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**A Semantic Analysis
of the Nuclear
Tones of English**

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Summary

It is hypothesised that the nuclear tones of English are morphemes with independent, consistent meanings. The variability in their semantic effect is argued to be a function of the speaker's communicative intentions. It is demonstrated that this variability can to a large extent be accounted for by specifying (1) whether the communication is speaker-serving or hearer-serving, and (2) whether the meaning of the tone is employed literally or metaphorically, and if the latter, what the meaning refers to.

It is demonstrated that English has three tones: the fall, the fall-rise and the rise. Additional tone variants are produced by the application of a number of phonetically specifiable modifications, which are also assigned morphemic status. A modification is thus both phonetically and semantically constant across tones. Modifications and tones are like columns and rows in a matrix. The phonetic and semantic effects of the modifications on the tones are discussed, and pitch contours are given of the twelve resultant tones (three unmodified and nine modified tones). In addition, range is postulated as an independently specifiable, gradient variable. It, too, is given semantic status, and its meaning is argued to be independent of those of the modifications. The analysis attempts to present the facts in terms of an autosegmental framework. The modifications as well as a tone linking rule are taken to lend support to the superiority of such a description. The article concludes with and a discussion of a few alternative proposals.

The discussion is with reference to standard British English. However, most of the conclusions may be equally applicable to American English, and literature dealing with data from either variety is taken account of where this seems relevant.

1.0 INTRODUCTION

Proposals concerning the relation between intonation and meaning vary along two dimensions.¹ The first is the segmentation dimension, which determines how the analyst cuts up the intonation contour into commutable chunks. The second dimension determines the manner in which the analyst views the contribution of intonation to the meaning of the utterance. On the segmentation dimension, proposals range from the structuralist pitch level analyses (Wells 1945, Pike 1945, Trager & Smith 1951) to holistic contour analyses (Lieberman & Sag 1974, Sag & Lieberman 1975, Glenn 1977), i.e. from 'atomistic' to 'global' (Bolinger 1972a:51). For the second dimension, the image of a unidimensional scale seems less appropriate. Rather, proposals lie around a centre of linguistic normalcy. Examples of extreme positions may be O'Connor & Arnold's (1973) (implicit) suggestion that the meaning of intonational units varies with sentence type and lexical content, or Glenn's (1977) exploration of the thesis that whole contour shapes are linked to particular speech acts. I call these positions extreme, because they deviate greatly from what linguists would so far seem to have established language is like. There are, as far as I know, no examples of morphemes whose meaning changes when the context is changed. Usually, it is either assumed that there is a case of homonymy - in which case both meanings should in principle be employable in any context - or that different contexts force different interpretations of the morpheme's meaning - in which case it is believed that a characterisation of that meaning can be given that underlies all instances of its use. (Compare, for example, the interpretations of blue in The bay was blue and My hands are blue (with cold).) And, apart from the isolated case of please as an unambiguous marker of the speech act 'request', it is not generally believed that there exist any kind of one-to-one correspondences between linguistic forms and speech acts, or between utterance acts and illocutionary acts

(Searle 1969). Indeed, the concept of speech act seems so important partly because there is not.

There are therefore two decisions that a semantic analysis must face before it can get under way, one on segmentation and one on distance from linguistic normalcy.

1.1 SEGMENTATION

The units that are recognised here are the 'nuclear tones' of the British tradition of intonation analysis (Palmer 1922, Kingdon 1958, Schubiger 1958, Crystal 1969, Halliday 1970, O'Connor & Arnold 1973, Brazil 1975, 1978). Nuclear tones are pitch configurations like 'fall', 'rise', 'fall-rise', 'rise-fall', 'level', which are associated with an accented syllable and any following unaccented ones. While details of mapping may vary from tone to tone, tones will typically expand and contract depending on the length of the stretch of speech they are mapped onto. Minimally, this stretch is one syllable long (the accented syllable). There is no upper limit, as there is no principled limit to the amount of unaccented speech that can be produced after an accented word.

Within this tradition there are considerable differences of opinion regarding the identification of tones. It is not generally recognised, for example, that a fall-rise which is mapped onto a longish stretch of speech, as in

(1) Isn't that where **YOU** were thinking of going then?

where the fall-part is mapped onto you and the rise-part onto the last syllable (then), is in fact a single tone. Some analyses have it that (1) constitutes a sequence of two tones, others that it contains a compound tone, which has the special characteristic of marking two syllables as ac-

cented - or 'tonic' (Halliday), or 'nuclear' (Crystal) - but at the same time that of creating a certain bond between them. In the present analysis, the unitary interpretation of instances like (1) is adopted, i.e. it is assumed that in (1) there is a nuclear tone, the fall-rise, on you, which may commute wholesale with such phonetically less complex tones as the rise or the level tone, always marking only the accented syllable you. For arguments supporting this solution see Gussenhoven (in press).

There is also disagreement about the inventory of nuclear tones: authors differ with respect to their number and the relations between them. Thus, Brazil et al. (1980) assume that the 'rise' is a reinforced variant of the 'fall-rise', while others see these tones as different and unrelated. In this article, a structure of the nuclear tone paradigm is presented in the course of the exposition of the meanings of the tones.

Finally, although in the mainstream of the tradition there seems to be general agreement on there being only a single nucleus in a tone group, authors may differ with respect to the number of tone groups a given utterance consists of, and hence on the status (prenuclear or nuclear) of certain accented syllables. For a discussion of this question and an alternative view, see Brown et al (1980). In section 10 it is suggested that it is not only the last accented syllable in a tone group that is assigned a nuclear tone. All accented syllables must address the paradigm of nuclear tones. Sequences of tones may be linked by tone linking rules, whose application may produce contours that elsewhere are classified as 'head contours' (pre-nuclear pitch configurations).

1.2 MEANING

The assumption of linguistic normalcy dictates that the units one identifies as the commutable chunks of the contour are units that make up a system in much the same way that segmental units do. Intonation is, in this view, not on a par with segmental phonology, but is more like the system of syntax/lexis. That is, it is a system of morphemes and of rules that operate on those morphemes to produce well-formed surface structures. The products of the two systems will have to be mapped onto each other, without giving one of the two priority over the other. A superficial comparison of the two systems reveals the following differences:

- a. Since for the expression of intonational units there is only a single, unitary phonetic variable available (fundamental frequency against time), but for the expression of segmental morphemes a far more richly exploitable, complex phonetic variable (spectral composition against time), the linguistic subsystem of intonation is likely to be vastly less complex than the linguistic subsystem of syntax/lexis.
- b. Also because of this difference in phonetic packaging, units in the linguistic subsystem of intonation are much less easily identifiable than units in the linguistic subsystem of syntax/lexis, where cues to correct segmentation can fairly readily be found in changes in spectral composition (cf 't Hart & Collier 1975: 237). In fact, there is even no guarantee that segmentation should proceed in linear fashion, as some units might intertwine with other units, and/or may have differently-sized domains from others. For example, it may well be necessary to consider a high range fall-rise to consist of two non-linear units: a fall-rise and an option 'high range'.

It is, however, more revealing to consider the similarities that emerge when the assumption of linguistic normalcy is made. Three points can be made:

1. Just as between syntax/lexis and surface structure there is a level of formal organisation providing 'a bridge between form and substance', specifying how 'the given language organises its resources in such a way as to carry (or 'expound') its grammatical and lexical patterns' (Halliday 1967a: 9), so we may recognise a level between the intonational system and F \emptyset variations. That is, if we choose to postulate the 'fall' as an intonational morpheme, representing it HL (à la Goldsmith 1976), then H and L could be seen as purely formal units making up the morpheme HL, in a way similar to that in which English /t/ and /i(y)/ make up the morpheme tea. Observe that either type of unit can enter into other well-formed sequences (cf. eat and LH, or 'rise').
2. Cross-linguistic comparison of intonational data should be based on a morphemic analysis of the languages concerned. If there are such things as syntactic universals, we do not, after all, expect to find them in the phonologies of the languages concerned. English and Dutch will be said to have the syntactic option [\pm plural], despite the fact that the phonological shapes of their morphemes differ. In the same way, we should be prepared to expect a morpheme that in one language or dialect comes out as HL, to appear in another as LHL (cf Ladd 1981).²
3. Just as lexico-syntactic choices are assumed to have consistent meanings that are independent of whatever other choices go into the making of any utterance, so intonational choices should be expected to have such meaning. The meaning of 'perfect', or of the adverbial clause conjunction 'if', however varied their contributions to the interpretation of a collection of utterances they happen to occur in may look,

are (assumed to be) essentially independent of those utterances, and therefore, if we try hard enough, we ought to be able to give them a unique characterisation. Why are we inclined to expect the meanings of intonational units to be different in kind? Why should not the meanings of nuclear tones be so describable? When Cutler (1977) says: 'No proponent of the "contours-have-meaning" proposal is foolhardy enough to claim that contour meanings are specific, referential, and analogous to word-meanings', we should be careful not to be misled into assuming that intonational meaning is principally different from what we have so far believed linguistic meaning is like. It would be foolhardy, too, to assume that intonational meaning is variable, depends on other choices it combines with, and cannot therefore be given specific characterisations. If this was true, how would language be learnable? Just how many combinations of tune and text are there? It must be added that Cutler's remark was made in the context of a proposal that involved assigning meaning to entire, tone group-long contours, a proposal she rightly rejects. It is important, however, to prevent her comments from being read in a more general light, as applying to the concept of intonational meaning as such. When she points out, for example, that intonation contours 'can be shown to be context-dependent to such a degree that the attempt to extract from them an element of commonality valid in all contexts must be reckoned a futile endeavour', it may well be true that this is in fact a hopeless exercise, but certainly not a pointless one, as this is precisely what linguists should see as a major research objective in the area of intonation. Note also that such context-dependency of 'meaning' is rarely seen as a prohibitive phenomenon in other areas of linguistic research. No one would ever maintain that the meaning of Didn't John kiss Mary cannot be got at because that meaning is so context-dependent:

(2a) (BOY!) Didn't John kiss MARY!

(2b) (I SAY) Didn't John kiss MARY?

(2c) (You don't SAY!) Didn't John kiss MARY?

There is, as far as I can see, no a priori reason to go on the assumption that intonational meaning is different from linguistic meaning generally, and I will therefore here tentatively assume maximum linguistic normalcy for the nuclear tones of English. Deviations from this position will have to be forced by the data, and justified: the burden of proof now lies where it ought to lie.

2.0 ON THE SORT OF MEANING INTONATION IS CONCERNED WITH

An intriguing paradox that emerges from even a cursory inspection of the semantic effects of intonational phenomena is that these effects seem extremely vague and subtle in one situation, and unambiguously precise in another (cf Liberman 1975: 142). Proposals for the description of intonational meaning (tacitly or explicitly subscribing to a position of normalcy) reflect this paradox. Cruttenden (1981) proposes a number of vague notions like 'open' and 'closed' as the meanings of rising and falling contours respectively. Similarly, Bclinger (1982) speaks of 'non-finality' and 'finality' for the same concepts. On the other hand, very specific proposals have been made. Liberman & Sag (1975) have identified a contour that means 'contradiction', and Ladd (1977) proposes that the fall-rise tone signals that the referent of the word marked by it is tagged as one of a defined set of similar referents.

Before attempting to assign specific meanings to intonational units, therefore, it would seem to be prudent to consider the question of what kind of meaning intonation is concerned with. Even if we assume that intonational meaning is linguistic in nature, we are still left with a great deal of latitude. The definition of the meaning of bachelor can be more specific than the definition of the meaning of this. While the former can be given in terms of easily identifiable properties of things in the world (adulthood, maleness and unmarried status), a characterisation of the meaning of this must be vaguer in that in addition to the properties 'sing-

larity' and 'definiteness' we must have recourse to some such ill-defined notion of 'intimacy of association with the speaker'. Compare, for instance, Can I have this apple? and Can I have that apple? in a situation where physical distances between speaker, hearer and apple are constant (at table, say). It can even be said that while the use of this as opposed to that clearly results from a choice from a linguistic paradigm, the effect of either option is wholly attitudinal. A similar point can be made with the help of quite a number of 'segmental' options (Dutch diminutives, English progressive, etc.).

If it is claimed, as was done in the introduction, that the meanings of the nuclear tones of English are constant, this does not imply that it is postulated that those meanings are therefore as easily specifiable as the meanings of many 'major class' segmental morphemes. What we should expect, however, is that the meanings of terms in the same paradigm are concerned with a particular kind of meaning. Man, woman, boy and girl are variations on a common theme of humanness, and this/these and that/those are placed along some dimension of 'intimacy of association with speaker'. Clearly, if linguistic normalcy obtains in the paradigm of nuclear tones, a similar common denominator ought to be identifiable. It is for this reason sound policy to avoid assigning meanings to only part of the paradigm of nuclear tones, leaving the meanings of others for future analysis. The danger here is that the perspective on the paradigm as a whole is lost, and that meanings are proposed that later turn out to clash with those of the others.

In the area of intonation there is at least one semantic concept which, however problematic its definition has turned out to be, is uncontroversial in that its existence is generally acknowledged. This concept is focus, or the division of the sentence into a part that is 'given' and a part that is 'new' (e.g. Halliday 1967b). In view of the variety of (non-intonational) interpretations that these terms have been given (Brown 1982), it is justifiable to present the distinction in somewhat

different terms: every sentence (fragment) obligatorily has all or part of its material marked as [+focus]. This material is thereby semantically marked as the speaker's 'contribution'. The (optional) part that is not so marked, the [-focus] material, is thereby presented as the 'starting point' for that contribution. While certain structures or exchanges would appear to require particular focus distributions, the speaker is generally at liberty to choose his focus distribution according to his intentions (cf Bolinger 1972b).

In other words, part of what intonation is used for is to mark the status of the information conveyed by the sentence with respect to a 'background' (starting point) hypothesised by the speaker. For every sentence he uses, the speaker must decide how much of it he will mark as his contribution, and what he will leave as his starting point. For example, in (3), which gives different versions of an answer to And who was born in Idaho?, the speaker understandably marks daddy as his contribution, the requested bit of information. (In this example, underlining symbolises [+focus].)

(3a) Daddy

(3b) Daddy was born in Idaho

(3c) Idaho is where daddy was born

Focus distributions are realised by sentence accents: the focus distribution in B's answers in (3abc) is signalled by a sentence accent on daddy. (As is well-known, there is no bi-uniqueness here: a sentence accent on a particular word may be the result of more than one focus distribution, and there are therefore numerous ambiguous sentences.) Sentence accents do not have a unique phonetic realisation (cf Bolinger 1958), and a mere identification of the position of the sentence accent leaves the surface structure grossly underspecified. This variation in the realisation of sentence accents is primarily due to the fact that for every sentence accent the speaker must make a choice from the paradigm of nuclear tones.³ Now, if sentence accents, which as we have seen are there to realise the

speaker's focus options, receive a further specification in terms of the F \emptyset movements that nuclear tones consist of, it is natural to assume that the semantic contribution of these tones consist in a further specification of the status of the 'contribution' with respect to the 'background'. Specifying the focus distribution is not enough: the speaker must specify what relationship exists between contribution and background. It is proposed that it is this relationship that provides the common element in the semantics of the nuclear tone paradigm.

3.0 THREE NUCLEAR TONES AND THEIR MEANINGS

To continue to argue in this abstract way for just a little longer, we may say that linguistic communication can be seen as a process whereby participants strive towards some common understanding about a particular segment of the world. The understanding they think they have reached at any one point in that process is called the background. Background should thus not be seen as some grand, static backcloth of knowledge against which that communication takes place, but rather as a miniature body of knowledge, which has either been explicitly created as a result of the exchanges so far, or is felt by the speaker to be implicitly called up by those exchanges, by virtue of common-sense hypotheses about the hearer's knowledge of the world which the speaker judges to be relevant to his purpose of reaching that common understanding. Because the word 'contribution' is semantically rather close to the meaning of one of the tones to be formulated below, this term will from now on be replaced with the more neutral term 'Variable'.

Three options are available. These options are here termed manipulations.

1. The speaker may add the Variable to the background (ADDITION);
2. The speaker may select a Variable from the background (SELECTION);

3. The speaker may choose not to commit himself as to whether the Variable belongs to the background. Since by far the most common purpose for which this option is employed would appear to be characterisable as the speaker's testing whether a Variable belongs to the background, this option is referred to as (RELEVANCE) TESTING. It should be remembered, therefore, that the term strictly refers to the meaning given earlier.⁴

These meanings are expressed by (1) the fall, (2) the fall-rise and (3) the rise. These are therefore proposed as the three basic tones of English. They are the only ones that are independent of each other, all other tones being modifications of them. Observe that, in different ways, both SELECTION and TESTING are opposites of ADDITION. The first opposition is that between 'putting in' and 'taking out', the second between 'putting in' and 'not putting in'. ADDITION and SELECTION may be compared with Brazil's notions of 'proclaiming' and 'referring', respectively (Brazil 1975).

