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# A Semantico-Pragmatic Analysis of Fall-Rise Intonation<sup>1</sup>

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## 1. Introduction

The role intonation plays in the grammar has been the subject of considerable controversy. To what extent is intonation determined by the syntax? Does it provide an independent semantic contribution? Does it have specifiable pragmatic functions? In this paper we examine one intonational contour, fall-rise intonation ('\\'),<sup>2</sup> which has figured prominently in this debate. For Jackendoff (1972), \\ provides evidence that (at least some) intonation is determined directly by an enriched syntactic representation. For Liberman and Sag (1974), \\ represents a semantically contrastive stress interacting with a pragmatic utterance-based contradiction contour. Ladd's (1980) lexical approach to intonation attempts to isolate the semantic contribution of \\ while recognizing its (pragmatic) role in relating an utterance to the context and expressing the attitude of the speaker. Our analysis of \\ in naturally-occurring discourse reveals that these previous studies have been inadequate in two ways. Either they have failed to identify properly the phenomenon in question, or they have failed to appreciate its full semantico-pragmatic function. In this paper we propose a new analysis of \\ including both its discourse function and the constraints on its use.

## 2. Defining \\

\\ intonation (Figure 2-1) is characterized by an optional sharp rise over some syllable **syl**, preceded by zero or more syllables and followed by an abrupt fall in pitch at some point before the

syl  
...  
(...) ...

Figure 2-1: \\ Contour

onset of the next vowel, ending with a sentence-final rise in pitch.<sup>3</sup> **syl** is a syllable of some constituent (at any level of the parse tree except the matrix S node) which, in neutral intonation, would receive primary stress. This constituent we will term the \\ *constituent*. \\ then promotes **syl** to *sentence nucleus*, i.e. the syllable of the sentence receiving *sentence stress*.<sup>4</sup> There are no constraints on the position of **syl**: it can occur in any constituent, as shown in 1 (**next page**).

## 3. Previous Studies

In Bolinger's (1958) three-way distinction of "pitch accent", \\ is subsumed under 'Accent A', a type of accent which is characterized by an abrupt fall within two syllables after the accentable syllable. For Bolinger, accents are morphemes with specifiable meanings: "Accent A' is assertive. It is used with items that are separately important, contrastive, and/or new to the discourse" (1958:143). However, as we will show below, \\ may be used even when these conditions, as we understand them, are not met.

- (1)
- a. A: Did Laura spill a diet Coke?  
B: \Elizabeth/ spilled a diet Coke.<sup>5</sup>
- b. A: Did Elizabeth drink a diet Coke?  
B: Elizabeth \spilled/ a diet Coke.
- c. A: Did Elizabeth spill my diet Coke?  
B: Elizabeth spilled \a/ diet Coke.
- d. A: Did Elizabeth spill a Coke?  
B: Elizabeth spilled a \diet/ Coke.
- e. A: Did Elizabeth spill a diet Pepsi?  
B: Elizabeth spilled a diet \Coke/.

Jackendoff (1972) claims that \ / marks the "independent variable" in a multiple-focus sentence. Jackendoff suggests that, when a sentence has two *foci*,<sup>5</sup> one will receive an A pitch accent [falling] and one will receive a B pitch accent [fall-rise].<sup>7</sup> To account for \ / within a sentence containing only a single-focus, Jackendoff introduces an "affirmation-negation" distinction<sup>8</sup> to serve as the other focus, whose sole function is to exclude *not*, *only*, and *even* from the presupposition. For example, in

- (2) \Fred/ didn't see John.

it is presupposed that {x saw John}, and it is asserted that {x≠Fred}; while in 3, with falling intonation (represented by '\') on Fred,

- (3) \FRED didn't see John.

it is presupposed that {x didn't see John}, and it is asserted that {x=Fred}.

However, this analysis fails to account for occurrences of \ / within a single-focus sentence which lacks the requisite *only*, *even*, or *not*, such as B's response in 4.

- (4) A: Do you have diet Coke?  
B: I've got diet \Pepsi/.

While Liberman and Sag (1974) argue persuasively against Jackendoff's focus-based analysis of \ /, they mistakenly conclude that \ / is simply a special case of an intonation pattern which they call "contradiction contour" (CC), illustrated in 5 and represented below by '!...!':

- (5) !Elephantiasis isn't incurable!

So they are led to claim that 6 and 7 differ only in that 7 contains an optional occurrence of \ / (for them, 'contrastive stress') over *elephantiasis*.

