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PROSODIC FORM AND DISCOURSE FUNCTION

Mark Liberman and Ivan Sag M.I.T.

We are compelled to apologize in advance for the mismatch between our medium and our message. This is a paper about intonation, and our examples are much better suited to the mode of speech than to the mode of writing. Since the format of this volume does not allow the inclusion of a record or tape recording, the reader will have to learn to perform our examples on the basis of the notation in which they are written, and a few words about this notation are in order.

Although the acoustic realization of intonation involves duration and amplitude as well as pitch, for our present purposes it is pitch which is crucial, and we will largely neglect other factors. The wavy lines over our examples represent fundamental frequency against time, roughly speaking--the pitch scale is linear within the accuracy of our ability to draw it, in the confined space which we have permitted ourselves, but the time scale is utterly nonlinear, being determined by the vagaries of English orthography and the spacing of our typewriter. Stop gaps have been filled in, and certain other effects of segmental phonology smoothed out. We hope that the result is a reasonable compromise, in view of its limited purpose and the interests of our audience--those who wish for more phonetic detail are referred to Liberman and Sag (forthcoming).

The facility which we used in our determination of pitch contours includes a real-time hardware pitch extractor and an A-D converter linked to a PDP-9 computer. We are deeply indebted to Prof. Jonathan Allen for the use of the facility, and to Douglas O'Shaughnessy for the use of his programs.

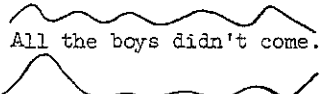
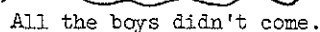
It's clear that the way a sentence is said is related to the role that it plays in a discourse. Consider the conversational exchange in (1), where the a and c sentences are to be understood as uttered by Speaker A, while the b and d sentences are the contribution of his good friend, Speaker B:

- (1) a There are several adequate theories of intonation in English.
- b There aren't any adequate theories of intonation in English.
- c There aren't any adequate theories of intonation in English?!
- d There aren't any adequate theories of intonation in English,
and you know it.

Some of these discourse-related properties of intonation, e.g. question vs. declarative, are enshrined in our writing system and (perhaps therefore) in linguistic theory. In other cases, e.g. the contour associated with sentences like (1)b, neither orthographic conventions nor (in general) linguists take cognizance of the difference.

Perhaps they're right in this. The question of what constitutes different uses of the same sentence, as opposed to uses of different sentences, is a vexed one. Not every difference in token (not even every systematic difference) is a difference in type, and no principled basis for deciding such questions has ever been made explicit.

The contour observed on sentence (1)b does, in any case, interact with various matters of traditional interest to linguists. Consider the examples in (2):

- (2)a  All the boys didn't come.
 b  All the boys didn't come.


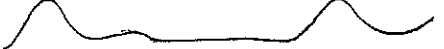
Sentences like (2)a have been the subject of much controversy in the recent literature¹. What has been at issue is how to account for informant responses to such sentences, which many people feel to be ambiguous between the so-called "neg-V" and "neg-Q" readings, according to the first of which every single boy failed to come, and according to the second of which not all of the boys came.

The testing of such sentences has been rather extensive, although not without methodological problems². Specifically, (2)b, with the same intonation contour as (1)b, strongly favors the "neg-Q" reading. Although this fact was noted by Jackendoff as early as 1970³, no subsequent studies controlled for the variable of intonation. Since the phenomenon was unnoticed or at least not commented on, of course no explanations (with the notable exception of Jackendoff 1972, p. 352 ff.) have been offered.

There are two avenues along which such an explanation might proceed. Following the first route, one would treat the determination of scope relations in sentences like (2), and the derivation of their intonation, as part of the same system, either by marking abstract linguistic structures with some precursor of the output intonation, to which scoping rules (whether interpretive or generative) could refer, or by having intonation generated according to the operation or output of scoping rules.