While the meanings identified above clearly belong to the less easily identifiable kind, they do satisfy the requirement of being constant across utterances. The evident variability that is encountered in actual data (cf O'Connor & Arnold 1973) should therefore be accounted for as resulting from pragmatic computations, into which enter such variables as the (textual and situational) context of the utterance, its lexico-syntactic composition, and intonational phenomena that are independent of the nuclear tone itself (such as the height of unaccented syllables, cf Bolinger 1970). This article does not pretend to even begin to approach the problem of the workings of these computations. Nevertheless, it would appear to be possible to bring about some order in the wide variety of semantic effects of nuclear tones. This can be done by introducing the distinction speaker-serving/hearer-serving and the distinction between literal and metaphorical orientation. The first distinction is binary: the tone is either speaker-serving or hearer-serving. It is discussed in

section 4. The second is multiple: it is determined by whether the manipulation refers to the Variable (in which case the manipulation is literal) or to some other aspect of the speech situation (in which case it is metaphorical). These aspects, as will be seen, include the relation between speaker and hearer, the textual structure, and the locution. This distinction is discussed in section 5.

4.0 SPEAKER- AND HEARER-SERVING TONES

The choice between speaker-serving and hearer-serving manipulations is determined by whether the manipulation is employed for the benefit of the speaker or for that of the hearer. The meanings of the nuclear tones given above acquire a more specific character when this distinction is applied to them: different interpretations emerge depending on which is used. Table 1 paraphrases these meanings, illustrating them with (is) a unicorn as the Variable. Observe that all uses are literal: the manipulations always refer to the Variable. The following comments should be made:

1. Hearer-serving orientations cannot be made in the absence of a hearer. Speaker-serving orientations may, but need not, be made in the absence of a hearer. In fact, speaker-serving manipulations are often used to let the hearer know what the position of the speaker is with respect to the latest (attempted) update of the background. Often, too, the manipulation may be deliberately ambiguous. When two participants in a quiz game are together trying to guess the answer to the question It's animal, mythical, and often figures in discussions on semantics, an utterance It's a \UNicorn! by one of them might well be ambiguous between speaker-serving and hearer-serving, the hearer being either the quizmaster or the other participant or both.

2. Observe that in the intonational system there is no marker for a category 'interrogative' comparable to subject-verb inversion in syntax. There are, however, combinations of tone and the 'serving' parameter that produce speech acts that can be described as 'requests for information', independently of the syntactic option 'interrogative/affirmative'. Speaker-serving TESTING addressed to the hearer is perhaps the clearest case: the speaker unambiguously appeals to the hearer to resolve his TESTING, and an answer is required. But also speaker-serving SELECTION can serve as a question. The difference is that because of the SELECTION, the hearer is not so much called upon to resolve the issue as to confirm the speaker's 'discovery' that the Variable is in fact part of the background (cf the examples in Table 1). It would even be possible for ADDITION to function as a question (again, if speaker-serving). In such situations the speaker enables the hearer to give only a perfunctory (dis)confirmation of the 'question'. Because of its lexis, It's a \UNicorn is perhaps not easily forced into such a context. Imagine, however, a conversation between a boy and a girl - I owe the example to B (1982) - in which the boy says I'm going to Gone with the Wind tommorrow, at the Calley, to which the girl replies

(4) You're going with \BETsy

The girl knows he frequently goes out with Betsy. With her utterance she tentatively adds the Variable to the background, leaving the boy free to correct it, if necessary, without having to feel that the answer is going to be of any importance to the questioner, who after all, by not using TESTING, never indicated that the answer was really needed for an update of their background. The effect, of course, is that it is now not relevant that it was she who asked the question. The boy can say No, I preferably see such films by myself, without needing to feel as if he is turning down an offer for a date.

3. It may be hypothesised that the frequency distributions of speaker-serving and hearer-serving vary with tone. Speaker-serving may be expected to be less frequent than hearer-serving in the case of ADDITION, but more frequent in the case of TESTING. Observe that hearer-serving TESTING is not restricted to the production of the speech act 'challenging'. It could also be used to 'suggest' (with the Variable of Table 1, this would give us 'How about unicorn as the answer to the question'), or to give gratuitous characterisations of the type occurring in But it's \TRUE, /DUMbo.

Table 1. The meanings of three nuclear tones with (a) speaker-serving and (b) hearer-serving manipulations

	Speaker-serving	Hearer-serving
ADDITION	<p>'I add to the background for my own benefit' → 'I infer this is background' (OF \COURSE!) It's a \UNicorn!</p>	<p>'I add to the background for your benefit' → 'I tell you this is background' (/SEE?) It's a \UNicorn!</p>
SELECTION	<p>'I select this V from the background for my own benefit' → 'I take note of the fact that this is (was) background' (/REALLY?) It's a \UNicorn!?</p>	<p>'I select this V from the background for your benefit' → 'I remind you of the fact that this is background' (After \ALL) It's a \UNicorn!</p>
TESTING	<p>'I choose not to commit myself as to whether this V is background for my own benefit' → 'I ask you/ I wonder*) if this is background' It's a /UNicorn? *)depending on whether a resolution of the manipulation is elicited</p>	<p>'I choose not to commit myself as to whether this V is background for your benefit' → 'Make up your mind as to whether this is background' It's a /UNicorn! (e.g. angry zoo visitor daring an attendant who has just mocked him by telling him a certain animal is a unicorn, to say that again)</p>

5.0 LITERAL VERSUS METAPHORICAL ORIENTATIONS

Where intonational morphemes of the type we are concerned with differ importantly from most segmental morphemes is in the extreme flexibility of their 'orientation'. Instead of referring to the Variable (literal orientation), the manipulations may refer to a variety of aspects of the speech situation (metaphorical orientations). The aim of this section is to demonstrate, by means of a number of examples of both literal and metaphorical uses of the three tones, that the relations that were established between the point of orientation and the background remain constant, despite the great variety of interpretations and implications that emerge.⁵

5.1 LITERAL ORIENTATIONS

Literal orientations are of two types. In the first type, the manipulation refers to the speaker's Variable, in the second it refers to the Variable elicited by the speaker from the hearer. The latter type is referred to below as transferred literal orientation.

5.1.1 Untransferred literal orientations

To put the discussion in its right perspective, consider first what may be regarded as a canonical case of literal orientation: the answer to a question for information.⁶ In this situation, the manipulation is most likely to refer to the Variable offered.

(5) A: Where shall we take Aunt Annie for lunch?

B: Howard \JOHNson's

ADDITION is the most reasonable option for a speaker who is merely concerned to commit the Variable to the background in response to the hearer's request to do so. The use of SELECTION would be quite contradictory. B cannot select from the background what A has just unambiguously declared not to be there: A, after all, is concerned to get his empty-restaurant slot filled. At the same time, this explains why B's reply can be well-formed. If Howard Johnson's is the only restaurant in town, B might want to imply 'You know that in our background there only is one restaurant I can fill your slot with, and therefore I am telling you it was already there: Where else could we take her?'. Conceivably, another reason for B to employ this manipulation might have been to signal that A had already asked the question and been given the answer: if B is of a caring and patient disposition and A a geriatric whose memory has deteriorated, (6) would again, be a possible answer.

(6) Howard ✓JOHNson's

The use of TESTING would signal that, although B offers the information, he chooses not to add it to the background, possibly because he wishes to allow A to give an opinion on his choice first. The effect is that of a proffer-suggestion:⁷

(7) Howard \JOHNson's?

Observe that it is not claimed that a given combination of manipulation and orientation results in one particular interpretation. Just what semantic effect will be achieved is still, as Gunter (1972) and Cutler (1977) observed, context-dependent. If in (7) we change the context so as to make it an answer to What's the best restaurant in this place?, (7) might well be interpreted as 'uncertainty' rather than as 'proffer-suggestion', and if we changed it into What's the best restaurant in New York?, (7) would be interpreted as signalling 'sarcasm'. What is claimed is that such interpretations can ultimately be traced back to interactions between manipulation and context.

5.1.2 Transferred literal orientations

A somewhat different type of literal orientation occurs in questions. In what - on a purely intuitive basis - could be regarded as a 'neutral' situation, the manipulations in requests for information do not refer to the Variable in the question, but to (the speaker's appreciation of) the status of the requested bit of information. Strictly speaking, this should be classed as a metaphorical orientation, but because of the evident unmarked nature of this situation, the type is classed as a case of transferred literal orientation.

ADDITION, then, in an utterance like (8):

(8) Have you got \CHILDren?

does not simply cause the speaker to put the Variable 'Q have children' in the background, but signals that the hearer's answer is going to have to

be an addition to the background. Example (8) would thus fit quite appropriately in conversations in doctor's consulting rooms, police stations and in who-are-you-type quiz games. Observe that in (4) we had a case of an untransferred literal orientation. There, the speaker was concerned merely to add the question to the background as her contribution to the continuation of the conversation. If in (4) we transferred the manipulation to the requested bit of information, we would thereby turn the speaker into a determined interrogator, who, for some reason known only to herself, needed to have the answer, which interpretation would obviously be quite inappropriate. (In either case, the question would be speaker-serving.)

Transferred literal SELECTION might seem an internally contradictory option. By asking the question, the speaker signals that he does not know the answer, but by using SELECTION he indicates that the answer is already part of the speaker's and hearer's background. In fact, Sag & Liberman (1975) explicitly characterise this intonation as 'strange' (cf their example 7a). Yet, it is precisely when we create the contradictory situation sketched above that the option becomes possible. Example (9) could be spoken to a child in a 'reminding' fashion, without in the least sounding unnatural:

(9) Now where did you put it ▼YESTerday?

which question implies that the answer is really already present in the background. However, if WH-questions are to serve as command-suggestions, the intonational morpheme SELECTION should really be avoided, as the contradiction created defies interpretation: 'I urge you to do X - X, in view of your behaviour, not being something you had already thought of, and I remind you of it'. That is, the speaker is trying to 'add' the Variable ('command-suggestion') and 'select' it (fall-rise) at the same time:

(10) ??Why don't you go and talk to somebody ▼ELSE?

But if we move the command-suggestion in the direction of a reminder again, it becomes immediately less strange for it to have SELECTION. If one was giving helpful hints to a child on how best to colour in the sea in his or her picture book, (11) is perfectly natural:

(11) Now why don't you use the ✓BLUE one?

especially if the blue crayon had earlier been used for a similar purpose.

TESTING with this orientation ought to imply that the questioner does not, as yet, consider that the answer will necessarily be relevantly part of the background. This may, again, seem to result in a somewhat contradictory speech act, but it is in fact far from infrequent. If we transpose (8) from a situation in which the speaker was a concerned psychiatrist, probing whether the client's complaints are related to his or her (not) having children (ADDITION) to the office of a civil servant responsible for the granting of welfare benefits, the question might well have criterion-status, in the worst case implying that if the answer is 'no', the interview will be terminated. TESTING with transferred literal orientation would then be a suitable option.

(12) Have you got ✓CHILDren?

Another user might be the participant in a quiz game, who, after drawing a blank on a number of questions with ADDITION, asks another with a rise, in order to imply that now he is at a loss and is probably, again, not going to hit on the right kind of information that will be relevant for a further definition of the background. Not surprisingly, too, the option can have a casual, perhaps even uninterested effect, if it is meant to signal that the answer is really not going to matter one way or the other:

(13) A: I'm going on a \HOLiday

B: Where are you ✓GOing?

In the analysis presented here, the often observed tendency for falls to be more frequent with WH-questions than for polar questions may be related to the tendency for speakers to (pretend to) have a better defined idea of what information they are after when asking a WH-question than when asking a polar question, and accordingly consider it less necessary to doubt that the information will be relevant for a further development of the background.

5.2 METAPHORICAL ORIENTATIONS

5.2.1 Manipulations referring to the initiation of the conversation

When a speaker opens a conversation with (14)

(14) ▼Mary

he is, quite obviously, not using SELECTION in the sense that he is highlighting the part of the background occupied by Mary: he is not reminding the hearer of her existence. Here, the manipulation refers to the status of the hearer as a participant in conversations with the speaker: it is this that the speaker presents as part of the background. Note that SELECTION is quite inappropriate as an 'initiatory' manipulation if the speaker cannot so take the hearer for granted as a participant in discourse, say, if the speaker was a schoolboy and the hearer his headmaster, or, indeed, if his hearer were his pet cat.

If in this same metaphorical usage, TESTING is used, the meaning would have to be: 'I cannot (as yet) commit myself as to whether the initiation

of this conversation can be put in a background' or 'I am testing the relevance of my initiating', an option that would obviously be appropriate if the speaker was addressing a sleeping patient who may or may not hear the speaker, or if the speaker is not certain if the intended hearer is in fact within earshot.

(15) /MAry?

Again, keeping the orientation constant, a fall (ADDITION) would then mean that the speaker considers the initiation of a conversation with the hearer as an addition to the background: it would create a background where before there was none. We may think of a teacher in a classroom, who, after having asked a question to no one in particular, creates a conversational relation with one of his pupils by saying

(16) \MAry

5.2.2 Manipulations referring to the narrative structure

It is frequently observed in discussions about the functions of intonation that falls signal 'finality' and rises 'non-finality'. An example might be (17):

(17) While John was chattering a^WWAY like this, she crossed to the other side of the /ROOM, and took Uncle Laurie's portrait off the \WALL

The first relation can fairly easily be accommodated in the analysis: the manipulation ADDITION can be said to refer to the textual structure, and

to signal that the linguistic unit concerned, a sentence, say, can be committed to the background: it is 'done'. The function of rises to signal non-finality is less clear, however. In the present analysis, the 'rises' referred to in the first sentence of this section must of course be split into two crucially different sorts, i.e. fall-rises, signalling SELECTION, and rises, signalling TESTING. The fact that both signal non-finality must then be a fortuitous similarity of the effects of different manipulations.

If the manipulations are taken as the starting point for the discussion, then, assuming the orientation is 'textual', the following predictions can be made:

1. Use of the fall-rise will signal that the speaker is dealing with a background for some event yet to be mentioned. It would express: 'You with me so far? Now for the main point.' The manipulation would typically not create suspense, but rather define a setting.
2. Use of the rise would signal: 'I don't want to commit this to the background as yet: there's more to come - you've only got half the story so far'. The manipulation would typically be used to create suspense: the hearer is explicitly told that at that point in the narrative he has only got half the information.

Observe how in (17) these predictions are borne out. First consider how the reader would have produced a considerably less competent product, if he had switched the fall-rise and the rise round:

(18) ??While John was chattering aWAY like this, she crossed to the other side of the VROOM, and took Uncle Laurie's portrait off the WALL

Observe, secondly, that changing the order of the clauses does not help, for, in the competent reading, the tones move with them, as in (19).

(19) She crossed to the other side of the /ROOM - and John just continued to chatter a√WAY to her - and took Uncle Laurie's portrait off the \WALL

where switching the tones round, again, leads to 'incompetent reading'. (Of course, many situations can be thought of in which the orientation of the manipulation is changed so as to make another tone plausible. A teacher reading (19) to a class might opt for a rise in the middle clause in order to warn certain of his pupils: 'Am I still relevantly reading this to you?' is what she might intend her TESTING to mean. Other cases are imaginable.)

On so-called 'listing intonation'

Listing intonation, as in

(20) /BEER /BREAD /CHEESE and \EGGS

is likewise an instance of the use of tones that have the textual organisation as their referent. The speaker chooses not to commit items to the background until the list is complete. As such, listing intonation is not theoretically 'special' in the sense that languages should reserve particular intonation patterns for lists. Put differently, the function of the rises in (20) is the same as that in (21).

(21) And they lived /HAPPily /EVER \AFTER!

Bolinger ([1958] 1965: 55) observes that a prenuclear fall is more likely to express 'unexpectedness' or 'newness', and that a prenuclear rise is more likely to be used for things that have already been introduced. This tendency can perhaps be explained as resulting from the speaker's strategy not to 'waste' an unexpected item on narrative-structure orientation,

but, in view of its importance, to add it to the background straightaway. Indeed, our so-called 'listing intonation' is less likely if the speaker is making a complaint at the police station about a neighbour's misconduct. In (22) the speaker is itemising the reasons for the complaint:

(22) Loose \WOMen, \PONCes, loud \PARTies, co\CAlNE, runaway \KIDS! You
 ✓NAME it, they've \GOT it!

Observe, too, the suggestion of non-finality in (22).

