When Given Information is Accented: Repetition, Paraphrase and Inference in Dialogue

(Presented at the LSA Annual Meeting, 1993)

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Abstract

A classic function of intonation is to indicate the distribution of given and new information in an utterance. This paper defines given in two ways: known and salient. It then examines 63 utterances from a radio talk show corpus to determine whether either definition of given is predictive of the intonational contours found in the corpus. Given as salient is found to reliably predict one class of contour: the sustained tones, and one type of boundary tone, a final Mid (Liberman, 1975).

1 Introduction

A classic function of intonation is to indicate the distribution of given and new information in an utterance (Halliday, 1967; Jackendoff, 1972; Terken, 1985). The pitch accent on new information indicates the information focus, the discourse entity about which a predication is being made, whereas given
information typically occurs without a pitch accent. The traditional view consists of three basic claims: (1) Each phrase contains an item marked by the main pitch accent as the information focus; (2) The remainder of the phrase is given information, the ground; (3) There are a limited number of special cases in which given information may be accented.

Pitch accents may function to draw attention to or to increase the amount of processing devoted to the information focus (Cutler, 1976). A complementary viewpoint is that deaccenting plays a functional role as well; it indicates to the hearer that the deaccented item is currently salient in the discourse (Terken and Nooteboom, 1987; Prince, 1981b). The combination of these two factors allows the distribution of pitch accents to guide the hearer’s processing.

Other researchers have claimed that given information may be accented in special cases such as when it is thematic, contrastive, or exclamative, as well as when the speaker echoes part of a previous utterance with surprise or incredulity or denies a presupposition in the previous utterance (Cruttenden, 1985; Nooteboom and Kruyt, 1987; Schmerling, 1976).

A less traditional view is that given information can occur with a pitch accent, but the type of pitch accent is qualitatively different than that on new information (Pierrehumbert and Hirschberg, 1990). P&H claim that the complex bitonal accent L*+H marks information that is known but not currently salient, whereas the bitonal H+L accents mark the propositional content of an utterance as being inferable. The H+L* accent indicates that ‘the desired instantiation of a salient open proposition is already among the mutual beliefs’ of the conversants. The H*+L differs from H* in conveying that the hearer ‘should locate an inference path supporting the predication’ (Pierrehumbert and Hirschberg, 1990).

In order to investigate some of these claims, this work develops independent logical/pragmatic criteria for classifying utterances as consisting of given or new information, and then examines whether in fact the intonational realization of given information corresponds to the predicted intonational patterns. This paper examines utterances that consist wholly of given information, e.g. repetitions of previous utterances. A definition of this class of utterances will be provided in section 2. I will call these INFORMATIONALLY REDUNDANT utterances, IRUs (Walker, 1992b; Walker, 1992a). Since the classical view is that each utterance has at least one item of new information, and since IRUs provide no new information, they potentially have an anomalous intonational realization.

The data consist of a selection of 63 IRUs from a corpus of naturally occurring dialogues, from a radio talk show for financial advice. IRUs constitute

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1 These utterances are not however communicatively redundant, and yet they provide no new information.

2 This corpus was initially transcribed by Hirschberg and Pollack from tapes of a live radio broadcast of a talk show called Speaking of Your Money on WCAU in Philadel-
about 12% of the utterances in the complete radio talk show corpus. The instances of IRUs that have been analyzed intonationally demonstrate cases of pitch accents on given information that do not seem to fit the special cases described in previous work.

Section 2 describes the independent criteria used to classify utterances as consisting of given information, the types of prosodic realization found in the corpus, and a number of distributional parameters used to classify the utterances in the corpus. The following sections examine particular subsets of the corpus defined by certain distributional properties, and finally section 7 proposes some issues for future research.