- (6) A: Elephantiasis is incurable.  
B: You're crazy. !Elephantiasis isn't incurable!

- (7) A: If I don't die of cancer, elephantiasis will get me.  
B: !\Elephantiasis/ isn't incurable!

However, this unitary analysis of CC cannot be maintained. First, as Ladd (1980) wonders, if 7 is simply CC cum contrast, then why is it possible to embed (Liberman and Sag's syntactic diagnostic for CC<sup>9</sup>) 7 but not 6? (cf. 8 and 9) Ladd's question underscores

- (8) A: Elephantiasis is incurable. (=Liberman and Sag's 9)  
B: You're crazy! #It's been demonstrated by medical science that elephantiasis isn't incurable!
- (9) A: Elephantiasis is incurable.  
B: You're crazy! It's been demonstrated by medical science that \elephantiasis/ isn't incurable.

the basic problem with Liberman and Sag's analysis: they conflate two distinct intonational phenomena. This conflation forces them to analyze all instances of \ / as contradictory. However, our corpus reveals that \ / can occur even when apparently nothing is being contradicted, such as in 10 through 12.

- (10) A: I don't want to leave yet.  
B: Your \father/ does.

- (11) A: Are you married?  
B: I'm \engaged/.

- (12) A: What interesting papers are there in the first session?  
B: There's \Gregory's/.

Ladd (1980) also argues for an interpretation of \ / distinct from CC. In rejecting Liberman and Sag's analysis, Ladd proposes an account of \ / along the lines of Jackendoff's focus/presupposition theory. Ladd claims that \ / "adds the information that the variable of the focus presupposition is a member of a set which is in the context" (p. 153). For Ladd, the meaning of \ / is "something like 'focus within a given set'. It picks something out of a set of possibilities [either explicit or implicit in the discourse] and focuses on it, but it specifically notes the connection of the set of possibilities to the context" (1980:153). For example, in 13 Ladd argues that \ / conveys that 'cat', the focused constituent, is a member of the set of animals evoked by A's query. While the superset is

- (13) A: Did you feed the animals? (=Ladd's 16)  
B: I fed the \cat/.

explicitly mentioned in 13, Ladd notes that this need not be the case, so long as the speaker is able infer such a superset from his knowledge of the hearer, of the domain, or of the discourse context.

To illustrate the semantic contribution of \ /, Ladd contrasts it with \: he claims that while \ indicates new and unpredictable information, \ / connects an item to a set in the context. Where \ indicates 'abruptness', \ / indicates a 'polite softening'. In the case of superlatives and comparatives, \ indicates 'enthusiastic agreement', while \ / signals disagreement or at least amendment. To illustrate, consider 14.

- (14) A: Do you want a glass of water? (= Ladd's example 19)  
B: I'll have a \beer/.

Ladd paraphrases B's response as: "You offered me something to drink -- how about a beer instead of water?" With \, this response would have "a rather abrupt feel, because in addition to saying no it makes a specific request without any other polite softening" (p.155). However, Ladd fails to explain how "focus within a given set" either achieves this 'polite softening' effect or signals disagreement/amendment.

Although we agree with Ladd's basic attempt to assign a semantic role to \ /, we have found his analysis to be inadequate in several respects. First, a referent may and often

must be interpreted as a member of some set even *without*  $\setminus/$  intonation in order for some exchange to be coherent.

(15) A: Did you feed the animals?

B: I fed the  $\setminus$ cat.

Despite the absence of  $\setminus/$  over 'cat' in 15, A must still recognize a set-subset relationship between 'animals' and 'cat' to interpret B's response.

Second, an item uttered with  $\setminus$  intonation need not be any 'newer' or 'less predictable' than one uttered with  $\setminus/$ . In 16, neither B1 nor

(16) A: You have a VW, don't you?

B1: I've got a  $\setminus$ bubble-gum/ card.

B2: I've got a  $\setminus$ bubble-gum card.

B2 is readily interpretable unless A postulates some relationship between Volkswagens and bubble-gum cards, and  $\setminus/$  makes it neither easier nor more imperative that A seek such a relationship.

Third, Ladd's claim that the primary purpose of  $\setminus/$  is to relate some entity to a set in the context does not explain cases in which  $\setminus/$  occurs when the relevant ordering is not simple set-membership. For example, consider the following exchange between passenger and bus driver:

(17) A: Do you go straight up Walnut?