5.2.3 Manipulations referring to the locution

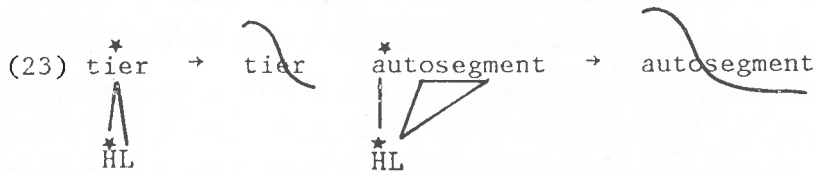
Manipulations may refer to the locution in the case of (first or foreign) language learners. Children learning to read may use rises for no other reason than that they are leaving it up to their hearers to say whether they are reading it right. Similarly, foreign language learners may use rises when reading bits of foreign language, leaving it up to their tutors to judge if they are pronouncing it right. Sometimes, this type of orientation may override the presence of particular tones in an imitation task: although the words may be presented with falls, the imitator may perform locution-oriented TESTING, and thus replace the falls with rises. Clearly, the use of ADDITION in such situations will inevitably make the imitator sound much more confident of his or her performance.

6.0 AUTOSEGMENTAL REPRESENTATIONS

Before we discuss any of the modifications of the three nuclear tones, an excursus on the formal representation of tones is called for. The modifications strongly suggest that the autosegmental approach proposed by Goldsmith (1976) and Leben (1976) (also adopted and developed in their own ways by Liberman 1975, Pierrehumbert 1980 and Ladd (in press)) lead to far more insightful formulations than representations like 'fall', 'rise' or \setminus , $/$ (however useful these devices are notationally) allow. In an autosegmental description of intonation, the segmental (CV) tier is formally separated from the tonal tier. Rules that operate on segments on either tier have - unless special provision is made to the contrary - no effect on the segments on the other tier: the two remain distinct until the event of articulation causes them to co-occur. The timing of the articulation of the two tiers relative to one another is defined by mapping rules specifying the necessary associations between segments on different tiers. Notationally, these take the form of association lines. Mapping proceeds according to both universal conventions and language-specific conventions or rules. There is some controversy over what the correct universal mapping conventions are (Halle & Vergnaud 1982), but, for our purposes, we may adopt Goldsmith's Well-Formedness Condition (1976: 27), which states (a) that association lines do not cross, and (b) that mapping must be exhaustive: that is, all segments on both tiers must be associated. In addition, the association of certain segments is uniquely defined by means of the asterisk convention. Asterisks specify the accented syllable on the

segmental tier and the tonal segment on the tonal tier that is to be associated with it. If there are more syllables than tonal segments, certain tonal segments will spread.

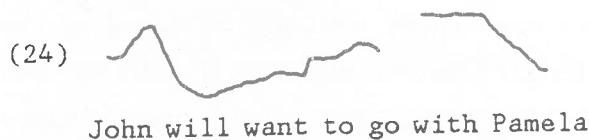
We here assume as a convention that - unless provision is made to the contrary - only unstarred tones can spread. (Cf. Pierrehumbert's tone spreading rule for 'phrase accents', i.e. tone segments coming after the starred segments, which is responsible, for example, for the formation of a mid plateau between the nuclear and the final syllable in a post-rise tail, or a low plateau between these syllables in a post-fall-rise tail (1980: 220).) Thus, if on the segmental tier we have the two morphemes tier and autosegment and on the tonal tier the morpheme $\overset{*}{\text{HL}}$, we get the following results:¹⁰



A preference for an autosegmental framework need not only be based on the fact that the independence of the tonal tier is explicitly part of the theory, rather than some, perhaps self-evident, but unexpressed assumption. The chief justification is that the framework admits of the formulation of significant generalisations that cannot be insightfully captured if pitch movements are labelled and classified as purely phenomenal concepts. Just as calling a spade a spade may be bad advice when one is dealing with the phonological (voiceless) status of Canadian English /t/ as well as with its phonetic (voiced) status in a word like writer, so one must be prepared to see a morpheme that, for good reasons, is classified as a 'fall', actually turn up as a rise on the surface. One example of this happening is when a fall on a non-final syllable is delayed: when we restrict our attention to the accented syllable, we may just observe a rising pitch movement there, instead of a rising-falling one, as in the

case of an undelayed fall. Yet both contours represent instances of the fall. Another example will be discussed in the section on tone linking.

The above comments on the separation of a phonetic level and a more abstract morphemic level, bring out what I perceive as the most important difference between previous autosegmental descriptions of English intonation and the present proposal. Ours bears a greater resemblance to the conventional treatment of segmental phonology. Thus, more or less abstract representations of the same linguistic structure are possible, depending on the extent to which we allow the underlying options to be implemented on the F \emptyset contour. The description is therefore in sharp contrast to that given in Pierrehumbert, who says in her introduction: 'In other languages [than English] rules which alter tonal values or delete tones can apply to such a [phonological] representation. English appears to lack such rules, with the result that the underlying and derived phonological representations of intonation are identical' (1980:11). Although we should be careful not to jump the gun with respect to the description that is to follow, an illustration will make the difference in approach clear. A contour like (24) (e.g. You can't ask John to accompany Mary...):

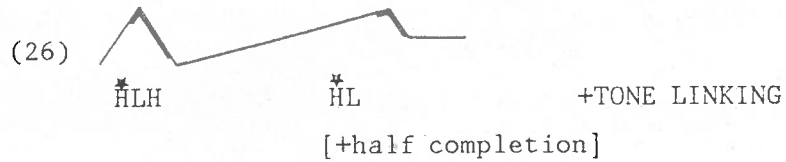


is derived by postulating two accents, one on John and one on Pam-. (This contour and those reproduced in Figures 1 and 3 were obtained with the help of the program SIFT in the ILS package.) For these accents the morphemes 'fall-rise' and 'fall', or $\check{H}LH$ and $\check{H}L$ are used, respectively. If no other options applied, the contour would be realised as (25).



To the second accent, however, the modification 'half-completion' has applied, causing the tail -ela to be realised at mid level ($\check{H}L \rightarrow \check{H}M$). The op-

tional tone linking rule (discussed in section 10) then applies so as to delete the final H of the first tone and to produce a gradually rising slope from (wi)ll to Pam-, as in (26), the diagrammatic version of (24).



In Pierrehumbert's model, the contour would be generated at one go (presumably as H* L- H% H*+L- H- L%). In short, in our approach intonation is a full-fledged linguistic subsystem by the side of the segmental subsystem (syntax/lexis).

7.0 MODIFICATIONS

The fall, the fall-rise and the rise are the three basic nuclear tones of English. Other nuclear tones are created by modifications of the basic tones. Like tones, modifications should be seen as morphemes. That is, a modification is semantically constant across tones. As will be shown, the phonetic specification, too, can be said to be constant across tones. Observe that this formulation implies that for any one tone variant encountered in any data, there will have to be two further variants, representing the other two tones under the same modification: tones thus always come in sets of three.

There are naturally limits to the ways in which nuclear tones, which are basically 'Gestalts' or 'configurations' (Bolinger 1951), can be modified without being altered beyond all recognition. As it is, the formal changes that do occur may seem quite drastic.

There would appear to be four (phonetic) variables that could be exploited:

1. Timing: The association of the tone with the text can vary as a function of time. The modification based on this variable will be discussed as the modification delay.
2. Stretching: The tones can be extended in time by lengthening the syllables onto which they are mapped. This type of

variation is exploited by will be discussed as the modification stylisation (Ladd 1978). It will be seen that the phonetic specifications per tone have to be more detailed than in the case of delay.

3. Completion: The tones can be clipped so as to prevent them from carrying out their canonical, unmodified trajectories: the movement is prevented from crossing the mid level. This modification will be discussed as the modification half-completion. The modification would seem to be less frequently discussed in the literature than either delay or stylisation.
4. Shrinking: The excursions of the tones can be reduced in size, and be carried out closer to the baseline. This variation is not in fact employed in the way the other three are. It is more clearly of a gradient nature than the others, and, more importantly, cross-cuts the others in the sense that all four modificatory states (three modifications and absence of modification) are specifiable for this variable. It will be discussed in a separate section as the variable range.

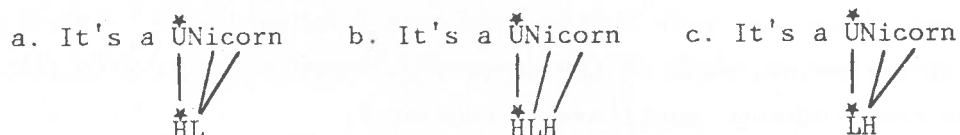
In addition, there are more subtle (and less frequent) ways of exploiting the timing parameter, such as the tempo-differentiation used by the modification crescendoing, mentioned in section 9.

7.1 DELAY

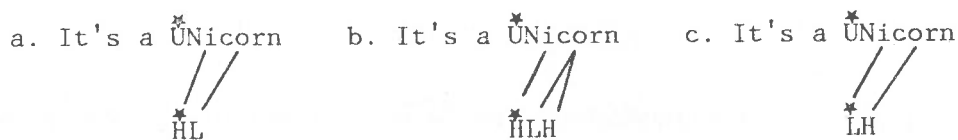
The modification delay postpones the association of the tone with the text.⁸ Delay has recently been independently claimed as a 'peak feature'

by Ladd (in press). It is emphasised that delay is here seen as an operation on tones, not on peaks.⁹ Indeed, as will be argued, it affects the rise as much as it does the fall and the fall-rise. If we represent the fall, the fall-rise and the rise as $\overset{*}{H}L$, $\overset{*}{H}LH$ and $\overset{*}{L}H$ respectively, it is more immediately clear what the effect of delay is. In the unmodified case, the starred element is associated with the nuclear syllable, and following elements are associated as follows: the L spreads to the end of the tail, with the exception of the last syllable in the case of a following H, which is reserved for that syllable; the H in $\overset{*}{L}H$ spreads over the tail, such that the first syllable of the tail is higher than the nuclear syllable and no following syllables are lower (but may be higher). The representation of the delayed fall is now not $L\overset{*}{H}L$, as in Leben (1976) or Pierrehumbert (1980, e.g. Fig. 2.22), but remains $\overset{*}{H}L$: the association of the starred element is simply shifted to the right (and with it the association of the following element, of course). Note that the starred element does not 'spread': it is its association target that is shifted. Similar descriptions apply to delayed fall-rises and rises. In (27) the unmodified associations are given, in (28) the delayed ones.

(27) UNMODIFIED



(28) DELAY



Thus, in (28), (a) is the rise-fall, (b) the rise-fall-rise and (c) the delayed rise, a nuclear tone (variant) I have not found discussed in the literature. It is to be noted that the place of the nuclear syllable in the contour in the case of delayed tones may be marked by a depression if the prenuclear stretch has mid or high pitch. The three delayed variants of the three basic tones are symbolised as \wedge , \wedge and \sim below.

The meaning of the modification delay is: 'This manipulation is very non-routine, very significant', which meaning agrees well with comments about the effect of the rise-fall (and the rise-fall-rise) that are found in the literature (e.g. O'Connor & Arnold 1973: 78-82, Gimson 1980: 271).

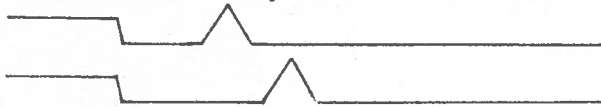
In the autosegmental literature it is normally assumed that there are 'tone-bearers' on the segmental tier (vowels, syllables) with which the tones can be associated. However, the phonetic facts suggest that the association target does not jump in blocks that can be defined in terms of units on the segmental tier. Rather, they move to points in the time domain that have to be specified considerably more precisely. For example, the delay of the association relative to an idealised unmodified value may be varied independently of the size of the units on the CV tier, as illustrated in (29).

(29)  BETTer BETTer BETTer

This also suggests that while there may be an 'ideal' target for delay (say, one syllable after the nuclear one if there is one), delay is a gradual modification. For British English, at any rate, it has been observed that the position of the rise-part of the 'rise-fall' may vary (cf O'Connor & Arnold's representation of the rise-fall, 1973: 9), and this observation is implicit in analyses that postulate a 'fall-rise-fall' by the side of a 'rise-fall' (Crystal 1969: 218), the former being an 'intensification' of the latter (Crystal 1975: 39). Thus, for (30), contours

with different degrees of delay are possible. Interestingly, the degree of the meaning of the modification (non-routineness) would appear to correlate with the degree of delay:

(30) I most ^CERTainly believe this is true



It may be that the 'ideal' position for delay was different in certain circles in Britain some time ago. Today, a delayed fall-rise on Rather! would probably come out as (31a), but (31b) apparently represents an upper-class pronunciation of the exclamation meaning 'Yes, very much so'. The usage is old-fashioned. It is used by actors portraying early twentieth-century characters (for instance, in the BBC television dramatisation of Evelyn Waugh's Brideshead Revisited).

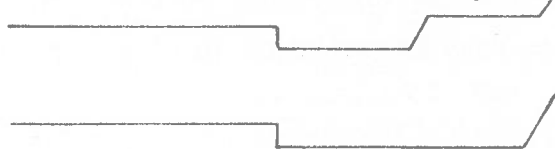
(31a) RATHER!

(31b) RATHER!

Its survival may well be due to the fact that the use of rather in this meaning has gone out of fashion. Observe that if we did not postulate delay as an independent modification, this one word would add yet another nuclear tone to the inventory of British English.

A delayed rise can similarly be delayed to a greater or lesser extent, as in (32), which is assumed to be spoken by a police interrogator. In it, the degree of non-routineness and the degree of delay increase proportionately.

(32) So you have never ~MET Julio Ignacio?



As will be clear, the meaning here is: 'I am leaving it up to you to decide whether the Variable really belongs to our background, and I consider giving you this option (very) significant'. As suggested by (32), delayed rises may occur in (humorous portrayals of) conversations where the intended suggestion is: 'We have ways of making you talk'. A quite different use may be found in speech to children, in which delay generally seems more frequent than in other types of speech. The explanation for the 'significance'-morpheme here lies presumably in the adult speaker's concern at getting through to the inexperienced, and possibly inattentive, language user, as in (33).

(33) (to sobbing child) Would you rather have your ~~MUM~~my take you to the hospital?

Note that patterns like these can never be mistaken for fall-rises. This is because of the absence of the $\overset{\star}{H}$ segment. A tone cannot be shifted to the left: any fall-rise must have its $\overset{\star}{H}$ after the beginning of the starred syllable, never before it. The hump caused by the association of the $\overset{\star}{H}$ midway through the syllable, though frequent, does not appear to be an essential feature, however. Halliday calls a humpless 'fall-rise' a 'pointed fall-rise', tone 2 in his system (oddly classed as a variant of the rise, tone 2, rather than as a variant of the fall-rise, tone 4) (e.g. Halliday 1970: 17). In the case of the fall, the hump does not appear to be an essential feature, either (Willems 1982: 86). Uldall (1982) suggests that it may have attitudinal significance.

7.2 STYLISATION

The modification stylisation is taken from Ladd (1978), in which two important points are argued for:

1. The 'Type I call contour' (Abe 1962) or the 'vocative chant' (Lieberman 1975), as in

(34) John---
ny!---

is a stylised variant of the fall in the same way that the level tone (Crystal 1969) or Mid-Level tone (O'Connor & Arnold 1973), as in

(35) They were all \THERE: -BILL, -MAry, -JOHNny

is a stylised variant of the rise.

2. The meaning of stylisation is 'This is a matter of everyday occurrence/routine'.

The tone in (34), therefore, does not signal that the speaker is calling the hearer, as had been widely assumed (cf Gibbon 1976: 276), but that the act of initiating a conversation with the hearer is presented as a matter of routine by the speaker. As Ladd points out, while there is no denying that (34) would appear to be frequently used in situations where speaker and hearer are some distance apart, this is not the decisive factor (cf his contrast between Look out for the broken -STEP and ??Look out for the cre -VASSE!, where the latter was assumed to be uttered in a non-routine situation).

Similarly, Ladd claims that the level tone signals 'routineness'. Crystal (1975: 38) in fact also notes 'an implication of routineness', although he gives 'absence of emotional involvement' as the more general characterisation (cf also Brazil et al., 1980). He postulates no connection with the rise, however.

If we adopt Ladd's interpretation of the call contour as the stylised fall and the level tone as a stylised rise,¹¹ we are left with a gap in the par-

adigm for the stylised fall-rise. Pierrehumbert (1980) in fact makes reference to a stylised fall-rise, there said to be identical with the stylised fall except for the high boundary tone (H% in her notation). The tone may be a less frequent option. It is not uncommon, however, in the vocabulary of children:

(36) $\overline{\text{NAN}} \text{ny} \underline{\quad}$

This should be interpreted as: 'I, as is now a matter of routine (stylisation), want to initiate a conversation with you (vocative), whose participation I am taking for granted (fall-rise).' The symbols $\overline{\quad}$, $\underline{\quad}$ and $\overline{\quad}$ will be used for the stylised fall, the stylised fall-rise and the stylised rise, respectively.