2 Informational Redundancy

Figure 1: Mary 46. Salient paraphrase, Sustained Tone

The term INFORMATIONALLY REDUNDANT utterances (IRUs) describes utterances that consist wholly of given information. In what follows, it will be useful to have a term to refer to the utterance(s) that originally added the propositional content of the IRU to the discourse situation. This the IRU’s ANTECEDENT. A definition of when an utterance counts as informationally redundant is given below (Hirschberg, 1985):

\[ \text{An utterance is defined as a clause. However when a complete turn contains no finite verb, the turn is counted as an utterance.} \]
Definition of Informational Redundancy

An utterance $u_i$ is **informationally redundant** in a discourse situation $S$ if:

1. $u_i$ has already been said in $S$
2. $u_i$ expresses a proposition $p_i$, and another utterance $u_j$ that entails $p_i$ has already been said in $S$
3. $u_i$ expresses a proposition $p_i$, and another utterance $u_j$ that presupposes or implicates $p_i$ has already been said in $S$ either non-adjacent to $u_i$ or by another speaker

Condition (1) of the definition means that saying an utterance in a discourse situation adds the propositional content of that utterance to the discourse situation. Condition (2) depends on identifying what is entailed from what is said; it relies on concepts such as paraphrase and logical inference. The motivation for distinguishing repetition from other entailments is that lexical repetition has often been taken as a key parameter for predicting deaccenting of given information. However, from a logical perspective, conditions (1) and (2) are equivalent. Therefore a diagnostic of whether the propositional content of an IRU is deniable can be used to test whether the information is already available in the discourse situation (Stalnaker, 1978). This diagnostic cannot be used for the implicatures mentioned in condition (3), since these inferences are defeasible.

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5 Other information is commonly included in the discourse situation such as that which is evoked by the physical situation or by common-sense or plausible inference (Prince, 1981b; Prince, 1986). However, I will only look at a subset of the ‘available’ information.

6 A motivation for examining these defeasible inferences however is that there may be some limit on how long these inferences remain defeasible. It is possible that after some point in the dialogue their cognitive status is equivalent to an entailment.
Thus there are 4 logical types of IRUs defined by their relation to their antecedent. An IRU may be a: (1) repetition, (2) paraphrase, (3) entailment, or (4) non-logical inference from its antecedent(s). This defines given information based on purely semantic properties.

I will also examine the interaction of salience with the semantic definition of given as informationally redundant that is provided above. The term given has been used to mean both semantically given as well as ‘in the hearer’s consciousness’ or salient (Chafe, 1976; Prince, 1981b). In fact, Brown argues that only when ‘given’ means ‘salient’ does it have relevance for intonational realization (Brown, 1983). I define salience purely on a textual basis:

An antecedent for an IRU is salient if it was either: (1) said by the speaker of the IRU in the same turn as the IRU; (2) said by the other speaker in the dialogue in the turn just before the turn in which the IRU was realized.

In the remainder of this section I will first describe the way that the IRUs in the corpus can be prosodically characterized, and then define a number of distributional parameters used to determine whether it is possible to predict the different intonational realizations.

2.1 Intonational Description

I will use the system for intonational description proposed by Pierrehumbert (Pierrehumbert, 1980), with two modifications. First, I will use the diacritic [ds] to indicate downstep (Ladd, 1980), replacing the abstract L in the H*/+L contour that was the trigger for downstep in Pierrehumbert’s original system. Second, I will adopt the parameter of ’:’ for sustained tones,
from McLemore (McLemore, 1991). This parameter indicates that a tone is sustained until the next tone.\footnote{Neither the system presented in Pierrehumbert’s dissertation nor the recently proposed TOBI standard’ transcription can describe a sustained tone without positing (sometimes seemingly unmotivated) intermediate phrase boundaries.}

Most of the IRUs examined here, (48 of them), are roughly categorized into three intonational patterns, all of which end in falls; the difference between them is in the relationship between the two or more high pitch accents (H*) that each pattern contains. I will call these (1) sustained tones, e.g. H*: H* L L,%; (2) downstepped H, e.g. H* [ds] L L,% (Ladd, 1980), and (3) upstepped H, e.g. H* H* L L,% (Liberman and Sag, 1974; Liberman, 1975). Figure 1 shows a sustained tone. Figure 3 gives an example of downstep and Figure 2 gives an example of upstep.\footnote{The terms downstep and upstep are used to refer to precisely defined phenomena in African tone languages; here, I am using them simply as descriptive terms to refer to a relationship between adjacent H* tones.} I have limited the cases I examine here to IRUs that are realized with final falls or levels. However there are two kinds of falls: 17 of the tokens examined here have a final downstepped H phrase accent (H*H[ds]L,%), i.e. final Mid (Liberman, 1975; Liberman and McLemore, 1992; McLemore, 1992), while the remainder consist of complete falls (H*L,%).