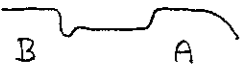
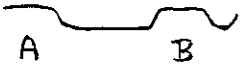
A second way to deal with facts like those in example (2) would be to consider the semantics of scope and the pragmatics of discourse function to be separate systems, which of course will interact in practice, but are formally and conceptually distinct; and to argue that the intonation contour of example (2)b belongs in the second, pragmatic, category.

Jackendoff (1972) chose the first of these alternatives, and is to be commended for devising the first serious attempt at a formal semantic account of such a wide range of intonational facts. He approaches sentences like (2)b by first considering discourses involving sentences with two focuses, as in (3):

- (3)a Well, what about GWENDOLYN? What did SHE analyze?

 b GWENDOLYN analyzed the SPECTROGRAMS.
 c Well, what about the SPECTROGRAMS? Who analyzed THEM?

 d GWENDOLYN analyzed the SPECTROGRAMS.

He notes that (3)b and (3)d are appropriate responses to (3)a and (3)c, respectively, but that (3)b would be inappropriate in response to (3)c, and (3)d would likewise be inappropriate in response to (3)a.

Working from such intuited contours as those he draws for (3)e and (3)f, which are his versions of our (3)a and (3)c,

- (3)e FRED ate the BEANS.⁴

 f FRED ate the BEANS.


(These contours are as given in Jackendoff 1972. Note that he places the contour below the caption, rather than above it as we do elsewhere in this paper. In reference to the discrepancy between his BEANS and our SPECTROGRAMS, etc., see our footnote 9.)

Jackendoff posits an interpretive mechanism that assigns a "presuppositional" mapping on the basis of the portion of the B (terminally rising) contour and the A (terminally falling) contour (these labels are due to Bolinger (1958), although Jackendoff does not seem to use them in quite the same sense).

(4) "The presupposition is a mapping from a set of values defined by the variable x, marked with a B accent, into a set of values defined by the variable y, marked with an A accent..."

Thus for example (3)e: Presupposition: x ate y.
 Assertion: (Fred, the beans) (x,y)(x ate y)⁵

This is an extension of the slot-substitution theory of surface structure focus interpretation proposed by Chomsky (1971). A substitution of variables s for the focused (i.e. stressed) elements will yield the so-called presupposition, as exemplified in (4) above, and the sentence is taken to have as its "assertion" that the focused element(s) may be substituted for these variables to yield a true sentence. Jackendoff's modification may be simply summarized, in

relation to the examples in (3): the B contour indicates what the speaker is being asked about; the A contour indicates the answer.

But how does all this account for the forcing of the "neg-Q" reading in sentence (2)b? Despite the fact that this question motivated his investigation in the first place, Jackendoff is hard pressed for an explanation. He represents (2)b as (5), with a contrastive B accent on the quantifier--the terminally rising "tail" of this accent is assumed to extend freely to the right, in this case taking up all of the remainder of the sentence:

- (5) ALL the men didn't go.

B

As he himself points out, his theory requires special modification to deal with such a case:

- (6) "...the interpretation of the B accent as an independent variable requires that it be freely chosen. Under this assumption, it would seem impossible ever to have a B accent associated with a single focus, since the presupposition uniquely determines the appropriate value, violating freedom of choice. One way to circumvent this problem is to use the affirmation-negation distinction as a dependent variable just in case there is a single B accented focus. In this way, the focus can be chosen freely; the choice of affirmation or negation will then be determined uniquely."

Even supposing that his formalism, under this modification, yields a rational semantics⁶ for sentences like (5), Jackendoff's invocation of the "affirmation-negation" distinction" is an ad-hoc circumvention of self-created problems. It leaves his explanation with no more generality than the simple observation that a "B contour" on certain sorts of sentences tends to enforce outside scope for negatives within its domain, and this was the very fact for which he originally had hoped to give a principled account.