Another usage of the stylised fall-rise may be more subtle. Utterance (37) was spoken (the name of the street has been changed) by a woman speaking on the telephone to a close friend, who had apparently just expressed her surprise over the fact that the speaker intended to make a long trip to city X for what appeared to her insufficient reason. Utterance (37) was used to suggest that an important additional reason for the trip was a visit to a boyfriend who lived in Park Road:

(37) I'll also go to Park $\overline{\text{ROAD}}$

The option 'stylised fall-rise' was obviously employed to suggest that the fact that the boyfriend lived there was well-known to her (SELECTION) and that her visit there should be regarded as a matter of routine (stylisation).

The phonetic implementation of stylisation necessitates the postulation of some such concept as 'fusion'. In the case of $\overline{\text{LH}}$ the two segments fuse as $[\overline{\text{M}}]$. For $\overline{\text{HL}}$, fusion is partial: both segments are allowed to creep up towards the midline, but they do not coalesce. The realisation could be

represented as $[\overset{*}{M}\uparrow\overset{*}{M}\downarrow]$, where the arrows are used to indicate intermediate values ('raised mid', 'lowered mid'). There is some evidence (see below) that fusion of $\overset{*}{H}LH$ leaves LH unaffected: $[\overset{*}{M}\uparrow LH]$. Two further points should be noted: $\overset{*}{M}$, unlike $\overset{*}{H}$ and $\overset{*}{L}$, does spread. In the case of the rise, the $\overset{*}{M}$ spreads all the way to the end of the tail, while the $\overset{*}{M}\uparrow$ of the fall and the fall-rise is associated not just with the nuclear syllable, but also with any unstressed syllables ('weak vowels', Gimson 1980: 226, or 'reduced vowels', Bolinger 1981), except the last (cf Leben 1976). Secondly, syllables are lengthened.

(38) STYLISATION

- a. It's a $\overset{*}{U}Nicorn$
 $\overset{*}{H}L \rightarrow [\overset{*}{M}\uparrow\overset{*}{M}\downarrow]$
- b. It's a $\overset{*}{U}Nicorn$
 $\overset{*}{H}LH \rightarrow [\overset{*}{M}\uparrow LH]$
- c. It's a $\overset{*}{U}Nicorn$
 $\overset{*}{L}H \rightarrow [\overset{*}{M}]$

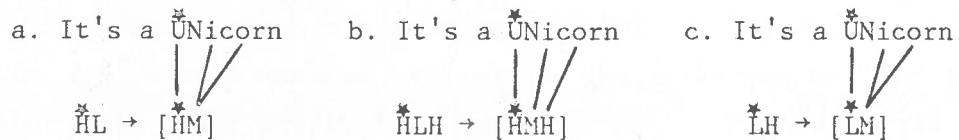
The contour in (38)b. is based on the results of $F\emptyset$ measurements of seven pronunciations of the tone by a speaker of British English. It is on this basis that we do not follow Pierrehumbert's suggestion and give it with a L rather than a $M\downarrow$, unlike the stylised fall. Synthesised versions of the nine tones have been used in a multidimensional scaling experiment. The results of this experiment strongly suggest that a single dimension can be interpreted, with delay at one end, 'unmodified' in the middle, and stylisation at the other end, representing a psychological dimension of 'routineness'. The results also suggest that there is a stable relationship between the fall and the stylised fall, just as there is between the fall-rise and the stylised fall-rise. For details see Gussenhoven (forthcoming).

7.3 HALF-COMPLETION

Phonetically, half-completion is defined as the failure of the tone to cross the midline: $\check{H}L(H)$ becomes $\check{H}M(H)$, and $\check{L}H$ becomes $\check{L}M$. The phonetic and/or semantic effects of this modification are much less frequently discussed in the literature than those of either delay or stylisation. The first reference is Uldall (1961), who notes that a fall from high to mid 'makes a "yes" unconvincing and uncommitted as opposed to a "yes" falling all the way to the bottom of the range' (cf Gibbon 1976: 135). Crystal (1969: 147,224) discusses the opposition between unmodified and half-completed falls in terms of contrastivity in the tail as opposed to contrastivity in the nuclear syllable. Observe that the autosegmental position adopted here rules out such 'local' interpretations of pitch phenomena in the tail, and must instead assume that these result from operations on the nuclear tone itself. Half-completed fall-rises are given by Crystal (1969: 218), there analysed as 'high' (a simple pitch range variable) and 'narrow' (a complex pitch range variable) fall-rises. I have no unambiguous references to half-completed rises. Indeed, in the present analysis, the notion of a separate tone-variant 'half-completed rise' by the side of an ordinary rise with non-high range (see next section) may seem to create some embarrassment for the description, since in both cases a rise from bottom to middish is produced: in the one case because the tone is not completed, in the other because it was never 'intended' to go any further in the first place. It turns out, however, that the two tones are clearly distinct. The half-completed rise begins in or immediately after the nuclear syllable and rises briskly to the midline, from which point the pitch is sustained at that level for any following unaccented syllables. The low-range unmodified rise rises in the syllable after the nuclear tone (or later in the nuclear syllable if there are no unaccented syllables after it), while the slope is gradual rather than steep, and may stretch over the entire tail (for illustrations see Figure 1.) Durational differences apart, the half-completed fall and the styl-

ised fall are distinguished by the spreading of the fused $\overset{*}{M}\uparrow$ to post-nuclear weak syllables, as opposed to no spreading of the starred tone of the half-completed fall. In monosyllables, the stylised fall, but not the half-completed fall, is characterised by the well-known two-plateau contour.

(39) HALF-COMPLETION



In spite of the obviously all-or-none nature of the opposition between half-completion and stylisation, it is hard to see how this opposition is paralleled by an equally clear-cut semantic distinction. Rather, it would appear as if, semantically, half-completion is somewhere between 'unmodified' and stylisation on the same scale of routine/non-routine. By using the morpheme half-completion, the speaker signals to his hearer that the latter should take the Variable as one that the hearer might somehow have expected, and that it should therefore come as no surprise to him. 'This is my Variable, but please don't make a big thing of it', might be a suitable paraphrase. Often, the effect is one of non-seriousness or light-heartedness, but in other contexts the modification may express perfunctoriness, or lack of interest or conviction. Note that all of these effects can be traced back to the meaning given above. Half-completed tones will be symbolised by placing the diacritic [=] before the symbol for the unmodified counterpart.

An example of a half-completed fall, expressing 'Add this to our background, but consider the addition as for-the-record only' is given in (40).

(40) =\I'LL get it!

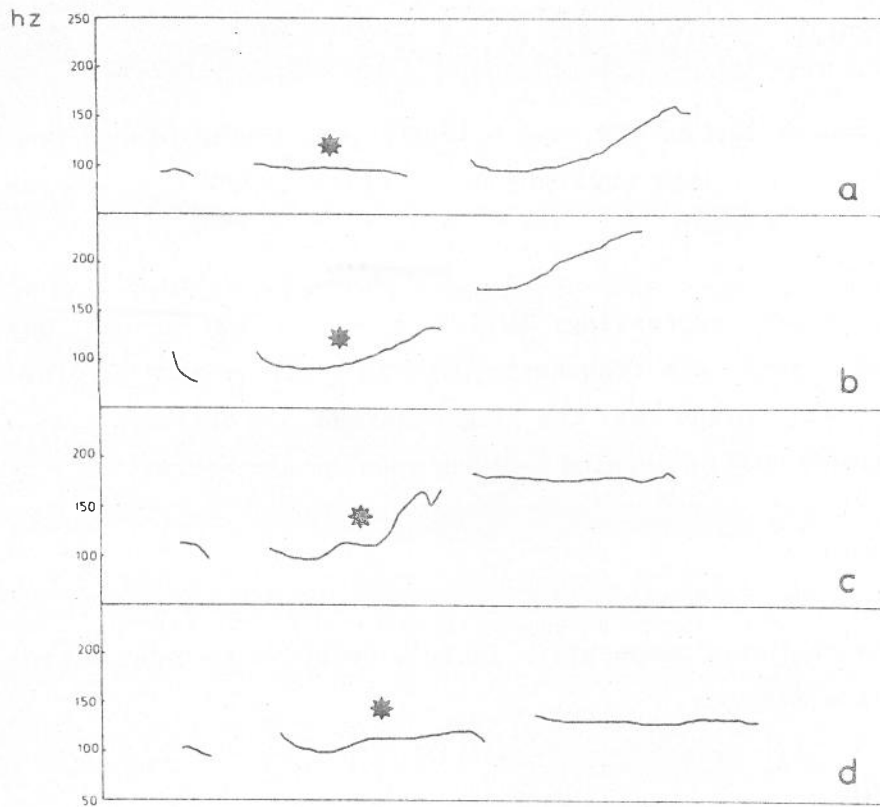


Figure 1. Delayed (a), unmodified (b), half-completed (c) and stylised rise (d) on 'It's a UNicorn'. (Ranges not equivalent.) Speaker PH.

spoken in reaction to the ringing of the doorbell or telephone. Another is (41), where the modification sounds pleasantly informal, because the ADDITION is not presented as a favour but as something that follows naturally from the situation (with high-pitched please).

(41) Please sit =\DOWN

Possibly, this is also the variant described by Leben (1976) as conventionally used by, for example, train conductors:

(42) Next stop =\OTTawa!

The tone is described by him as HMM, and is explicitly distinguished from the 'regular' call contour (the stylised fall), which is HHM in his notation.

Half-completed fall-rises, expressing 'This is (now) our background, but I'm not forcing the point', are frequently used to signal a note of playfulness. Example (43) might be the lighthearted termination of a none-too-serious difference of opinion between speaker and hearer.

(43) But it's =\TRUE!

while (44) could be used as a cooperative adult's response to a child pretending to hide or run away.

(44) I'll =\GET you!

Observe that stylisation in these contexts would give too much weight to the meaning 'routine'. Example (43) might be interpreted as a taunt, and in (44) it might undesirably emphasise the overtone of pretense.

Half-completed rises are similarly used in contexts in which the stylised rise (the level tone) would emphasise the routineness too heavily. Observe that although the phonetic difference is slight, the difference in effect is unmistakable. Example (45) could be spoken by a form-filling clerk, entrusted with the initial processing of a fresh levy of conscripts.

(45) ...Are you =/MARRied...ever been to see a psy =/CHIatrist... is there elephan=/TIasis in the family ...any =/OTHER hereditary diseases...=NEXT please.

Note how in this context unmodified rises would increase the impression of genuine interest on the part of the clerk, and that stylised rises would increase the effect of routineness. Precisely the same relationships hold if the speaker does not require resolution of his TESTING.

(46) I don't under\STAND. The =/POWER's on...there's =/FEED in the hopper... I've set the =/GRAIN switch... Should I /KICK it?

The modification half-completion has a semi-conventionalised use in the speech of speakers who do not wish their speech to be overheard by third parties. Low-volume speech, if used for this purpose, is frequently half-completed:

(47) (e.g. whispery voice) You've got the =/GUN ready? Sh! Here he =\IS. He's a=\LONE. Can you =\SEE him?

The explanation for this use of the modification may be that the meaning 'not make much of a point of the manipulation' is extended to apply to physical distance. It is as if the speaker does not want the point to be made anywhere other than in the restricted physical area where he and his hearer carry on their exclusive conversation. (The reverse does clearly not hold: shouted speech may also be half-completed.)

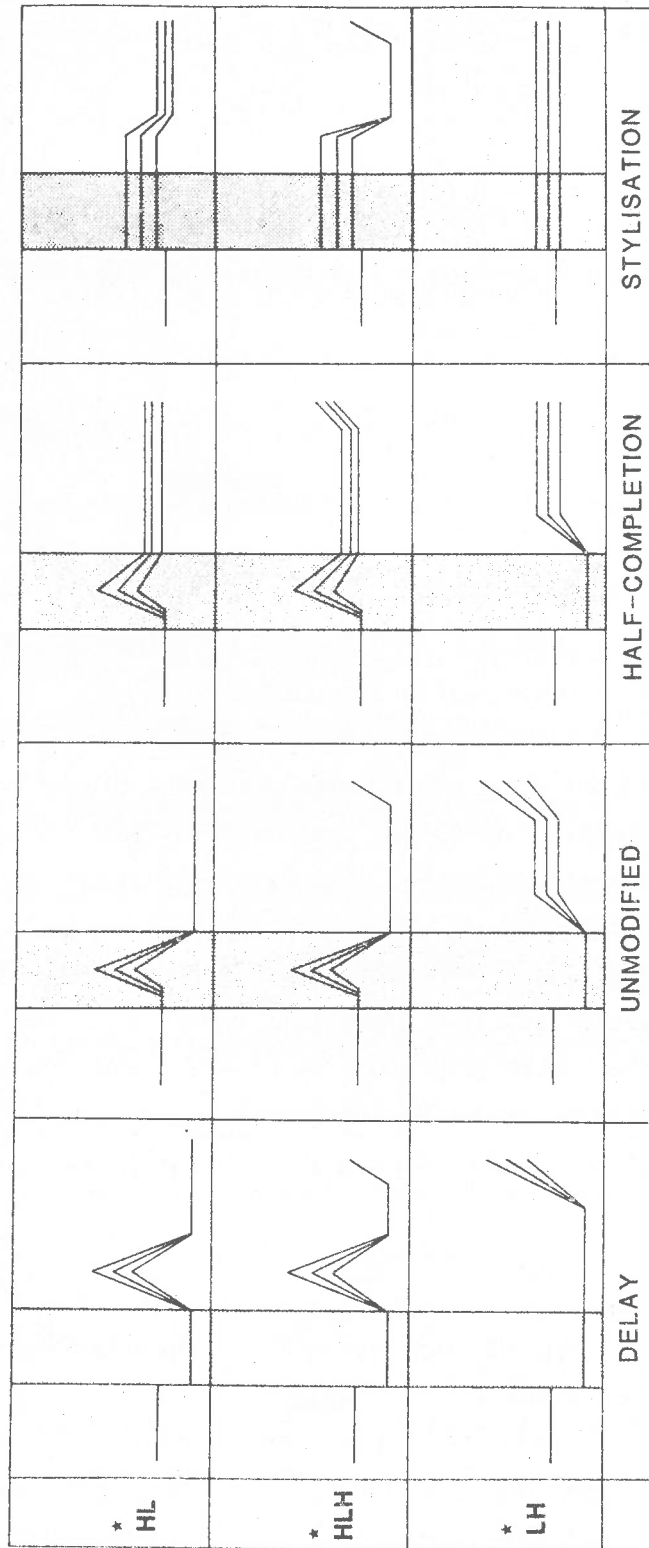


Figure 2. Diagrammatic representation of the effect of the variable 'range' on twelve nuclear tones (e.g. 'It's a Unicorn'). The shaded area represents the accented syllable.

8.0 RANGE

Range is here interpreted as a gradient variable, which is specifiable independently of tone and modification. That is, all twelve tones (tone variants) discussed so far are continuums on a phonetic scale ranging from 'carried out close to the baseline' to 'carried out with maximal excursion above the baseline', as illustrated in Figure 2.

In order not to confuse the effects of range with that of the modification half-completion, the terms 'low-range' and 'wide-range' will be used to refer to the ends of the scale, rather than 'low' and 'high' or 'wide' and 'narrow'. Terms like 'high rise', 'low fall' will continue to be used if they are used by the authors of work discussed here. Observe that whatever touches the baseline in the low-range variant, does so in the wide-range one, and that what does not, is higher above the baseline in the wide-range variant than in the low-range one. Thus, the stylised rise (or 'level tone') is placed higher in the pitch range as the range is wider.

There are frequent suggestions in the literature that range is not a gradient variable, but a set of two or three categories. For example, O'Connor & Arnold (1973) postulate two variants for the rise and the fall, high and low, and Brazil (1978) postulates three keys, high, mid and low (which are applicable not just to the nuclear tone, but rather to the first accented syllable of the tone group). With respect to the meaning

of range rather disparate comments can be found in the literature. Brazil (1978: 8) classifies the low rise as a 'neutral' tone (together with the level tone), signalling a 'withdrawal from the interactive situation'. Ladd (1980 :111), who considers range gradient in the case of the fall and the fall-rise, but all-or-none in the case of the rise (i.e. the low rise and the high rise are taken as separate categories), notes that answers to WH-questions sound 'self-assured' if they have a low rise, but 'hesitant' if they have a high rise, and that affirmative sentences are 'questions' if they have a high rise, but 'contradictions' if they have a low rise. O'Connor & Arnold give a number of more specific characterisations, like 'soothing', 'genuinely interested', 'airy' etc., depending on the type of sentence the tone combines with.