For utterances that fit in these three main classes, there is often very little juncture between pitch accents in their realization. This means that the whole utterance seems to be treated as a unit since no single sub-part of the utterance is selected as focal. This is interesting due to the potential anomaly referred to earlier; theories that say that given information is de-accented predict that the whole utterance would be de-accented, and yet this is in conflict with the assumption that at least one item in an utterance is always accented. Realizing the utterance with a sustained H* or with broad focus makes sense if every item has the same information status. In this case, the whole utterance consists of given information. In particular, the sustained tones often sound as though no item in the utterance has a pitch accent.

There are 7 IRUs in the corpus that are ambiguous between the three patterns described above because there is only one pitch accent in the utterance. Clearly one cannot distinguish sustaining a tone, downstepping from a tone, or stepping up to a tone when only one tone is realized. These will be called one-tone and will be discussed in more detail in section 4. Additionally, there are 15 tokens that do not fit into these three patterns, classified as Other. These Others typically have an item realized with narrow focus somewhere in the middle of the phrase, or have a noncanonical syntactic structure and prosodic realization, e.g. topicalizations (Prince, 1981a). These will be discussed in more detail in section 6.
The following section discusses the distributional parameters used to classify the corpus and presents some initial distributional results. These results will then be discussed in the remainder of the paper.

### 2.2 Distributional Description

One of the main distributional parameters is the logical type of the IRU as defined above, whether it is related to its antecedent as a repetition, a paraphrase, an entailment or a non-logical inference. Of the 63 tokens of IRUs examined here, 13 are repetitions, 30 are paraphrases, 13 are entailments, and 7 are logico-pragmatic inferences such as scalar implicatures (Hirschberg, 1985).

The second main distributional parameter is salience. An IRU may have an antecedent that is currently salient in the discourse context, i.e. just said by the other speaker or within the same turn of the current speaker. An IRU may also have an antecedent that is not currently salient. Its antecedent has been displaced by an intervening change in topic (Brown, 1983). Of the 63 tokens examined here, 42 have salient antecedents, and 21 have displaced antecedents.

The distribution of the corpus according to these parameters is presented below. Figure 4 shows the distribution of the three main contour types, presented in section 2.1, with respect to whether or not their antecedent is salient or displaced. Figure 4 also includes the 7 tokens that are called One-Tone, those with only one pitch accent and thus could fit in any of the sustained tone, downstep and upstep categories.

As figure 4 shows, salience is a predictor of sustained tones ($\chi^2 = 5.600, p < 0.02$, for comparing salience as a predictor of sustained tones vs. downstep + upstep + other). Furthermore all the tokens that are difficult to classify because they only have one pitch accent, i.e. the one-tone category, have a salient antecedent. Salience is a predictor of one-tone as well ($p < 0.05$). The one-tone tokens pattern like sustained tones in other respects as well; over half of them are repetitions. If the one-tone contours were classified as sustained tones, the relationship between salience and sustained tones would
be even stronger (p < 0.01). Some one-tone contours will be examined in section 4.

Both the downstep and upstep contours are equally likely to have a salient antecedent as a displaced antecedent. In section 3, I will compare examples of downstep and sustained tones that occur in similar discourse situations.