Furthermore, Jackendoff's attempt to generalize his (interesting and suggestive) treatment of two-focus sentences to cover cases like (2)b requires the unwarranted assumption that the initial high pitch in such sentences must reflect a contrastive focus. We shall argue below (on both semantic and phonetic grounds) that this is not the case.

The second approach outlined above (that of isolating as a separate system the contribution of intonation to the meaning of sentences like (2)b) was assumed, more or less, by Pike (1947). However, Pike's primary concern was isolating minimal meaningful units, made up of sequences of phonemic pitch levels, which would be the atomic units of all complex contours. Hence, in his discussion of a contour similar to that on (2)b Pike offers the following:


- (7) "A °2-4-2 contour combines the meaning of °2-4 (=center of at-

tention, pointing, contrasting) and °4-2 (=incomplete deliberation, incomplete sequence)."

Pike's example: That can't be true!⁷
 °2 - -4-2/

For Pike this is the same °2-4 contour that ends most simple declarative sentences, and the same °4-2 contour that can occur at the end of yes/no questions. Pike does not, to our knowledge, comment on the interaction of his °2-4-2 contour with quantifier scope, and the meanings that he assigns to its (allegedly) constituent pitch morphemes are, like good astrological readings, not demonstrably inconsistent with the facts, but far too vague to be of much predictive value.

Contrary to Jackendoff's view (that the pitch contour we are considering is a semantically contrastive contour centered on some element in a sentence) we propose that it is a pragmatic utterance-based contour, unrelated to contrast. One piece of evidence for our view is provided by sentences like (8):

- (8)  Elephantiasis isn't incurable!

If an utterance begins with unstressed or low-stressed syllables, the initial rise (characteristic of the contour we are investigating) nevertheless gives these unstressed syllables an unusually high pitch, with the result that following stressed syllables may be very considerably lower. This never happens in contrastive cases, unless of course it is the (normally unstressed) morphological or phonetic material itself which is being contrasted. It is worth noting, incidentally, that examples like (8) are unembeddable--thus

- (9) *It's been demonstrated by medical science that elephantiasis isn't incurable!⁸

This distinguishes such contours sharply from contrastive accents, which are quite freely embeddable.

Contrary to Pike's view (that the pitch contour exemplified in (8) is to be analyzed as two tonal morphemes), we propose that this contour is a holistic unit. We offer two arguments--one from sound and one from meaning.

Phonetically the contour exemplified in (8) has four key characteristics:

- 1/ an initial rise, lasting roughly 200 msec. and peaking about an octave above the middle of the speaker's normal range;
- 2/ a rapid fall from this peak down to the speaker's mid range or a little below it;
- 3/ a rise, of about 100-200 msec. duration, at the very end of the utterance (almost invariably within the final syllable), trailing off

in amplitude as it rises in pitch, and reaching a level of a fifth to an octave above the middle value;
4/ a lowering and flattening of the contour in the body of the utterance.

This picture is somewhat complicated by its interaction with segmental phonetics and with word stress, and there are also complications arising from emphasis, excitement, rate of speech, etc., all of which will be disregarded here.

Characteristics 3/ and 4/ (the terminal rise and the medial flattening) are common enough in English intonational patterns--however, characteristics 1/ and 2/ (the initial rise and fall, uncorrelated with word stress) are unique to this contour, as far as we know, and themselves cannot occur without characteristics 3/ and 4/ accompanying them. This suggests to us that the contour is phonetically (more properly, psychologically) holistic.

Actually, the final rise (characteristic 3/) is also systematically differentiated from other final rises (e.g. in so-called question intonation) by the fact that it is limited to final syllables, and by the fact that the amplitude begins to drop very soon after the pitch begins to rise, but it is not impossible to find particular tokens of, say, "question" rises which share these characteristics.

An important difference between the contour found in examples like (8) and the secondary contrastive accent observed in cases like (3), is that in the so-called B contrastive accent the terminal rise is very optional, usually very small when it can be produced at all, and in fact only shows up in very slow, exaggerated renditions of carefully chosen examples⁹, whereas in cases like (8) the terminal rise is obligatory and cannot be dispensed with even in the most rapid or sloppy speech.