It may well turn out to be convenient to recognise categories on the range continuum that represent clearly distinguishable semantic effects in the case of certain tones. However, as a theoretical option, range is clearly gradient. Certainly phonetically, there is no question that range represents a continuum, as is evident, for example, from the experiment Pierrehumbert (1980: 119) did for the fall and the fall-rise. It is hypothesised that the meaning of range is insistence on the meaning of the manipulation (cum modification, if any): the speaker signals a greater degree of insistence on the meaning expressed by the tone as the range is greater. To take a straightforward case:

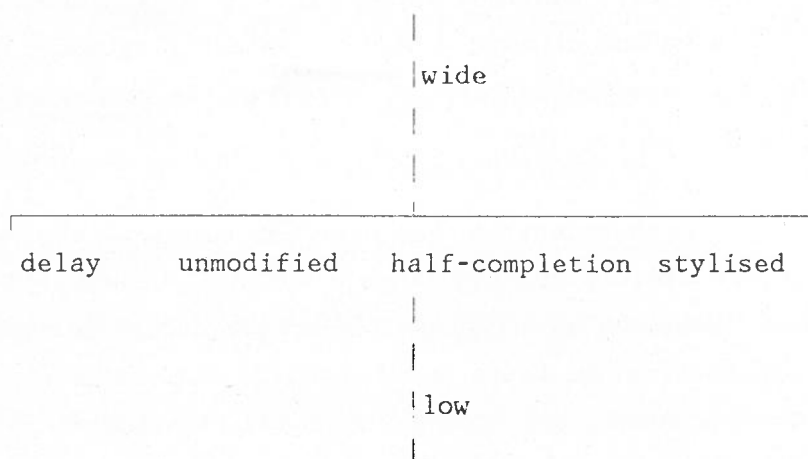
(48) I said come \HERE

Example (48) represents a more forceful command as the span of the fall is wider.

While it is not difficult to draw a distinction between the everyday notion of 'insistence' as a speaker intention (in the sense of the speaker insisting on some kind of adequate response, verbal or otherwise, on the part of the hearer) and the notion of 'insistence on the meaning of the

tone', as introduced here, it may not be immediately clear how the latter notion should be distinguished from the semantic scale 'routine' - 'non-routine' on which the four modificatory states of the three tones are placed. It could be argued that the extreme ends of the scale produce, by their very nature, 'insistent' variants of the three tones, e.g. 'X is very non-routine'. How then should the semantic relationship, represented graphically in (49), be understood?

(49)



Intuitively, the difference between a wide fall and a low fall and that between a wide fall and a wide delayed fall ('rise-fall') are not on the same level. And the same goes for the former difference and that between, say, a wide fall and a wide stylised fall ('call contour'). The representation in (49), and more generally the theoretical framework presented here, enable us to formulate this intuition meaningfully. The answer to the question why the above contrasts do not seem to be of the same order is that modifications add a meaning element to the manipulation, and that range enhances or reduces the satiation of that meaning (manipulation) or those meanings (manipulation and modification). To give an example, if in (50) the speaker uses an increasingly wide range for the sequence of falls on John, he is merely increasing the effect of his meaning 'I am adding the initiation of a conversation with you to our background'.

(50) \JOHN, \JOHN, \JOHN!

If a reply continues not to be made, he may choose to change his strategy: if he knows the hearer can hear him (because they are in the same house, say), he might indicate that his speech act has (by now) become a matter of routine, and switch to stylisation, and - if he is optimistic enough - repeat it with wider range:

(51) \JOHN, \JOHN, \JOHN, \JOHN, \JOHN!!

Alternatively, if he doubts whether the hearer can really hear him, he can change his manipulation from ADDITION to TESTING, and again, if undeterred, repeat it with wide range:

(52) \JOHN, \JOHN, \JOHN, /JOHN, /JOHN!!

What this is meant to illustrate is that there are clear shifts of meaning with the change of either the modification or the manipulation, but that only greater intensities for the those meanings are introduced as the range is increased in width.

When this prediction is checked against the data presented in O'Connor & Arnold, it appears that the characterisations given for the low fall violate it. WH-questions with a low fall, to take one example, are said to be 'searching' 'serious', 'intense' and 'urgent', while with a high fall they are 'brisk', 'businesslike', 'considerate' and 'not unfriendly'. It turns out, however, that these meanings importantly depend on the lexis of the WH-questions concerned. In our analysis, the fall expresses that the answer is considered a relevant addition to the background. It is significant that of the five examples for the 'low fall' given by O'Connor & Arnold (1973: 47) four do not really seem to require the hearer to give an answer: the addition of the V is not insisted upon.

- (53) Now where did I put my \PIPE
(54) Why did you \DO such a thing (=I think that was a stupid thing to do [CG])
(55) Why don't you \LOOK where you are going (=Look where you are going [CG])
(56) How can I \THANK you (=I know this is a silly question [CG])

One example concerns a question that does require an answer, but presumably the speaker feels that here insistence on the ADDITION is unnecessary:

- (57) What can I get you to \DRINK?

By contrast, the examples given for the high fall (1973: 55) much more clearly require an answer:

- (58) What's the \TIME?
(59) When did you ar \RIVE?
(60) How long did it take you to \GET there?
(61) Where on earth have you \BEEN all this time

It is in combination with rises that range would appear to be capable of producing the most dramatic semantic effects, which is reflected in the frequent postulation of the low rise and the high rise as separate tone categories (Bing 1979, Ladd 1980). Our analysis predicts that a low rise expresses a low degree of insistence on the meaning TESTING: it signals that the speaker not only leaves the background status of the Variable open, but also refrains from forcing the hearer to resolve the issue. It is suggested that it is this distinction that lies at the basis of contrasts between high and low rises. For example, the 'self-assuredness' that Ladd (1980: 111) notes as the effect of the low rise in answers to WH-questions, as in (62), is due to the fact that the speaker considers

the hearer's comment ultimately unnecessary ('Is that good enough for you?').

(62) A: Where did you get your deGREE?

B: Cor, NELL

The 'hesitancy' which Ladd says is signalled by a high rise in this same dialogue, is the effect of the speaker's submission to the judgement he invites his hearer to give. He now actually invites the hearer to give an answer to the question 'Is that good enough for you?'.

Similarly, the 'genuine interest' noted by O'Connor & Arnold as the effect of the low rise in yes/no-questions seems due to the fact that the speaker signals that the resolution of the TESTING does not have to be provided, but that it would be nice if it was. This 'genuine interest' will predictably disappear if the speaker signals a high degree of insistence on his TESTING. Also, this interpretation provides the solution to the problem addressed by Sag & Liberman (1975), who wonder why it is that Would you stop hitting GWENDolyn? tends to be taken as a genuine question when it has a high rise (e.g. spoken by a psychiatrist: 'If I were to give you this new therapy...'), but as an indirect speech act (command-suggestion) when it has a low rise. In the latter case, the speaker is not really interested in the hearer's opinion. The manipulation is employed for the hearer's benefit only: the speaker merely 'invites' the hearer to add the 'answer' to the background himself. Note that this speech act is pragmatically very 'insistent' in the sense of being an effective way of conveying a command. What I am concerned to point out is that this effect is created by the speaker's non-insistence on the resolution of his TESTING. Needless to add, a high rise, again, does insist on such resolution (and is speaker-serving), and leads to the interpretation 'real question'.

Note, finally, that inasmuch as a low-range rise signals that the speaker leaves the background status of the Variable open, but at the same time

refrains from forcing the hearer to resolve the issue, this tone variant is eminently suitable for gratuitous characterisations, such as epithets. In (63) and (64), the speaker is concerned both to make the hearer feel he is free to agree or disagree with the characterisations given (the Variables have not been committed to the background) and to excuse him from openly coming down on either side (the low range signalling that he need not bother to resolve it).

(63) It's \JOHN, the stupid /BASTard

(64) It's \JOHN, the poor /SOUL

(For arguments why epithets, unlike vocatives, are assigned nuclear tones, see Gussenhoven, in press).

Range, like other intonational options, can have a syntactic effect. For example, in sentences of the type It's A, not B, the speaker may use ADDITION for both clauses. If he does, he is likely to give the main point of his statement the wider fall (It's A). If he now adds a third term (It's A, not B, C), the range of the fall on C will in effect behave like a structuring device: if it is appositional to the main point (A), it will share its wide range, but if it is appositional to the minor point (B), it will have a low-range fall. Thus, in We need a man who's got \COURage, not a \COWard, somebody with \KETso the nonsense word ketso can be made to mean either 'guts' or 'cowardice', depending on the range we use. Note that it would be unwise to say that intonation has a 'syntactic function', just as it would be unwise to say that it has a 'lexical function': the structuring behaviour of range here is caused by the meaning of range (degree of insistence on, in this case, ADDITION). Whichever term C agrees with for this meaning will agree with C in range.

9.0 COMBINING MODIFICATIONS

The twelve nuclear tones that are generated by applying the four modificatory states to the three basic tone categories fall, fall-rise and rise do not exhaust the inventory of well-formed nuclear F_0 contours, even when the continuous variable range is taken into account. Some, which seem extremely rare, must be accounted for by postulating further modifications (e.g. crescendoing). For others, however, we do not need to postulate additional intonational units - tones, modifications or other variables. The contention is that all tones can be described in terms of our framework, and importantly, that this framework adequately expresses the correlation between complexity of formal representation and the complexity, or 'markedness', of the linguistic event it describes.¹² Thus, an unmodified fall is in an intuitively convincing way less 'marked' than a delayed fall or a half-completed fall, which intuition is formally expressed by the specification of a modification for the latter two tones. Although the postulation of a single semantic dimension 'special-routine' would appear to suggest that modifications are mutually exclusive (such that a tone cannot be both stylised and delayed, for instance), this is not in fact a prediction that the framework should be interpreted to make. Rather, it predicts that such tones are heavily marked: they must be specified for two modifications. This linguistic complexity is reflected in the fact that these tones are semantically rather loaded, as well as in the fact that not all speakers may feel they should go in for them. A likely assumption is that they are typically used by speakers who are on fairly

familiar terms with their hearers. As an example, consider (65), which is a fall combining the semantically extreme modifications stylisation and delay. Delay is evidenced by the low-pitched nuclear syllable, stylisation by the two plateaus characterising the stylised fall.

(65) It's a ^{*}UN i corn!

$\overset{*}{\text{HL}} \rightarrow [\overset{*}{\text{M}} \uparrow \text{M} \downarrow]$
 [+delay]
 [+stylisation]

The example could occur in motherese: with it, the speaker offers the solution to a problem in a mock guessing game played with a child in its pre-linguistic phase, as in a peek-a-boo situation. Here, the delay signifies that the speaker considers it important that the child should pay attention to this addition to their background, and should try to remember it the next time the question comes up. At the same time, however, she wishes to impress it upon the child that this should be an easy task, i.e. that the fact the object is called a unicorn is a matter of routine (stylisation).

Delay can also be combined with half-completion. In (66) both modifications have applied to the fall.

(66) It's a ^{*}UNicorn

$\overset{*}{\text{HL}} \rightarrow [\overset{*}{\text{H}} \text{M}]$
 [+delay]
 [+half-completion]

Example (66) could be used by someone establishing the nature of the contents of a mysterious parcel which arrived without sender's name. The speaker is at a loss as to what the significance of parcel or contents

might be, applying delay to express his assessment of the non-routineness of the communication, and half-completion to express the fact that in the absence of any reasonable explanation of why he was sent the thing, he has very little in the way of a contribution to make to the background. The tone thus sounds both surprised and reserved.

Combining half-completion and stylisation in a fall leads to a tone that maintains a tenuous, but interesting opposition with an ordinary stylised fall, which it will be difficult to capture for any framework that links F \emptyset contours directly to phonological representations (cf Pierrehumbert 1980, whose system would seem to be able to offer just $\overset{\star}{H}+L- H- L\%$ to serve the half-completed fall, the stylised fall and the half-completed stylised fall). The half-completed stylised fall is appropriate in situations where, in addition to the meaning 'routine', either a note of light-heartedness or a note of secrecy is required, in line with what was said about the meaning of half-completion in section 7.3. Thus, the speaker may be involved in a game of hide-and-seek, and together with the hearer be hiding from a third person. If the speaker wants to draw the hearer's attention without at the same time giving his hiding-place away to the third person, he might use a low-range, half-completed stylised fall on the hearer's name (with low-volume, whispery voice). A wider-range version might be appropriate for a speaker who wished to make her presence known to a hearer (a child; for instance) and to intimate that she intends whatever social interaction may ensue to have a playful character. In (67), the hearer's name is assumed to be unicorn for the sake of the uniformity of the lexis.

- (67) $\overset{\star}{U}Nicorn!$
 \downarrow
 \downarrow
 $\overset{\star}{HL} \rightarrow [\overset{\star}{M}\uparrow M] \quad (\text{via } [\overset{\star}{M}\uparrow M\downarrow\uparrow])$
 [+half-completion]
 [+stylisation]

With middish range, the sizes of the intervals might be 150-100 Hz for the stylised fall, and 150-120 Hz for the half-completed version.

The half-completed stylised fall should not be confused with the 'reproaching' tone that speakers sometimes use to call their hearers to order. This tone would seem to be stereotypical on isolated vocatives in the situation where a henpecked husband is told off by his wife (esp. low-range: JEFFrey! Don't say that when other people can hear you!). The tone has nothing whatever to do with stylisation: neither its semantics nor its phonetics fit. Phonetically, a stylised fall is characterised by syllable-stretching, spreading of the starred tone to reduced syllables, and plateau-formation. Observe that in the 'reproaching' tone the nuclear syllable is typically not lengthened, no spreading of the starred tone takes place (cf unicorn with the tone for Jeffrey above) and thirdly that there is no plateau in the lengthened tail, but rather a drawn-out, very weakly falling slope, which speeds up its downward course in the very last part of the syllable. We are here in fact dealing with a further modification, which may be termed 'crescendoing'. It seems to be characterised by a lengthening of the final syllable and by the tempo-differentiation noted, but it does not have the fusion characteristic of stylisation. Further research is needed to determine its significance.

As was said before, tones with two modifications may be rare phenomena. Our chief motivation for discussing them is to demonstrate that the descriptive framework lays bare the linguistic parameters by which the nuclear tones of English are defined. The framework is predictive in that application of the postulated options predicts (generates) well-formed tone contours as well as their semantics. A purely observationalist approach will, for example, not lead one to suppose that a contour on unicorn with u- low-pitched and -nicorn at a middish level, may represent either of two linguistic constructs. It could be a half-completed rise of the type illustrated in (45) and (46), or it could be a delayed stylised rise. In this more marked tone, the nuclear syllable is low-pitched not

because of the L in LH, but because delay has applied, the plateau on the tail being the realisation of stylisation. We may imagine this latter tone to be used by a speaker who was getting impatient with someone who is supposed to read out a list of simple sentences beginning with It's a unicorn, but despite the simplicity of this task, keeps tarrying. The speaker might then say

(68) Oh come ON!! It's a ^{*}UNicorn...

^{*}LH→[^{*}M]

[+stylisation]

[+delay]

in an effort to start him off. The delay in this hearer-serving TESTING is to be interpreted as an expression of the speaker's impatience with the reader's slowness in getting started ('Please consider my TESTING a significant act'), the stylisation as an expression of the fact that, in the opinion of the speaker, the task is easy (routine). Phonetically, the tone may only differ from the half-completed rise in the lengthening of the syllables, typical of stylisation. (Further research is needed to establish whether the level stretch in the stylised tone is lower than that in the half-completed tone, assuming equivalent range specifications.)

10.0 A TONE-LINKING RULE

In the discussion so far, the bulk of the examples that have been discussed either had one sentence accent (and hence one nuclear tone), or had more, but were only analysed with reference to the last. The theoretical status of prenuclear prominences, to use a neutral term, is problematic. Partly, this is because prominence-lending intonational options appear to be available that can be employed in a position other than those marked by sentence accents. Thus, a full-focus version of Write it down! has one sentence accent (on down) and hence one position at which the nuclear tone paradigm can be addressed. Yet, assuming a low-range fall on down, write can be given high pitch (which makes it prominent in a subjective sense) or low pitch, a choice that clearly affects the overall semantic effect (cf. also Bolinger's discussion of two pronunciations of allegations (1981: 27), and his references to Bing and Schubiger). It can sometimes be difficult to distinguish between pre-final accent prominence and pre-final prominence of the kind we find on Write in the example above. Consider the sentence fragments Even John and Also John. At first sight, the prosodic characteristics might seem identical. There is some sort of weaker stress on even and also, and a stronger one on John. It is, however, anything but trivial that John even and John also have clearly different prosodic characteristics: even has no sentence accent, also does. The position taken here is that in Even John one nuclear tone is assigned, and in Also John two, and, moreover, that whatever meaningful options are employable on even in Even John fall outside the scope of this article: they

are taken to constitute an issue separate from that of the nuclear tone paradigm. For experimental evidence supporting the above distinction between two kinds of prenuclear prominences, see Gussenhoven (1983).