<table>
<thead>
<tr>
<th></th>
<th>SustT</th>
<th>DownS</th>
<th>UpS</th>
<th>One-T</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Paraphrase</td>
<td>2</td>
<td>18</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Entailment</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Non-Logical</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure 5: Logical Type as a Predictor of Contour

Figure 5 examines the distribution of the various logical types of IRUs with respect to the contour categories. This figure shows that paraphrases are more likely to be realized with a series of downstepping tones ($\chi^2 = 9.877, p < 0.01$, as compared to the other logical types and other contour types).

Figure 5 also shows that repetitions are more likely to be sustained tones than any other logical type ($p < .01$). However this could be due to the fact that repetitions are more likely to have a salient antecedent ($p < .02$). See figure 6.

<table>
<thead>
<tr>
<th></th>
<th>SustT</th>
<th>DownS</th>
<th>UpS</th>
<th>One-T</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salient</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Displaced</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 6: Repetitions: Salient vs. Displaced Antecedents

I also examined the distribution of phrase final (boundary) tones; in particular the characteristic Mid of the ‘warning/calling’ contour (Liberman, 1975) or stylized fall (Ladd, 1980), described as an (L)HM by Liberman (Liberman, 1975), and by Pierrehumbert as downstepped H phrase accents (Pierrehumbert, 1980). For convenience, I will refer to them as final Mids.

The classification of boundary tones is supported by the graph shown in figure 7. This figure plots the relationship of the final boundary tone to the
Figure 7: F0 of Final Tone as a function of F0 of previous H, showing two distinct distributions for Mids (M) vs. Lows (L).

F0 of the previous High Tone. It is clear from the graph that the tokens which are classified as Mids (M) have a significantly different distribution than those classified as final Lows (L).

<table>
<thead>
<tr>
<th></th>
<th>P Final Mid</th>
<th>T Final Mid</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salient</td>
<td>4</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>Displaced</td>
<td>2</td>
<td>0</td>
<td>18</td>
</tr>
</tbody>
</table>

Figure 8: Salience as a Predictor of Phrase (P) and Turn (T) Final Mid

As shown in figure 2.2 salience is a predictor of final Mids ($\chi^2 = 6.291, p < 0.02$). Thus salient old information is likely to be realized with stylized intonation, providing support for the claim that stylized intonation is used on ritual, old or predictable information (Liberman, 1975; Ladd, 1980). Of course in other discourse situations there are other ways for information to
be predictable; in this discourse situation the main way that information becomes predictable is by being previously realized.

Finally, a comparison of IRUs inferable from their antecedents, i.e. logical and non-logical inferences, with repetitions and paraphrases, shows that inferables are less likely to be realized with one of the three main patterns discussed ($p < .01$). See Figure 2.2.

<table>
<thead>
<tr>
<th>Repetitions and Paraphrases</th>
<th>Other</th>
<th>Not-Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferables</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>11</td>
</tr>
</tbody>
</table>

Figure 9: Inferables are more likely to be Other

Thus it seems that there is much more variability in the way the inferential IRUs are realized; they are neither realized consistently with the downstepping tones predicted by P&H nor with the stylized contours that were documented by Ladd and McLemore (Pierrehumbert and Hirschberg, 1990; McLemore, 1991; Ladd, 1980). The following sections will discuss particular examples of the contours discussed here.

3 Sustained Tones vs. Downstep

According to figure 4, the sustained tone contours are predicted by the salience of the antecedent. However why is it that there are so many downstepped contours with salient antecedents? The dialogue segment in 1, from (56) to (58) provides three examples of IRUs. In the dialogue excerpts given here, IRUs will be marked with CAPS whereas their antecedents will be given in *italics*.

(1) (52) h. and they will maintain their value approximately because they are variable rate funds
(53) m. I see
(54) h. Ok
(55) m. Fine
(56) h. *and but separate it,*
I DON'T WANT IT ALL IN ONE
(57) m. TWO DIFFERENT ONES
(58) h. TWO DIFFERENT ONES, three would be even better....