The nature of the articulatory mechanism of this contour is suggested by the following simple experiment--place a finger (gently) on your adam's apple and produce a sentence such as (8). You'll find that the height of the larynx seems to vary directly with the pitch of the voice, suggesting that the extrinsic musculature of the larynx is the primary articulatory vehicle of such contours. We speculate that the articulatory nature of this contour is simply a momentary upward impulse imparted to the larynx at the beginning and at the end of the utterance. Much of the observed phonetic variation then would result from differences in the relative timing of the initial impulse and the onset of phonation, and from limitations in the acoustic realization of the final rise due to the fact that subglottal pressure would be shut off at about the same time as the final laryngeal gesture begins, so that phonation would typically stop while the laryngeal gesture was still under way.

Our second reason for supposing the contour exemplified in (8) to be holistic has to do with what it means. We find that this contour is appropriate (although of course optional) just when the speaker is using the utterance which bears it to contradict--he may contradict what has just been said by another, he may contradict some assumption or implication of what has been said or done by another, or he may contradict himself.

Consider the following exchange:

(10) Mark: Hey Ivan, how about on your way to school this morning you drop off my pet whale at the aquarium?

Ivan: (Kazoo or slide whistle; ad libitum)



Without having any idea of the content of his utterance, we know from the melody performed by the second speaker that he objects in some way to the first speaker's request. What propositional content might he have meant to attach to this intonational superfix? A few possibilities might be:

- (11)a |You don't have a pet whale!
b |I'm not going to school today!
c |I don't want that monster wiggling around in my car!
d |They don't want him at the aquarium!
e |I'm not taking orders from you anymore!

There are some possibilities that don't work so well:

- (12)a |I'm not very fond of that animal!
b |I'm more than happy to take him along!

We don't mean to suggest that responses such as those in (12) are ill-formed, just that they require some fairly unnatural assumptions in order to be construed as contradictions, and therefore are unnatural in the context created for them by (10). Faced with (12)a and (12)b as responses to the request in (10), one would most naturally answer, "well, I didn't say you were," or, "well, I didn't say you weren't."

A consideration of possible contexts for the examples in (13) may help to suggest the nature of the discourse function we are calling "contradiction," and the association of the contour exemplified in (8) with that function. We invite our readers to attempt this not unproblematic task at their leisure--for now we regard the point as established.

- (13)a |You can't have that food!
b |(A few of) my friends can come over if they want to!
c |I'm a careful driver!
d |I didn't know you were a jujitsu black belt!

We are now in a position to explain the apparent disambiguation of scope relations in (2)b. It's easy enough to see why the use of such a sentence as a contradiction would tend to yield the neg-Q reading over the neg-V reading. If a sentence containing a

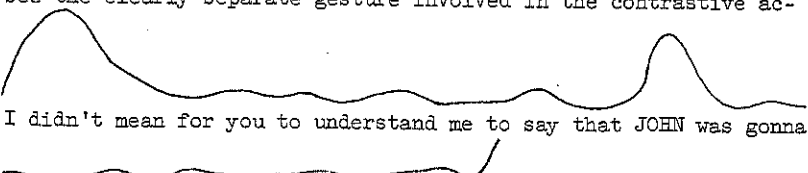
negative is used as a contradiction, it's natural to adopt an interpretive strategy which takes the negative itself to be the vehicle of that contradiction, i.e. to assume that what is being contradicted can be discovered by simply removing the negative particle from the sentence in question. This will guarantee that the negation will take wide scope with respect to any other operators in the sentence.

However, by our theory this should be merely the result of a plausible chain of reasoning, or of a natural psychological strategy, so that the implicature should be contextually cancellable. We think that it is--consider example (2)b in a context where it's my job to keep a certain group of boys from coming around, and I've just been accused, falsely in my opinion, of failing in this duty.