Assuming, then, that many utterances have more than one sentence accent, and that at each sentence accent position the nuclear tone paradigm must be addressed, the question arises of how these tone sequences are realised. This seems particularly relevant in situations where they are close together and/or close-knit syntactically. Typically, it is not found that the tone in the penultimate position is allowed to run its full course in the way the final tone is: the speaker may not be prepared to take the time to keep all of the trajectory of the prefinal tone intact. That is, tone linking rules are employed to ease these transitions between sentence accents.

The Tone Linking Rule given below perhaps illustrates the superiority of an autosegmental description even more clearly than did the three modifications given above. This is mainly because it can be stated quite unambiguously in terms of operations on certain tonal elements without the addition of timing-sensitive specifications.

Theoretically, any tone can be linked to any other tone, and, with three (basic) tones, nine linked contours should be generated. As it happens, two of these would seem to be rare: a rise followed by a fall-rise, and a fall-rise followed by a rise. The most common situation is for a tone to be preceded by a fall. As for the question which of a sequence of more than two tones are linked, it would appear that linking operates from right to left: it is typically the penultimate tone that is linked to the final one. This is in accordance with Collier & 't Hart's (1978: 20) observation that, in Dutch, the 'flat-hat pattern' can be preceded by a 'pointed hat', but not vice versa. 'For the last two accented syllables, it is possible to accentuate the first with only a rise and the last with only a fall. Between these two pitch movements the pitch remains high, and we get what we

	UNLINKED	PARTIALLY LINKED	COMPLETELY LINKED
* HL+HL			
* HLH+HL			
* LH+HL			
* HL+LH			
* HLH+LH			(see text)
* LH+LH			

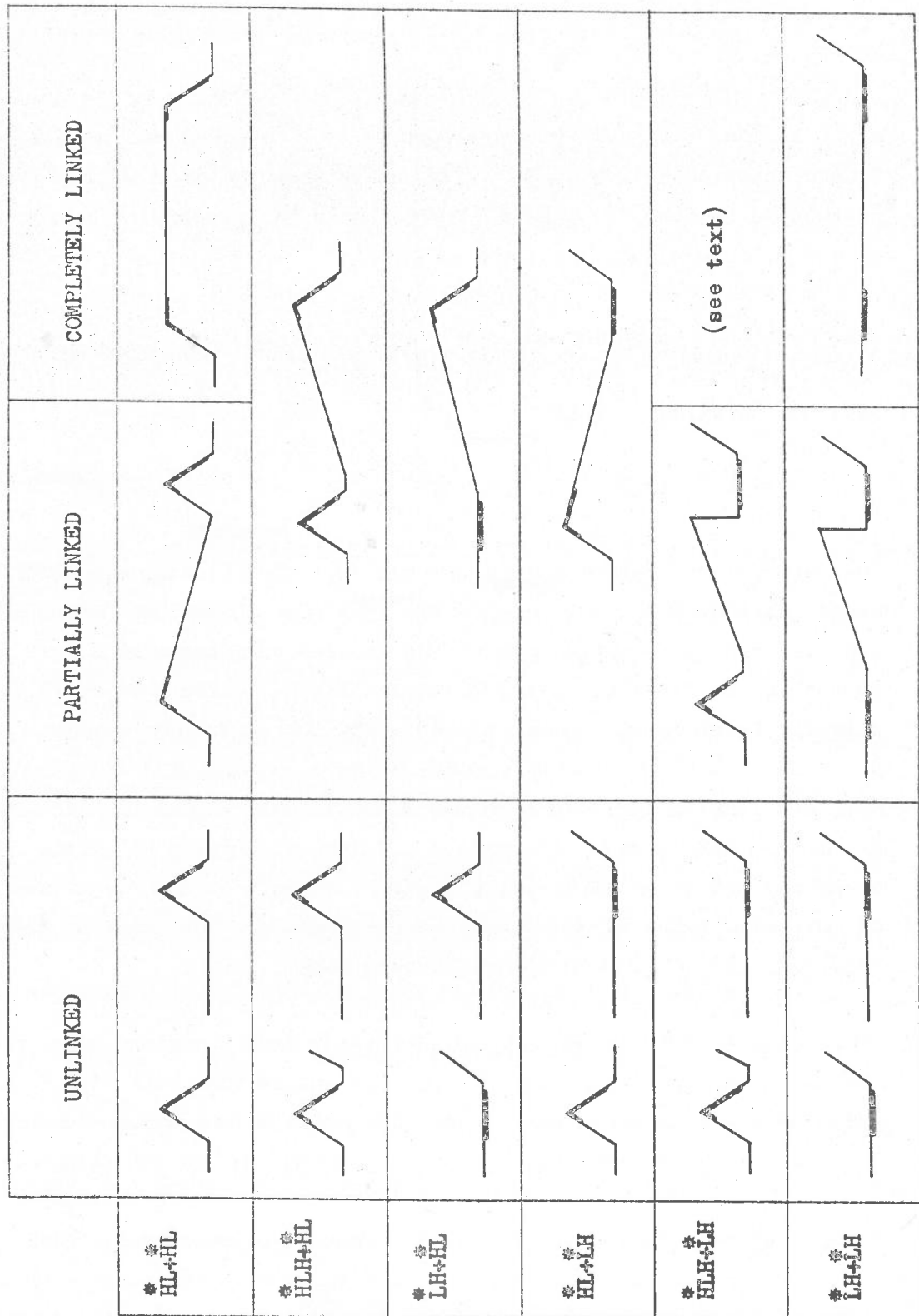
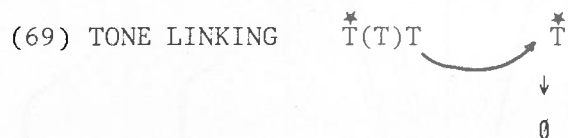


Figure 3. Contours of linked and unlinked tones, (a) as measured on the carrier-phrase 'Toronto is(n't) the capital of Ontario' and (b) in diagrammatic representation. Speaker PH.

might call a 'flat hat' [i.e. as opposed to a 'pointed hat' marking only a single accented syllable CG]. It will be shown below that the 'flat hat' postulated by Cohen & 't Hart (1967) should be interpreted as the result of a tone linking rule linking $\overset{*}{H}L+\overset{*}{H}L$.

The English Tone Linking Rule can be stated as follows.



The formulation attempts to capture the fact that linking may occur in two steps: partial linking occurs when the last tone element of the penultimate tone is moved across the intervening unaccented stretch to a position adjacent to the final tone, and complete linking occurs when this last tone segment is deleted. Thus, if $\overset{*}{H}L\dots\overset{*}{H}L$ is partially linked, we get $\overset{*}{H}\dots\overset{*}{L}HL$, the intervening stretch being a gradually falling slope. If complete linking applies, we derive $\overset{*}{H}\dots\overset{*}{H}L$ (see Figure 3). In many cases the distinction between complete and partial linking is vacuous. First, there may not be an intervening stretch, second, both options may amount to the same thing if the moved tone segment is the same as the first (starred) tone segment of the right-hand tone.

If we take Toronto is the capital of Ontario from a context where the discussion is about capital cities, and thus ensure that both Toronto and Ontario have a sentence accent, then (69) gives us the contours represented in Figure 3. In the contours, the unaccented To- is set at a low level.

Below, the description of prenuclear contours allowed by the TONE LINKING RULE is compared with the traditional British description of such data in terms of 'head contours'. O'Connor & Arnold's description is taken as the reference point. The following claims are made and argued for:

1. It is not the shape of the head contour as such that is the significant feature, but the tones that it links.
2. The analysis enables one to tease apart cases of unaccented prenuclear contours and phonetically similar contours that contain an accented syllable.
3. The analysis enables one to bring together semantically similar contours that are treated as categorically different contours in a 'head contour' analysis.

10.1 TONE LINKING VERSUS HEAD CONTOURS

Linking accounts for part of the 'head contours' described for British English (Crystal 1969, O'Connor & Arnold 1973: 20-38). Below, some of these head contours are reinterpreted in terms of the TONE LINKING RULE: these are the ones given by O'Connor & Arnold.

10.1.1 Rising Heads

Rising heads occur in a variety of situations, among which is linked LH+HL, a pattern described by O'Connor & Arnold (1973: 195) as the 'Long Jump' and analysed by them as a rising head followed by a high fall. Linked $\overset{*}{H}LH+\overset{*}{H}L(H)$ also presents a rising slope between the accented syllables. For Dutch, this pattern is given by 't Hart & Collier (1975), Collier & 't Hart (1978), who label the slope concerned '4', the whole contour being '1&A 4 A'. In fact, the concept of a tone linking rule

readily emerges from their description. At one point they introduce the notion of 'transformation'. The idea there is that contour X can be transformed into contour Y by replacing one of the slope segments in X by some other slope segment. However, because their grammar is written in terms of allowable concatenations of monotonic pitch movements (an 'A-fall', a '4-rise', etc.), the connections between one pattern and the next remain arbitrary, and fail to get an interpretation in terms of phonological elements. It does not become clear, for example, that a transformation may in one case involve a change of tone in the first accented syllable, but in another the application versus the non-application of a tone linking rule. The suggestion in their description is that the different contours included in it represent a list of alternative ways of realising accented syllables. In 't Hart (1975) they are explicitly referred to as 'free variants'. Why this list of strings of pitch movements is composed the way it is, and why the strings are what they are, thus remains obscure.

10.1.2 Falling Heads

Falling heads may result from partially linked $\overset{*}{H}L+\overset{*}{H}L(H)$ and from linked $\overset{*}{H}L+\overset{*}{L}H$. $\overset{*}{H}L+\overset{*}{H}LH$ occurs in O'Connor & Arnold's 'Switchback', a falling head followed by a fall-rise. Note that linked or unlinked $\overset{*}{H}L+\overset{*}{L}H$ should not be confused with O'Connor & Arnold's 'High Dive', which consists of a fall-plus-rise (compound fall-rise) nuclear tone. In our analysis, this pattern corresponds to a (single) fall-rise on the syllable that carries the fall-element in O'Connor & Arnold's description, i.e. it represents the occurrence of the fall-rise on a non-final word (see section 1). In an unlinked version, $\overset{*}{H}L+\overset{*}{L}H$ is discussed by Liberman & Sag (1975) as the 'contradiction contour' (see section 11.4).

10.1.3 Low Heads

Low heads result from the linking of $\overset{*}{LH} + \overset{*}{LH}$. In O'Connor & Arnold's analysis the low head exclusively occurs with a (low) rise (the 'Take-off'), as in (70)

(70) A: You shouldn't have \DONE it

B: And what's it got to do with /YOU may I ask?

Observe that a very similar pattern may be obtained if we allow what to be [-focus], as in (71)

(71) A: And what's it got to do with \BO[zsi...] (unintelligible)

B: And what's it got to do with /WHO?

The difference between (70) and (71) quite naturally falls out of our analysis. In (70) there are two sentence accents, in (71) only one. That is, the analysis predicts that the low-pitched what before a rise can be both accented and unaccented. What is more, it specifies that if it is accented, it is an instance of the rise. Observe how this explains that in (70) it is perfectly normal to allow the pitch to go up from what to you (partially linked contour), but that this rising middle section in the slope is wholly inappropriate in (71): here there is no accent, and no tones to be linked. Linking of $\overset{*}{LH} + \overset{*}{LH}$ so happens to produce a pattern very much like an accentless baseline followed by a rise. The analysis is of course also supported by the fact that O'Connor & Arnold, on an intuitive basis, included a low head in their analysis (recall that 'head' is defined as a stretch of speech starting with an accented syllable).

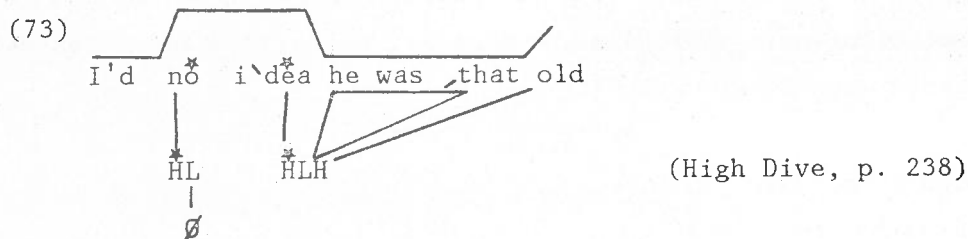
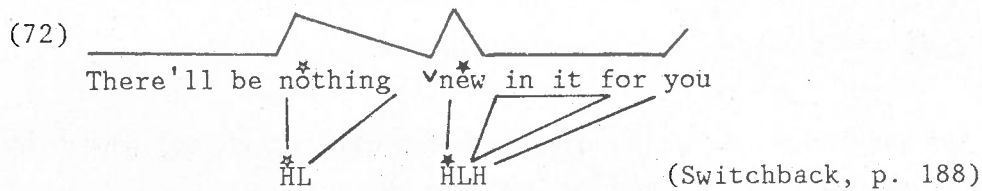
There may in fact well be phonetic differences between the two low-pitched stretches concerned. Thus, what in (70) may be lower in pitch than its

surroundings and be longer, while in (71) the whole prenuclear stretch may have a more constant, lowish pitch.

10.1.4 High Heads

High heads occur between fully linked $\overset{*}{H}L+\overset{*}{H}L(H)$. With fully linked $\overset{*}{H}L+\overset{*}{H}L$ we produce the canonical pattern described by Cohen & 't Hart (1967) as the 'hat pattern' (later 'flat hat pattern') for Dutch, and for English by O'Connor & Arnold as either the 'Low Drop' or the 'High Drop', depending on the range of the second fall. In their description, these are the first two of the ten tunes discussed. They also include as a separate tune the 'Jackknife', which in this analysis is the same pattern, with the fall in second position delayed.

If the second tone is a fall-rise, a pattern results that O'Connor & Arnold label the 'High Dive'. As was said above, this tune always has a 'compound fall-rise', an option that in the present analysis is just a fall-rise in early (non-final) position. Where the fall-rise is not classed as compound by O'Connor & Arnold, they always assume a falling head for the prenuclear accent (referred to earlier as the 'Switchback'). Observe how these two categorically distinct tunes in O'Connor & Arnold's analysis, come out as variants of the same contour in ours. The Switchback is a partially linked $\overset{*}{H}L+\overset{*}{H}LH$, and the High Dive, if preceded by the high head of course, a fully linked $\overset{*}{H}L+\overset{*}{H}LH$. Compare the two descriptions for (72) and (73), examples given by O'Connor & Arnold.



These two categorically different contours in O'Connor & Arnold's analysis (agreeing neither in head nor in tone) are, in the present analysis, classed as two instances of $\overset{*}{H}L+\overset{*}{H}LH$, one with partial and one with complete linking respectively. Observe that these examples already suggest what linking does semantically. It would appear to deplete the semantics of the first tone and present the two tones as a single unit ('no idea'). Without linking the tone on no, the speaker would seem to want to keep the effect of the accent on no fully in force, making him sound more surprised as a result. Conversely, linking the tones on nothing and new would seem to make 'nothing new' behave as a unit of some sort, rather than as a shortened version of nothing that would be new to you.

Two other tunes in O'Connor & Arnold's analysis have High Heads: the 'Low Bounce' and the 'High Bounce'. Both have a rise in second position (low-range and wide-range, respectively). As can be seen in Figure 3, the pattern is not generated by our Tone Linking Rule: a rise can be preceded by a Low Head, a Falling Head or a Rising Head, but not by a High Head. Inspection of O'Connor & Arnold's examples suggests that in many cases this seems precisely what would be required of a theory: the High Heads concern [-focus] material, with no accents. An example is:

(74) A: The blue one's larger than the \BLACK

B: The blue one's larger than the /WHICH one?

which sort of exchange is particularly frequently given for the High Bounce. For these patterns we should therefore assume that some 'onset' option is employed for the unaccented prenuclear stretch, which option is quite independent of tone assignment. However, not all contours can be explained in this way. Consider (75).

