of the first element of the glide, since this element is comparably longer than the second element. The resulting measures in this syllable are 46.6 semitones produced at 1.29 seconds.

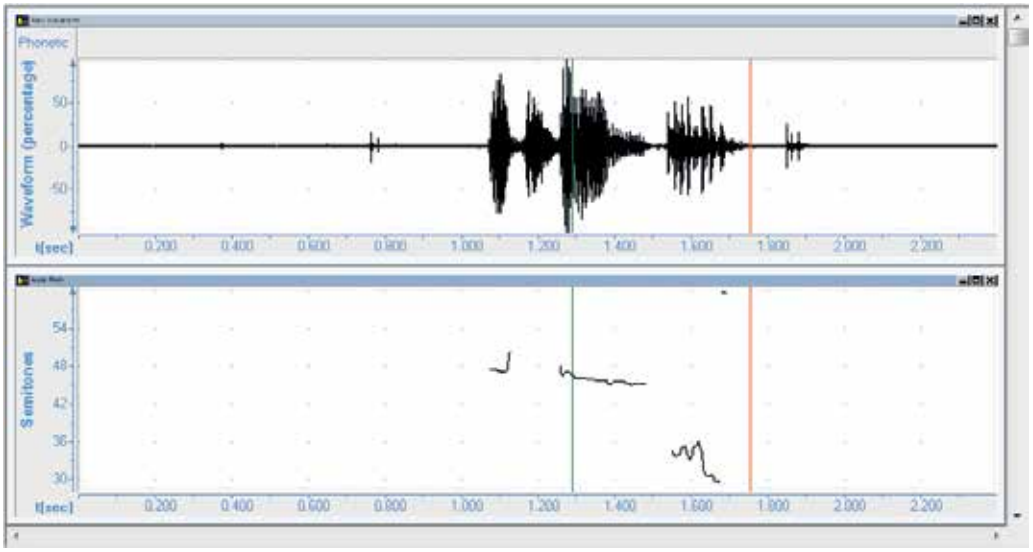

Figure 20: Waveform and FØ Contour for <<Joe10>> Peak Alignment in Subject

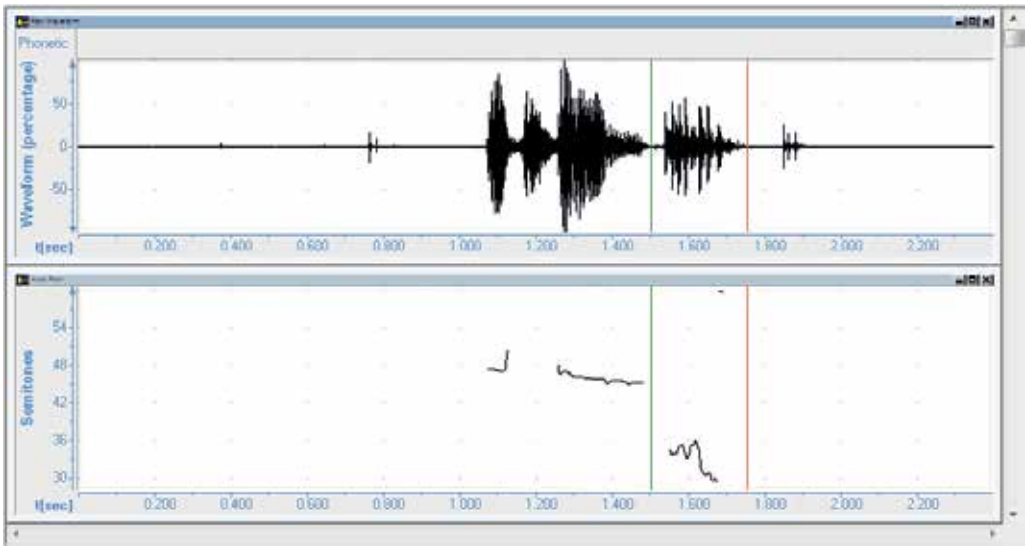

Figure 21: Waveform and FØ Contour for <<Joe10>> Anchoring of Tonic in Verb

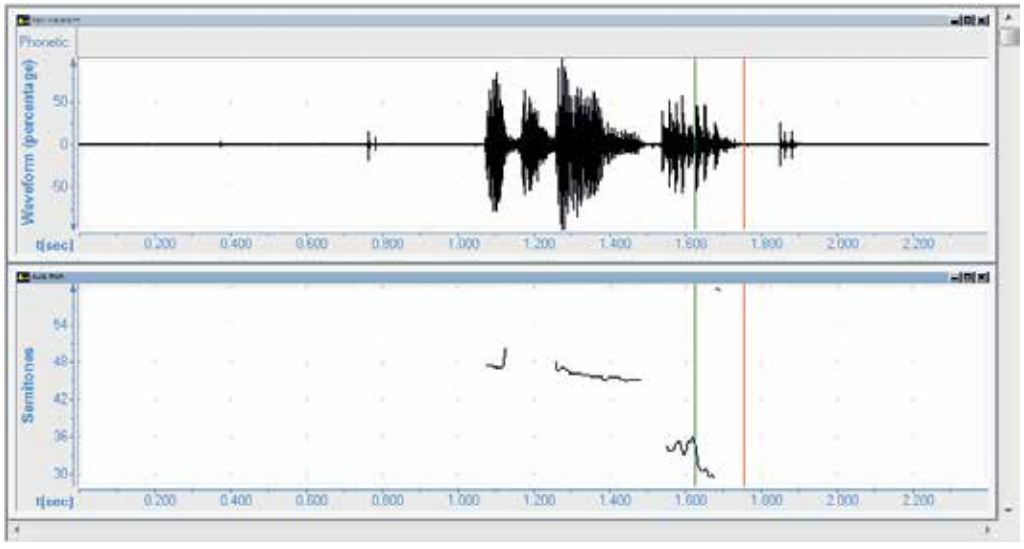

Figure 22: Waveform and FØ Contour for <<Joe10>> Peak Alignment in Verb

The anchoring of the tonic syllable in the verb is shown in Figure 21. The one-syllable verb *broke* is anchored between approximately 1.5 and 1.75 seconds. This syllable is flanked by a voiced plosive /b/ to the left and a voiceless plosive /k/ to the right, which again produce visual interruptions of the FØ trace. However, the presence of these plosives does not affect the metrical measures of the downstepped peak !H*. Additionally, in this syllable, there is also a diphthongal vowel glide, but its reduction, probably due to the facts that it is followed by a voiceless plosive /k/, that it is located almost at the end of the utterance and that is pronounced with a relatively low pitch, makes its peak distinguishable from its adjoining elements. The scaling of the downstepped peak !H* reaches a level of 35.7 semitones, and its locus is positioned at 1.6223 seconds from the onset of the intonational contour (see Figure 22 above).

(56) <<Marisa3>> The leaves fell.

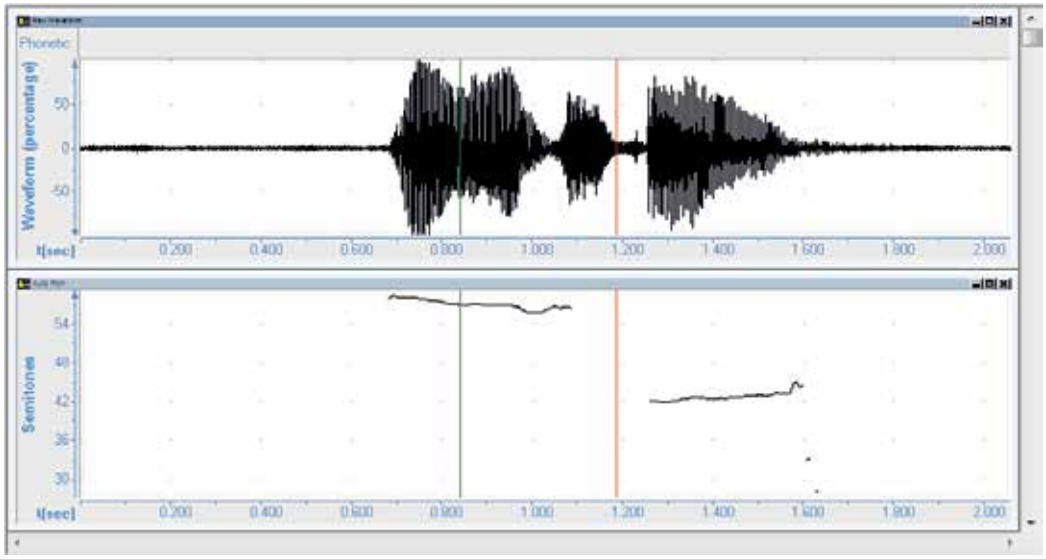

Figure 23: Waveform and FØ Contour for <<Marisa3>> Anchoring of Tonic in Subject

Finally, example (56) further illustrates the metrical measures of telic unaccusative bare constructions with H* pitch accents. Figure 23 shows the anchoring of the tonic syllable of the subject of the utterance, between 0.83 and 1.2 seconds. In this example the three-element cluster made up of the last two fricative obstruents in *leaves* and the first fricative obstruent in *fell* originate a discontinuity in the FØ contour. In particular, the long /z/ sound, devoiced by the following voiceless sound, produces a perturbation detectable in the waveform contour that is manifested in the FØ contour as an interruption of the line. Figure 24 illustrates the alignment of the H* peak in the syllable, which develops in a plateau-like form despite the character of the high vowel in it, which is supposed to raise the peak, but does not because of the effect of the cluster mentioned above. The metrical measures of scaling and peak alignment in this figure are 57.2 semitones and 0.8754 seconds, respectively.

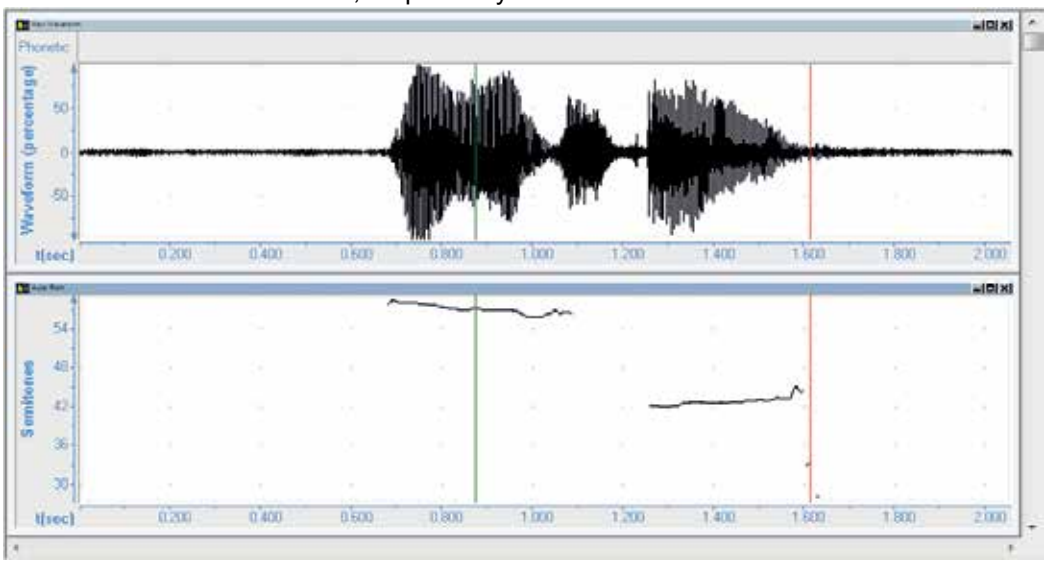

Figure 24: Waveform and FØ Contour for <<Marisa3>> Peak Alignment in Subject

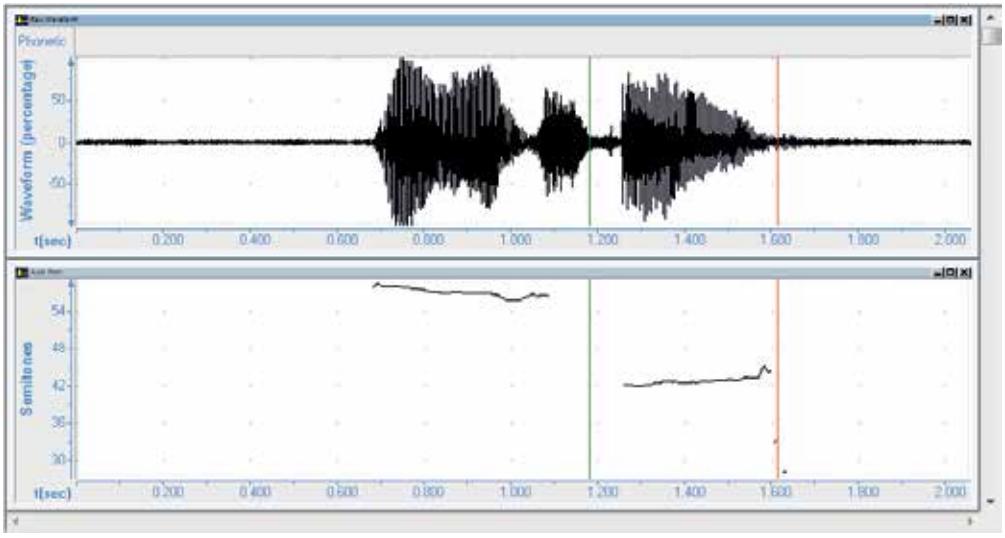

Figure 25: Waveform and FØ Contour for <<Marisa3>> Anchoring of Tonic in Verb

Finally, Figures 25 and 26 indicate the anchoring and peak alignment of the one-syllable verb *fell*. This syllable is anchored between 1.2 and 1.6 seconds; and the metrical measures of scaling and alignment, taken in the middle of the front vowel /e/, are 42.7 semitones and 1.369 seconds.

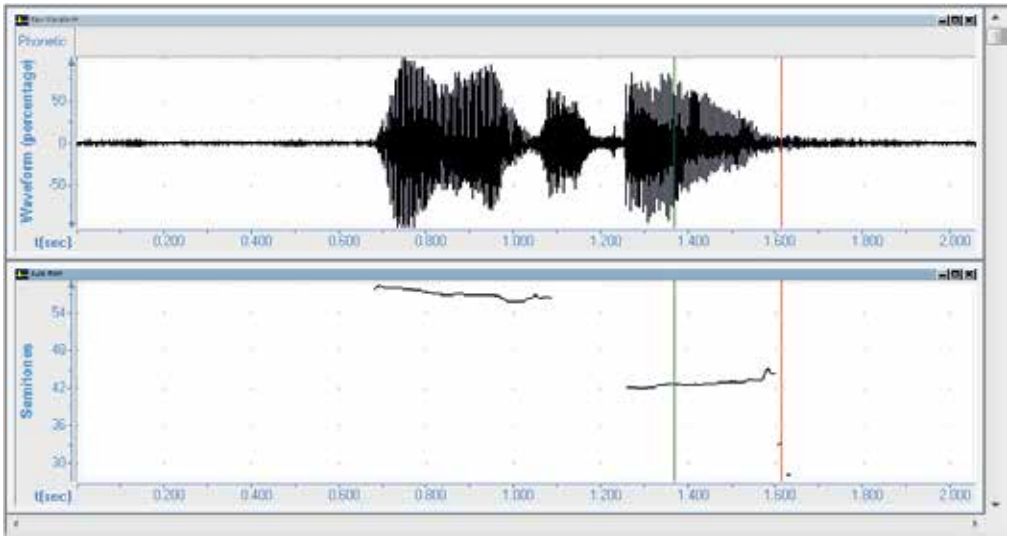

Figure 26: Waveform and FØ Contour for <<Marisa3>> Peak Alignment in Verb

Table 10 below summarises the data of alignment and scaling for the three segments analysed in examples (54) to (56), along with the distance in seconds between successive peaks in each segment and the pitch distance in semitones, obtained by means of difference between the respective columns. The same procedure is followed with each of the 113 segments of telic unaccusative bare constructions with a prenuclear accent H* and a downstepped nuclear pitch accent !H*.

