Fall-Rise Intonation and the Place of Intonational 'Meaning' in Linguistic Theory

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1. Introduction

A major issue facing studies of intonation is the question of whether intonational contours have context-independent meaning, and, if so, how that meaning should be characterized.[1] In these studies, the FALL-RISE contour in English has often served as a case in point. The contribution FALL-RISE makes to utterance interpretation has been claimed to be syntactic by some (Jackendoff 1972), lexico-semantic by others (Ladd 1980, Liberman and Sag 1974), pragmatic by others (Cutler 1977, Gussenhoven 1983), and affective by still others (Pike 1945, Bolinger 1982). In this paper we argue that much of this disparity stems from the equation of 'semantic' with 'context-independent' and of 'pragmatic' with 'context-dependent'. Based upon a corpus of naturally occurring data,[2] we propose an alternate account of the meaning of FALL-RISE as a case of Gricean CONVENTIONAL IMPLICATURE (Grice 1975). In Section 2 we provide a prosodic description of the FALL-RISE contour. In Section 3 we review our current work on the contribution of the contour to utterance interpretation. In Section 4 we show how this contribution can be accommodated in pragmatic theory as a type of conventional implicature.

2. Phonological Characteristics of the FALL-RISE Contour

FALL-RISE is a type of FALLING-RISING intonational contour. It is distinct from other such falling-rising contours in that it is a SCOOPED contour,[3] that is, one in which pitch peak is reached late in the accented syllable. A relatively abrupt drop in pitch occurs within two syllables of the accented syllable. In addition, FALL-RISE is characterized by a sentence-final rise in pitch. We provide a spectrogram of this contour in Figure 1.[4] This contour, which we are calling FALL-RISE, has been discussed in the literature under this and a variety of names in different intonational frameworks. It is not always possible to map between various systems with certainty; however, from contour descriptions and examples provided in these studies, as well as previous comparisons of intonational systems, we believe that FALL-RISE has been identified in the following ways:

Pike (1945)	*°2-4-3* contour
Bolinger (1958, 1982)	subtype of ACCENT A (most recently as AC CONTOUR)
Kingdon (1958)	tones *III* and *V*
Schubiger (1958)	a FALLING-RISING contour
O'Connor and Arnold (1961)	FALL RISE
Halliday (1967)	tone *4*
Gunter (1972)	a FALLING-RISING contour
Jackendoff (1972)	Bolinger's B ACCENT
Liberman and Sag (1974)	contrastive stress within CONTRADICTION CONTOUR
Cutler (1977)	FALL RISE
Bing (1979)	A-RISE contour
Ladd (1980)	FALL RISE
Pierrehumbert (1980)	L*+H- L- H%
Moulton (1982)	\2°32↑/

Table 1: FALL-RISE in Previous Studies

To illustrate the relationship between our FALL-RISE and the contours in Table 1, it is necessary to map them into a single descriptive system. For this purpose, we adopt Pierrehumbert's (1980) description of intonational patterns, or TUNES. In her system, tunes are described as structured strings of low (L) and high (H) tones in the F0 contour. A well-formed tune for an intonational phrase consists of one or more pitch accents, which are aligned with stressed syllables on the basis of the metrical pattern of the text, plus single tones which characterize the phrase accent and the boundary tone. A pitch accent consists either of a single tone or an ordered pair of two tones, such as L+H. Accented syllables are marked by a star (*), as L*+H. Tones which lead or follow an accented syllable are marked by a raised hyphen (-). Thus '*' and '-' correspond to a stressed/unstressed distinction. Boundary tones are marked with '%'.

In this framework, FALL-RISE can be represented as L*+H- L- H%. That is, the nuclear accent is L*+H-; the primary stressed syllable has a very low F0 (indicating an L tone) and the F0 peak (the H tone) occurs in the following syllable. The following phrase accent is low (another L tone) and the boundary tone is H, indicating sentence-final rise. Note that this contour differs crucially from the similar contour generally referred to in the literature as AC or A-RISE, which is depicted in Figure 2.

In this spectrogram, we have, in Pierrehumbert's terms, an L-+H* L- H% tune. The important distinction to be made between this tune and that of Figure 1 is the different alignment of the stressed syllable with F0. While primary stress occurs on the L tone in our FALL-RISE contour in Figure 1, it occurs on the H tone in Figure 2.[5] There may also be significant differences in the pitch frequencies of these two contours, the initial L tone, and the duration of the stressed syllable; however, these possibilities await further study. In further support of our claim that these two contours are in fact distinct, we now examine the contribution each makes to utterance interpretation.