B: To  $\setminus$ Thirty-fourth/.

In 17, A infers that B passes all and only those streets between their present location and Thirty-fourth Street. However, if 'Thirty-fourth' were simply a member of a set of streets, it is not clear how the notion of 'focus within a given set' would account for this understanding. Ladd attempts to account for related phenomena by extending the concept of set to include comparatives and superlatives as 'hierarchical sets', on which a linear ordering must be imposed. But even the notion of hierarchical set does not account for the appropriateness of  $\setminus/$  in 18.

(18) A: Is he tall?

B: He's a  $\setminus$ basketball/ player.

Moreover, sets are by definition unordered, and Ladd needs sets so defined to account for exchanges like 13. Thus, in fact Ladd requires two distinct ordering relations to account for all occurrences of  $\setminus/$ . So in effect Ladd's account is not the unified one he has set out to provide. While simplicity alone should not decide among competing analyses, *ceteris paribus*, an analysis that postulates but one ordering relation is to be preferred.

Fourth, Ladd's analysis fails to account for the inappropriateness of  $\setminus/$  even when some referent can be interpreted as a member of an explicitly mentioned set, as in 19:

(19) A: Did you go to Bendel's or Bloomingdale's?

B: #I went to  $\setminus$ Bendel's/.

Similarly, in 17, if B knew that Walnut Street ended at Thirty-fourth Street, he could not use  $\setminus/$  in 17 even though Thirty-fourth Street could be seen as a member of a set of streets.

#### 4. Constraints on $\setminus/$

We agree with Ladd that some perceived ordering relationship is a necessary condition for a speaker's use of  $\setminus/$ . More specifically,  $\setminus/$  can occur over some constituent denoting an entity, attribute, event, activity, time, or place  $c_i$  only when  $c_i$  is ordered by some relationship  $S$  implicit or explicit in the discourse context. However, our corpus of naturally-occurring tokens reveals that  $S$  is not restricted to simple set-membership relations – or even Ladd's 'hierarchical sets'. Instead we have found that when any *partial ordering*<sup>10</sup>  $O$  on a set  $B$  of referents or meanings of terms  $\{b_1, b_2, \dots, b_n\}$ <sup>11</sup> can be established, a speaker may use  $\setminus/$  over some such  $b_i$ . For convenience we will call such orderings *scales* (Hirschberg 1984).  $S$  may be mentioned explicitly in the context or it may be inferrable, often from some mention of a particular value on  $S$ . For scalar values  $b_1, b_2$  on a scale  $S$  where  $b_1 \neq b_2$ ,  $b_2$  is 'higher' on  $S$  than  $b_1$  iff  $b_1 O b_2$ ; similarly, we can say that in such a case  $b_1$  is 'lower' on  $S$  than  $b_2$ . Any incomparable elements<sup>12</sup>  $b_3, b_4$  of  $B$ , are then of 'equal rank' on  $S$ .

By this definition we can account not only for simple set relations (in terms of set inclusion) but also for Ladd's 'hierarchical sets', since we can see them as ordered from root to leaf. We can also accommodate hierarchical and linear orderings *not* mentioned by Ladd, such as spatial and temporal orderings, stages of a process, type/subtype, entity/attribute, and part/whole relationships.<sup>13</sup> By broadening the range of orderings that permit  $\setminus/$  beyond set-membership, we can account for all of Ladd's data as well as the counter-examples we have discussed above.

Given our definition of scale, we can describe a conversational exchange in which  $\setminus/$  occurs in the following terms:

1. Some proposition  $P_a$  becomes salient<sup>14</sup> in the discourse;
2.  $a$  is perceived as lying on some scale  $S$ ;
3.  $P_x$  then represents the open proposition formed by substituting a variable  $x$  for  $a$  in  $P_a$ ;
4. A speaker instantiates  $P_x$  with some  $b$  that co-occurs with  $a$  on  $S$ ;
5. The resulting  $P_b$  is affirmed or denied by the speaker, who intones the constituent referring to  $b$  with  $\setminus/$ ;

For example, in 20,  $P_a = P_{\langle \text{credit cards} \rangle}$  and

(20) A: Do you take credit cards?

B: Visa and  $\setminus$ MasterCard/.