Observe also that whatever tendency there is to give the negative outside scope in a case like (2)b is matched for a similar intonation on a sentence like "John doesn't like all of your roommates," which provides one more demonstration that a contrastive accent on the quantifier is in no way involved. Even a wording like "John doesn't like every single one of your roommates," which with normal intonation tends to suggest inside scope for the negative, wants to have the negative outside when said with a contradiction contour.

Having demonstrated the nature of the beast in some relatively clear cases, we begin to track our contradiction contour into the intonational jungle.

First we observe that the contradiction contour can coexist with contrast. In (14) we have the contradiction contour clearly laid out at the beginning and end of the utterance, with a contrastive stress picking out John, which is far enough from the beginning and end for us to see the clearly separate gesture involved in the contrastive accent.

(14)  I didn't mean for you to understand me to say that JOHN was gonna be the one who'd hafta do all this work.


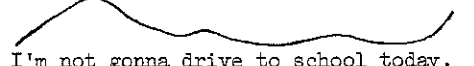
In sentence (15) a contrast on incurable gives us a contrastive rise on the stressed syllable cur as well as the contradiction contour rise on the terminal syllable -ble. Here the two gestures interact to some extent, and might be taken to be inherently connected if not carefully analyzed.

(15)  Elephantiasis isn't INCURABLE.

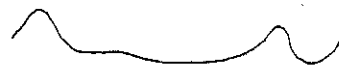
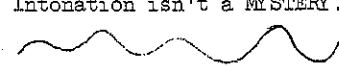
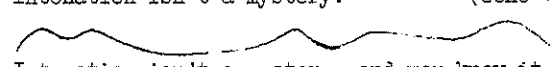
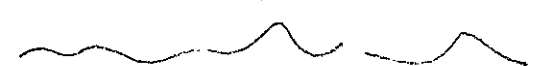
In the case of (16)a, the initial rise due to the contradiction contour entirely overlaps a contrastive stress on I--the case without contrast may be seen in (16)b. In the contrastive case the I tends to be lengthened so as to occupy the whole of the rise and perhaps even a little of the fall, whereas in the noncontrastive case the I has its normal length and the contradiction contour rise might

peak somewhere around the g of gonna, and not come down again until the beginning of drive. However, it is likely that there is a grey area in which it is impossible to determine from the output whether a contrast is present in addition to the contradiction contour.

Here the effects of contrast and of contradiction interact to the extent that without careful consideration of related cases one might assume, as Jackendoff did, that only one phenomenon is at issue.

(16)a  I'M not gonna drive to school today.
b  I'm not gonna drive to school today.

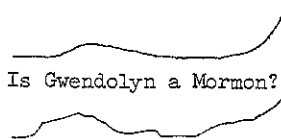
In investigating phenomena of this sort, it's difficult not to be misled by similarities in pitch contour, apparent or actual. Not without pain, we've come to realize that there is extensive neutralization of surface forms in intonational matters. As an example, consider the cases in (17).

(17)a  Intonation isn't a MYSTERY. (contradiction + contrast)
b  Intonation isn't a mystery! (echo + emphasis)
c  Intonation isn't a mystery, and you know it. (emphasis + continuation rise)
d  Intonation isn't a mystery, it's a problem. (substitutive contrast)

Suppose we have the sentence "intonation isn't a mystery," with the contradiction contour plus a contrastive accent on mystery. This (example (17)a) is parallel to the situation we observed in example (15). Zeroing in on the word mystery, we observe a rather distinctive-looking "backwards S on its side" shaped contour. If we look around for other instances of such a contour on a single word at the end of a phrase, we'll find plenty of them. A certain kind of echo will yield a similar melody on mystery, as in (17)b. An emphatic stress plus a continuation "rise" (actually, it is usually rather different, but which might be taken by some to be related. A substitutive contrast on mystery can optionally give us a contour on that word which is very similar indeed to the one it gets from contrast plus contradiction--the result, in the substitutive case, is shown in (17)d.