3. The 'Meaning' of FALL-RISE

It is in large part the failure to distinguish FALL-RISE from more general falling-rising contours on phonetic/phonological grounds that has led to attempts to interpret its contribution to utterance interpretation in more general terms as well.[6] For some authors, FALL-RISE conveys some type of speaker attitude. Halliday sees this contribution as 'a statement or answer with reservation ("there's a 'but' about it")' (1967:27). Bolinger (1982, personal communication) characterizes this attitude as one of 'incompletion' or 'up-in-the-airness'. For others, FALL-RISE relates some discourse entity to other entities in the context. Ladd (1980) describes this relationship as 'focus within a set'; Gussenhoven (1983), as 'selection of a variable from the background'; and Liberman and Sag (1974), as 'contrast within contradiction contour'.

Problems have been found with each of these analyses. Liberman and Sag's contradiction contour analysis has been refuted by Ladd (1980), who notes that FALL-RISE is embeddable while contradiction contour is not[7] and that not all instances of FALL-RISE can be analyzed as conveying contradiction. Bolinger's subsumption of FALL-RISE under his AC contour leads him to subsume its meaning under the general notion of 'incompletion' or 'up-in-the-airness'. However, just as AC and FALL-RISE are phonologically distinct, so too are they functionally distinct. For example, while FALL-RISE is possible in 1, in 2 it is not.[8]

(1) A: What tourist trap are you going to this year?
B: We're going to \Dis/neyworld.

(2) A: Where are you spending the holidays?
B: #We're going to \Dis/neyworld.

If FALL-RISE is subsumed under AC, then we cannot account for this difference. Note that AC (i.e. rise on *DIS*, fall on *ney*, and sentence final rise) in this context is fine (3).

(3) A: Where are you spending the holidays?
B: We're going to DISneyworld/.

With AC, B's response may be interpreted as conveying Bolinger's 'incompletion' – A will expect B to list other places to be visited during the vacation.

Ladd (1980:153) claims that the function of FALL-RISE is 'something like "focus within a given set". It picks something out of a set of possibilities [either explicit or implicit in the discourse] and focuses on it, but it specifically notes the connection of the set of possibilities to the context.' For Ladd, then, in 4, FALL-RISE singles out *Opel* from the set

(4) A: You have a VW, don't you? (= Ladd's 18)
B: I've got an \O/pel.

of foreign (or small or German) cars.

Elsewhere (Hirschberg and Ward (1984), Ward and Hirschberg (To appear)) we have noted certain problems with this analysis. First, even *without* FALL-RISE intonation, a referent often must be interpreted as a member of some set in order for an exchange to be coherent. For example, in 5, A must perceive some relationship between Opels and VWs in order to make sense of B's response.

(5) A: You have a VW, don't you?
B: I've got an Opel.

Second, Ladd's analysis cannot explain the inappropriateness of FALL-RISE even where a set-member relationship is clearly salient, as in 6:

(6) A: Did Shawn have a boy or a girl?
B: #She had a \girl/.

Third, the set-marking function Ladd attributes to FALL-RISE does not account for the numerous tokens of FALL-RISE in our corpus in which no clear set-member relationship can be discerned.[9] Consider 7:

(7) A: Is the restaurant open?
B: We open at 5:\30/.

As an alternative to the discourse functions proposed in previous studies, we propose a more precise and comprehensive specification of both the attitude associated with FALL-RISE and the way in which a salient relationship between discourse entities provides the basis for that attitude. This reinterpretation of FALL-RISE not only accounts for the constructed examples of FALL-RISE in the literature but also accommodates the naturally occurring counter-examples discussed above.

In Hirschberg and Ward 1984, we claim that the function of FALL-RISE is the conveyance of speaker uncertainty about some salient relationship between discourse entities; however, contra Ladd, set-membership is only one such relationship. Although Bolinger's 'up-in-the-airness' or Halliday's 'reservation' might subsume our notion of 'speaker uncertainty', we claim that it is this more specific notion that is a necessary condition for FALL-RISE. Moreover, the 'speaker uncertainty' required for felicitous FALL-RISE is of a particular type.

