

Topic-Comment Structure, Syntactic Structure and Prosodic Tune

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1. Introduction

It has often been suggested that speakers use prosodic tune to convey the information structure of an utterance. Researchers argue that there is a specific pitch accent or tune associated with the focus (or comment) of an utterance, which is distinct from the pitch accent or tune associated with the topic. For example, Steedman (1991) has proposed that the L+H* LH% pattern is "the theme tune" and at least one function of this tune is to mark "what the utterance is about." (p. 275). Vallduvi and Zacharski (1994) note that this L+H* LH% tune "is generally not correlated with a focus in a focus-ground partition", thus supporting Steedman's claim, to the extent that focus and topic/theme are complementary notions. In earlier work, Bolinger (1986 and earlier works), Jackendoff (1972), and Gundel (1978) propose that a rise-fall (A) accent typically falls on the comment of a sentence, whereas accented topics receive a fall-rise (B) accent.

In this talk I will report on a study we have conducted which examines this proposed relationship between topic comment structure and tune, paying particular attention to boundary tones.

2. Definition of topic-comment structure

Information structure has been described by a variety of researchers under a number of different names and guises: presupposition and focus (Chomsky (1971), Jackendoff (1972)), theme and rheme (Firbas (1972)), topic and comment (Gundel (1974), (1978)), open proposition and focus (Ward (1985) and Prince (1986)), and ground and focus (Vallduvi (1990)). While the details of these accounts differ in significant ways, they are all based on intuitions we share that utterances are 'about' something (topic) which 'links' up with information the speaker can assume the hearer is aware of, and that utterances contain information the speaker is presenting as new relative to this topic (the comment). We will use the terms topic and comment to refer to these two parts of an utterance. The definitions we are using, taken from Gundel (1985), are as follows:

Topic

An entity, E, is the topic of a sentence, S, iff in using S the speaker intends to increase the addressee's knowledge about, request information about, or otherwise get the addressee to act with respect to E.

Comment

A predication, P, is the comment of a sentence S, iff, in using S the speaker intends P to be assessed relative to the topic of S.

In the present study, we made the following basic assumptions in analyzing the topic-comment structure of sentences in the discourses we examined.

Topics need not be represented by noun phrases.

This is illustrated in examples (1) and (2),

- (1) A: What time are you leaving for the party?
B: I'm leaving at seven.

where the topic of B's response is the time that B is leaving.

- (2) In April, it rains a lot.

where the topic is represented by the prepositional phrase *in April*.

Topics need not be sentence initial.

This is illustrated in B's response in example (3), where *I'm leaving* is associated with the topic, the time that B is leaving.

- (3) A: What time are you leaving for the party?
B: At seven I'm leaving (and not a moment later).

Topics need not be continuous

This is illustrated in (4):

- (4) A: What did you do to the hard drive?
B: I formatted it.

where the subject, *I*, and the object, *it*, are both associated with the the topic of B's response, what B did with the hard drive.

An utterance may contain no words associated with the topic

This may be for two reasons. One, is that the utterance is elliptical, and it is the topic that has been elided. For example, the topic of (5B) is roughly *The black thing B bought Rita*, which is not represented in the utterance.

- (5) A: What else did you buy Rita that was black?
B: Pants.

The other reason is that the utterance is an all comment utterance, where the topic is something introduced in a previous utterance or the general situation, time, or place. Examples of this are illustrated in (6) and (7):

- (6) (Oh, look!) The sun's shining.

- (7) A: Why can't you come to the party?
 B: My husband is sick.

It is important to keep these features of the relation between topic-comment structure and syntactic structure in mind when we consider the prosodic properties of topic and comment.