All of these cases have been conflated with the contradiction contour by one investigator or another. If we were to try to isolate a "meaning" common to all such cases, we would be driven, like Pike, to a level of generality at which empirical content is pretty thin. To try to express the "meaning" of one of these cases in terms of a system devised to deal with another one, as Jackendoff did, requires the introduction of ad hoc clauses even to begin, and soon reaches the point at which patching becomes unreasonable. The moral is, one should be a little cautious in assuming that two intonational cases, which are in some way similar, are in fact underlyingly the same.

We don't have the space here to analyze all the cases in (17) in any detail, but a sketchy treatment of a sample case, (17)b, may be instructive. Example (18)a shows a typical yes/no question with terminal rise--(18)b shows roughly the same intonation with no subject-aux inversion.


- 
- (18)a Is Gwendolyn a Mormon?
- b Gwendolyn is a Mormon?

One typical use of a sentence such as (18)b would be as an echo, in a dialogue like the following:

- (19) First Speaker: I'm surprised that Gwendolyn held a seder, her being a Mormon and all.
Second Speaker: Gwendolyn is a Mormon?

There is a continuum, apparently involving degree of emphasis, from this rendition to that given by the second speaker in (20):

- (20) First Speaker: Gee, it's really a great thing that you're promoting interfaith harmony by marrying Gwendolyn, her being a Mormon and all.



Gwendolyn is a Mormon!?

The addition of emphasis amounts phonetically to an additional impulse imparted to every stress in the sentence, with an especially large boost given to the crucial word Mormon, and a concomitant reduction in the terminal rise¹⁰. Somewhere along the continuum from (18)b to (20) (Second Speaker) occurs the case in which the emphatic impulse on the syllable mor- and the remaining "question" rise on the syllable -mon mimic exactly the contour which might have been given to that word (Mormon), at the end of such a sentence, by the combination of contrastive stress and contradiction-contour terminal rise. This is the case which is comparable to (17)b. It's only at this one place in the spectrum (of more-or-less emphatic echos) that this neutralization of last-word contours happens, but unless one looks at each case carefully, on its own terms, this kind of overlap can be very

confusing.

The contradiction contour, isolated and explicated in this paper, has other peculiarities which we do not have space to discuss, such as the general impossibility of including nonrestrictive relative clauses, deintensive (parenthetical, adsentential¹¹) verbs and adjectives, and so forth.

Another question which we can ask, but not answer, concerns the circumstances in which a language will exhibit this contour or something like it--it seems to be widespread but by no means universal. One hypothesis which might be gingerly advanced, on the basis of the few cases we've examined, is that stress-timed languages like English, German and Russian will tend to have a set of discourse-functional intonations, of which the contradiction contour is one; while syllable-timed languages like French and Japanese will tend to accomplish the same means by other ends.

An answer to questions of this sort can be found only through a deeper understanding of the nature of intonation and its function in human communication. We hope that this paper will inspire some of its readers to begin the search for that understanding, or will in some way help those already at work on the problem.

FOOTNOTES

1. cf. Carden 1970, 1971, 1972; Heringer 1970, Labov 1972.
2. cf. Heringer 1970; Stokes 1973.
3. As cited by Heringer (1970), p. 293 fn. 6. Jackendoff claimed the relevant factor was contrastive stress interacting with sentence-final rising intonation. We will return to this matter below.
4. Jackendoff 1972, pp. 260-262.
5. ibid.
6. It's unclear whether Jackendoff means "affirmation/negation" to be a distinction in truth values, in propositional attitudes, or in illocutionary acts. It's also unclear whether the values of the "independent variable," whose position is arrived at by substituting for the allegedly focused item (in this case the quantifier all), are taken to be substitutable lexical material (e.g. all, some etc.) or intensional objects in some way corresponding to these.