Segment	**Alignment (sec)**			**Scaling (st)**		
	Prenuclear	Nuclear	**Distance**	Prenuclear	Nuclear	**Distance**
Fallon19	1,360	1,784	**0,424**	55,0	53,4	**1,6**
Joe10	1,290	1,622	**0,332**	46,6	35,7	**10,9**
Marisa3	0,875	1,369	**0,494**	57,2	42,7	**14,5**

Table 10: Metrical Measures in 3 Segments

4.3.1.1.2. Atelic Unaccusative Constructions with H* !H* Pitch Accents

Examples (57) to (59) illustrate the metrical measures obtained for atelic unaccusative constructions with H* !H* pitch accents. (57) and (58) are striking because they run counter to prototypical examples of event sentences cited in the literature. In particular, Wells (2006:174) provides the very same example as (57) and (58) with a nucleus falling on the subject rather than on the verb. The striking intonation of (57) and (58) may be due to the wide inventory of resources available within the tonicity and tone systems from which native speakers unconsciously choose rather than to the theoretical choices within the tonicity system alone cited in the literature.

(57) <<Holly39>> The phone is ringing.

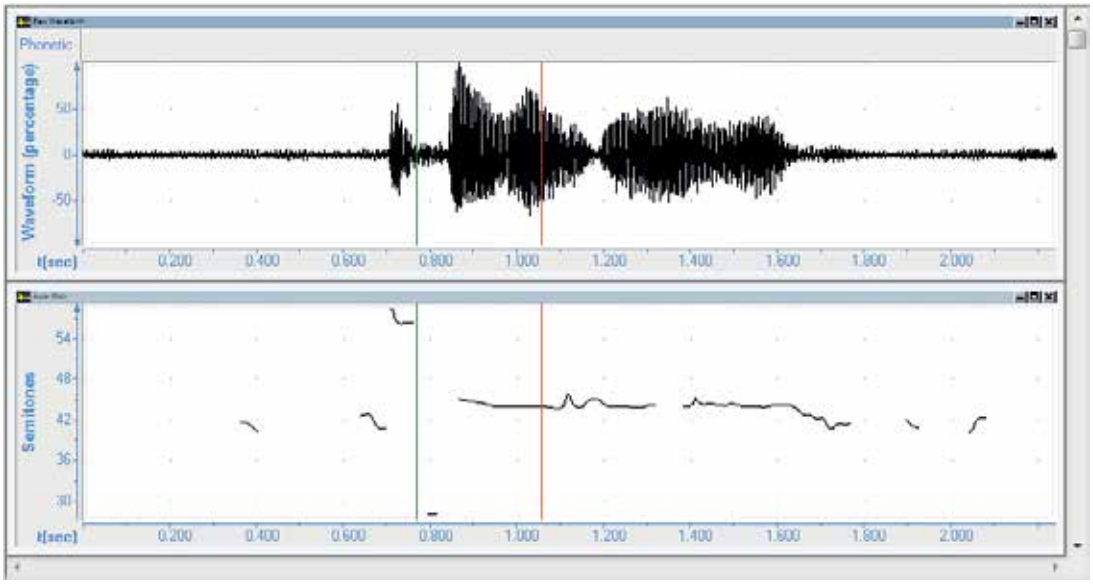

Figure 27: Waveform and FØ Contour for <<Holly39>> Anchoring of Tonic in Subject

Figure 27 shows the anchoring of tonic in the subject of the utterance <<Holly39>>, between 0.7682 and 1.129 seconds. The presence of an obstruent fricative /f/ at the onset of the syllable produces a discontinuity in the FØ trace of the intonational contour that does not otherwise affect the scaling or alignment of the prenuclear H* peak. These measures are indicated in Figure 28. The H* peak is aligned to the first element of the diphthongal glide in the noun of the subject *phone*, at 0.9129 seconds from the onset of the intonational contour and its scaling reaches 44.6 semitones.

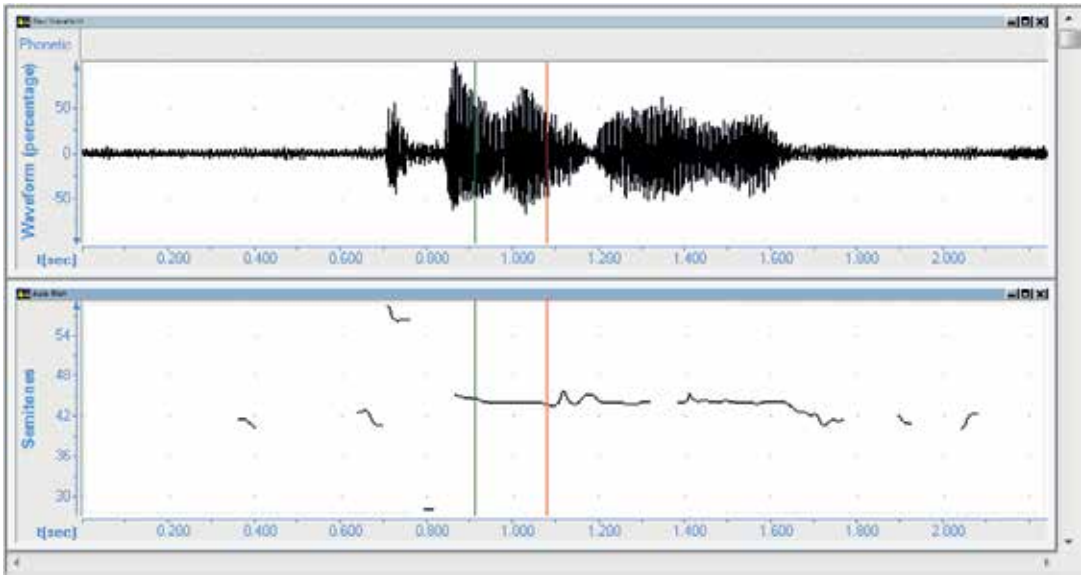

Figure 28: Waveform and FØ Contour for <<Holly39>> Peak Alignment in Subject

In its turn, the anchoring of the tonic syllable in the verb is found between 1.1966 and 1.3517 seconds, as indicated in Figure 29 below. This syllable, like that of the tonic in the subject, is uttered in an almost plateau-like way so that the peak is conventionally aligned to the /I/ vowel in the syllable. The scaling of the downstepped nuclear peak H*, aligned at 1.2492 seconds from the onset of the intonational contour, reaches a level of 44.0 semitones (see Figure 30).

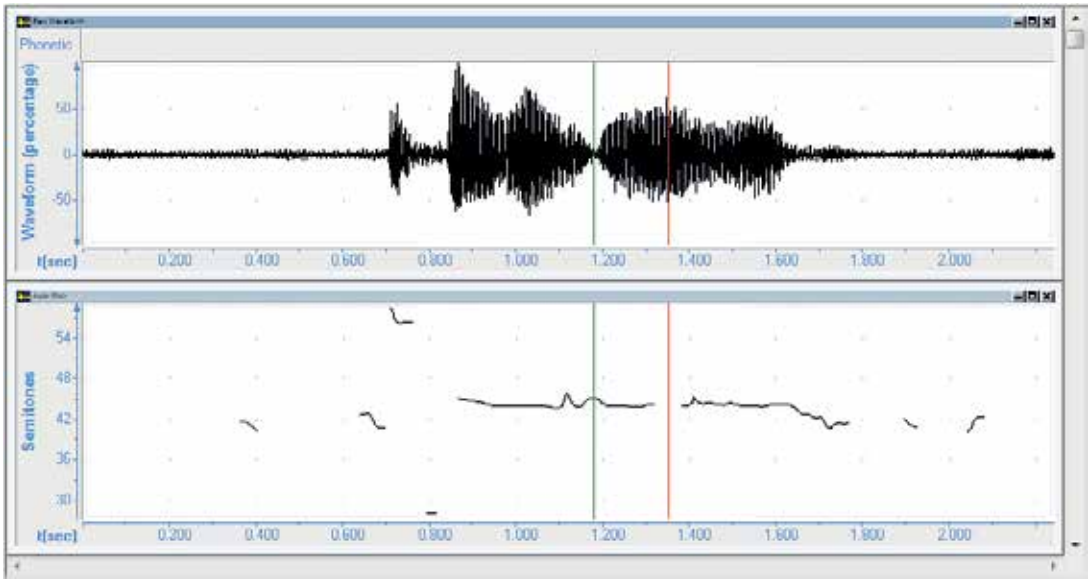

Figure 29: Waveform and FØ Contour for <<Holly39>> Anchoring of Tonic in Verb

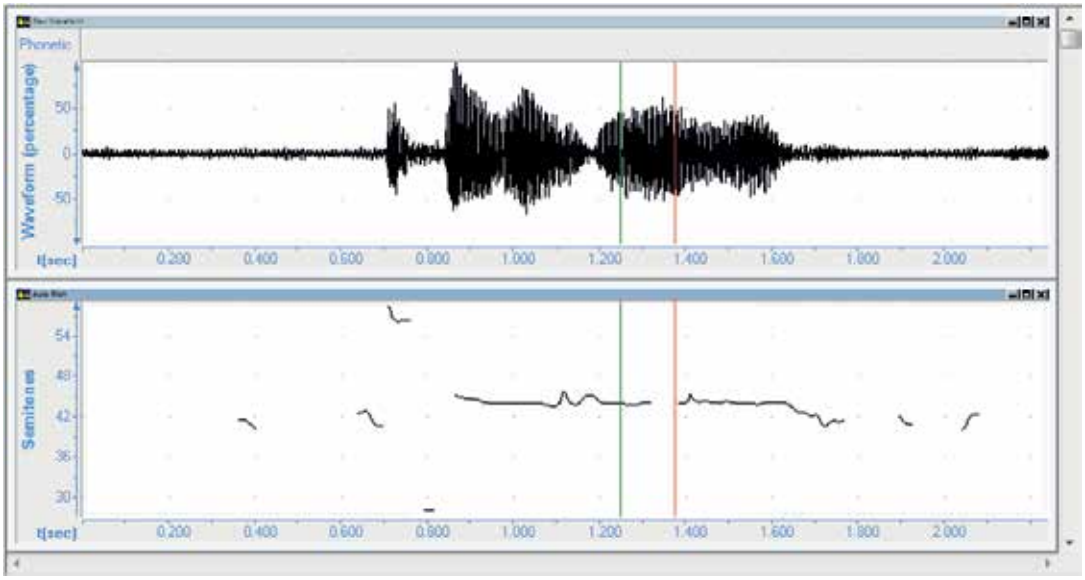

Figure 30: Waveform and FØ Contour for <<Holly39>> Peak Alignment in Verb

(58) shows an utterance worded in exactly the same way as the example (57) previously analysed and uttered with the same intonation pattern but for the choice of boundary tones H- H% in (58), which gives the utterance a rising intonation at the end.

(58) <<Bless5>> The phone is ringing.

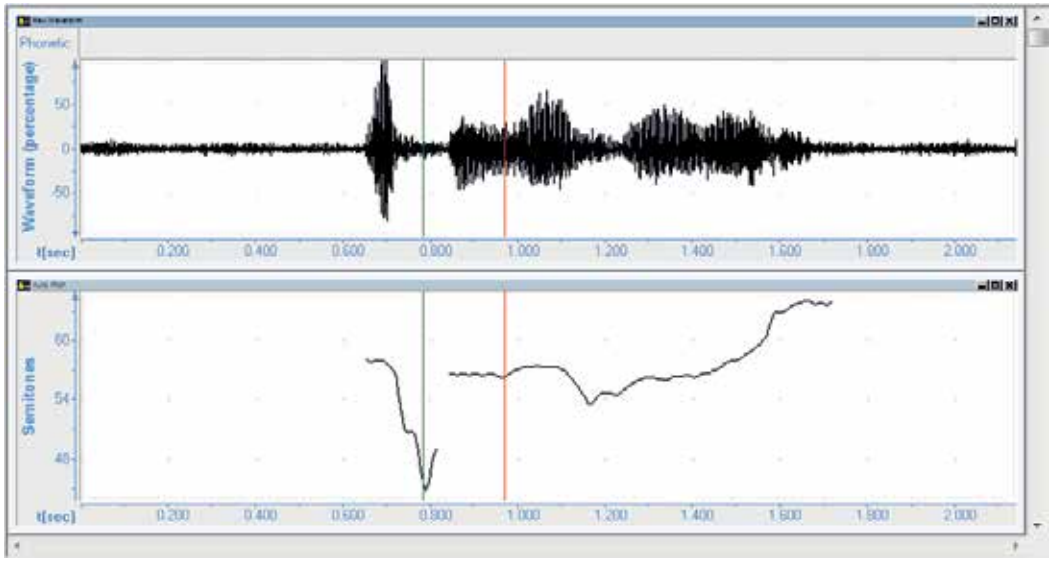

Figure 31: Waveform and FØ Contour for <<Bless5>> Anchoring of Tonic in Subject

Figure 31 shows the anchoring of the tonic syllable in the subject of <<Bless5>>, between 0.7826 and 0.9589 seconds. Again, in this case, the voiceless obstruent fricative /f/ in its initial position originates an interruption in the intonational contour. The scaling of the prenuclear peak H*, seen in Figure 32 below, reaches a level of 56.6 semitones and its alignment occurs in the middle of the first element of the diphthongal glide in *phone*, at 0.9405 seconds from the onset of the intonational contour. The tonic syllable of the verb is anchored between 1.2166 and 1.404 seconds, with no interruptions in the visual display of the FØ trace, because of the fact that the syllable is flanked by voiced phonemes, as shown in Figure 33 below.

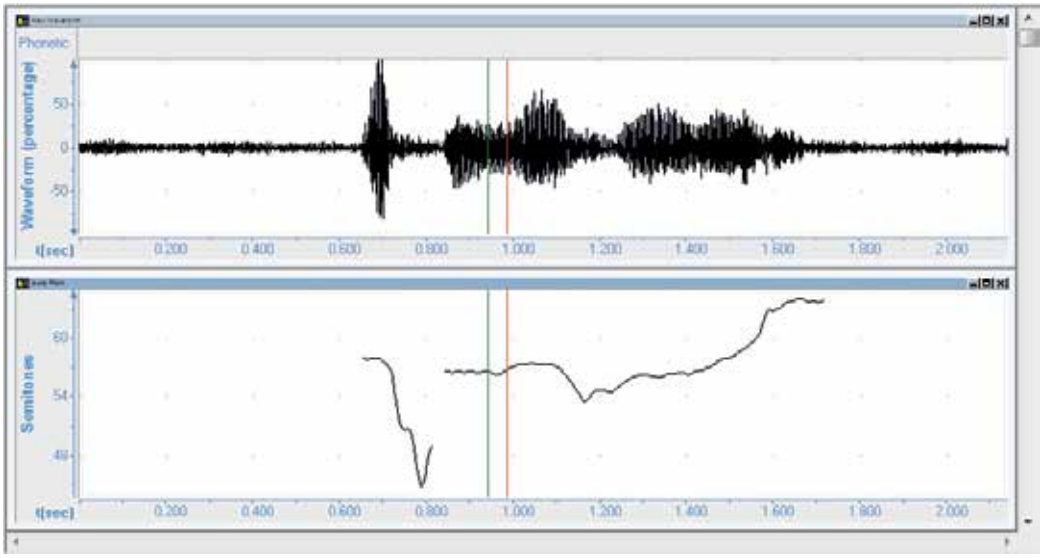

Figure 32: Waveform and FØ Contour for <<Bless5>> Peak Alignment in subject

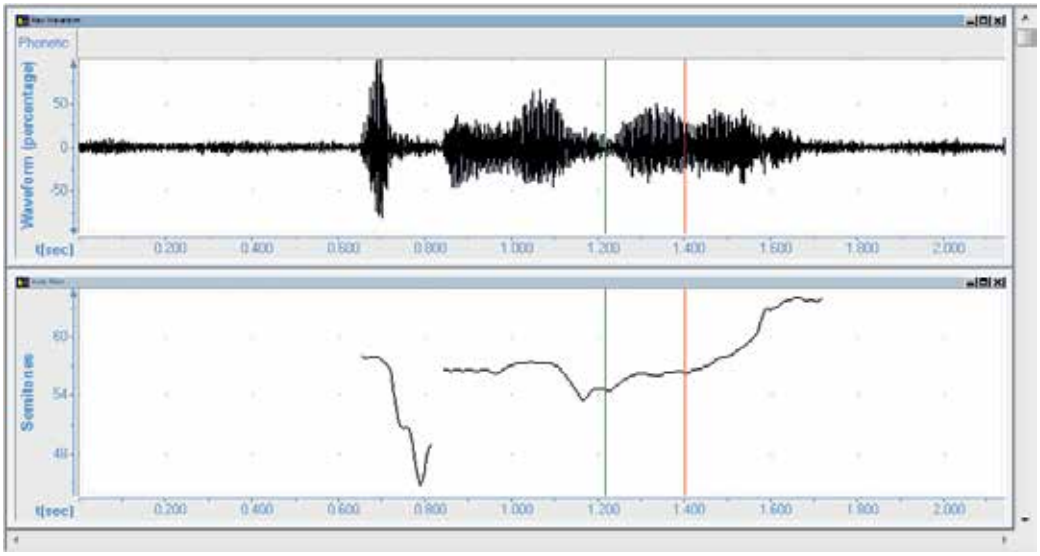

Figure 33: Waveform and FØ Contour for <<Bless5>> Anchoring of Tonic in Verb

The scaling of the downstepped nuclear peak H* in the verb is located at 1.2912 seconds from the onset of the intonational contour and reaches a slightly lower level (56.2 semitones) than the prenuclear pitch accent (compare Figures 32 above and 34 below). Attention is not to be given to the apparent peak produced in the non-stressed auxiliary *is* in between the prenuclear and the nuclear pitch accents.