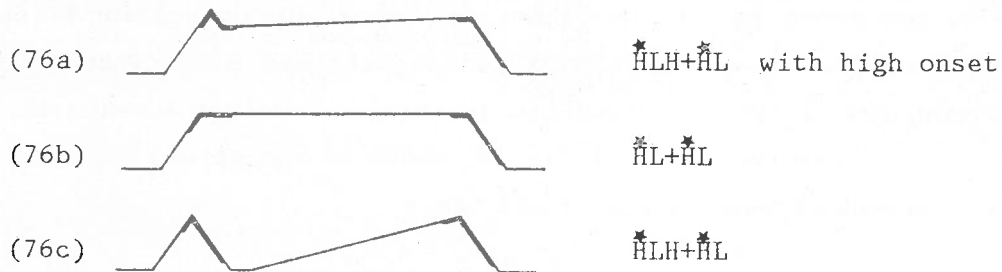
(75) A: I haven't included ✓ROBERT

B: Why have you left /HIM out? (p. 161)

This reply must be assumed to have two accents, one on why and one on him. Observe that it does not seem to be the case that the difference between O'Connor & Arnold's pattern and the pattern produced by linking $\overset{*}{H}L+\overset{*}{L}H$ is dismissable as free variation. Our pattern (with a falling slope for have you left) sounds decidedly less friendly, in the context of (75), that is. Two options are open to us to account for cases like (75):

1. The Tone Linking Rule could be revised such that the starred H in the first tone is allowed to spread to the syllable before the next starred tone, which ploy would produce the missing contour, and leave the other patterns in Figure 4 intact. A drawback to this solution is its arbitrary nature. If $\overset{*}{H}$ spreads in this situation, then why not $\overset{*}{L}$? And if $\overset{*}{H}$ spreads here, why not elsewhere? (Note that the spreading of $\overset{*}{L}$ would generate, for instance, a Low Head for $\overset{*}{L}H+\overset{*}{H}L$, which contour would be very different from the ones given in Figure 4, and, also, is absent from O'Connor & Arnold's description.)
2. The high onset option could be allowed to apply to unaccented as well as accented prenuclear stretches. In the latter case, the tone would ride on the crest of the high onset, theoretically detectable as an appropriate obtrusion at the accented syllable. The consequence of this solution is, of course, that the high onset option would have to

be extended to the other prenuclear accents as well. High onset for $\overset{*}{H}LH$, for instance, would considerably reduce the phonetic difference between $\overset{*}{H}LH+HL$ and linked $\overset{*}{H}L+\overset{*}{H}L$. That is, the solution would force us to class (76a) with (76c) rather than with (76b):



Clearly, perceptual research is needed to confirm this prediction. Meanwhile, it is clear that the second solution is preferable. Not only does it save us from having to add an arbitrary condition on the Tone Linking Rule, but it predicts that High Heads, like Low Heads, may contain accented as well as unaccented syllables. It would clearly be desirable for a theory to be able to distinguish (75), in which why and him are accented, from (77), an echo-question with only who in focus, which, like (75), has a High Head:

(77) A: Why have you left \backslash BO[zsei..] out?

B: Why have I left \nearrow WHO out?

Observe that our account predicts that that pattern with a downward slope for have you left does not fit in the context of (77): the sentence accent on why that is suggested by the pattern would be incompatible with the [-focus] status of why. It would appear, then, that the lumping together of (75) and (77) should be exposed as a spurious generalisation based on vague phonetic similarity.

10.2 ON THE SEMANTICS OF TONE LINKING

With the Tone Linking Rule we have brought prenuclear accents within the compass of our semantic account of nuclear tones. The discussion below is kept brief, and intended only to indicate that such prenuclear accents avail themselves of the same semantic features as nuclear accents do. In addition, it is pointed out that linking provides conceptual unity to the stretch of speech spanned by the linked tones.

Patterns with $\overset{*}{H}L$ in second position provide the clearest illustration. Thus, $\overset{*}{H}L+\overset{*}{H}L$ for our example sentence Toronto is the capital of Ontario gives us 'I add Toronto to the background and I add that it is Ontario that it is the capital of ('x is the capital of y' being the starting point)'. If SELECTION is used for Toronto, the first clause should be replaced with 'I select Toronto', e.g. 'Now that you've mentioned it...', and if TESTING is used, with 'I have a Variable I do not (as yet) commit to the background', e.g. 'Hang on, the main point is to come' or 'If you want to know about Toronto...'. The latter two sentences are more readily imaginable in a conversational context than the first, which may strike one as an un-called-for piece of information of the 'Look-what-I-know' type. With speaker-serving manipulation, however, it could easily be an inference ('So that's the situation').

When the second tone is $\overset{*}{L}H$, the second part of the paraphrase becomes: '...and I wonder/ask you/challenge you as to whether it is Ontario that it is the capital of'. Pattern $\overset{*}{H}L+\overset{*}{L}H$ might mean: 'If I add Toronto, then is "it is the capital of Ontario" part of our background?', which, with speaker-serving could be used to convey 'This is an odd outcome of my deductions' and with hearer-serving to convey a challenge, the latter imaginable if the hearer had just implied that Toronto is not the capital of Ontario (What's \backslash WRONG with you? To \backslash ronto is the capital of On \backslash TARio! \backslash YOU should know that!, preferably with high onset for To-). A polar re-

versal here of course gives us the well-known situation for Liberman & Sag's (1975) 'contradiction contour'. $\overset{*}{LH}+\overset{*}{LH}$ seems unproblematic: the challenge might be extended to both Variables, as in a surprised echo-question. $\overset{*}{HLH}+\overset{*}{LH}$, however, is odd, or at least heavily marked. It is rarely given in the literature (e.g. Pakosz 1982, example (15a)). The tones do not seem linkable: in fact, the tone-deleting operation in the Tone Linking Rule must be blocked for this combination, in order to prevent it from producing the pattern for linked $\overset{*}{HL}+\overset{*}{LH}$. Yet, the paraphrase seems perfectly decodable: 'I select Toronto, and wonder/ask you (speaker-serving), challenge you as to whether (hearer-serving), the predicate belongs in the background'. The significance of SELECTION here is clearly 'This of all places (just mentioned by you)'. Presumably, both the tones are phonetically and semantically self-contained, and do not allow linking. A similar problem arises in the case of $\overset{*}{LH}+\overset{*}{HLH}$. Here the linked pattern can be formed, but the combination would appear to be marked. The paraphrase 'I do not commit to the background Toronto, and select from the background the predication' is possibly interpretable as 'If you want to know about Toronto, then may I remind you that (we have just established that) it is the capital of Ontario'. The sentence might be used on a note of polite surprise, for instance, and addressed to someone who just made the proposal to make Toronto the capital of British Columbia, shortly after the decision had been reached to make it the capital of Ontario.

The most neutral option for any tone to be preceded by is $\overset{*}{HL}$, and $\overset{*}{HL}+\overset{*}{HLH}$ is unproblematic. Pattern $\overset{*}{HLH}+\overset{*}{HLH}$, too, is not difficult to interpret, although, again, it seems a fairly marked option. The double SELECTION is clearly appropriate if the Variables had recently been added to the background, either as a result of the speaker's own deductions or because the hearer put them there, in which case the speaker may take them out in order for participants to have a closer look at them. If SELECTION for the second tone is meant to convey a reminder, the first tone is likely to have $\overset{*}{HL}$, though.

Semantically, linking causes a certain degree of semantic depletion of the penultimate tone, the general effect being that the stretch of speech concerned is presented as an integral chunk of information. Absence of linking in evidently integral expressions like John the Baptist is therefore rare. Neither do we expect people to pronounce Dear Mary with two unlinked falls, while Dear me! is preferably unlinked to enhance the effect of the exclamation. Similarly, the National Coalboard or a national joke are linked, but a speaker may well wish to keep a national disaster unlinked, in order to give the indication of the scope of the drama its proper weight. This function of linking explains why the Tone Linking Rule cannot be applied if the last two accents occur on items that belong to syntactically different domains, in particular if the accent before them belongs to the same domain as the middle accent, as in the bottom rung of the ladder. In such cases, downstepping of the accents (not dealt with in this paper, see Pierrrehumbert 1980: ch 4) would appear to be the more appropriate option.

11.0 OTHER PROPOSALS

This last section is devoted to a discussion of a few rival proposals concerning the meaning of English intonation. The discussion is restricted to (aspects of) the proposals made by Jackendoff, Ladd, Bing, Brazil and Liberman & Sag. Other proposals, which are not discussed here, include those by Crystal (1975: 1-46), Glenn (1977), Cruttenden (1981), Deakin (1981), and Pakosz (1982).

11.1 JACKENDOFF

Jackendoff (1972: ch 6) is the first attempt to assign meaning to nuclear tones that went beyond a vague association of falls with finality and rises with non-finality. His analysis concerns the fall and the fall-rise in American English, referred to by Jackendoff as the A-accent and the B-accent, respectively. After dividing the constituents of sentences into 'presupposition' and 'focus', he associates the tones with the focus. The fall is taken to mark a dependent variable, i.e. 'a variable not chosen freely, but rather in such a way as to make the sentence true' (p. 263). If it is true, for example, that Fred ate the beans, then in this analysis, we must get \FRED ate the beans as the answer to Who ate the BEANS?, Fred being the dependent variable in the presupposition 'x ate the

beans'. By contrast, a fall-rise is said to mark an independent variable. The second speaker in the above conversation could continue by saying But \forall MARY ate the \backslash MEAT in which Mary is freely chosen, but (given 'Mary ate x') the meat is not. In those cases in which a fall-rise is not attended by a fall in the same tone group, the dependent variable is said to be provided by the polarity, as in \forall FRED didn't eat the meat. Once the independent variable is chosen (Fred), then, given the presupposition 'x (unknown polarity) eat the meat', the polarity is determined uniquely. The case for this analysis of the 'unattended' fall-rise rests on two arguments:

1. In sentences in which the polarity is under focus, only the fall is possible, as in (78).

(78) Max $\left\{ \begin{array}{l} \backslash \text{DOESn't like Myra's cooking} \\ * \forall \text{DOESn't} \end{array} \right.$

2. Negative written sentences that are ambiguous between a reading with not associating with the focus (I will use the term 'focus governing') and not included in the presupposition, such as:

(79) Karl doesn't write political pamphlets in the BATHroom

are disambiguated by the nuclear tone used. With a fall on bathroom, not is included in the presupposition ('It is in the bathroom that Karl doesn't write political pamphlets'), but if a fall-rise is used, not is focus governing ('It is not in the bathroom that Karl writes political pamphlets'). The explanation is said to be that, with a fall-rise, bathroom is an independent variable: if not was not attracted to the focus (and was allowed to be in the presupposition), there would be no dependent variable. When, however, bathroom is a dependent variable (with a fall) not is not called upon to provide the

dependent variable, and will be in the presupposition. Similar reasoning is applied to ALL the men didn't go: with a fall on all we get 'The number of men that did not go is all' or 'None of the men went', and with a fall-rise 'The number of men that went is not all' or 'Some of the men went'.

This analysis of single-tone sentences illustrates rather clearly that Jackendoff's approach is misguided. Although it is clear that the contextless sentences he presents tend to get the interpretations he gives, it is not difficult to demonstrate that exchange of the tones is possible without at the same time exchanging the interpretations. (See also Bolinger (1982).) In other words, the interpretations given are by no means obligatory. It is clear that (79) with a fall-rise will be interpreted as 'He does write them, but not in the bathroom' in isolation, but this same interpretation would be given to (80), in spite of the fall:

(80) A: Now let me \SEE... So Karl doesn't write political pamphlets in the \KITChen... \AH... Could it be that he writes political pamphlets in the \BATHroom

B: \SORRY. He \DOESn't, but do go on /GUESSing

Conversely, although a contextless (79) with a fall will be interpreted as 'His not-writing of them is in the bathroom', with not in the presupposition, that same reading is obtained in (81), although bathroom, quite naturally, has a fall-rise:

(81) A: I'm glad Karl doesn't write political pamphlets \ANYwhere in the house these days

B: Well, Karl doesn't write political pamphlets in the \BATHroom, but have you checked the /KITChen?

For ALL the men didn't go, too, counterexamples are not difficult to find. In (82) and (83) we have a fall marking all with not focus governing, and in (83) we have a fall-rise on all, with not in the presupposition:

(82) O \K. So \TOM would go if Mary \DIDn't go, and she \DIDn't, but \BILL wouldn't go if \TOM went... So far \ONE thing is certain: \ALL the men didn't go, but be\YOND that...

(83) A (God, remorsefully): But there must have been at least \ONE man in Sodom who regularly went to the \TEMPle, and \WORshipped, and...
 B (angel): Don't \WORRY. \ALL the men didn't go. I \TOLD you. I checked \EVERybody.

The analysis of the fall-rise and the fall given here enables one to give a different, though perhaps less spectacular explanation of the effects noted. Unless a context like the one in (83) dictates otherwise, the reader/hearer of the sentence \ALL the men didn't go will assume that some Variable in the background (SELECTION) is being removed from it (negation): what else could negative selection be doing? That is, he will assume not is focus governing, leaving 'x men went' as the starting point. In (83) this interpretation is frustrated because the context makes it clear that '(at least) x men did not go' is part of the background. In fact, so is all, but the whole point of the utterance was to remind the hearer of this fact. If he perceives \ALL the men didn't go, he will argue that some Variable is being added to the background that wasn't there previously (ADDITION). The hearer will now not assume that not is focus governing ('He cannot take out what wasn't there in the first place', he will argue), and not must be part of the starting point ('x men did not go'). If he is to assume that not is focus governing, we must frustrate the process whereby not is placed in the starting point, by choosing a context in which 'some men/man went' is part of the background, as in (82). The speaker there is - somewhat unexpectedly perhaps - trying to remove from 'his' background the notion that 'all' is true for 'x men went',

and therefore needs a not as a focus governor for all. Note that ADDITION here has speaker-orientation.

As for the starred version of (78), here too, natural contexts can be thought of. There is no reason why it could not be a polite reminder, or an indignant repetition of somebody else's statement to the effect that Max does not like Myra's cooking.

11.2 LADD AND BING

Ladd (1980: 152-62) discusses Jackendoff's examples, finds his explanations of them wanting and proposes a different meaning for the fall-rise: it marks the focus as being part of a limited set of entities. If, for example, I fed the \vee CAT is given as an answer to Did you feed the \backslash DOG?, the significance of the fall-rise of cat is, says Ladd, that it marks this animal out as a member of a limited set of animals that could have been fed. Bringing this analysis to bear on ALL the men didn't go, Ladd notes that if all is given a fall-rise, it is thereby tagged as being within a limited set: since 'all the men' cannot be a limited set, constituting as it does the whole set, this interpretation is ruled out, and the hearer therefore resorts to 'not all the men', which does conform to the requirement of being part of a set. Since no such limiting effect is given by the fall, the hearer is free to interpret \backslash ALL the men didn't go as 'none of the men went'. It will be clear that this analysis, too, conflicts with the data presented above. It may be added that the meaning 'focus within a set' is, when it is there, the result of the fact that the fall-rise selects from the background, and that many things will be organised there in sets.

Bing (1979: 185-90) defends Ladd's analysis and interprets the fall-rise on an item as marking the speaker's intention to contrast that item with another in the set. (For a similar characterisation, see Tibbitts 1975.) While, again, there is no problem with her interpretation of (84), for example

(84) I don't ∇EAT avocados (Bing ch 6 [76])

as carrying the implication that the speaker does something else with avocados, this interpretation is not the only one possible. If it is spoken in response to And I'll get some avocados for ∇STARTers when you're here, it could simply be meant as a reminder that avocados are not among the things the speaker eats, eat being the only member in its set, and not being contrasted with anything.

Bing tries to extend the interpretation to include the frequently observed effect of 'reservation' (cf Halliday's oft-quoted 'there's a "but" about it' (1967a: 27, 41)). If the contrast is not immediately clear from the situation, Bing says, the fall-rise acquires an aspect of reservation. Note that example (84) (in the second interpretation) is a counterexample to this claim. To illustrate the point, Bing gives (85):

(85) A: What do you think of Henry's ∇WIFE?

B: Well, she's ∇PRETTY (=Bing ch 6, [78])

where the reservation derives from the implied contrast with rich, intelligent, etc. Note, however, that at least some of this reservation derives from the lexis, and that a fall or a rise on pretty would hardly make the speaker sound more enthusiastic. The extra effect of reservation contributed by the fall-rise is due to the fact the 'pretty' is presented as background knowledge: 'I'm not going to say anything beyond what I assume both of us expect Henry's wife to be, viz. pretty'. Thus, the 'reserva-

tion' meaning is an effect of the meaning of the fall-rise (selection from background) in certain contexts, not the meaning itself.

11.3 BRAZIL

In spirit, our proposal concerning the meaning of English tones is perhaps most akin to Brazil (1975, 1978), Brazil et al. (1980), where what was earlier called 'linguistic normalcy' is clearly the working hypothesis. The formulation of our proposal has - it is hoped - been explicit enough to simultaneously serve as a refutation of those aspects of Brazil's description that differ from ours, and as corroboration of those elements the proposals have in common. I will therefore restrict myself to stating what I see as the main characteristics of Brazil's proposal, and giving a brief indication of what I regard as the main flaws. The main characteristics are:

1. Nuclear tones are of three types:
 - a. Proclaiming: signalling 'I mean to say', marking 'the matter as new';
 - b. Referring: signalling 'you know', marking the matter as 'part of the shared, already negotiated common ground occupied by the participants at a particular moment in an on-going relationship';
 - c. Neutral: signalling a withdrawal from the interactive situation.