$P_b = P_{\langle \{ \text{Visa}, \text{MasterCard} \} \rangle}$ . Note that, in 21,  $P_a$  is not explicitly evoked in the linguistic context but can be inferred to be  $P_{\langle \text{authors of the paper} \rangle}$ ; here

(21) A: Is Hirschberg giving the paper tomorrow?

B:  $\setminus$ Hirschberg/ isn't giving the paper.

$P_b = P_{\langle \{ \text{Hirschberg} \} \rangle}$ .

## 5. The Discourse Function of $\setminus/$

While a speaker's perception of some scale is a necessary condition for  $\setminus/$ , we believe that its primary function is to convey uncertainty about the speaker's use of this scale to instantiate an open proposition in the discourse. Recalling our model of  $\setminus/$  exchanges, we can characterize this uncertainty as follows:

1. the speaker may be unsure about whether to use a scalar at all;
2. given that some scale is appropriate, a speaker may be uncertain about which *S* to choose; or,
3. given some *S* and *a*, he may be uncertain about his choice of some particular *b* on *S*.

This uncertainty need not reflect a speaker's doubt about his own utterance; it may represent uncertainty conveyed for purposes of politeness or irony or deference. However, in each case it can be directly related to some aspect of the speaker's choice of scale and scalar.

First,  $\setminus/$  may convey uncertainty about whether *any* scale at all is appropriate in some context: is there in fact any *S* which is salient? For example, in 22, if *A* is a bartender, either *B1* or *B2* would be odd, even though the scales invoked are clear.

- (22) *A*: Are you 21?  
*B1*: #I'm  $\setminus$ 20/.  
*B2*: #My  $\setminus$ brother/ is.

While these responses could conceivably be produced in such a context, they seem unlikely, given the difficulty of imagining *B1*'s uncertainty about whether the legal drinking age is fixed or *B2*'s about whether his brother's age might be relevant. However, in the context of a telephone survey, for example, *B1*'s response could be felicitous: *B1* might not know whether *A* wished to elicit his exact age or simply to determine whether he is 'over 21'. *B2*'s response might be appropriate, say, if *A* and *B2* were trying to buy beer legally (in Pennsylvania, for example); *B2* might use  $\setminus/$  to suggest that his brother's services be exploited.

Second,  $\setminus/$  may convey uncertainty about whether the particular scale a speaker has chosen is appropriate, given the many scales that might be invoked in any particular context. In 23, for example, is it

- (23) *A*: Elizabeth made a great batch of cookies.  
*B1*:  $\setminus$ Elizabeth/ didn't make the cookies.  
*B2*: Elizabeth didn't make the  $\setminus$ cookies/.

the set of cooks or of things Elizabeth has baked that will be most salient for *A*? Similarly  $\setminus/$  may convey a speaker's uncertainty about whether the hearer shares a definition of some scale. For example, in 24, *B* is conveying uncertainty about whether 'vitamins' belong to the set 'medication'.

- (24) *A*: Is she taking any medication?  
*B*:  $\setminus$ Vitamins/.

Third, a speaker may not wish to convey doubt about the appropriateness or the definition of a chosen *S*, yet he may still wish to convey uncertainty about the salience

- (25) *A*: I need a ride home. Are you leaving at 6:00?  
*B1*: I'm leaving at  $\setminus$ 6:30/.  
*B2*: I'm leaving at  $\setminus$ 5:30/.  
*B3*: #I'm leaving at  $\setminus$ midnight/.  
*B4*: #I'm leaving at  $\setminus$ 5:59/.  
*B5*: I'm leaving when  $\setminus$ Kenny/ gets here.

of *b* with respect to *a*. Consider 25: Here, '6:30' and '5:30' can be seen as close enough (on a temporal scale) to '6:00' to warrant *B*'s belief that his time of departure might be acceptable to *A*, yet far enough away to warrant some doubt. *B3* and *B4* are odd just because, in the context given, the distance between 'midnight' and '6:00' is too great – and that between '6:00' and '5:59' not great enough – to justify such doubt. A less specific temporal reference such as 'when Kenny gets here' in *B5* is thus more amenable to  $\setminus/$ .

Note that, in Examples 22 through 25,  $\setminus/$  may always be felicitously replaced by  $\setminus$ . The only distinction between the two contours in each case is the uncertainty conveyed with  $\setminus/$ . In fact, the infelicitous responses in Examples 22 and 25 become felicitous when this substitution is made, since the uncertainty associated with  $\setminus/$  is no longer conveyed.