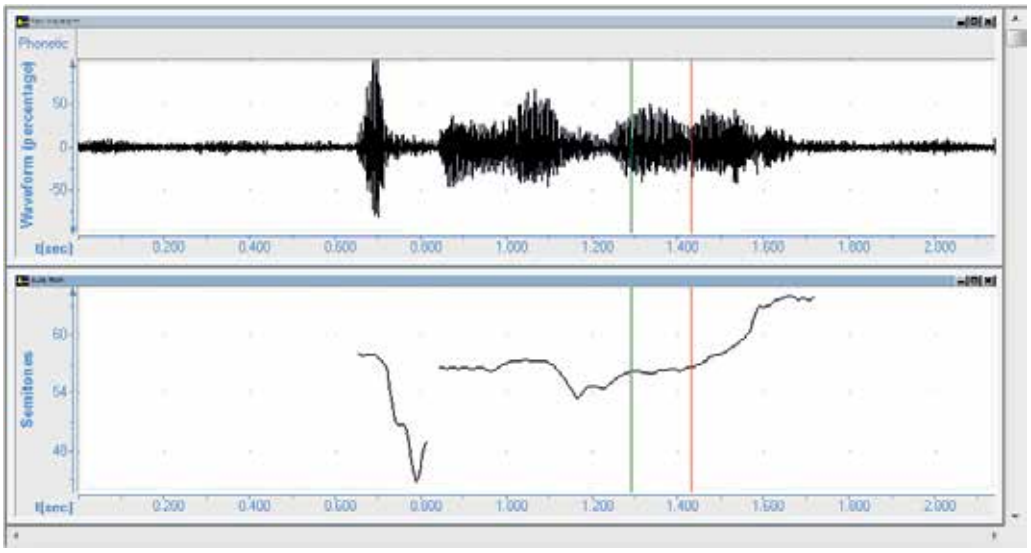

Figure 34: Waveform and FØ Contour for <<Bless5>> Peak Alignment in Verb

A further example of atelic unaccusative bare construction with H* !H* pitch accents is illustrated by (59). The anchoring and alignment of the prenuclear and nuclear pitch accents are shown in Figures 35 to 38 below. The anchoring of the tonic in the subject is produced between 1.1116 and 1.6532 seconds from the onset of the intonational contour. The presence of a voiceless affricate obstruent at the onset of the tonic syllable generates a visual interruption in the FØ trace of the contour but does not affect the scaling or alignment of the peak in the syllable.

(59) <<Shellby10>> The chain is breaking.

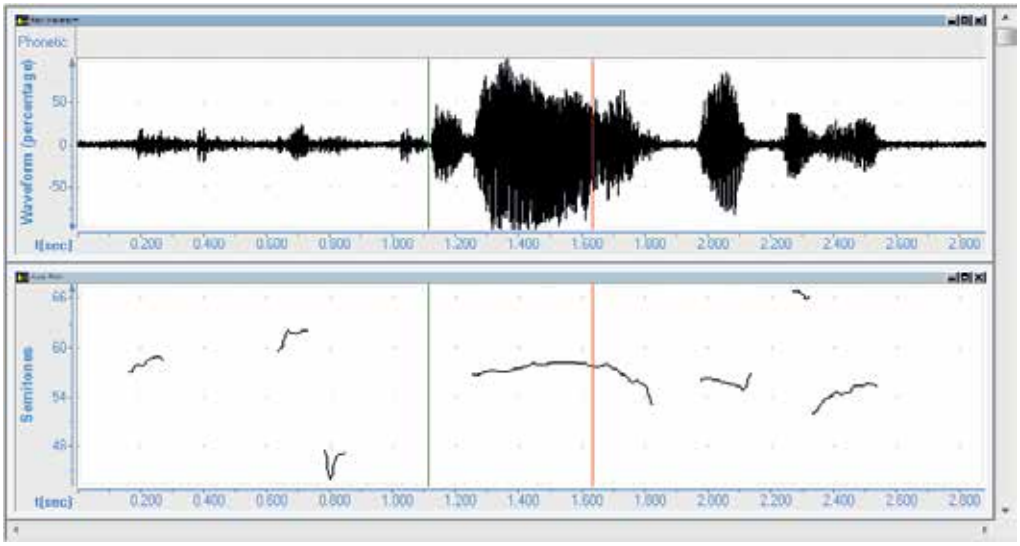

Figure 35: Waveform and FØ Contour for <<Shellby10>> Anchoring of Tonic in Subject

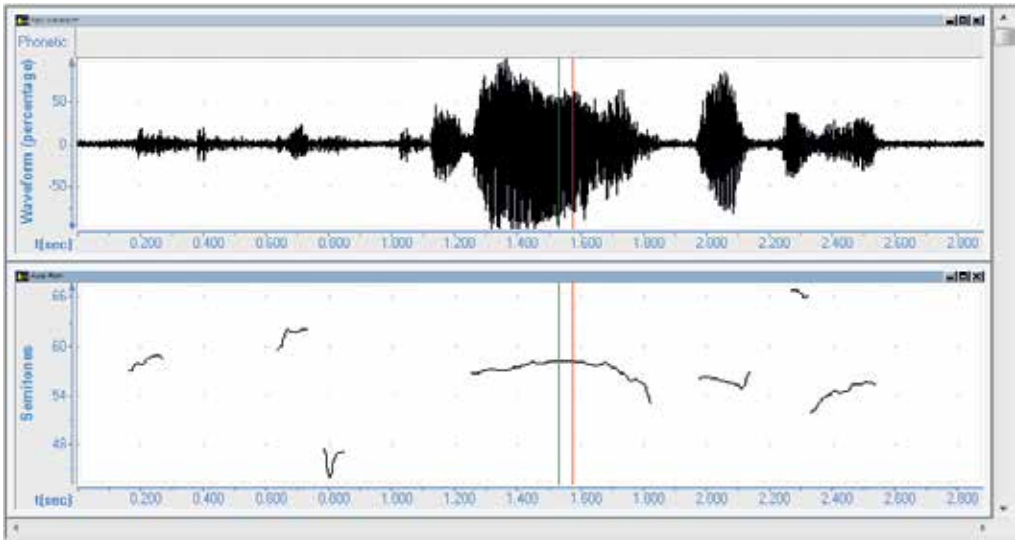

Figure 36: Waveform and FØ Contour for <<Shellby10>> Peak Alignment in Subject

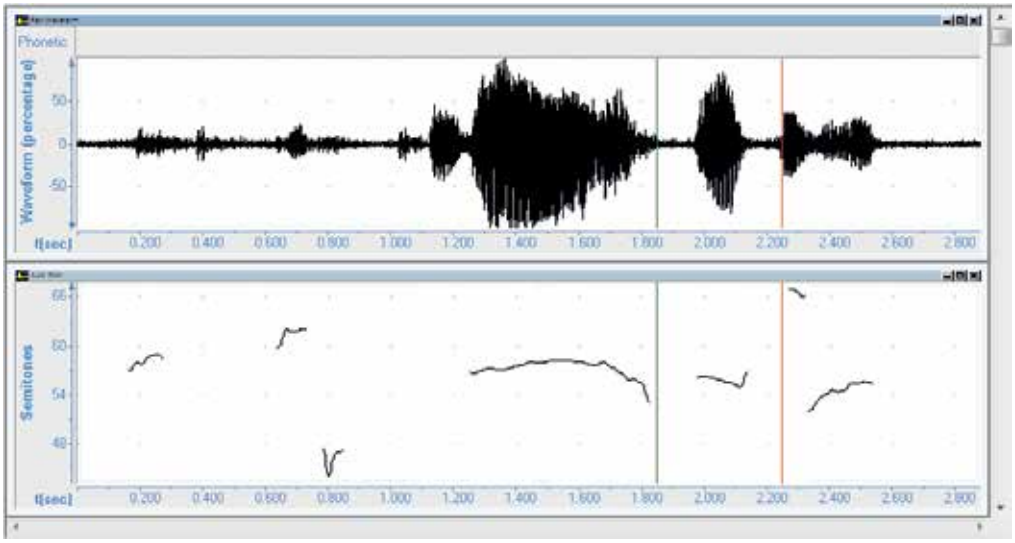

Figure 37: Waveform and FØ Contour for <<Shellby10>> Anchoring of Tonic in Verb

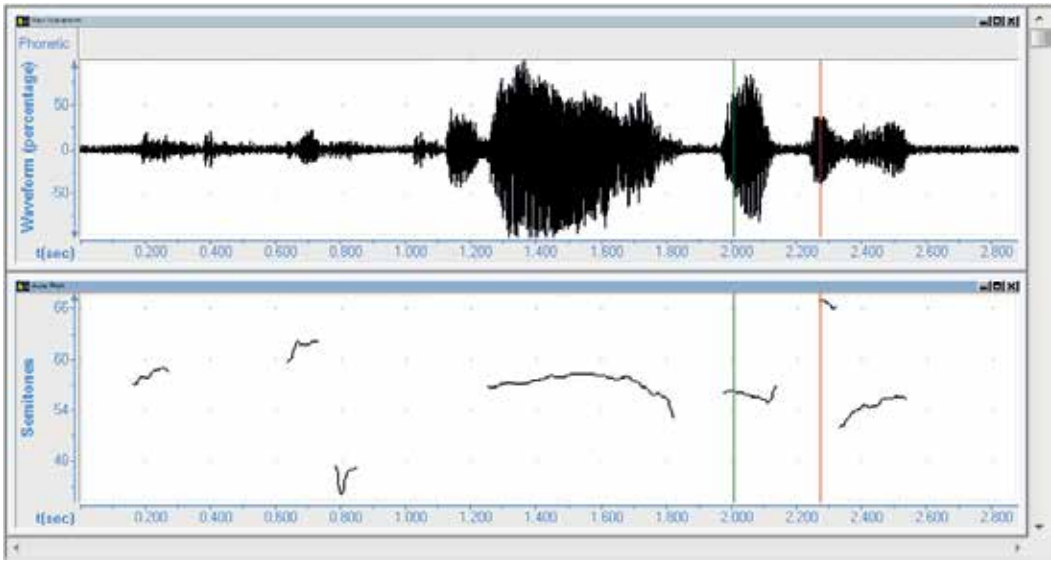

Figure 38: Waveform and FØ Contour for <<Shellby10>> Peak Alignment in Verb

The scaling of the peak H* pitch accent in the tonic syllable of the subject reaches a level of 58.3 semitones, at 1.5279 seconds form the onset of the intonational contour (see Figure 36). The tonic syllable in the verb *breaking* is anchored between 1.8455 and 2.2422 seconds. Both obstruents that flank the syllable, the voiced bilabial plosive /b/ to the left of the syllable, and the voiceless velar plosive /k/ to its right, cause visual interruptions in the FØ contour of the utterance. The scaling of the downstepped peak H*, aligned at 2.0090 seconds, right in the middle of the first element of the diphthongal glide in the verb, reaches a level of 56.3 semitones. All in all, examples (57) to (59), whose metrical measures are displayed and analysed in Figures 27 through 38, are instances of atelic unaccusative bare constructions with H* !H* pitch accents. The following subsection explains the metrical measures obtained in unergative constructions with similar pitch patterns.

4.3.1.1.3. Atelic Unergative Constructions with H* !H* Pitch Accents

Unergative constructions with H* pitch accents are illustrated in examples (60) and (61) below and the corresponding Figures 39 through 46.

(60) <<Letizia41>>
These kids were fighting.

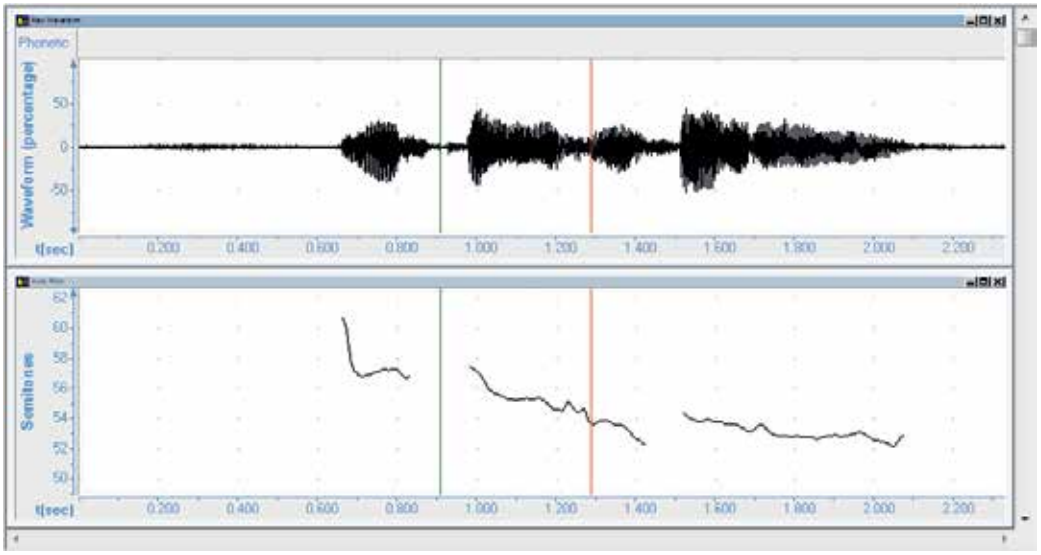

Figure 39: Waveform and FØ Contour for <<Letizia41>> Anchoring of Tonic in Subject

Figure 39 shows the anchoring of the tonic syllable in the subject of <<Letizia41>>, produced between 0.9067 and 1.2887 seconds. The voiceless plosive /k/ at the onset of this syllable causes a visual interruption in the FØ trace of the intonational contour, which together with the relatively high tension applied to the vowel of the syllable, make the pitch accent in the syllable appear to be a descending H+!H* accent. However, if these microprosodic effects are discarded, the prenuclear pitch accent on *kids* is taken to be an H* accent. Its scaling, located at 1.1390 seconds, reaches a level of 55.3 semitones (Figure 40).

The tonic syllable of the verb is anchored between 1.4401 and 1.6842 seconds, as illustrated in Figure 41. Again, at the beginning of the syllable, the voiceless fricative /f/ displays a visual interruption of the FØ trace. Conversely, at the end of the syllable, the plosive is uttered with a tap, as is usually the case in unaccented intervocalic positions in the American variety of English, especially in post-accentual positions, which disfavours the visual interruption of FØ.