Some of the difficulties that arise in this connection can be brought out by considering two examples. In a sentence like

- (i) I want Ralph NOT to get the job, but Melinda wants him TO get it.

the distinction between a verbal complement and its negation is felt to reside in the lexical distinction to/not to, wherefore these elements receive the stress intended to bring out the contrast (this case was brought to our attention by Peg Griffin). Does this opposition of lexical material require its poles to be treated as substitutable constituents in the grammar?

To take another sort of case--in a sentence like

- (ii) In NO way does Max resemble his mother.

presumably no is being contrasted with some, etc., but the substitution yields an ungrammatical sentence:

(iii) *In some way does Max resemble his mother.

Once these questions (what sorts of objects do the variables range over, and into what sort of expression are their values substituted) are decided, the problem remains of what it means to plug such values into such an expression in cases like (2)b. Since (as we will argue below) sentences like (2)b have, in general, nothing at all to do with contrastive stress, the point is fortunately moot.

7. Pike 1947, p. 57.

8. We use the notation "i...!" to indicate that the enclosed material is to be said with a contour similar to that on sentences (2)b, (8).

9. Fred and beans are short enough that it is very difficult to perform a "B contrast" on them, so that we were forced to invent examples with polysyllabic initially-stressed words. Even under these more favorable circumstances, only one of the authors of this paper was ever able to master the skill of consistently producing a natural-sounding "B contrast" which had an actual acoustic rise at the end, and he had a tendency to wind up with a sort of warble or wobble as often as a simple rise. By comparison, even the less vocally talented author had no problem in producing lovely terminal rises in the case of the contradiction contour, even on short monosyllables or on the final syllable of polysyllabic words like incurable which had a contrastive peak on the main stress.

10. Perceptual phenomena which appear to be related to this balancing of pre-terminal peak and terminal rise were studied in Hadding-Koch and Studdert-Kennedy 1964.

11. cf. Bresnan 1968, Lieberman 1973.

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On make the claim that S

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0. Background

This paper treats S's such as

- (1) Sam made the/*Harry's claim that he would marry Shirley.
(2) Sam had the/*Harry's feeling that he would marry Shirley.

When formulating the Complex NP Constraint, Ross (1967) noticed that S's such as (1)-(2) behave quite differently from ordinary appositive clauses such as (3).

(3) Sam discussed the/Harry's claim that he would marry Shirley. For example, the claim and the feeling in (1)-(2) cannot be modified by possessives, while claim in (3) can. Also, much to Ross's embarrassment, they do not seem to obey the CNPC. So, for example:

Question

- (4) Which girl did Sam make the claim that he would marry?
(5) Which girl did Sam have the feeling that he would marry?
(6) *Which girl did Sam discuss the claim that he would marry?

How are we going to explain this puzzling phenomenon?

1. Harris's Modalization

Back in 1957, Harris proposed that there is a rule in English which transforms S's such as in (7) into the corresponding S's in

(8) (Ross 1967: 78).

- (7) a. Sam progressed.
b. I feel that Arch will show up.
(8) a. Sam made progress.
b. I have a feeling that Arch will show up.

Ross was tempted to explain the behavior of these 'pseudo-appositives' by adopting Harris's rule, Modalization, and by imposing an extrinsic ordering between it and movement rules. According to this hypothesis, (1)-(2) are derived from (9)-(10).

- (9) Sam claimed that he would marry Shirley.
(10) Sam felt that he would marry Shirley.

The CNPC does not apply to (1)-(2), since at the time movement rules apply, they are still in the stage of (9)-(10).

(11) Movement rules

Modalization

Unfortunately, Ross had to abandon this approach due to an inherent ordering paradox. Consider (12).

- (12) (This is the girl (S₁ whom Sam {made the claim } (that
S₀ he would marry) S₂) S₁) S₀ {had the feeling} S₂

In order to derive (12) successfully, Modalization may not apply at the S₁ level, otherwise Relativization at the S₀ level would be blocked by the CNPC. Modalization must follow Relativization on S₀, the topmost S. Therefore, it follows that Modalization is