Of course, a speaker may convey uncertainty with  $\setminus/$  even when he is not actually uncertain about any aspect of *a*, *b*, or *S* but wishes to convey some other attitude via this uncertainty. We are now in a position to propose a more principled account of Ladd's observation that  $\setminus/$  can induce a polite softening effect in exchanges like 14. By using  $\setminus/$  in 14, *B* indicates that he does not assume that beer is available when only water has been offered – i.e., that he is 'politely uncertain' about how *A* may react to his positing that 'beer' and 'water' are members of some set of available refreshments. Thus Ladd's 'polite softening' is merely a secondary effect of the conveyance of uncertainty.

In 26, another effect may be achieved. If both speakers are linguists, *B*'s response will be seen as odd.

- (26) *A*: Did you hear Chomsky's paper?  
*B*: I heard all the  $\setminus$ linguists/.

However, if *B* is anti-Chomsky he may use  $\setminus/$  to cast doubt on Chomsky's membership in the set of linguists. Thus  $\setminus/$  can be used to achieve an ironic effect as well.

## 6. Conclusion

In arguing against the notion that intonation has "the special function of expressing the speaker's attitudes", Ladd cites the following passage from O'Connor and Arnold: "The contribution that intonation makes is to express, in addition to and beyond the bare words and grammatical constructions used, *the speaker's attitude to the situation in which he is placed*" (O'Connor and Arnold 1961:2). To Ladd this account of intonation is "simply an unfortunate consequence of assuming that intonation must be something peripheral" (p.123). However, our analysis of the semantics and pragmatics of the  $\setminus/$  intonation contour suggests that, in fact, the conveying of particular speaker attitudes is precisely what  $\setminus/$  does. In effect, what for Ladd are the peripheral results of  $\setminus/$  we see as its central function. Our findings support the view that intonation makes an independent semantico-pragmatic contribution to utterance interpretation. They demonstrate how one particular intonational contour interacts with knowledge representation and discourse context, how this interaction is constrained, and how particular attitudes result. Admittedly, speaker attitudes are difficult to characterize precisely; but this difficulty should not in itself relegate their study to 'the edge of language'.

## Notes

<sup>1</sup>We would like to thank Dwight Bolinger, Debbie Dahl, and Ellen Prince for useful comments on this work.

<sup>2</sup>Fall-rise intonation has been referred to in the literature variously as *fall-rise nuclear tone* (Ladd 1980), as a subtype of *Accent A* (Bolinger 1958), or as contrastive stress within *contradiction contour* (Lieberman and Sag 1974), *inter alia*. For the purposes of this study, we adopt Ladd's terminology.

<sup>3</sup>A more detailed account of the acoustic properties of  $\setminus/$  can be found in Liberman and Sag (1974) and in Ladd (1980).

<sup>4</sup>In our corpus of naturally-occurring data, we have noticed that many tokens of  $\setminus/$  exhibit an additional rise at the end of the  $\setminus/$  constituent. To our knowledge, this property of  $\setminus/$  intonation has not been noted in the literature. Whether this pattern is significant or not requires further investigation.

<sup>5</sup> $\setminus x/$  indicates the word in which *eyl* appears.

<sup>6</sup>For Jackendoff, "the semantic representation of a sentence is divided into focus and presupposition, where a mark F, realized as stress, marks focus constituents. The presupposition is formed by replacing the focus in the semantic interpretation by an appropriate variable, then applying the lambda-operator. The presupposition and assertion are formed from the resulting **expression**" (1972:353ff.).

<sup>7</sup>As Ladd notes (1980:216), Jackendoff misapplies Bolinger's terminology by calling  $\setminus/$  a 'B accent'; in Bolinger's system, both fall and  $\setminus/$  are A accents:

<sup>8</sup>See Liberman and Sag (1974) and Ladd (1980) for convincing arguments against this ad hoc solution.

<sup>9</sup>But cf. Bolinger (1982) for an interesting criticism of Liberman and Sag's diagnostic.

<sup>10</sup>defined here as an irreflexive, asymmetric, and transitive relation.

<sup>11</sup>in effect, a *partially ordered set*.

<sup>12</sup>Elements are incomparable if they are not ordered with respect to one another by **O**.

<sup>13</sup>This definition deliberately excludes orderings such as cycles, intransitive relations, and symmetric relationships, none of which permit  $\setminus/$ .

<sup>14</sup>e.g., via assertion or as the desideratum of a query or imperative.

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