FALL-RISE conveys speaker uncertainty regarding some SCALE evoked in the discourse or some VALUE on such a scale. Scales are defined as PARTIALLY ORDERED SETS, or POSETS. Posets are defined by a PARTIAL ORDERING R on a set B. R must be REFLEXIVE, ANTISYMMETRIC, and TRANSITIVE or, alternatively, IRREFLEXIVE, ASYMMETRIC, and TRANSITIVE.[10] The concept of poset provides a formal definition for an intuitive notion of SCALE, allowing the ranking of discourse referents as VALUES on such scales. The relationships that provide the basis for the felicitous use of FALL-RISE are just those that can be represented as *partial ordering relations*.[11]

A VALUE on a scale S may refer to an entity, attribute, event, activity, time, or place – or to a set of such items. In this way we can rank a property with respect to some entity which exhibits it via an *attribute-of* relation; an event with other events according to temporal precedence; elements or proper subsets of a set with respect to the set by an inclusion relation; and so on. Thus, defining scales as posets accommodates not only Ladd's set-member relationship but other orderings as well, such as spatial and temporal orderings, stages of a process, type/subtype, entity/attribute, and part/whole relationships. So, in 8, for example, Reagan conveys uncertainty about whether the scalar value *talking* – on a scale defined by stages-of-the-negotiation-process – is close enough

to the queried value *progress* to warrant mention:

(8) Reporter: Any progress, Mr. President?
Reagan: We're \talk/ing.

Given this definition of scale and of scalar values, we can say that a speaker may convey uncertainty with respect to some scale or scalar value in three ways: A speaker may convey uncertainty about whether it is appropriate to evoke a scale at all in some context (Type I). S/he may convey uncertainty about whether the scale s/he has chosen to evoke is an appropriate one for the hearer (Type II). Or s/he may convey uncertainty about whether the chosen scalar value is an appropriate one (Type III).

Type I uncertainty is exemplified in 9:

(9) A: Oh, do you have a badminton team?
B: I \had/.

In this exchange between student A and athletic coach B, B indicates via FALL-RISE that she is uncertain about whether A is interested only in knowing whether there is a current badminton team or in knowing whether there ever has been one. In 10, B conveys Type II uncertainty:

(10) A: Do you know Michael B.?
B: I've heard him \speak/.
A: Oh, then you know what he looks like.

Here, the uncertainty is about which scale to choose, given that *some* scale *is* appropriate: *know* can be seen both as a value on the scale 'degree-of-personal-familiarity' or on the scale 'degree-of-academic-familiarity'. Here B did not know if A was inquiring about whether she knew Michael B. personally, or whether she knew his work. From A's response, B inferred that in fact it *was* the former scale -- and the one B had chosen -- that was salient for A. Finally, Type III uncertainty is illustrated in 11:

(11) A: Well, because conventional implicature has a special status
that you semanticists have not been able to handle.
B: Well, there've been pro\po/sals.

In this exchange, B did not know whether A would count *proposals* as a counter to A's jibe at semanticists.

4. Intonational Meaning and Conventional Implicature

While few would disagree that FALL-RISE makes some contribution to utterance interpretation, few would agree about the nature of this contribution. Having described FALL-RISE and our view of its contribution to utterance interpretation, it remains for us to locate this 'meaning' in broader linguistic theory. In this section, we claim that the 'meaning' conveyed by FALL-RISE is best seen as pragmatic; specifically, as a case of Gricean conventional implicature.[12]

While the boundary between semantics and pragmatics has been a source of considerable debate, we follow common practice in adopting a truth-conditional criterion

for distinguishing between semantic and pragmatic phenomena. Under this view, those aspects of utterance interpretation which enter into the determination of the truth-conditions of the proposition conveyed by that utterance constitute the SEMANTIC contribution. Those aspects which do not, constitute the utterance's PRAGMATIC contribution. In a Gricean framework (Grice 1975, 1978) this distinction is presented as one between the CONVENTIONAL FORCE of an utterance (i.e. 'what is SAID') and the NONCONVENTIONAL aspects of an utterance (i.e. 'what is IMPLICATED').