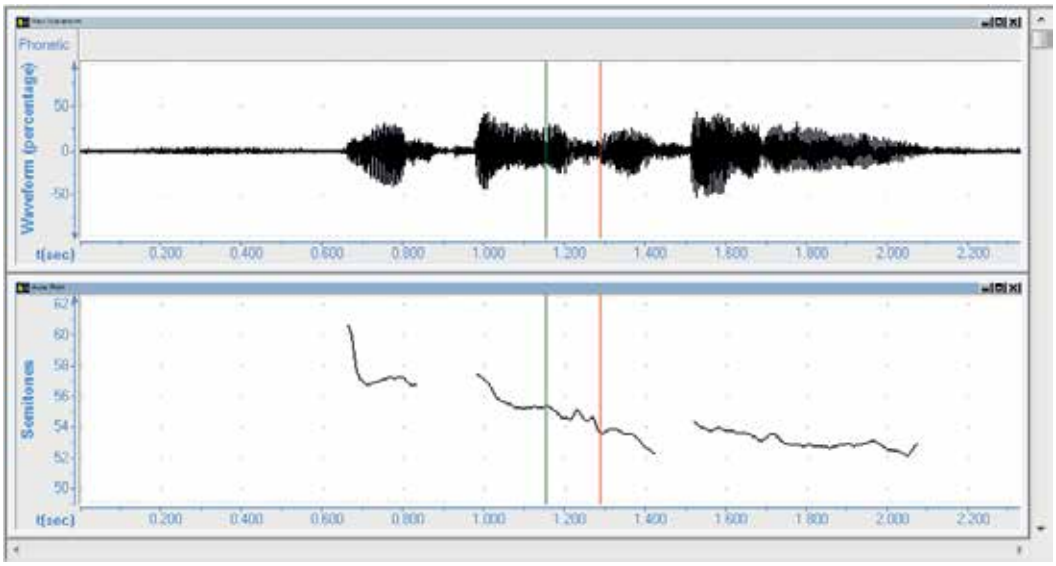

Figure 40: Waveform and FØ Contour for <<Letizia41>> Peak Alignment in Subject

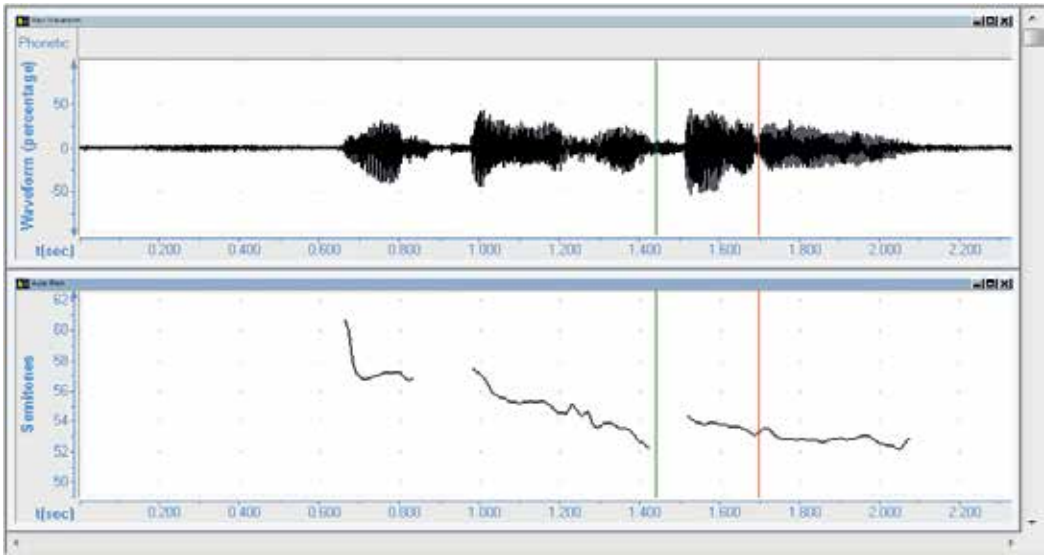

Figure 41: Waveform and FØ Contour for <<Letizia41>> Anchoring of Tonic in Verb

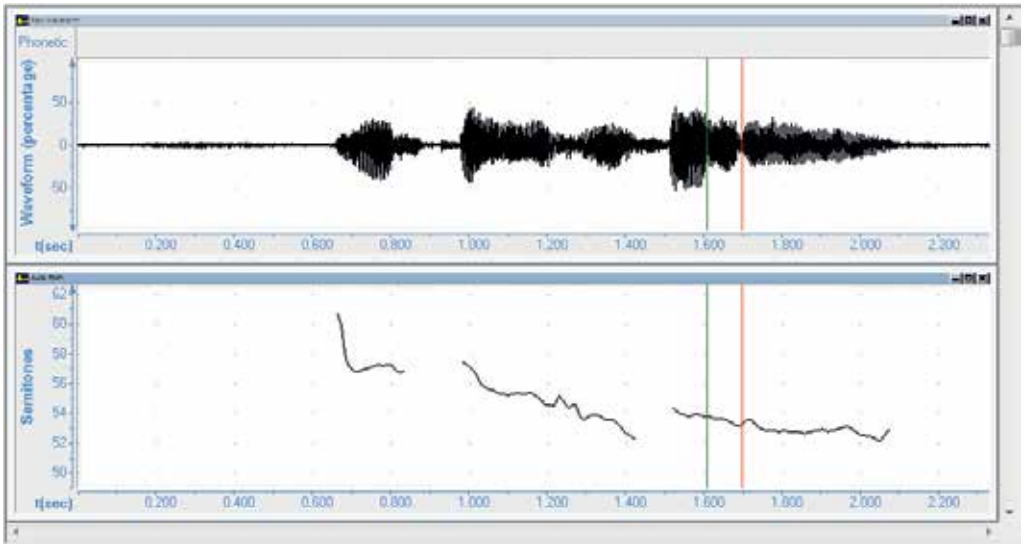

Figure 42: Waveform and FØ Contour for <<Letizia41>> Peak Alignment in Verb

The scaling of the tonic syllable of the verb, at 1.6063 seconds, reaches a level of 53.8 semitones, as shown in Figure 42 above.

(61) <<SamB11>> A baby is sleeping.

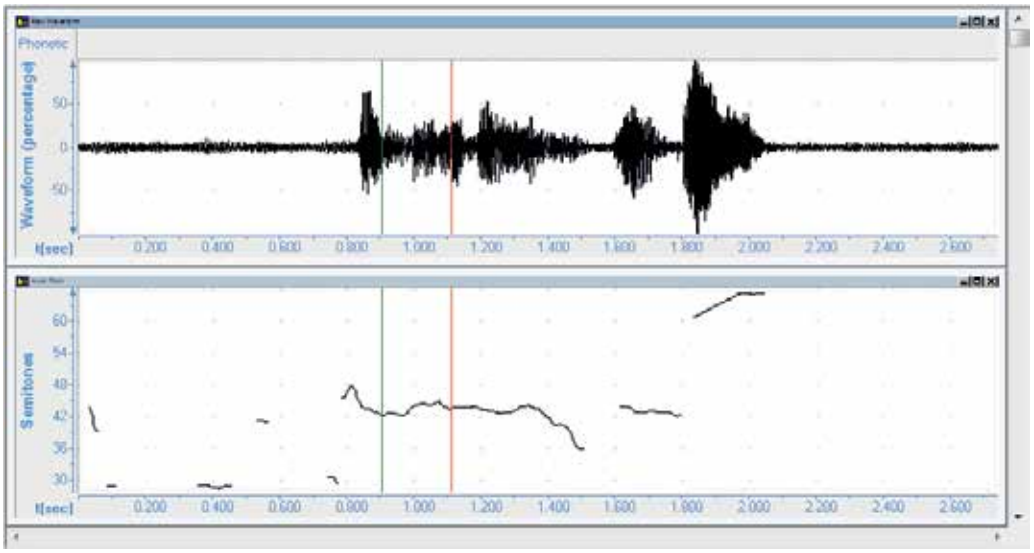

Figure 43: Waveform and FØ Contour for <<SamB11>> Anchoring of Tonic in Subject

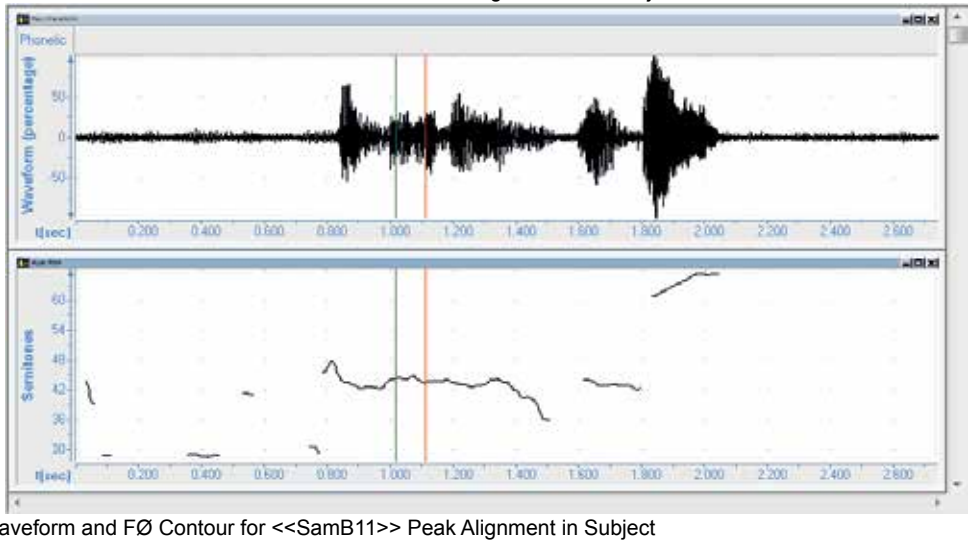

Figure 44: Waveform and FØ Contour for <<SamB11>> Peak Alignment in Subject

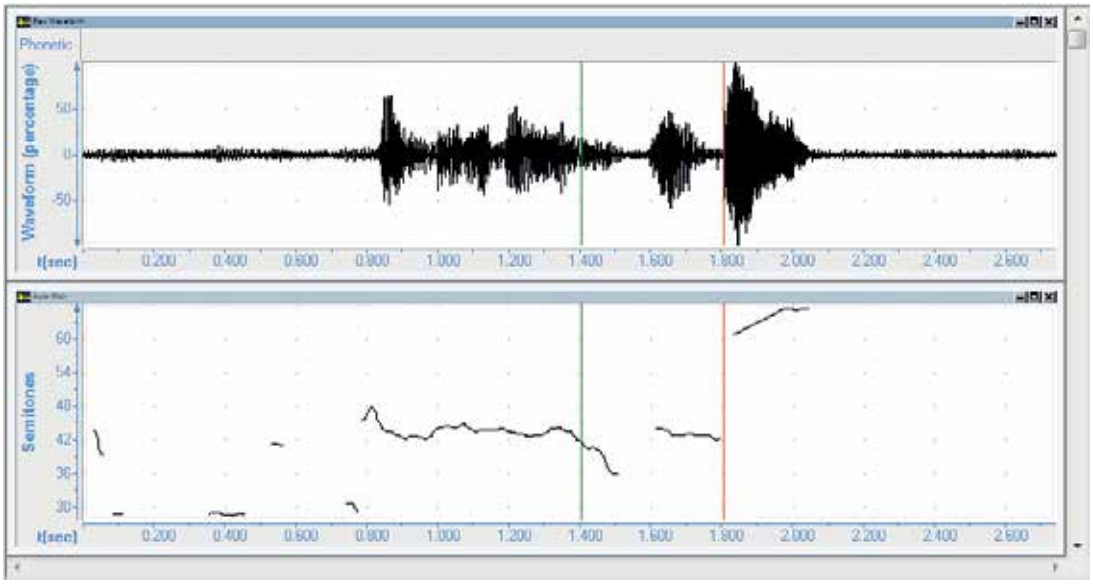

Figure 45: Waveform and FØ Contour for <<SamB11>> Anchoring of Tonic in Verb

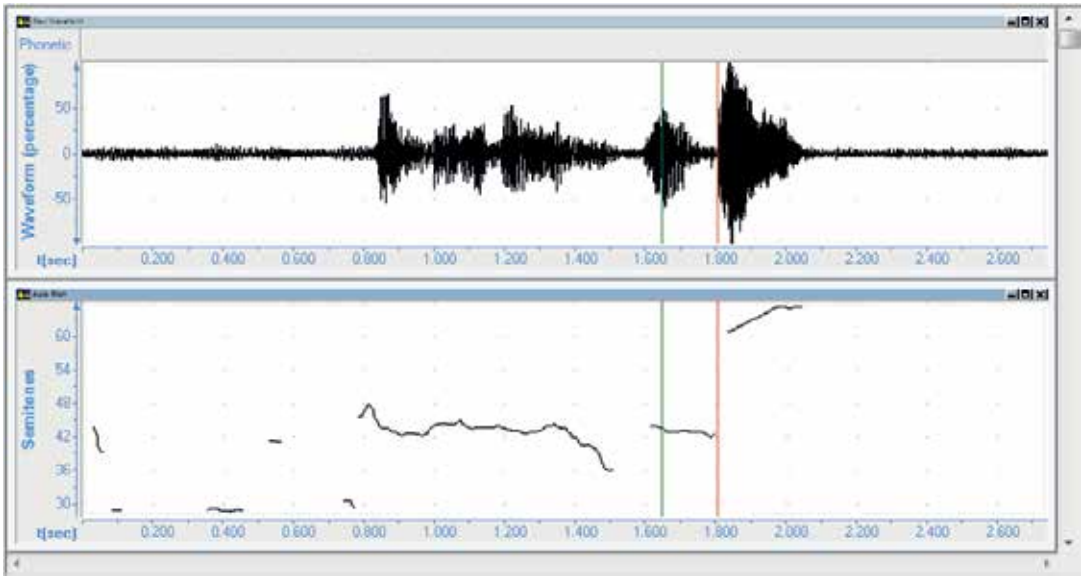

Figure 46: Waveform and FØ Contour for <<SamB11>> Peak Alignment in Verb

A further example of atelic unergative bare construction with H* pitch accents is illustrated by example (61) and Figures 43 through 46 above. The anchoring of the tonic syllable in the subject is located between 0.9037 and 1.0973 seconds (Fig.43). Its scaling, at 1.0166 seconds, reaches a level of 44.3 semitones (Fig.44). The tonic syllable in the verb, flanked by voiceless consonants that cause interruptions of the FØ trace, is anchored between 1.4042 and 1.8078 seconds (Fig. 45) and the nuclear peak of the verb, aligned at 1.6471 seconds, reaches a level of 43.8 semitones (Fig.46).

The previous subsections, from 4.3.1.1.1 to 4.3.1.1.3., address the metrical measuring of H* peaks in order to obtain the slope of declination of the topline of each of the three constructions under study. I will turn, in the following subsections, to the metrical measuring of L* valleys with the aim of obtaining the slope of declination of the baseline for each of the three types of constructions under study.

4.3.1.2. Baseline Declination

The baseline is the line that joins the lowest points of the intonational contour (Maeda 1976, Nooteboom 1997) and is generally agreed to join the lowest levels of successive valleys and of the boundary tone L% in a declarative utterance. However, instrumentally, this boundary tone very frequently falls beyond the pitch range perceived and reproduced by the program with certainty. So, in this study we consider the baseline to be determined by the lowest point or bottom of two successive L* pitch accents of the intonational contour.

4.3.1.2.1.Telic Unaccusative Constructions with L* L* Pitch Accents

(62) <<Desiree10>> The chain has broken.

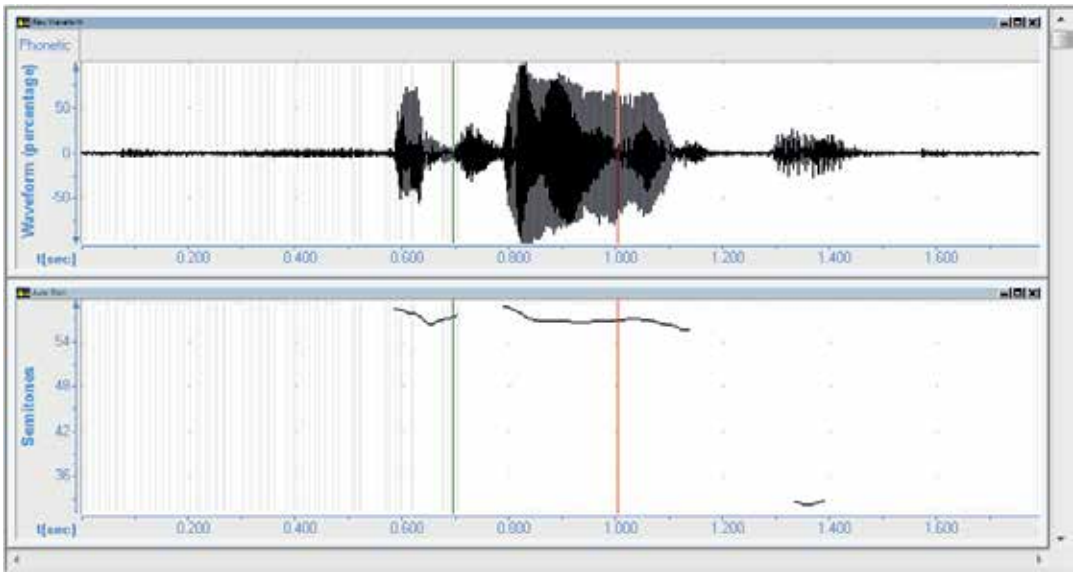

Figure 47: Waveform and FØ Contour for <<Desiree10>> Anchoring of Tonic in Subject

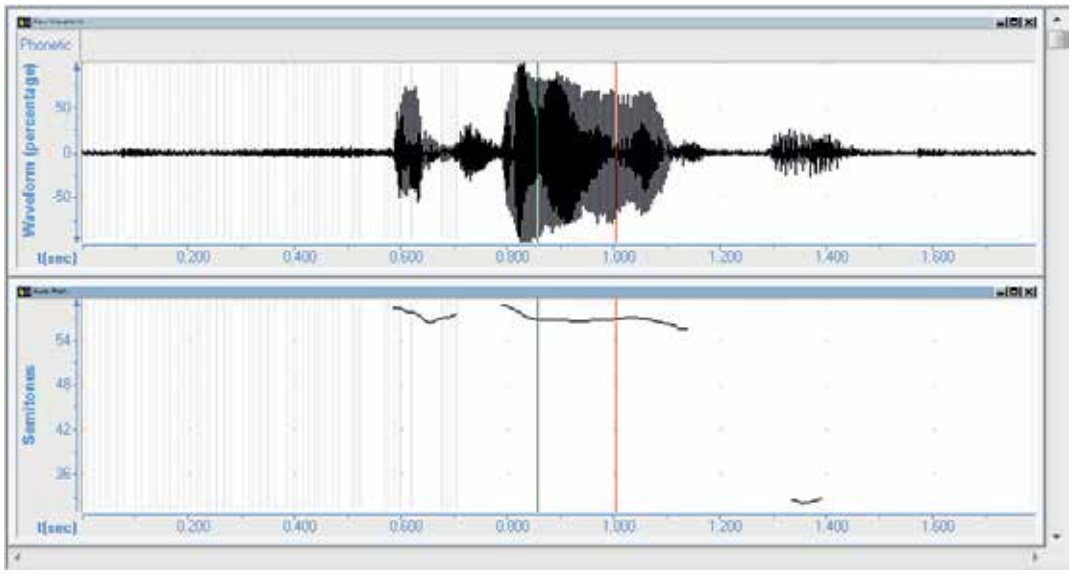

Figure 48: Waveform and FØ Contour for <<Desiree10>> Bottom Alignment in Subject

Examples (62) and (63) show instances of contours with L* L* L- L% accents and Figures 47 through 54 illustrate the anchoring of the tonic syllable in the subject and the verb and the scaling of the bottom of their valleys.