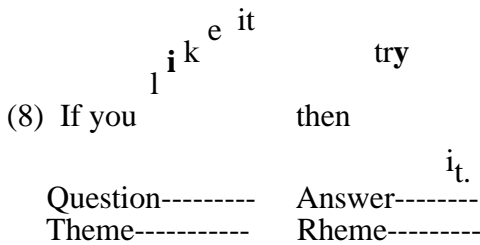
3. Prior research

3.1 Associations of tune with topic-comment structure

A number of researchers have suggested a relationship between topic-comment structure and intonation. For example, Bolinger (1986) describes the information structure of an utterance as follows:

"There's part of the utterance that lays the groundwork, that asks the question, that relates to what we already know or can guess, and a part that adds the figure to the ground, that answers the question, that supplies what was not already known. The first part is called the THEME and the second part the RHEME."

Bolinger then states that the majority of well-executed (longer) utterances have an intonational shape and information structure that corresponds to this question and answer---or theme-rheme---organization, as in example (8):



Jackendoff (1972) also relates prosodic tune to topic-comment structure, associating what he calls a B (background) pitch accent to the topic and an A (Answer) pitch accent to the comment. Consider the following example, taken from Pierrehumbert 1980:

- (9) What about Manny? Who came with him?

Anna came with Manny
 H* LL% H* LH%

- (10) What about Anna? Who did she come with?

Anna came with Manny.
 H* LH% H* LL%

In these examples, the prosodic structure appears to correspond to the topic-comment structure. In (9) *Anna* is associated with the comment (the answer) and receives an H* LL% tune and *Manny* is associated with the topic (the background) and receives an H*

LH% tune. Similarly, in (10), *Manny* is associated with the comment and receives an H* LL% tune and *Anna* is associated with the topic and receives an H* LH% tune. The distinction between these two tunes is the boundary tone---the pitch accents and the phrase accents of these tunes are the same. The generalization appears to be that the H% boundary tone is associated with topics and the L% tone is associated with comments.

Notice that in these examples, the two tunes could not be switched. The following sound distinctly odd:

(11) What about Manny? Who came with him?

Anna came with Manny
H* LH% H* LL%

(12) What about Anna? Who did she come with?

Anna came with Manny.
H* LL% H* LH%

More recently, Steedman (1991) has argued that the part of the utterance representing the comment receives an H* LL% tune and the part of the utterance representing the topic is marked with an L+H* LH% if it is unactivated and unaccented if it is activated. Vallduvi and Engdahl 1996 argue that noncontrastive links (our unactivated topics) are optionally marked with an L+H* pitch accent, that contrastive links are obligatorily so marked, and that foci (our comments) are marked H*.

3.2 Associations of tune with other discourse features

Other researchers, however, have suggested that these tunes (or the pitch accents and boundary tones that comprise these tunes) serve to mark discourse functions other than topic-comment organization. For example, Pierrehumbert and Hirschberg (1990) suggest that an H% boundary tone indicates that the speaker intends to interpret the utterance with respect to a subsequent utterance, so that H* LH% or L+H* LH% tunes mark "continuation". Similarly, McLemore (1991) associates tune types with functions 'connects' (for a rising tune), 'continues' (for a level tune), and 'segments' (for a falling tune). If these proposals are correct, then topics are marked the way they are not because they are topics, but because they connect to the rest of the utterance or to subsequent discourse. And we would expect comment constituents to be marked with the same tune in cases where they connect to the following discourse.

4. Methodology

The corpus

This study uses transcripts of six radio news stories read by a professional newscaster. The prosody of the audio recordings was analyzed and prosodic annotations were added to the transcripts by Julia Hirschberg and her colleagues at AT&T Bell Labs. For our study, the transcripts without the prosodic annotations were given to two coders who independently

labelled the topic comment structure of each utterance. This structure was coded by placing labelled brackets around words associated with activated topics (AT), unactivated topics (UT), and comments (C). An activated topic is one that can be assumed to be in current awareness because it has been recently mentioned. An unactivated topic is one that is newly introduced or re-introduced into the discourse.

In addition to the features noted above, and standard topic tests like the question test and the “as for” test, coders agreed on certain guidelines which would be used in determining the possible topic-comment structure of a given utterance. Some of these are shown in (13).