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*A comparison of repetitions with all the other logical types is not significant ($p < .10$). However a comparison of repetitions with inferences alone is significant ($p < .05$), as is a comparison of paraphrases with inferences alone ($p < .05$).*
The IRU in (56) is shown in figure 1. In 1-56, the speaker, (h), has paraphrased his own utterance from the just previous clause. The lexical item separate in (56) entails a division into at least two separate parts. As shown by plot of f0 in figure 1, this utterance is realized with a high sustained tone, followed by a final Mid value (cf. (Liberman, 1975; Liberman and McLemore, 1992)), H*: H* H[ds] L%. This is an example of a stylized fall (Ladd, 1980; McLemore, 1991). Stylization makes sense in these contexts; since the information has just been said, it is certainly predictable.

When we compare 1-56 with the paraphrase of it that Mary (m) produces in 1-57, we find that this utterance, in the same context is realized with a downstepping contour, rather than with the sustained tone. See figure 10. However there is a third example of an IRU in example 1-58, where Harry repeats two different ones. This is shown in figure 11. This utterance is counted as a sustained tone because of the difference between it and the downstep seen in figure 10. However the f0 for this utterance does go down slightly as it nears the end of the phrase.10

An almost identical context occurs in the following excerpt:

(2) (24) h. that is correct, it could be moved around so that each of you have 2000
(25) m. I
(26) h. without penalty
(27) m. WITHOUT PENALTY
(28) h. right
(29) m. and the fact that I have a an account of my own ...

10The phrase-final level indicates that Harry intends to continue his turn (McLemore, 1991).
The F0 for 2-(26) is shown in figure 3. This case differs from 1-56 in that even though (26) is an IRU, its antecedent is displaced, being some 10 plus utterances back in the dialogue. The salient repetition in 2-(27)(Figure 12), is realized as a sustained tone and is clearly distinct from downstepping f0 in (26)(Figure 3). A similar example is given in 3-34 below. This is also a sustained tone, shown in figure 13:

(33) h. well the amount that you have, the excess amount, the twenty eight hundred
(33.1) r. okay
(33.2) r. the amount that that was not your own contribution, you rollover
(34) r. YOU ROLLOVER
(35) h. right, but not your own contribution
In example 4, there is no lexical repetition but the information in (20) is a paraphrase of that in (18) and (19):

(4) (18) h. Are there any other children beside your wife?
    (19) d. No
    (20) h. YOUR WIFE IS AN ONLY CHILD
    (21) d. Right. And uh wants to give her some security .......

The corresponding contour, shown in figure 14 is classified as a sustained tone because all the main accents on *wife*, *only*, *child* are at the same f0 value.

An example of downstep that is very similar to that given in figure 10 is the repetition in example 5-9. As shown in figure 15, the utterance in 4-9 is
realized as a series of downstepped highs, with a pitch accent first on take and then money realized as an H*[ds].

(5) (8) h. you can stop right there: take your money
(9) j. TAKE THE MONEY
(10)h. absolutely.....

Figure 15: Jane 9. Salient repetition, Downstep

Note that while all the sustained tones have a salient antecedent, there are other IRUs that have a salient antecedent and yet are not realized with sustained tones. Thus clearly some other pragmatic factor, not measured here, further constrains the distribution of sustained tones.

4 One Tone Contours

As noted in section 2.2 there are some tokens which can’t be classified as either a sustained tone, a downstep or an upstep because they only have one pitch accent. For example 6-8 in the excerpt below, and shown in figure 16.

(6) ( 6) r. Uh 2 tax questions. one: since April of 81 we have had an 85 year old mother living with us. Her only income has been social security plus approximately 3000 dollars from a certificate of deposit and I wonder what’s the situation as as far as claiming her as a dependent or does that income from the certificate of deposit rule her out as a dependent?
( 7) h. Yes it does
( 8) r. IT DOES
( 9) h. Yup that knocks her out.

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These tend to be elliptical repetitions such as the one shown here. Figure 4 showed that these one-tone contours pattern distributionally like the sustained tones.

![Figure 16: Ray 8, Salient repetition, One-Tone](image)

A similar example is given below in 7 and shown in figure 17.