Grice terms the nonconventional aspects of utterance interpretation IMPLICATURES. Implicatures, while making no contribution to the truth conditions of an utterance, nonetheless constrain its appropriateness in discourse. Grice identifies two major types of implicature, CONVENTIONAL and CONVERSATIONAL, which he distinguishes chiefly on the basis of degree of context-dependence and defeasibility. While conventional implicature is context-independent and is not defeasible, conversational implicature is context-dependent and defeasible. So, for example, the utterer of 12a conventionally implicates that John's being brave is a consequence of his being an Englishman.

(12)
a. John is an Englishman; therefore, he is brave.
b. John is an Englishman; and, he is brave.
c. #John is an Englishman; therefore, he is brave; however, his being brave does not follow from his being an Englishman.

Since 12a is, strictly speaking, true just in case both conjuncts are true, it is semantically equivalent to 12b. The implicature associated with 12a is thus *not* a part of 12a's conventional force. Similarly, in 13a, B implicates that it is at least possible that gas is available at the station.

(13) A: I'm out of gas.
a. B: There's a gas station around the corner.
b. B: There's a gas station around the corner, but unfortunately it's closed.
c. B: Around the corner is a gas station.

However, B's response is true just in case there is in fact a gas station around the corner – even if it cannot provide gas.

The difference between the conventional implicature in 12a and the conversational implicature in 13a can be captured by Grice's classic tests for defeasilibity and context-dependence: whether an implicature is CANCELLABLE and whether it is DETACHABLE.[13] An implicature is cancellable iff 'what is implicated' can be denied without denying 'what is said'. While conversational implicatures are cancellable, conventional implicatures are not. So, while 13b is felicitous, 12c is not. An implicature is detachable iff the substitution of a truth-functionally equivalent utterance preserves the implicature. Conversational implicatures are detachable, but conventional implicatures are not. While 13c licenses the same implicature as 13a, 12b does *not* license the implicature of 12a.

FALL-RISE does in fact pass all of the standard diagnostics for conventional implicature. First, FALL-RISE does not affect an utterance's truth conditions. In all of the examples we have presented of FALL-RISE, the truth of the proposition uttered is independent of

FALL-RISE; that is, the conditions under which a proposition is true will be just those under which the same proposition uttered without FALL-RISE is true.

If presupposition is seen as a semantic phenomenon, it could be claimed that Jackendoff's belief that FALL-RISE affects the presuppositions of an utterance would present a problem for our analysis. Jackendoff (1972:353ff) contends that, while falling intonation denotes 'what is asserted', FALL-RISE denotes 'what is presupposed'. So, for Jackendoff, FALL-RISE on *Fred* in 14 excludes *not* from the presupposition.

(14) Fred doesn't write poetry in the garden. (=Jackendoff's 6.137)

Thus, in this example, the presupposition is 'x writes poetry in the garden' – not 'x doesn't write poetry in the garden'. Jackendoff claims that, with falling intonation on *Fred*, no such exclusion occurs, and the presupposition of the sentence remains 'x doesn't write poetry in the garden'. However, if we provide an appropriate context for 14, as in 15, the utterance *with* FALL-RISE would presuppose 'x doesn't write poetry in the garden', which Jackendoff's system could not account for.[14]

(15) A: Name me one major poet who doesn't write poetry in the garden.
B: \Fred/ doesn't write poetry in the garden.

Thus, even if presupposition (as defined by Jackendoff) is seen as a semantic phenomenon, it is independent of FALL-RISE.

Cutler's claim that FALL-RISE negates the literal meaning of an utterance might also be viewed as counter-evidence to our claim that FALL-RISE does not affect truth-conditions. Consider 16:

(16) A: How do you like my new color scheme? (= Cutler's 22)
B: Not \bad/.

Cutler interprets B's response in 16 as conveying 'the speaker's opinion that the color scheme is not good.' (1975:112) We argue that *not bad* is <u>not</u> equivalent to *good*, but rather that *good* and *bad* represent poles on a continuum of values. The negative quality Cutler attributes to this example does not result from FALL-RISE but from the SCALAR IMPLICATURE which A is entitled to infer from B's response, i.e. that the higher value *good* is false or unknown to B. (See Hirschberg 1985.) Hence the inference on A's part that B believes that the color scheme is not good. So, FALL-RISE does not negate the literal reading of the utterance and thus does not affect an utterance's truth conditions in this way.