In Figure 47 above, it is shown that the tonic syllable of the subject in <<Desiree10>> is anchored between 0.6949 and 0.9983 seconds. The voiceless affricate obstruent at the onset of the syllable produces an interruption in the FØ trace of the contour but does not affect the scaling of the bottom of the valley, at 0.8548 seconds from the onset of the intonational contour. The scaling of the valley is located approximately in the middle of the first element of the diphthongal glide and reaches a level of 56.8 semitones (Figure 48). In its turn, the tonic syllable of the verb is anchored between 1.2066 and 1.5175 seconds, and its FØ trace presents apparent interruptions since the syllable is flanked by obstruent consonants, a voiced bilabial plosive /b/ to the left and a voiceless velar plosive /k/ to the right (Figure 49). The scaling of the bottom of the valley is located at 1.3585 seconds and reaches a level of 32.2 semitones, as shown in Figure 50.

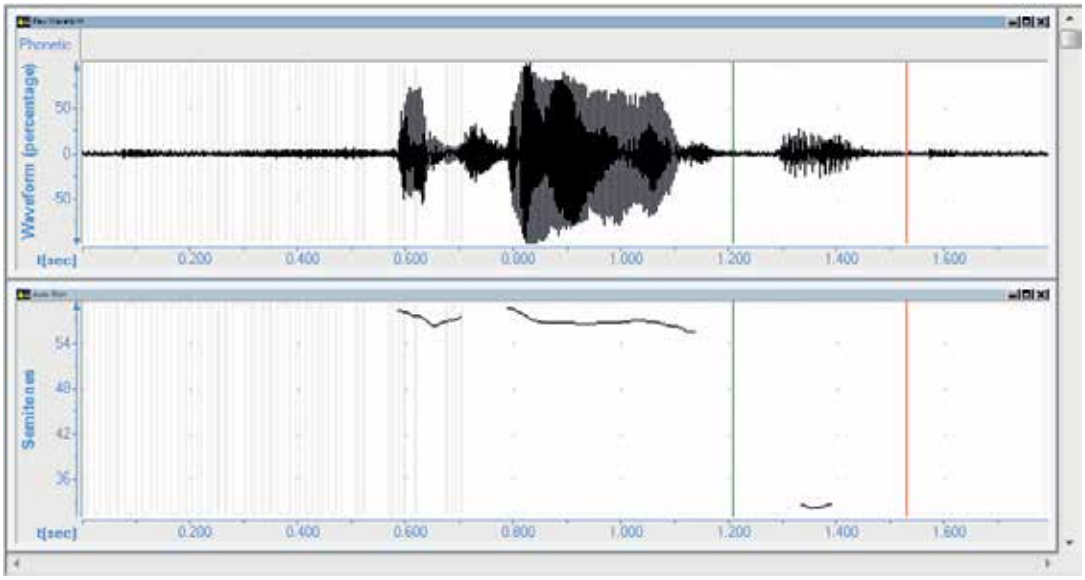

Figure 49: Waveform and FØ Contour for <<Desiree10>> Anchoring of Tonic in Verb

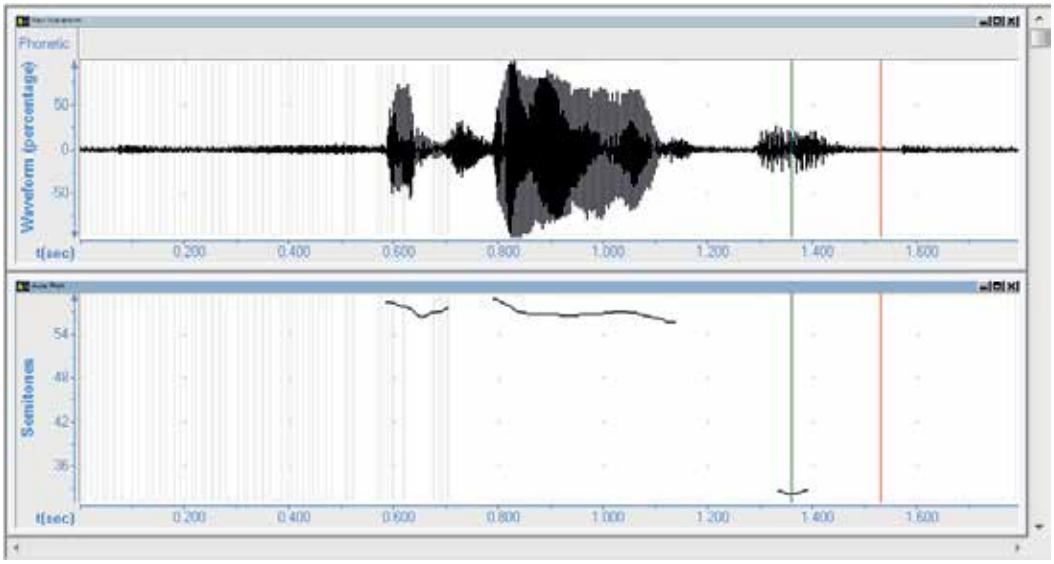

Figure 50: Waveform and FØ Contour for <<Desiree10>> Bottom Alignment in Verb

Analogously, Figure 51 shows the anchoring of the tonic syllable in the subject of <<AshleyF1>>, between 0.7928 and 1.0213 seconds; Figure 52 indicates the scaling of the bottom of the valley, at 0.9558 seconds, which reaches a level of 56.1 semitones; Figure 53 reproduces the anchoring of the tonic syllable of the verb, again flanked by voiceless interruptions, between 1.2326 and 1.8590 seconds; and finally Figure 54 indicates the scaling of the bottom of the valley, at 1.4778 seconds, which reaches a level of 43.1 semitones.

(63) <<AshleyF1>> A car has crashed.

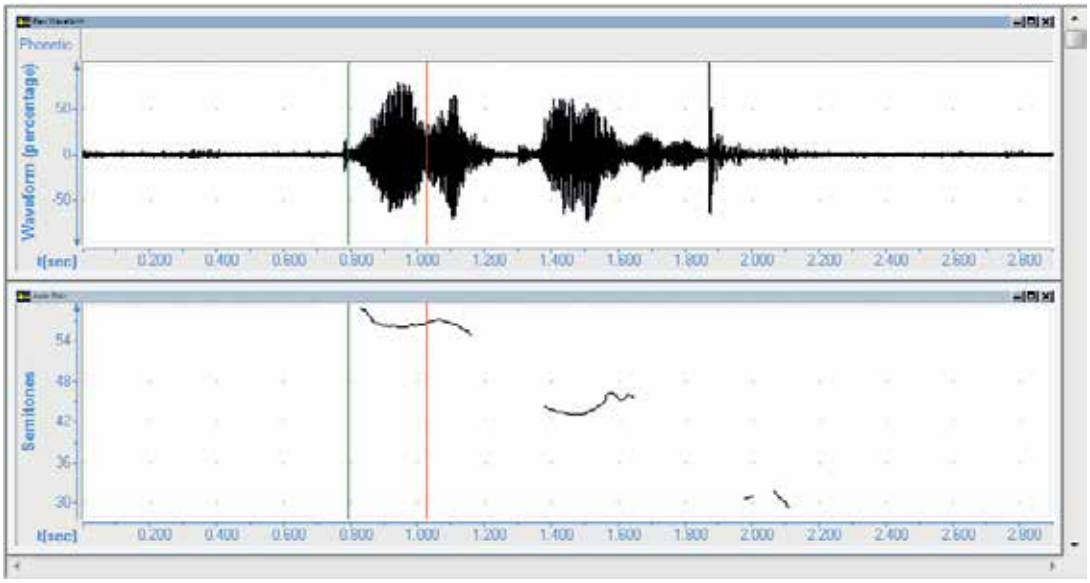

Figure 51: Waveform and FØ Contour for <<AshleyF1>> Anchoring of Tonic in Subject

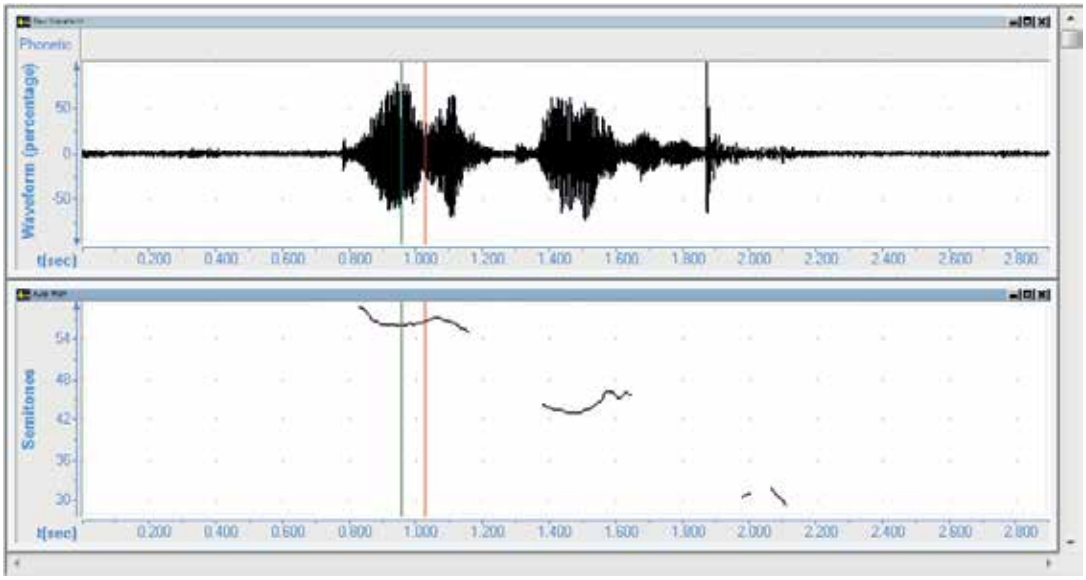

Figure 52: Waveform and FØ Contour for <<AshleyF1>> Bottom Alignment in Subject

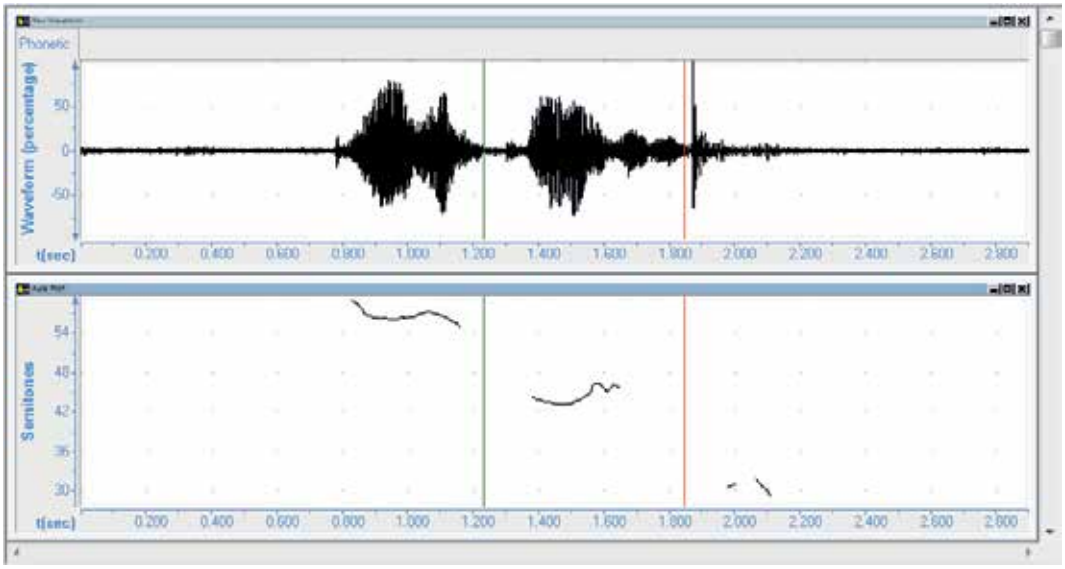

Figure 53: Waveform and FØ Contour for <<AshleyF1>> Anchoring of Tonic in Verb

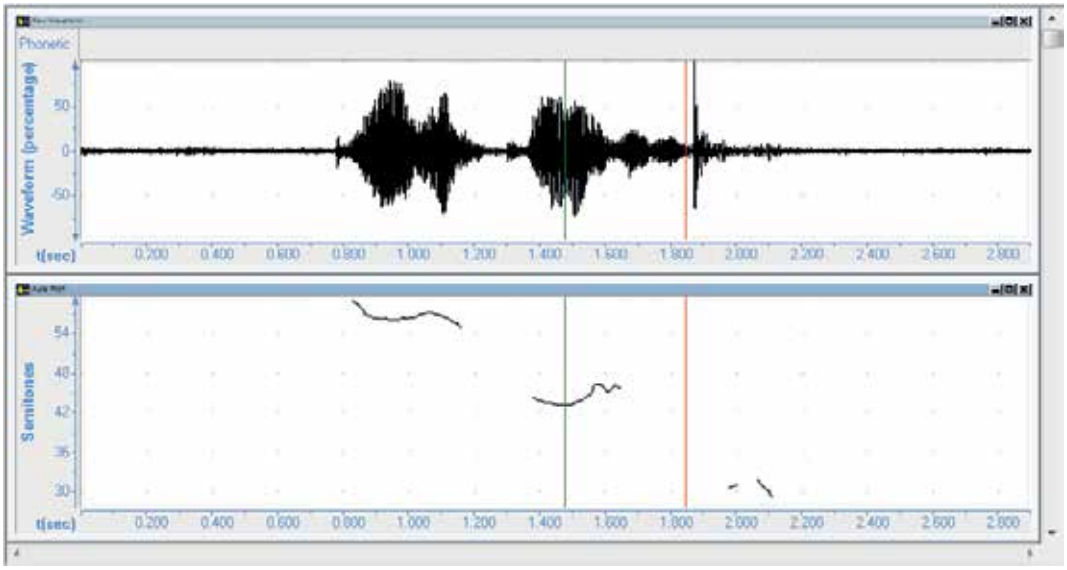

Figure 54: Waveform and FØ Contour for <<AshleyF1>> Bottom Alignment in Verb

4.3.1.2.2. Atelic Unaccusative Constructions with L* L* Pitch Accents

Atelic unaccusative constructions with L* L* pitch accents are exemplified by (64) and (65), which can graphically be analysed in Figures 55 through 62. The figures illustrate the anchoring of the tonic syllable in the subject and the verb and the scaling of the bottom of the corresponding valleys.