Proclaiming tones are the fall (unmarked) and the rise-fall (intensified). Referring tones are the fall-rise (unmarked) and the high rise (intensified). Neutral tones are the low rise and the level tone. If

'proclaiming' and 'referring' are equated with ADDITION and SELECTION respectively, then the differences concern the classification and semantics of the high rise, the low rise and the level tone, all of which are the same manipulation, in our view, with the first two differing in range and the third differing from the others in being stylised. In Brazil et al (1980) the low rise is reclassified as an intensified fall-rise, with low 'termination'.

2. Key and termination are postulated as separate paradigms. Key marks the whole tone group as high, mid or low, and is employed at the first accented syllable. If that is not the nucleus, termination can also be employed, which has the same three contrasts. Thus, termination would appear to correspond to what is here called 'range', though without the division into three categories. The status of key is less clear, as it is not clear on what basis prenuclear syllables are called 'accented' (or 'prominent').

There would seem to be two main problems with Brazil's account. The first is that there is a preoccupation with pitch movements per se, without a proper differentiation between those that mark accented syllables and those that do not. Every movement is accounted for in terms of the same set of units, ignoring the fact that a lot may be going on in a contour that is unrelated to the marking of accents. When a child utters A book with high-pitched a and a low rise for book as a flippant answer to her teacher's question What have you got there?, Brazil would appear to have two choices: ignore the high-pitched a, or treat it as an accented ('prominent', 'onset') syllable. Neither solution seems adequate. The same preoccupation also causes the fall-part and the rise-part of a non-final fall-rise to turn up as two tonics, and, because Brazil does not employ 'compound tones', to occur in different tone units. Examples of this type of analysis are (It's extraordinary that the Government can ask people to compress their differentials) when at the \SAME / /TIME (it's offering..)(1980: 194); millions of \POUNDS / involved /HERE (p 196); (I

believe the CBI) are \backslash RIGHT / in \nearrow SAYing (p 187). In these examples, it is of course the first syllable that is nuclear (same, pounds, or possibly even mil(lions)), which is given with 'high key', with pounds marked as a mid termination fall, and right), the 'rise' marking the last syllable of the tail. If we remain within the confines of his analysis, there appears a curious contradiction between regarding, for example, at the \backslash SAME / \nearrow TIME as an instance of 'unmarked proclaiming' followed by 'intensified referring', and regarding the intuitively more marked utterance at the \backslash SAME / \searrow TIME as an instance of the same linguistic structure minus the 'intensification' of the second tone.

This last point also reveals the second weakness, which concerns the classification of the tones (and their semantics). Ultimately, the classification is an elaboration of the time-honoured, but, in our view, spurious opposition between rises and falls.¹³ Clearly, the classification of the rise as a kind of fall-rise is unjustifiable. There are too many instances where the two are non-commutable (cf tag questions), or are commutable, but lead to very different semantic effects from the substitution of rise-falls for falls (cf the use of fall-rises instead of rises in a 'listing' situation).

11.4 LIBERMAN & SAG

In Liberman & Sag (1974) and Sag & Liberman (1975) the proposal is made that the intonational semantic units consist of contours that embrace the entire tone group. These contours are seen as holistic units, which may, within limits, be modified by 'contrastive accents' on certain items. The quotations from Cutler (1977) in section 1 were taken out of a context which argued against just this approach. The key example the authors use to support their approach is the 'contradiction contour' (Liberman & Sag

1974). In addition, Sag & Liberman (1975) deal with the 'surprise/redundancy contour' and the 'tilde-contour', of which the 'contradiction contour' may be a subtype. The discussion here will concentrate on the 'contradiction contour'. In its canonical form, it looks like (86) (cf their description on pp 420-1):

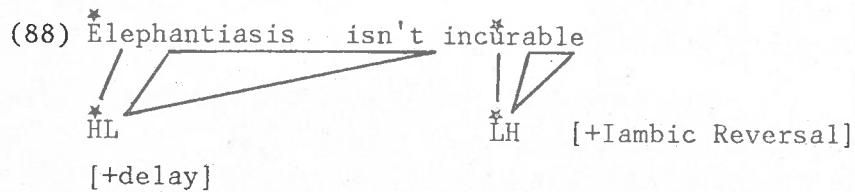


And their example is

(87) Elephantiasis isn't incurable

A possible context (from Ladd 1980: 150) is: I just found out I am going to die of elephantiasis. Liberman & Sag represent the pattern as showing the initial peak early in the word elephantiasis, which suggests that stress shift has applied to it (from -ti- to el-). We can be fairly certain, therefore, that incurable is nuclear. If elephantiasis was the nucleus and incurable was in the tail of a fall-rise nuclear tone, no stress shift could have applied, for, as Liberman & Prince have it 'iambic reversal does not apply to the Designated Terminal Element of the intonation contour' (1977: 319). This analysis squares with Ladd's statement that the contour is 'a high-falling head and a low-rising nuclear tone' (1980: 15). Liberman & Sag, of course, do not ascribe the initial peak to stress shift, or even accent, but to a feature of the contradiction contour, a view reiterated in Sag & Liberman, where the peak is said to be linked to the initial boundary of the sentence. More specifically, the contour is said to be characterised by an initial rise of some 200ms, followed by a steep fall. This specification causes the peak to take place in the second syllable of elephantiasis, which suggests that delay has applied to

this shifted accent, as indicated in (88).



The pattern, with or without delay, is not used for this sort of speech act in British English. In fact, the contour does not occur in O'Connor & Arnold (1973), although ^{*}HL+^{*}LH is normal on 'granting' expressions like All /RIGHT. The British equivalent for (88) would have a fall-rise rather than a rise on the second accent, giving an O'Connor & Arnold 'Switchback'. This pattern is also given by Liberman & Sag, who consider it the same 'contradiction contour' with the superimposition of a contrastive accent on incurable.

There are at least three things that require an explanation:

1. How is it that the 'contradiction contour' is well-formed in American English, but not in British English?
2. Why should the 'contradiction contour', as Liberman & Sag claim, not be embeddable?
3. Why should ^{*}HL+^{*}LH mean contradiction?

The first point, I would suggest, simply concerns a cultural difference of the type 'We don't say it that way'. The more interesting fact is that both HL+LH and HL+HLH are possible in American English, and that therefore, in this dialect, there ought to be an interpretation difference produced by the difference in manipulation on incurable. This difference may in this particular case be subtle, but is nevertheless real. The fall-rise presents the predicate as part of the background, the rise leaves that

background status for the hearer to comment upon. If we imagine the hearer to reply to the HL+LH contour with Yes it IS!, he would be seen to have superior information and on that basis reject the speaker's challenge to reconsider the background status of 'the disease is incurable'. If a fall-rise had been used, this same reply would sound more like a correction of the other's misconception that it is incurable.

The answer to the second question reinforces the answer to the first. As already pointed out by Bolinger (1982), the reason why the 'contradiction contour' seems unembeddable in Liberman & Sag's example (here) (89)

(89) ?It's been demonstrated by medical science that \elephantiasis isn't in /curable!

is not that the contour is not embeddable per se, but that the options employed in it make it unsuitable as an argument for a factive predicate. We cannot declare to be a fact what we subsequently intend to be taken as a challenge. If, however, we replace TESTING with SELECTION the clash no longer occurs. Compare (90) with (91), and (92) with (89): ¹⁴

(90) ?I know for a fact that \God doesn't e /xist

(91) I know for a fact that \God doesn't e \xist

(92) It's been demonstared by medical science that \elephantiasis isn't in \curable

Because of their negatives, they are perhaps difficult to contextualise. For (91) we may imagine a confirmed atheist trying to reassure an audience of fellow-atheists that, in spite of a peculiar dream he has had, he is still firmly committed to the atheist cause. And (92) could be uttered by a secret service official, defending his proposal that an artificially produced outbreak of elephantiasis might be the best way to dispose of a group of enemy agents, in spite of the fact that the disease is curable. His next utterance might be But may I point out that in the area concerned

no medical help will be available?. Note further that if we include the factive matrix sentence in the challenge by removing the accent on elephantiasis, there is no problem: 'I challenge you to consider the background status of the fact that...' (cf Ladd 1981b, Bolinger 1982), as in(93).

(93) It's been demonstrated by medical \science that elephantiasis isn't in /CURable!

and that with a (semantically non-clashing) non-factive matrix sentence the contour is naturally embeddable:

(94) Are you really sure that \God doesn't e /xist?

The answer to the third question has also already been given by Bolinger (1982): 'it doesn't' (cf also Cutler 1977). Bolinger gives numerous examples of the combination of the contour with different lexis/syntax from which the notion of 'contradiction' is absent. In our analysis (87) means something like: 'A (significant, if delay is applied) addition to the background concerning elephantiasis is this: your task to consider the background status of the notion that it is not incurable'. Here, TESTING has literal hearer-orientation. If we allow the final rise to have textual structure orientation, we get an entirely different interpretation. Note, however, that the manipulations used can still be said to have the meanings ADDITION and TESTING:

(95) A: Do any of these diseases not meet our criteria?

B: Well, \Elephantiasis isn't in /CURable, \smallpox isn't a /VAIable, and \cancer \TAKES too long...but all the others will \DO.

12.0 CONCLUSION

It can be said that the analysis of intonational meaning presented here does not compel us to relinquish the position of linguistic normalcy adopted in the introduction. It appears to be possible to maintain that the meaning of intonational morphemes is constant across utterances. Yet, some feeling of dissatisfaction remains. This feeling is perhaps chiefly based on the realisation that, although one may have some notion of what the linguistic units are and some notion even of what they mean, the bafflingly fast workings of the language user's pragmatic computations that produce the subjectively so sharply-defined interpretations we are all familiar with, remain uncharted. Perhaps we should seek consolation in the words of L.R. Palmer:

'Speech, indeed, is nothing more than a series of rough hints which the hearer must interpret in order to arrive at the meaning which the speaker wishes to convey.'

(In Introduction to Modern Linguistics, p. 82. Cited in Daniel Jones, The Phoneme: Its nature and use, p.215, Note 19)¹⁵

Notes

1. This paper has benefited greatly from the comments of a number of readers of earlier versions. I should like to thank in particular Flor Aarts, Ton Broeders, Gill Brown, Laurie Iles, Hans 't Hart, Phil Hyams, Bob Ladd, Toni Rietveld, Besty Uldall and Nico Willems.
2. An analysis can never succeed, incidentally, if it relies on phonetic considerations only. As Bolinger (1961:40) points out, John Peck with a fall-rise on John (Don't you mean GREGory Peck?) may be phonetically identical with the same phrase intoned with a fall on John and a (nuclear) rise on Peck ('merely showing surprise that the name as a whole should apply to this individual'). Cf also Pierrehumbert (1980: 72). Bolinger notes that the difference is absolute ('there is no middle ground'), and adds that replacing John with Gregory brings out the phonetic difference quite clearly.
3. When it is claimed that tones are morphemes, this statement should be read in much the same light as Bolinger intended his claim to be taken when he said that his A, B and C accents are morphemes (Bolinger [1958] 1965: 51), and not, of course, in the sense of Trager & Smith (1957), who believed that tone levels were the significant levels in intonation the way phonemes are in segmental phonology. Bolinger's accents, by the way, which are defined in terms of F \emptyset relations holding between the accented syllable and an adjacent one, cannot be equated with nuclear tones, which are pitch 'Gestalts', with definable, though stretchable, domains. Neither is there any one-to-one correspondence between these accents and tones. While an A accent would invariably appear to correspond to a fall (assuming the fall-rise is paired off as the A-rise accent, Ladd 1977), the reverse is not the case: a C accent, while usually corresponding to a rise, could also correspond to a downstepped or low-range fall. Similarly, a B accent could correspond to a fall or to a rise.
4. A number of people have sympathised with me on the difficulty of finding a suitable mnemonic, expressing 'being non-committal with respect to the background status of the Variable'. Of the terms suggested, perhaps 'VETTING' (unfortunately only BrE), '(CARROT-)DANGLING' or 'MATCHING' might be suitable.
5. It may be observed that variability of effect is of course commonplace in language generally. Thus, in spite of the fact that the morpheme have V-en is ideally described as having single constant meaning (e.g. 'occurring at a time or in a period of time linked directly with the moment of time the utterance is anchored to, usually the moment of speaking'), we get different effects in I've broken my leg and I've lived here since 1980. Similarly, He was killed in action versus He was killed slowly, etc.
6. I am here exploiting an example I owe to Bob Ladd.

7. I use the term 'proffer-suggestion' for this kind of speech act to distinguish it from 'command-suggestion', as in Why don't you get lost?.
8. In fact, details of association may have to be specified per tone. While delay has a fairly predictable effect on the fall in English (the 'rise-fall'), a delayed fall in Dutch causes the fall to be placed right at the end of the tail, and has the rise-element (movement up to H) half-way or late in the nuclear syllable (Collier & 't Hart 1975, Collier & 't Hart 1978: 38), leaving a high plateau for the tail. Readers familiar with Liverpudlian intonation may recognise the pattern as characteristic of this accent of English.
9. Ladd (in press) points out that the effect of delay resembles the phenomenon observed for tonal accents in languages like Swedish and Serbo-Croatian, quoting Bruce and Garding's work on Swedish tones. A delayed fall or fall-rise is in fact much like a Tone II accent in the dialect investigated by Bruce and Garding. Earlier Malmberg (1963: 102-8) showed that the position of the peak was the only relevant factor in the perception of tone 1 (early peak) and tone 2 (peak after 100 msec from vowel onset) in Stockholm Swedish. Gandour (1978) cites Purcell's (1975) work on the location of the peak in Serbo-Croatian accented syllables, and his finding that it alone was responsible for whether a 'falling' tone or a 'rising' tone was perceived. Conceivably, such tonal contrasts may have arisen from a partial (forward) accent shift, comparable to the accent shift that has occurred in Welsh. Williams (in press) has shown that, although Middle Welsh must be assumed to have had end-syllable accentuation, perceptually (for Welsh speakers, at least) the accent in Welsh words now regularly falls on the penult, but that, interestingly, the phonetic correlates (duration, F₀) still 'linger' on the final syllable. This may in fact cause non-Welsh listeners to hear the accent on the penult as an accent on the last syllable. Grundt (1977), too, accounts for the difference between Norwegian Tone I and Tone II in terms of accent retraction for Tone II, taking her cue from such phenomena as Jeg vil ga (Tone I) hjem ('I'll GO home') versus Jeg vil ga (Tone II) hjem ('I'll go HOME'). The fact that Swedish has tone II in past participle forms of verbs, and that Germanic had the accent on the stem-final past participle marker, may point to a similar development. Delay and tonal contrasts may thus have very different origins.
10. Goldsmith and Leben advocate MHL as the neutral tone of English. The prenuclear M would appear to have two functions: to set the prenuclear stretch at some suitably 'neutral' value, and to prevent the starred H from spreading to the left. In the view adopted here, prenuclear F₀ contours are either specified independently of nuclear tone choice, as in archipelago, where archi- may have high or low pitch irrespective of the nuclear tone chosen, or are the output of (nuclear) tone linking rules. Clearly, with the non-spreading convention for starred elements adopted above, the prenuclear M would fulfil one of its functions vacuously (containing the starred element) and the other badly (specifying the prenuclear F₀ stretch).

11. Ladd (in press) reclassifies the call contour as a stylised fall-rise. Also Pierrehumbert (1980: 115) and Gunter (1982) prefer a connection with a fall-rise to the one postulated here. Note that this interpretation throws out the stylised fall-rise given here, and also runs counter to the results of the experiment referred to in section 7.2.
12. The equation here is not between 'pragmatically unmarked form' and 'underlying form', but between 'pragmatically unmarked form' and 'linguistic form to which few rather than many linguistic options have applied', in the sense that he might have been smoking is both linguistically and pragmatically more complex than he smokes. Thus, Goldsmith's criticism (1982) of Ladd's claim that the stylised fall should be further removed from the underlying form of the category 'fall' than the 'plain fall' (which Goldsmith says is a non-sequitur, since speaking 'close to the underlying form', i.e. with no reductions, assimilations etc., may be a very marked sort of thing to do) does not apply to my claim.
13. A similar dichotomy between 'falls' and 'rises' is (independently) made for Dutch by van Buuren (1980), who postulates a feature 'appealing' for the rise. The fall-rise is treated as a 'contrastive' variant of the rise, and is distinguished from it by allowing the former to have an 'upward jump'. That is, in his system, the fall-rise is to the rise what the rise-fall is to the fall, which constitutes a reversal of the relation between the fall-rise and the rise relative to Brazil's dichotomy.
14. The oddity of (89) is also due to the application of stress shift. The relative improbability of the kind of non-initial stress shift exemplified (i.e. with the stress shift rule operating over a non-initial domain larger than the phrase) can be demonstrated in other examples. Thus, (1) is somewhat less expected than (2), and (3) is more expected than (1):
 - (1) ?Are you a'ware that 'visibility is 'poor?
 - (2) Are you a'ware that visi'bility is 'poor?
 - (3) 'Visibility is 'poor
15. I thank Gill Brown for calling my attention to this quotation.

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