Second, FALL-RISE is detachable. A truth-conditionally equivalent proposition uttered without FALL-RISE does *not* convey the uncertainty associated with FALL-RISE. So, the substitution of falling intonation for FALL-RISE in any of the examples given above simply eliminates the uncertainty. For example, falling intonation on *proposals* in 11 simply conveys B's belief that the existence of 'proposals' constitutes a counter to A's claim. In 10, falling intonation on *speak* conveys B's certainty that the information that she has heard Michael B. speak will satisfy A's query. And, in 9, falling intonation on *had*

indicates that B believes information about a past team will be relevant for A.

Third, the contribution of FALL-RISE is not cancellable. In 17a, B's response may convey uncertainty about whether any scale at all is appropriate; that is, "Do you need a nickel or just five cents?"

(17) A: Do you have a nickel?
  a. B: I have a \dime/.
  b. B: #You're in luck – I have a \dime/.
  c. B: You're in luck – I have a \dime.

However, in 17b, B's response seems contradictory, because the first clause appears to contradict the uncertainty conveyed by the second. Note that 17c – with falling intonation – is fine.

Given that the understanding FALL-RISE induces passes these tests, we conclude that FALL-RISE conveys this understanding via conventional implicature. Furthermore, we believe that, at least in the current Gricean framework, there is no principled basis upon which conventional implicatures derived from intonational phenomena can be distinguished from those derived from *non*-prosodic phenomena. So if, like Karttunen and Peters (1979), one attempts to extend a model-theoretic semantics to account for conventional implicature, FALL-RISE must be included in this extension. If other intonational contours convey conventional implicatures as well, then these must receive similar treatment.

5. Conclusion

It seems to us that the controversy over the location of intonational meaning in linguistic theory stems from the peculiar theoretical status of conventional implicature. While the non-truth-functional aspect of conventional implicature points to a pragmatic phenomenon, its context-independent aspect suggests a semantic phenomenon. No one would claim that *all* prosodic phenomena convey conventional implicatures, although we suspect that such a claim could be made for CONTRASTIVE STRESS and CONTRADICTION CONTOUR, for example. Regardless of which other contours turn out to generate conventional implicature, if our analysis of FALL-RISE is correct, then whatever status is ultimately assigned to conventional implicature in linguistic theory must also be assigned to FALL-RISE.

Notes

[1]We would like to thank Dave Graff for his assistance in the preparation of the spectrograms used in our analysis and Franz Seitz for his help in recording the contours. We also thank Janet Pierrehumbert for her comments on our phonetic description of FALL-RISE, and Martha Pollack and Ethel Schuster for providing some of our naturally occurring data.

[2]These data were collected by the authors and others from November 1983 through January 1985.

[3]Cf. Ladd 1980.

[4]The spectrograms presented below were produced with the help of Dave Graff, using the Interactive Lab System. The tape recordings were digitized at a sampling rate of ten KHZ and analyzed for F0 estimations using a combination of zero-crossing and cepstrum computations.

[5]Pierrehumbert (1980) identified the A-RISE contour as H* L- H%. However, it is not clear whether this phonological distinction between H* L- H% and L-+H* L- H% triggers any semantico-pragmatic differences (Pierrehumbert, p.c.). What is clear is that both differ from our FALL-RISE.

[6]For a more comprehensive discussion of the controversy surrounding the 'meaning' of FALL-RISE, see Ward and Hirschberg (To appear).

[7]But see Bolinger (1982) for apparent counter-examples to Ladd's claim.

[8]In this and subsequent examples, $\backslash x/$ is used to identify x as the accented syllable, and '#' to denote pragmatic infelicity.

[9]Our analysis of FALL-RISE is based on a corpus of naturally occurring tokens collected by the authors and others from service encounter exchanges, radio and television programs, and informal conversations. For each of the naturally occurring examples provided in this paper, we had access to either the speaker's or the hearer's own interpretation of the discourse.

[10]R is reflexive iff for all $b_1 \in B$, $b_1 \; R \; b_1$. It is ANTISYMMETRIC iff, for all $b_1, b_2 \in B$, ($b_1 \; R \; b_2$ and $b_2 \; R \; b_1$) $\rightarrow b_1 = b_2$. It is TRANSITIVE iff, for all $b_1, b_2, b_3 \in B$, ($b_1 \; R \; b_2$ and $b_2 \; R \; b_3$) $\rightarrow b_1 \; R \; b_3$. R is IRREFLEXIVE iff, for all $b_1 \in B$, $b_1 \not R b_1$. R is ASYMMETRIC iff, for all $b_1, b_2 \in B$, $b_1 \; R \; b_2 \rightarrow b_2 \not R \; b_1$. A relation satisfying the first definition of poset is *is-as-tall-or-taller-than*, and one satifsying the second is *is-taller-than*. Note that we can always start with a relation satisfying the second definition and produce one satisfying the first simply by adding an equality disjunct to the relation, as with the *is-taller-than* relation. For simplicity's sake, we will employ the the second definition below.