(64) <<Vanessa54>>Ice is melting.

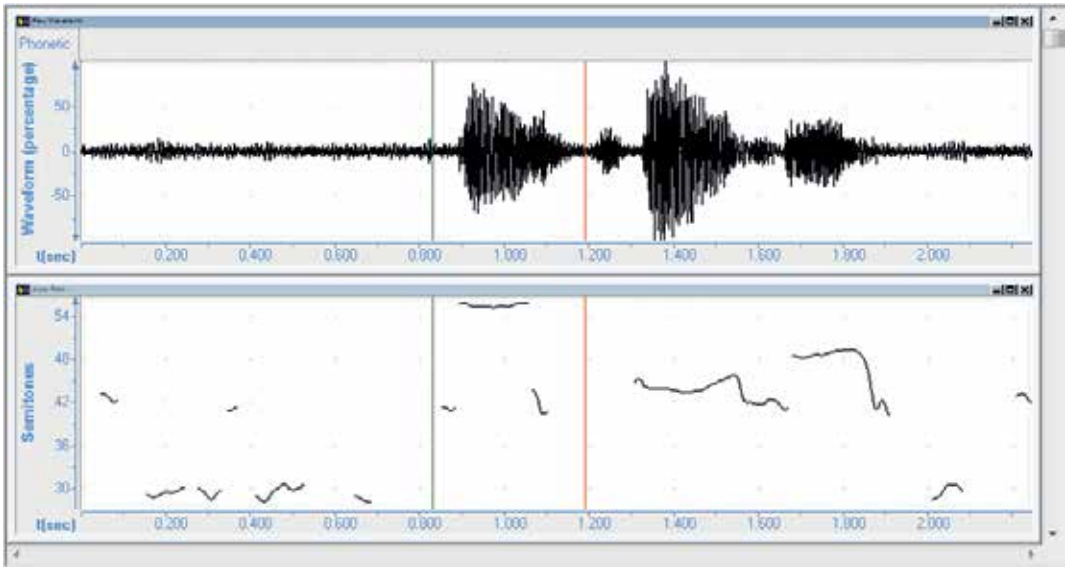

Figure 55: Waveform and FØ Contour for <<Vanessa54>> Anchoring of Tonic in Subject

Figure 55 illustrates the anchoring of the one-syllable subject of <<Vanessa54>>, between 0.8297 and 1.1310 seconds, which is flanked to the right by a voiceless fricative obstruent /s/ sound. The scaling of the bottom of the valley, produced in the middle of the diphthongal glide of the syllable, at 0.9706 seconds, reaches a level of 55.3 semitones (Figure 56). The anchoring of the tonic syllable of the verb is found between 1.3040 and 1.6463 seconds and in this case, the voiceless dental plosive /t/ at the offset of the syllable, between 1.5498 and 1.6043 seconds, produces an apparent downward movement in the FØ trace discarded in the analysis (see Figure 57). The scaling of the bottom of the valley, at 1.4383 seconds, reaches a level of 43.3 semitones (Figure 58).

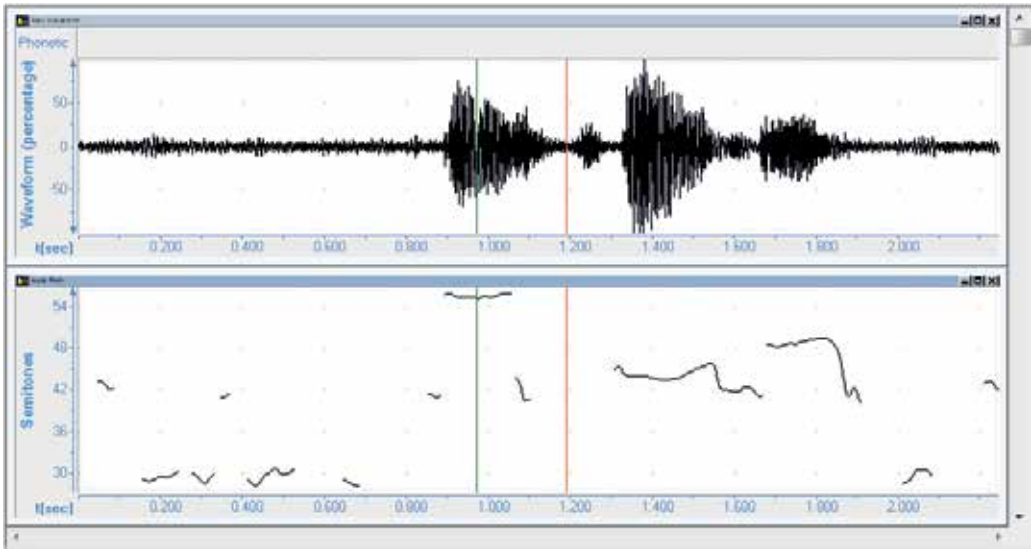

Figure 56: Waveform and FØ Contour for <<Vanessa 54>> Bottom Alignment in Subject

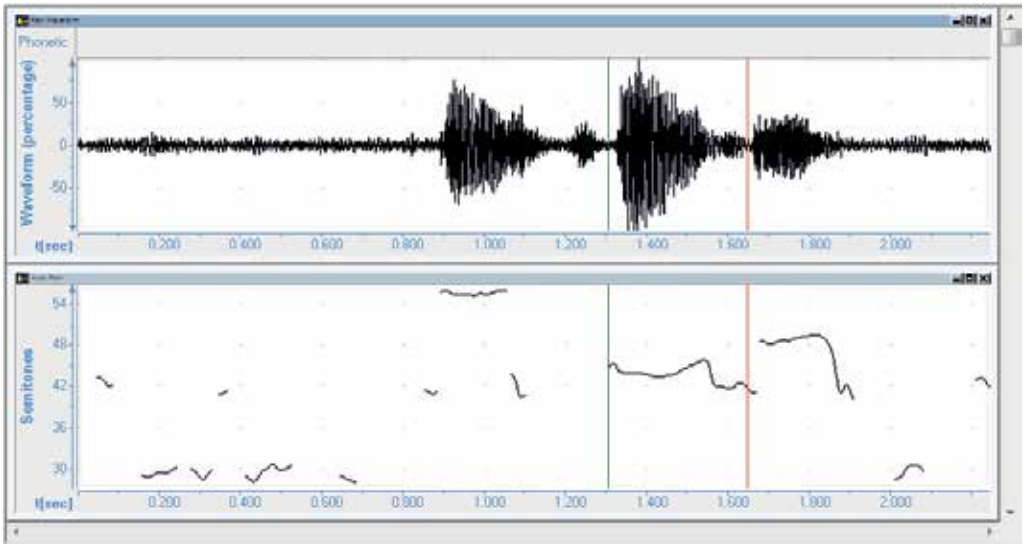

Figure 57: Waveform and FØ Contour for <<Vanessa54>> Anchoring of Tonic in Verb

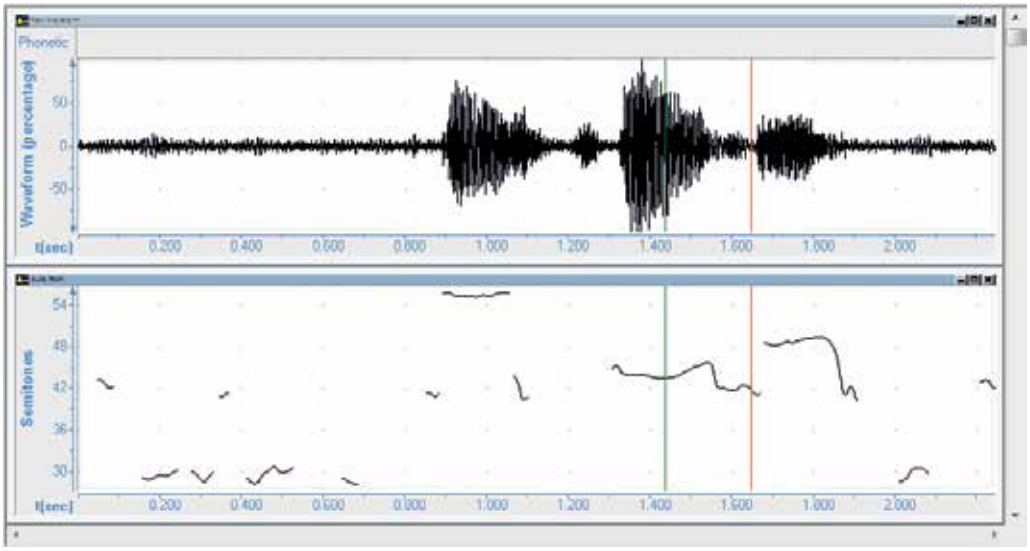

Figure 58: Waveform and FØ Contour for <<Vanessa 54>> Bottom Alignment in Verb

Example (65) below characterises the intonational contour of the utterance <<Kim5>> worded in exactly the same way as that of examples (57) and (58) analysed in subsection 4.3.1.1.2., which this

time is uttered with L* pitch accents rather than the H* pitch accents chosen in (57) <<Holly39>> and (58) <<Bless5>>. According to Pierrehumbert (2000), the different choices made by Kim on the one hand and Holly and Bless, on the other hand, may stem from the fact that Kim chose to mark her information as salient but not necessarily an addition to the mutual beliefs of participant/analyst; while Holly and Bless chose to mark their information as added to the mutual beliefs of participant/analyst. In other words, Kim seems to convey information already shared or simultaneously discovered by the participant and the analyst, therefore choosing L* pitch accents; whereas Holly and Bless seem to convey information that lies within the knowledge of the participant but outside the knowledge of the analyst, therefore choosing H* pitch accents. Apart from the differences in the pitch accents, the three segments differ in the choice of boundary tones. While <<Holly39>> resorts to an L% edge tone, which is the typical choice in declarative utterances, <<Bless5>> and <<Kim5>> are uttered with final H% edge tone, which is uncharacteristic of declarative contours, but probably due to continuation rise applied by these participants.

Figures 59 through 62 show the anchoring and the scaling and alignment of the bottom of the valley of the tonic syllable in the subject and in the verb of <<Kim5>>. The tonic syllable in the subject is anchored between 0.6959 and 1.0020 seconds and its FØ trace exhibits an interruption at the onset of the syllable due to the presence of the voiceless fricative obstruent /f/ (Figure 59). The scaling of the valley, measured in the middle of the first element of the diphthongal glide, at 0.8497 seconds, reaches a level of 52.7 semitones (Figure 60). The tonic syllable in the verb is anchored between 1.1874 and 1.3586 seconds (Figure 61) and its scaling, at 1.2496 seconds, reaches a level of 51.5 semitones (Figure 62).

(65) <<Kim5>> The phone is ringing.