- (13)
- i. Topics are necessarily definite or generic.
 - ii. Sentence topics are usually expressed in subject position; they are next likely to be expressed in object position.
 - iii. Scene-setting time and place expressions are usually topics
 - iv. The head of a relative clause is the topic of that clause.
 - v. If a conjunction of VP’s or S’s is part of the comment, then each VP or S is a separate comment.

Topic comment structure is not uniquely determined by context. That is, a speaker has some freedom in choosing topic-comment structure and it is not always possible to determine from the form (especially without intonational cues) what particular topic-comment structure the speaker actually intended. The coding structure we used reflects this indeterminacy by marking mandatory and possible material. For example, in (14)

- (14) What about Manny? Who came with him?

[Anna]C [came with Manny]AT

Manny would be marked as a mandatory component of the topic since there is no other possible analysis within this context, as the question test makes clear.

On the other hand in (15), we assumed that one analysis was for the subject to be an unactivated topic with the VP being comment, but that the whole sentence could equally well be the comment. (Square brackets indicate a mandatory analysis, and parentheses indicate a possible analysis.)

- (15) Nothing was said about the thump
but everyone looked at everybody else
and lunch was served.

[(The stewardesses)UT looked terrified]C

This example falls into a well known and documented class of examples which can have either an all comment reading or a topic-comment reading; and the coders agreed that both possibilities would be appropriate in this context. As shown in (16), the prosody here suggests that the news reader intended the all-comment reading since the subject does not form a separate intonation unit and it bears the pitch accent of the sentence (cf. Schmerling 1976).

- (16) The H* stewardesses looked terrified LL%

Similarly, in (17), *him* could either be viewed as an activated topic or as an activated part of the comment.

- (17) He last saw Kilroy after his son was born.
Mark was an usher in my wedding.
And he came up from school when my son was born,
DelaHoussaye said.
He thought my son Anthony Joseph was great.

[I]AT [never thought [that]AT would be
the last time I'd see (him)AT]C.

Here, the prosody, given in (18), does not reveal which analysis was chosen by the newsreader, since the pronoun is unaccented, which is consistent either with it being an activated topic or with it being an activated part of the comment.

- (18) I H*+L never thought H*+L that would be
the H*+L last time I'd H* see him LL%

After the coders agreed on a topic-comment structure for each transcript, the coded transcripts were compared with transcripts marked for prosody to test the hypotheses given in (19) about the correlation between specific types of tunes and topic comment organization.

- (19) i. The L+H*LH% tune marks only topics.
ii. The H*LH% tune marks only topics
iii. The H*LL% tune marks only comments.
iv. The H% boundary tone marks only topics and the L% boundary tone marks only comments.

5. Results and discussion

5.1 The L+H* LH% tune marking topic

As noted above, various researchers have suggested that the L+H* LH% tune marks topics (Pierrehumbert and Hirschberg 1990, Steedman 1991, Vallduvi & Zacharski 1994, Vallduvi & Engdahl 1996). Because there were only six occurrences of this pattern in our data, our results are inconclusive. Only two of the occurrences were consistent with the hypothesis that topics are marked with this tune. For example, in (20), the L+H* LH% tune marks a phrase, 'the pilot', that was analyzed as an unactivated topic.

(20) "It was a normal landing, there was no emergency" Stanton said.

[**The L+H* pilot LH%**]**UT**
[H* Captain H* David H* Leney LH%]**UT**
[was H* told by the H* control tower LH%]**C**
[that a H* piece of the tail was missing LL%]**C**

The other four instances of the L+H* LH% were not associated with topics, as in example (21), where 'minor accidents' was analyzed as part of a comment, and example (22), where the pitch accent on 'requiring' was analyzed as marking part of a comment.