[11]Although one may define posets on singleton sets, we exclude such posets from our definition of scale. The only relationship such posets can model is one of simple equality, and we have defined the notion of scale to capture relationships *between* distinct VALUES on scales.

[12]Grice (1978:121-23) suggests that some stress might be regarded as a means of conveying implicatures. While he believes this interpretation holds for so-called 'default accents', he is unsure about whether it can be extended to cover other types of stress. Culicover and Rochemont, in passing, suspect that 'particular contours define conventional implicatures' (1983:126, Note 3), but do not go on to investigate this possibility.

[13]Grice and others have recognized certain problems with these tests insofar as they can be used to identify conversational implicature, in particular the fact that they are not sufficient; this difficulty is true for conventional implicature too.

[14]Gussenhoven (1983:79) makes a similar observation.

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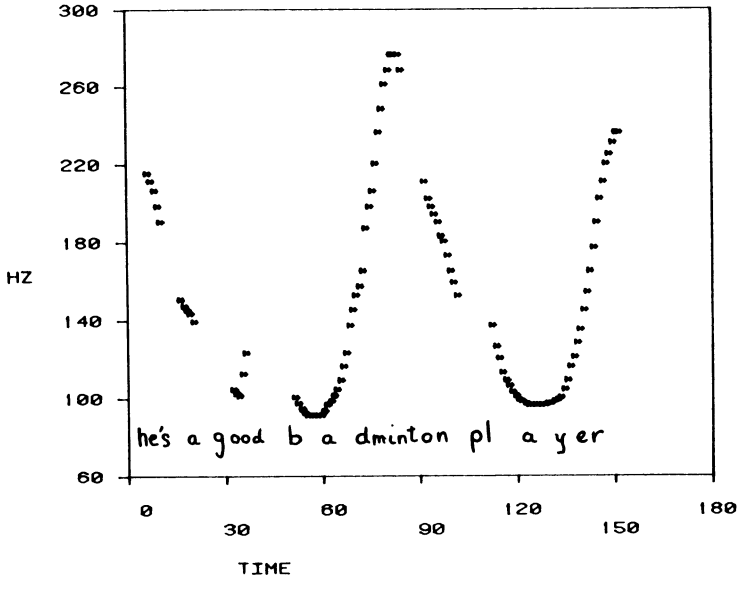

Figure 1: The FALL-RISE Contour

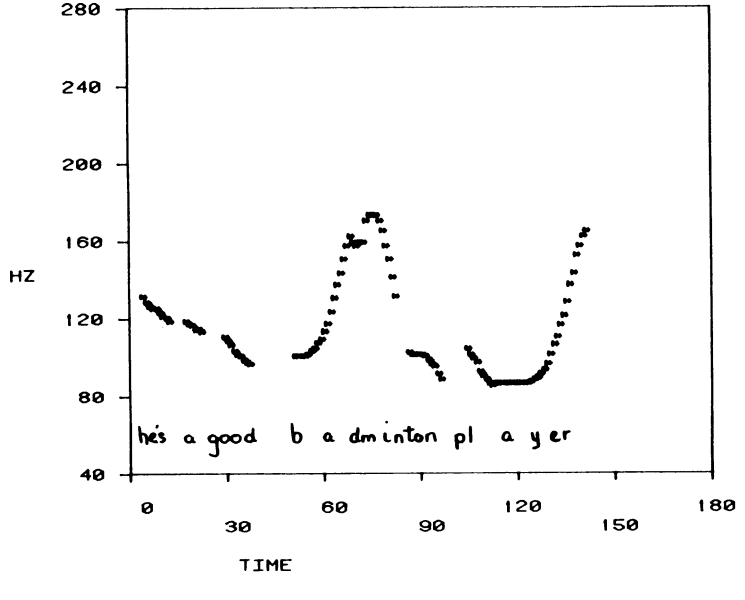

Figure 2: The A-Rise or AC Contour