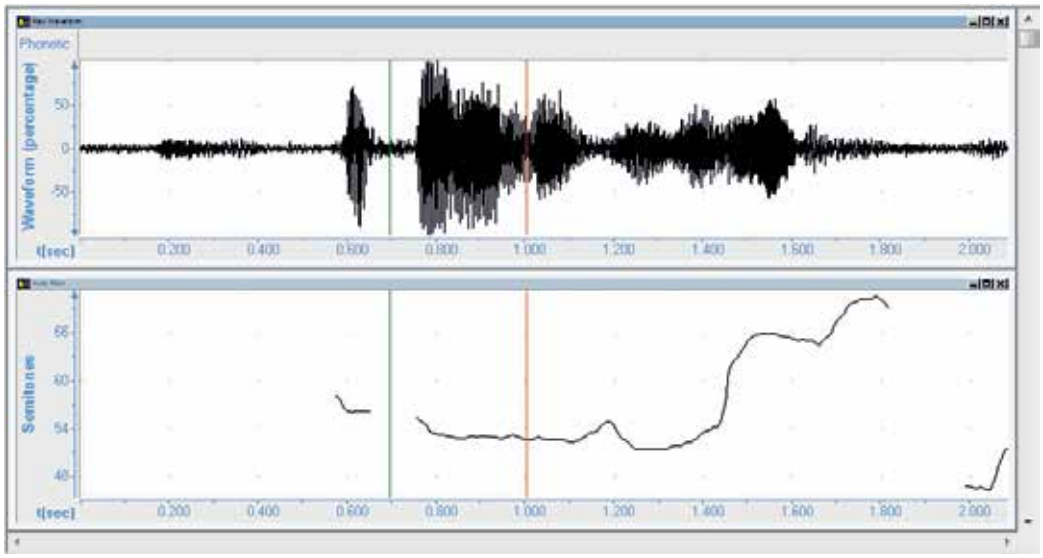

Figure 59: Waveform and FØ Contour for <<Kim5>> Anchoring of Tonic in Subject

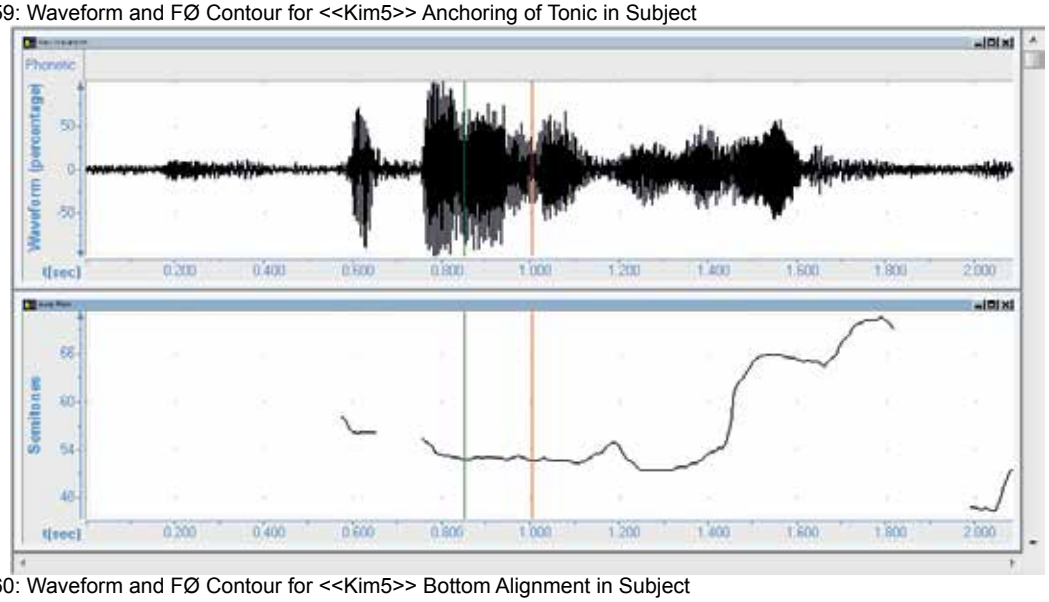

Figure 60: Waveform and FØ Contour for <<Kim5>> Bottom Alignment in Subject

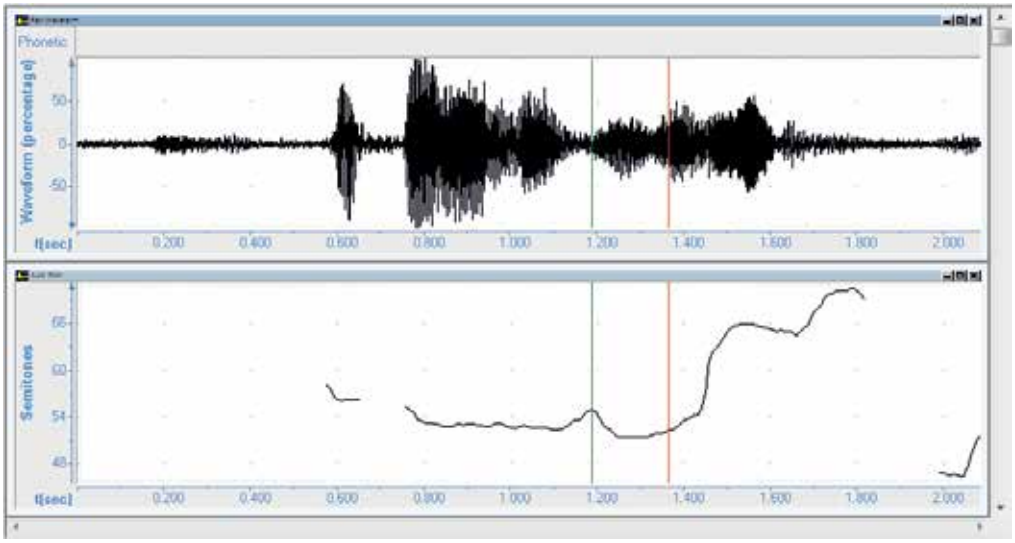

Figure 61: Waveform and FØ Contour for <<Kim5>> Anchoring of Tonic in Verb

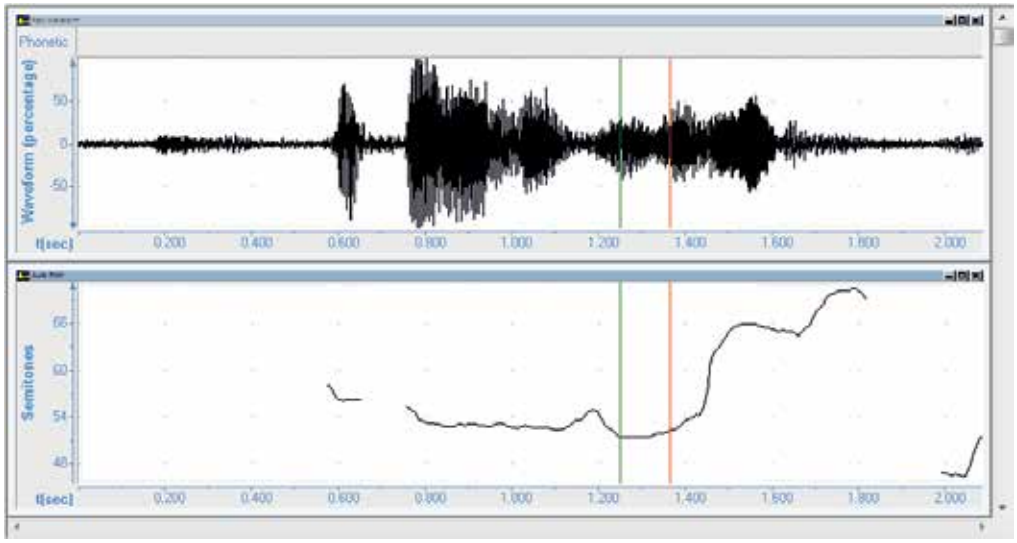

Figure 62: Waveform and FØ Contour for <<Kim5>> Bottom Alignment in Verb

4.3.1.2.3. Atelic Unergative Constructions with L* L* Pitch Accents

In this subsection, examples (66) and (67) illustrate the metrical measures obtained in the case of atelic unergative constructions with L* pitch accents. Figure 63 shows that the tonic syllable in the subject of <<StevenM11>> is anchored between 1.4740 and 1.5959 seconds and Figure 64, that the scaling of the bottom of the valley in this syllable, at 1.5456 seconds from the onset of the intonational contour, reaches a level of 46.5 semitones. Finally, Figures 65 and 66 indicate the metrical measures of the tonic syllable in the verb. This syllable, anchored between 1.8450 and 2.0744 seconds, is flanked by obstruent consonants that produce interruptions in the FØ of the intonational contour. To the left of the syllable, the voiceless fricative obstruent /s/ causes an apparent upward movement that must be disregarded in the categorisation of the tone of the syllable. To its right, the voiceless plosive obstruent /p/ produces an additional interruption in FØ that otherwise does not affect the metrical measures of the syllable (Figure 65). The scaling of the bottom of the valley, at 1.9905 seconds, reaches a level of 35.5 semitones (Figure 66).

(66) <<StevenM11>> The baby is sleeping.

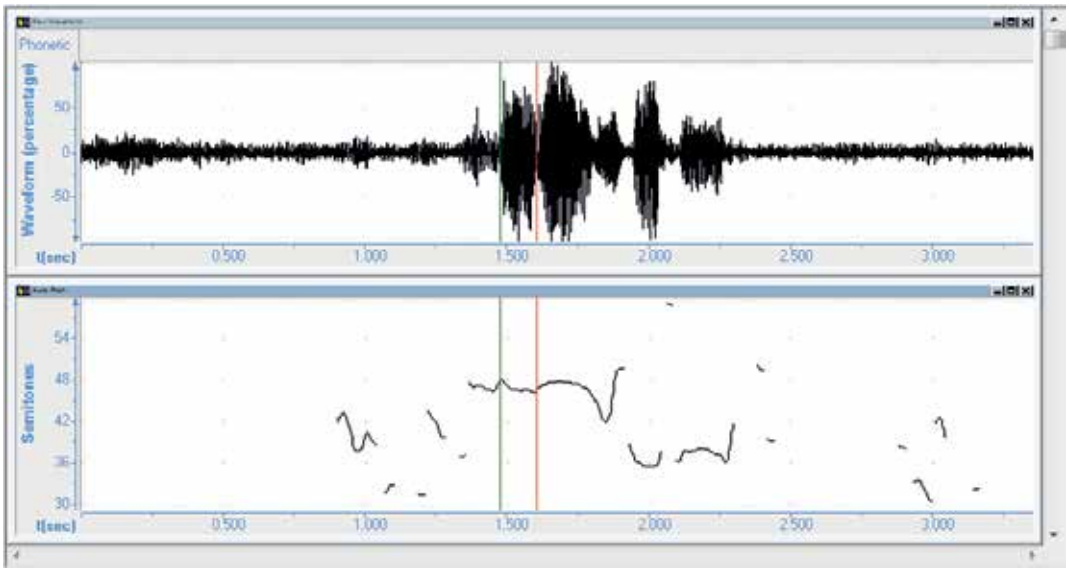

Figure 63: Waveform and FØ Contour for <<StevenM11>> Anchoring of Tonic in Subject

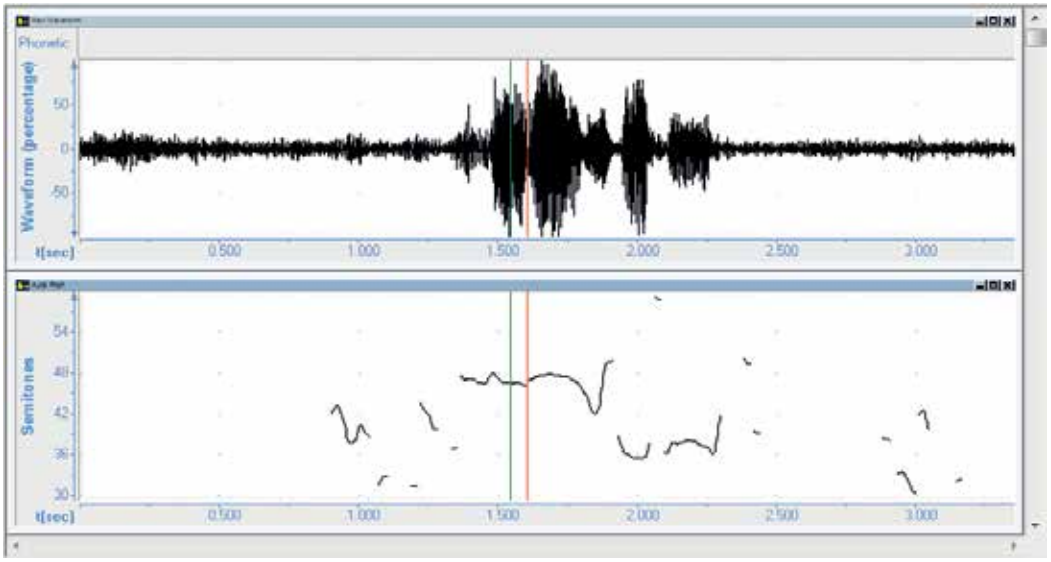

Figure 64: Waveform and FØ Contour for <<StevenM11>> Bottom Alignment in Subject

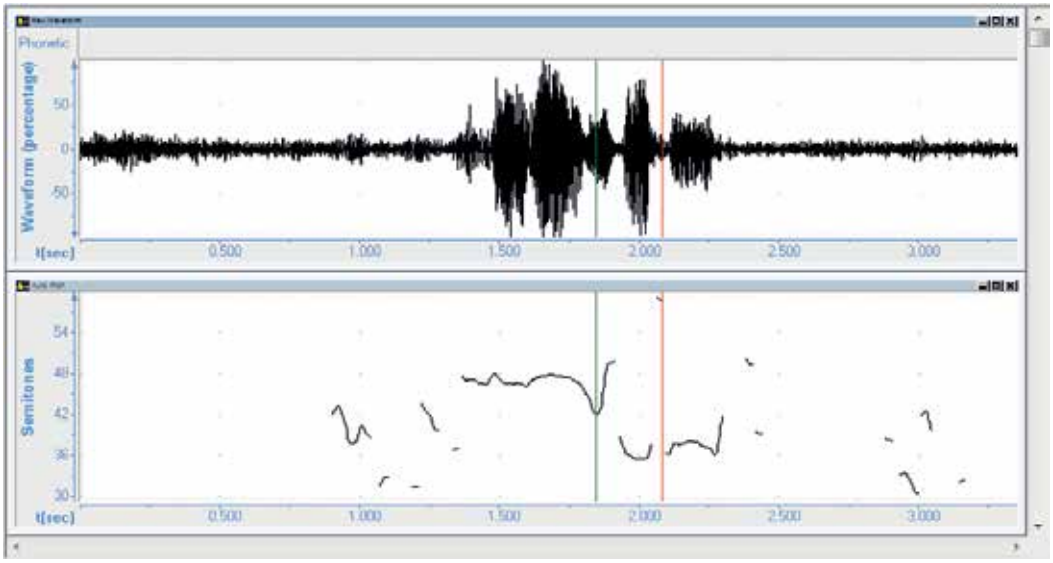

Figure 65: Waveform and FØ Contour for <<StevenM11>> Anchoring of Tonic in Verb

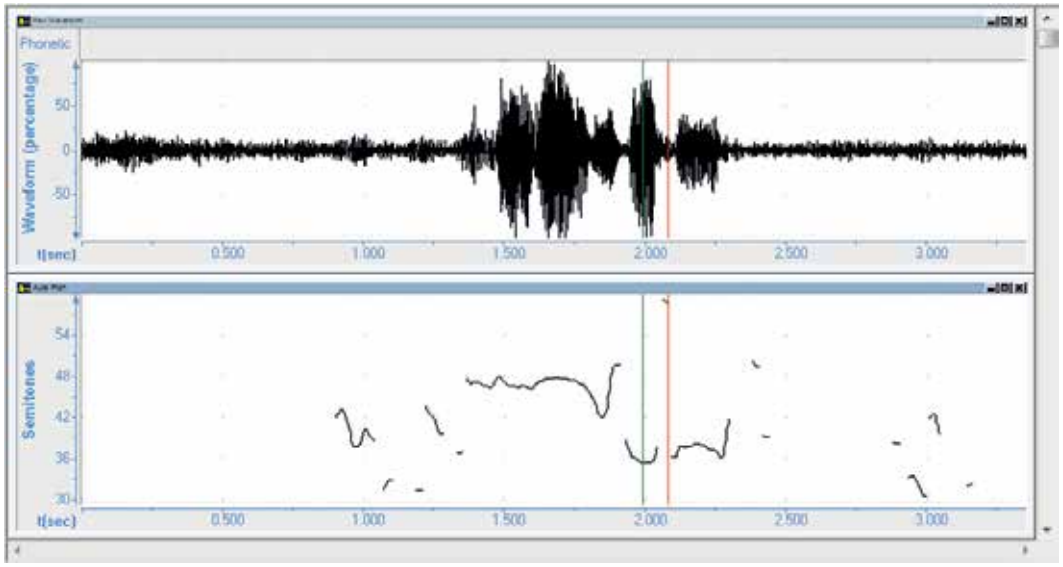

Figure 66: Waveform and FØ Contour for <<StevenM11>> Bottom Alignment in Verb

In (67) participant Kendra also utters segment <<Kendra32>> with L* pitch accents, proposing the information she is reporting as salient but not as an addition to the mutual beliefs of participant/analyst.

(67) <<Kendra32>> The man was sleeping.

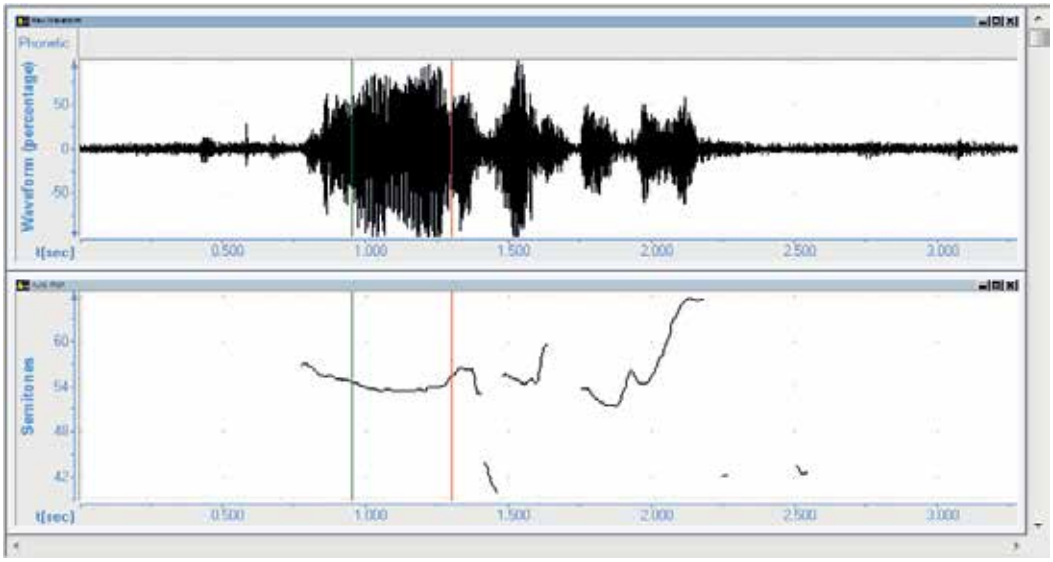

Figure 67: Waveform and FØ Contour for <<Kendra32>> Anchoring of Tonic in Subject

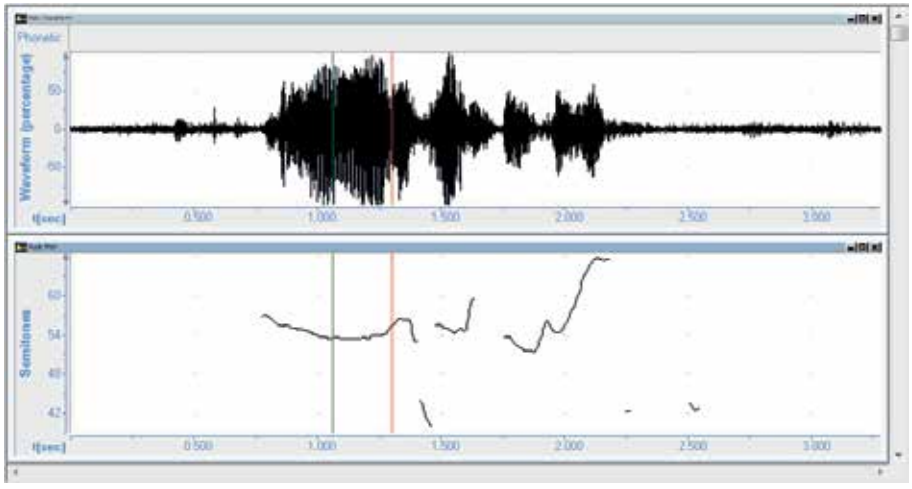

Figure 68: Waveform and FØ Contour for <<Kendra32>> Bottom Alignment in Subject

Figure 67 indicates the anchoring of the tonic syllable of the subject, between 0.9509 and 1.3003 seconds and Figure 68 indicates the scaling of this syllable, whose lowest point, aligned at 1.0593 seconds, reaches a level of 53.4 semitones. Figure 69 shows the anchoring of the tonic syllable in the verb, again with a voiceless interruption to its left, between 1.7040 and 1.9190 seconds. The relevant measures of scaling and alignment are in this case 51.6 semitones, at 1.8654 seconds (Figure 70).