(21) [L* H Concorde LH%]**AT** [H* built by LH%
L*+H French L*+H British H* consortium]**UT**
[have H*+L been H* involved in a H* number of
L+H* minor accidents LH%]**C**
[but there have been H* no H* major L* accidents LH%
H*+L involving H*+L loss of H* life LL%]**C**

(22) [The H*+L chairman L
H*+L Wendell H* Ford L
H* Democrat of H* Kentucky LH%] **UT**
[H* told H* reporters after (the session)**AT** that H* Congress HL%
should consider **L+H* requiring (the F A A)**AT** LH%**
to H* force L
an H* increase in the H* frequency of
H* inspections of (older H* aircraft LL%)**AT**]**C**
[H* require H
H* replacing H* certain H+L* parts L
L+H* rather than H* examinations of them LH%]**C**
[H* and H* set H* training H
and experience H* standards for airline
H* inspectors L
and H* mechanics LL%]**C**

It is worth noting that the constituent marked by this tune is explicitly contrastive in (21)-- 'minor accidents' as opposed to 'major accidents'; and perhaps the tune in (22) can also be viewed as marking a contrast between 'requiring' and 'permitting' or 'not requiring,' thus supporting the suggestion made by Pierrehumbert and Hirschberg (1990) that correction or contrast is the primary meaning of the L+H* pitch accent. It could also support the suggestions noted above that the function of this tune is to mark continuation or connection. The tune could be viewed as a signal to 'connect with other members of the contrast set'.

Judging from our transcripts, the L+H* LH% tune is an infrequently used marker. It doesn't only mark topics, and not all topics are marked by this tune.

5.2 H*LH% marking topic and H*LL% marking comment

We next considered the hypothesis of Pierrehumbert 1980 that the H*LH% tune marks topics and the H*LL% tune marks comments. The distribution of these tunes is shown in Table 1.

Table 1. Distribution of H*LH% and H*LL% tunes

	[AT]	(AT)	[UT]	(UT)	Comment	Total
H*LH%	4	8	8	55	113	188
H*LL%	1	7	0	4	121	133
	5	15	8	59	234	321

If we collapse all the topic categories, the contrast between topics and comments becomes more apparent. It can be seen that topics overwhelmingly tend to be marked with H*LH% instead of H*LL%, while comments can be marked with either tune, though there is a small preference for H*LL%. A chi-square test shows these results to be significant at the .001 level.

Table 2. Distribution of H*LH% and H*LL% tunes (collapsed)

	Topic	Comment	Total
H*LH%	75	113	188
H*LL%	12	121	133
	87	234	321

$$\chi^2 = 39.15, \text{ d.f.} = 1, p < .001$$

11 out of 12 cases of topics marked with H*LL% were possible instead of mandatory topics, occurring in sentences that had more than one possible topic-comment analysis. For example, in the absence of prosodic cues, sentence final 'him' in (23) could be analyzed as an activated topic, but it could equally well be an activated part of the comment.

- (23) In Houston, the twenty-one year old Kilroy was mourned by boyhood friend, Eddie delaHousaye, who grew up with him in Galveston County. Mark was a great guy he said.

[he]AT [H*+L didn't H*+L deserve H* something H*+L that H* awful L
H* happening cl to (H* him LL%)AT]C

Our data are thus consistent with the hypothesis that H*LL% marks only comments, but not consistent with the hypothesis that H*LH% marks only topics. There were 113 comments marked H*LH%. Note that only 4 out of these 113 comments occurred in sentence-final position, whereas two-thirds of the comments marked H*LL% occurred in sentence-final position (80 out of 121). There is thus a strong sense in which H*LH% indicates continuation and H*LL% indicates non-continuation.

5.3 H% marking topic and L% marking comment

Since H*LH% and H*LL% are distinguished not by pitch accent (both are H*) or by phrasal tone (both are L), but by boundary tone, we next examined the possibility that the

H% tone marks topic and the L% tone marks comment. The 388 instances of these boundary tones were distributed as shown in table 3.