(7)  
(26) h. First of all with that forty one thousand, and that’s your pension alone  
(27) m. yes  
(28) h. completely taxable  
(29) m. yes  
(30) h. ok  
(31) m. so we’re in a  
(32) h. you’re in a pretty healthy tax bracket  
(33) m. YES WE ARE  
(34) h. as a result i’m not sure that I would want any of that hundred twenty thousand in any more treasury notes

Some of the contours classified as one-tone also share the phrase-final Mid with contours classified as sustained tone. For example consider the excerpt below and the corresponding f0 in figure 18.

(8)  
(22) b. Are there ah .. I don’t think the ah brokerage charge will be ah that excessive  
(23) h. No they’re not excessive but THERE ARE CHARGES

Although this cannot be classified as a sustained tone since there is only one major pitch accent, it is also an example of a ‘stylized’ fall (Liberman and Sag, 1974; Liberman, 1975; McLemore, 1991; Ladd, 1980).
5 Upstepping Contours

One example of an upstepping contour was given in figure 2. Another example is given below in excerpt 9, and is shown in figure 19.

(9) (8) j. and uh I’d like to start out an I R A for myself and my wife, 
     she doesn’t work
(9) h. well how about last year?
     
     (Intervening dialogue about eligibility for 81)
     
     (17) h. ahh that then then you’re not eligible for eighty one
     (18) j. I see, but I am for eighty two
     (19) h. You said it. You’re eligible for twenty two fifty IF YOUR 
          WIFE IS NOT WORKING OUTSIDE OF THE HOME
These upstepping contours sound as though the speaker is trying to be enthusiastic. The phrase-final tone is also Mid in this particular example. Additional tokens and further distributional analyses of this contour type would be necessary for formulating a more precise characterization.

6 Other Contours

There are 20 IRUs whose antecedents are inferable by logical inference or linguistically licensed inferences such as scalar implicatures or presuppositions (Gazdar79, Bridge91, Hirschberg85). As discussed in section 2.2, these are more likely to be realized as Other type contours. An example is shown in the excerpt below, where Harry (h) makes an entailment explicit from information provided in 10-7 by Jane (j).
and I'm entitled to a lump sum settlement which would be between 16,800 and 17,800 or a lesser life annuity, and the choices of the annuity um would be $125.45 per month. that would be the maximum with no beneficiaries

you can stop right there: take your money

take the money.

h. absolutely. YOU'RE ONLY GETTING 1500 A YEAR.

Utterance 10-10 is shown in figure 20. This utterance shares the high final pitch accent with the upstepping contours and shares the note of enthusiasm with those contours.

7 Discussion

This paper has examined the distribution of intonational contours on utterances consisting completely of given information. I have examined the interaction of a semantic definition of given with discourse salience. Independent of whether given information is salient or displaced, given information is realized with a pitch accent.

The work presented here should be extended to actually test whether downstep is correlated with given information as P&H proposed (Pierrehumbert and Hirschberg, 1990). The fact that 25 out of 63 IRUs are realized with a downstepping contour could be taken as weak support for their claims. However, I have not compared these tokens against a sample of non-redundant tokens to test whether downstep appears on these tokens just as frequently. Furthermore there are a number of other contours that these IRUs are realized with, such as the Sustained Tone, Upstep and Other contours that would not be predicted on P&H's account.

However, this paper has argued that salience is a predictor of one class of contour, the sustained tones. Other accounts have not distinguished salient and displaced mutual beliefs in terms of intonational realization (Pierrehumbert and Hirschberg, 1990) or have suggested that salient is the only relevant notion of given information (Brown, 1983). I have shown here that, in this type of dialogue, the sustained tone contour is correlated with salience. However discourse salience is not predictive of downstepping contours. Furthermore, in this type of dialogue, salience predicts phrase final Mid tones. In addition, I have shown that IRUs that are inferable from their antecedents are more likely to be realized with some item in narrow focus than IRUs classified as repetitions or paraphrases.

Future research should include examination of these types of utterances in other types of dialogue in order to provide a more general account of the use of the contours described here.
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