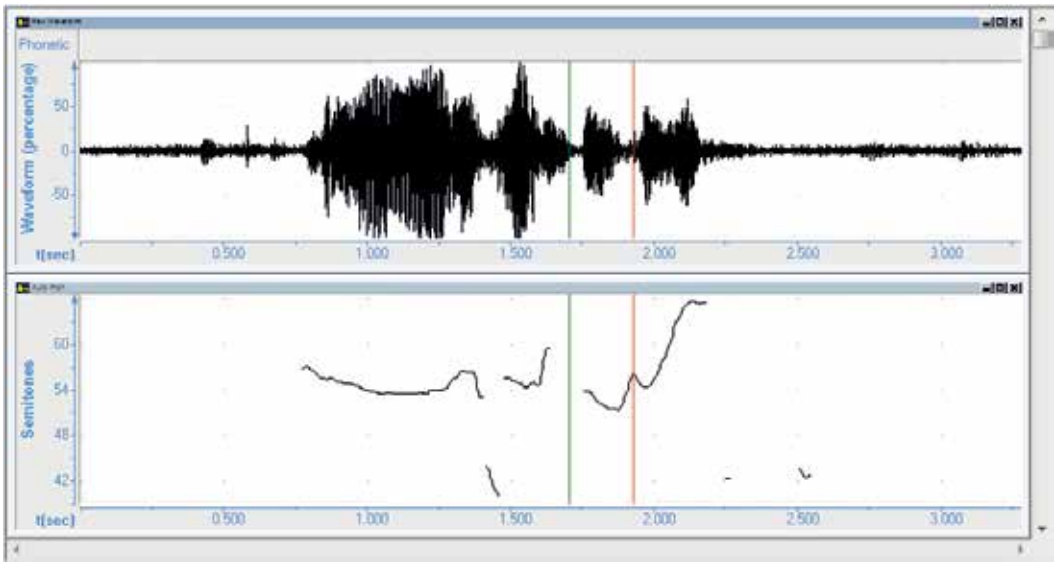

Figure 69: Waveform and FØ Contour for <<Kendra32>> Anchoring of Tonic in Verb

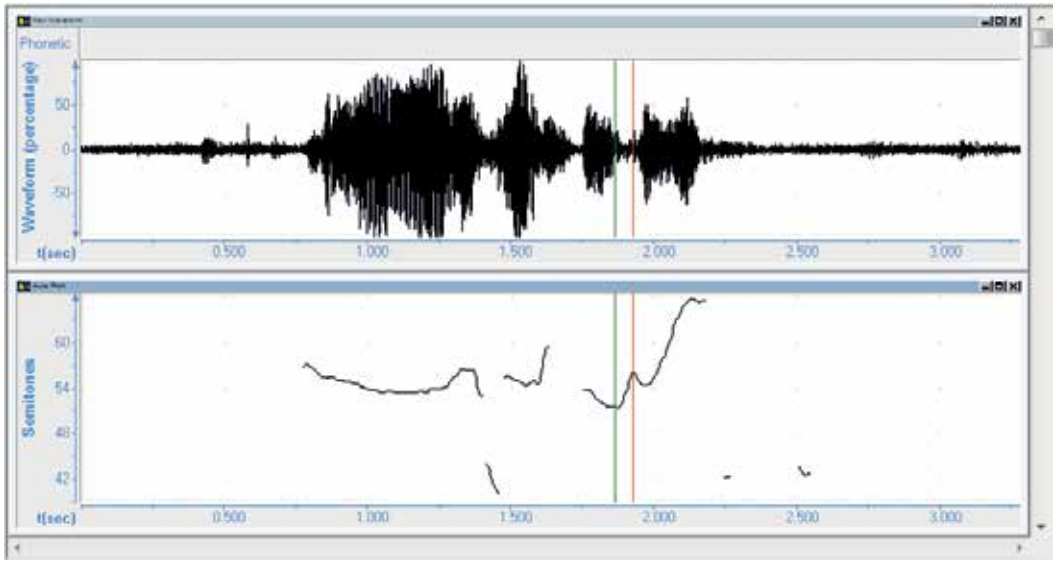

Figure 70: Waveform and FØ Contour for <<Kendra32>> Bottom Alignment in Verb

4.3.1.3. Slopes of Declination

Once all the metrical measures were taken and copied onto a spreadsheet file for each of the occurrences of telic unaccusative, atelic unaccusative and atelic unergative constructions with H* and with L* pitch accents, as described above, the differences of scaling and of alignment of successive peaks and of successive valleys were obtained. Table 11 below summarises the total, the number of occurrences, the mean and the standard deviation (δ) of duration and of pitch difference (ΔF) for each type of construction with H* pitch accents. Table 12 summarises these results for each type of construction with L* pitch accents.

Tones H* !H*								
Telic Unaccusatives			**Atelic Unaccusatives**			**Atelic Unergatives**		
	Duration	ΔF (st)		Duration	ΔF (st)		Duration	ΔF (st)
Σ	661,759	619,7	Σ	467,647	387,8	Σ	178,595	127,2
N	113	113	N	89	89	n	32	32
Mean	5,856	5,484	Mean	5,254	4,357	Mean	5,581	3,975
Δ	3.142	6.328	δ	2.901	5.694	δ	1.773	6.347

Table 11: Summary of Results for Constructions with H* !H* Pitch Accents

Tones L* L*								
Telic Unaccusatives			**Atelic Unaccusatives**			**Atelic Unergatives**		
	Duration	ΔF (st)		Duration	ΔF (st)		Duration	ΔF (st)
Σ	385,292	300,9	Σ	270,000	159,9	Σ	84,765	47,9
N	69	69	N	37	37	n	12	12
Mean	5,584	4,361	Mean	7,285	4,322	Mean	7,064	3,992
Δ	3.253	5.748	δ	7.120	5.171	δ	2.465	4.911

Table 12: Summary of Results for Constructions with L* L* Pitch Accents

Finally, the average slope of topline declination for each type of construction was obtained by making the quotient between the mean pitch distance between two successive H* tones and the mean duration that separates them. Analogously, the average slope of baseline declination for each type of construction was obtained by making the quotient between the mean pitch distance and the mean duration of two successive L* pitch tones. These results are summarised in Table 13 and illustrated by figures 71 and 72 below.

	Telic Unaccusatives	Atelic Unaccusatives	Atelic Unergatives
H* !H*	0.936	0.829	0.712
L* L*	0.781	0.593	0.565

Table 13: Average Topline and Baseline Declination for each Construction

From these results we can draw the following conclusions. First, for each of the types of constructions, the average slope of topline declination is consistently higher than the average slope of baseline declination, so that on average, the topline and baseline are convergent as argued by Laver (1994) and Vaissière (2005) rather than parallel as predicted by Maeda (1976) and Nooteboom (1997).

Secondly, for both the topline and the baseline, unaccusative declarative constructions tend to decline more abruptly than unergative declarative constructions. For example the mean slope of topline declination for telic unaccusatives is 31.46% higher than that of unergative constructions. In the case of the baseline declination, its mean slope in telic unaccusative constructions is 38.23% more abrupt than that of their unergative counterparts. Therefore, apparently native speakers of American English tend to make an unconscious phonological differentiation between unaccusatives and unergatives. This differentiation is more properly described in terms of the slope of declination of unaccusative / unergative utterances rather than e.g. the choice of nucleus placement within the utterance. In other words, native speakers of English tend to resort more frequently to the tone system than to the tonicity system to manifest the phonological realisations of the choices made at the lexico-gramatical level of the language dimensions (Halliday & Greaves 2008).

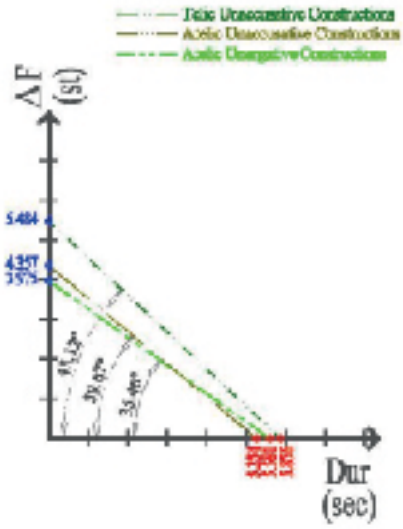

Figure 71: Mean Topline for 3 Different Constructions

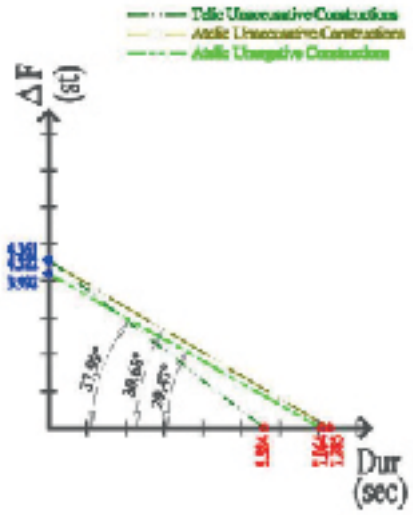

Figure 72: Mean Baseline for 3 Different Constructions

Thirdly, it can be concluded that the average slope of declination in atelic unaccusative constructions is recurrently lower than that of telic unaccusative constructions and higher than that of unergative constructions. This finding is in line with arguments in favour of telicity to differentiate unaccusatives from unergatives (Hoekstra 1988, Van Valin 1990). Yet, the characterisation seems to be found along a continuum rather than in terms of a categorical differentiation, as suggested by Levin & Rappaport Hovav[37] (2002). That is to say, the distinction between unaccusative and unergative verbs is not determined by a clear-cut categorical line, so that e.g. the more telic an event, the closer to the unaccusative end, while the more atelic the event, the closer to the unergative end.

Additionally, this study has provided wide-scale empirical evidence to support the Syntax-Based Theory of Focus Projection posited by Selkirk (1995) for the syntax-phonology interface. Selkirk's theory predicts the accentuation of non-final arguments in subject position together with the deaccentuation of their final intransitive predicates in the case of unaccusative constructions in broad focus. Her theory also accepts alternative patterns of accentuation wherein both the unaccusative predicate and its preverbal argument are accented. The findings of this study have revealed that both patterns of accentuation of unaccusative predicates are exploited by native speakers of American English, though with strikingly different frequencies. The latter pattern of accentuation, that in which both the argument and the predicate carry accents, is much more recurrent (97% of instances) than the former, in which the predicate is deaccented (3% of instances).

Finally, also within the syntax-phonology interface, both generativists (Pullum & Zwicky 1988, Miller *et al* 1997, Selkirk 2001) and systemicists (Halliday & Matthiessen 2004, Halliday & Greaves 2008) have posited that syntactic properties of the language must have a correlation in the phonological component of the language. This study has also provided empirical evidence in favour of this correlation from syntax to phonology. The evidence provided has been drawn from the phonological characterisation of unaccusative / unergative predicates. The study has shown that unaccusative predicates, which have a different syntactic configuration from unergative ones (Chomsky 1981, Alexiadou *et al*. 2004, Levin and Rappaport Hovav 1994), have a correlation in the phonological representation of unaccusative / unergative constructions. This different phonological configuration between unaccusatives and unergatives is explained to a certain extent through the different realisations in the tonicity system; and to a greater extent, through the different realisations in the tone system. In the tonicity system, the difference between unergative and unaccusative bare constructions in broad focus is manifested through the additional alternative of nucleus placement that unaccusatives allow. In other words, while unergatives in broad focus only accept a pattern with prenuclear pitch accent on the subject and a nuclear pitch accent on the verb – // ‘S `V //, unaccusatives additionally accept a pattern with nuclear pitch accent on the subject and no accent on the verb – // `S V // (Selkirk 1995, Hoskins 1996). In the tone system, this study has shown that the difference between unaccusatives

37. Let us remember that these authors claim that it is not telicity alone that differentiates unaccusatives from unergatives, but rather event complexity, which is an interplay of the properties of the argument and the predicate, telicity being one of these properties.

and unergatives is realised through the different slope of declination with which declarative constructions are uttered. We have seen that for each type of construction, telic unaccusatives, atelic unaccusatives and atelic unergatives; and for each imaginary line joining successive peaks or successive valleys, topline and baseline, unaccusative assertions tend to decline more abruptly than unergative ones. Therefore, the tonicity and tone systems jointly contribute to the phonological correlation of the syntactic differentiation between unaccusative and unergative constructions.

5. Conclusions

This study has attempted to provide wide-scale evidence to shed light on the syntax-phonology interface through the phonological characterisation of unaccusative / unergative bare declarative constructions. The study has shown that the different syntactic configurations between unaccusatives and unergatives (Chomsky 1981) have a correlation in the phonological form of unaccusative / unergative bare declarative constructions in broad focus. The findings of this study have proved that the phonological differentiation between unaccusatives and unergatives is realised in two of the three intonational subsystems, tonicity and tone.

The system of tonicity has proved to be a rather limited tool to capture the abovementioned differentiation because of two reasons. First, both unaccusatives and unergatives admit the nuclear pitch accent of an SV utterance to fall on the verb and a prenuclear pitch accent on the subject. Second, while unaccusatives, unlike unergative bare constructions, admit an additional tonicity choice, this alternative choice is only partially exploited by native speakers of American English. We have found that the alternative tonicity of nucleus on the subject and deaccentuation of the verb, possible for unaccusative constructions but not admitted by unergative ones, is only exploited on 3% of the occasions by native speakers of English.

Additionally, the results of the study have shown that the tone system, in particular metrical measures of slope of declination within this system, can more fruitfully characterise the phonological differentiation between unaccusatives and unergatives. Slopes of declination are systematically higher for bare unaccusative constructions than for unergative ones. For example, the mean slope of topline declination in constructions with H* !H* pitch tones for telic unaccusatives is 31.46% more abrupt than that for atelic unergative constructions. Analogously, the mean slope of baseline declination in constructions with L* L* pitch tones for telic unaccusatives is 38.23% more abrupt than that for atelic unergative constructions. Therefore, the different syntactic configuration for unaccusatives and unergatives is reflected in the phonological system through the more tilted slope of declination for unaccusatives than for unergatives.

The results of the study have also shown that telicity is one important variable to determine the unaccusativity of a predicate, which lends empirical support to the analyses proposed in the last decades (Hoekstra 1988, Van Valin 1990, Levin and Rappaport Hovav 1995, 2002). We have found that the mean slope of declination for atelic unaccusative constructions is consistently higher than that for atelic unergative constructions and lower than that for telic unaccusative ones. This finding is also in line with Dowty's (1991) theory, since within the unaccusative / unergative cline, telic constructions are prototypically more unaccusative than atelic ones.

Finally, the study has provided wide-range empirical evidence in favour of Selkirk's (1995) Syntax-Based Theory of Focus Projection, which deals with patterns of (de)accentuation of argument and predicate in intransitive constructions. Selkirk considers two alternative patterns of accentuation for unaccusative constructions in broad focus. The first pattern, which is exclusive of unaccusative constructions, accentuates the preverbal subject and deaccentuates the verb in final position. The second pattern, which is also possible for unergative constructions, is that in which the preverbal subject carries a prenuclear accent and the verb carries a nuclear accent. Both these patterns of accentuation have been found in this study. The former pattern is only partially exploited by native speakers of English. The latter pattern, which is common to both unaccusatives and unergatives, is by far more frequent. However, in this case, we have seen that it is the metrical measure of the slope of declination that contributes to the differentiation between unaccusative and unergative constructions.

Further lines of exploration might be followed in order to capture a wider characterisation of the phonology of unaccusative / unergative constructions. For example, it would be interesting to investigate whether the contrastive slope of declination of unaccusatives / unergatives for declarative utterances is replicated

in the case of polar interrogative contours. Presumably, it might expected that unaccusative interrogative utterances would rise more steeply than unergative ones, but this hypothesis requires further empirical validation. It would also be worth unravelling the role of other variables that have fallen beyond the scope of the present study. For instance, it would be enlightening to examine how the presence of additional pitch accents in non-bare constructions affects the phonological differentiation between unaccusatives and unergatives. Additionally, it would be enriching to analyse the extent to which additional unstressed syllables between pitch accents influence the slope of declination in unaccusative / unergative constructions. It would also be revealing to see how the measures of slope of declination vary in the case of utterances in narrow focus either on the subject or on the verb of unaccusative / unergative constructions.

Further variables worth studying would be sociolinguistic ones such as regionality and gender. For example, participants could be grouped according to their place of origin into west, centre and east, to try and examine whether they produce gradual differences in the slope of declination for unaccusative / unergative utterances. Finally, a cross-gender study could possibly reveal if female speakers, who have a greater range of fundamental frequency than male speakers, make greater use of the different slope of declination for unaccusatives / unergatives than their male counterparts.

Finally, it would be of great interest to conduct a cross-language study, in particular to contrast the results arrived at for American English with those for a more flexible word-order SVO language like Spanish. Research on the phonology of unaccusative constructions in further languages like Spanish would reveal whether the findings arrived at in this study capture a universal property of the phonology of unaccusatives or rather are characteristic of those inflexible word-order languages like English. The abovementioned lines of exploration would shed further light on the characterisation of unaccusative / unergative constructions and consequently, on the syntax-phonology interface.

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