Table 3. Distribution of H% and L% boundary tones

	[AT]	(AT)	[UT]	(UT)	Comment	Total
H%	8	9	13	65	133	228
L%	4	7	0	7	142	160
Total	12	16	13	72	275	388

Again, the collapsed Table 4 shows the results more clearly. Many more topics were marked by H% and more comments were marked by L% than would be predicted by the null hypothesis. A chi-square test again shows that the results are significant at the .001 level.

Table 4. Distribution of H% and L% boundary tones (collapsed)

	Topic	Comment	Total
H%	95	133	228
L%	18	142	160
	110	275	388

$\chi^2 = 43.63$, d.f. = 1, $p < .001$

5.4 Sentence final boundary tones

Perhaps the most compelling data we have is sentence final boundary tones, whose distribution is shown in Table 5.

Table 5. Distribution of sentence-final boundary tones

	[AT]	(AT)	[UT]	(UT)	Comment	Total
LH%	5	3	0	5	4	17
LL%	3	4	0	3	91	101
HH%	0	0	0	1	0	1
Total	8	7	0	9	95	119

Once again, if we collapse the topic categories in this table, the contrast between sentence-final topics and comments becomes more apparent. Once again the results are significant at the .001 level, as shown in Table 6.

Table 6. Distribution of sentence-final boundary tones (collapsed)

	Topic	Comment	Total
H%	14	4	18
L%	10	91	101
	24	95	119

$\chi^2 = 40.03$, d.f. = 1, $p < .001$

As the table shows, the vast majority of sentence final H% occurred on topics---of the 18 occurrences of H%, 14 of them were on topics. An example is shown in (24).

- (24) It's just so cruel Zack Creech said
 Mark never did anything wrong. He was a real good person
 and had a great family. A lot of people loved him.
 Creech last saw Kilroy at the Hard Rock Cafe
 in Matamoros Mexico the night of March fourteenth.
 Kilroy disappeared while walking with other friends
 back to the International Bridge.

[H*+L That]AT [cl was cl the H*+L last H* time I H* saw
 (him)AT]C [**Creech L* said LH%**]AT

However, it should be mentioned that nearly half of sentence final topics are marked with LL%. An example is shown in (25):

- (25) In nineteen eighty four when Congress passed the Cable Act
 cable characterized itself as a struggling infant industry
 said Edward Fritts president of the National Association of
 Broadcasters. That act which in essence removed all regulatory
 oversight has become the communications equivalent of anabolic
 steroids. Today cable television operators enjoy an unregulated
 monopoly.

[H* Amazingly LH%
 H* only H* thirty H+L* two LH%
 cl of more than H* eight H* thousand H* cable systems LH%
 have H* any L
 direct H* competition L]C
 [**L* Fritts L* said LL%**]AT

So sentence final topics are not always marked with LH%.

The hypothesis suggested by Pierrehumbert and Hirschberg (1990) that an H% boundary tone indicates that the speaker intends the hearer to interpret that utterance with respect to a subsequent utterance is also not consistently supported by this corpus, as can be seen from example (26).

- (26) H*+L Frank James H* Padula LH%
 H*+L Kilroy H* neighbor LH%
 said H*+L Kilroy's H*+L ambition to go to
 H* medical school L
 H* drove him to H* succeed LL%

H*+L School came H* first to him LH%
and H* he H* knew how to H* draw H*+L that H* line LL%
said L* **Padula** LH%
a L* senior LH%

H*+L Tammy H*+L Shead who H* went to H* high school H* with Kilroy H
in his H* home town of H* Sante Fe LH%
H* said L
H* Kilroy was L
H*+L always H*+L trying to be the H* best LL%

If there is a discourse segment boundary anywhere in this example it is before the phrase 'Tammy Shead who went to high school with Kilroy ...'. However, it is exactly at this spot where the H% boundary tone occurs. So while both topic comment structure and discourse segmentation may play a role in type of boundary tone, the relationship is not one to one.

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