10. Intonation, Mental Representation, and Mutual Knowledge

10

Intonation, Mental Representation, and Mutual Knowledge

ANN WENNERSTROM
University of Washington

AN IMPORTANT PART of the research program in cognitive linguistics involves using linguistic structure as an entry point to better understand cognitive processes. In this chapter, I argue that just as certain lexicogrammatical structures have been claimed to interact with cognitive processes and constructions, certain intonation patterns also interact with cognitive processes and constructions. Therefore, in our search for a better understanding of these relationships we would be well served to include intonation analysis among our methodologies.[1]

Rather than argue for a particular cognitive model, I draw from three popular existing models (which are not necessarily incompatible): Clark's (1992) model, in which community membership is a crucial element in constructing a mental representation of discourse; Fauconnier's (1985) mental space theory, in which discourse is represented by a network of interconnected mental spaces; and Lakoff's (1987) theory of idealized cognitive models (ICMs), in which new situations are processed with respect to stored prototypes (as in Rosche 1978). I illustrate with excerpts of conversations and lectures how an intonation analysis is consistent with each of these models and, in some cases, can actually shed new light on cognitive constructions beyond what might be revealed in lexicogrammatical structure.

I consider two main intonation patterns, both from English (though other languages may have similar patterns): the high-pitched intonation of contrast (henceforth "contrast intonation") and the low pitch of accessible information (henceforth "given intonation"). Contrast intonation—often referred to as "contrastive focus" or "contrastive stress"—usually is manifested as an L+H* pitch accent (Pierrehumbert 1980) aligned with the stressed syllable of the contrasting word. This syllable is higher in pitch than would be expected within the normal declination of the intonation contour and may be louder and of longer duration. Given intonation, which also has been called "deaccentuation" (Ladd 1980; Terken and Hirschberg 1994), can be either a lack of prominence or a more deliberate lowering gesture for items that the speaker believes to be accessible to hearers in the discourse (Chafe 1994; Ladd 1980; Wennerstrom 2001).[2] Given intonation usually is associated with lower amplitude as well. I have argued elsewhere (Wennerstrom 1998, 2001) that both of these intonation patterns function as cohesive devices in discourse. A contrast, by definition,

juxtaposes two ideas in an adversative or concessive relationship (Rudolph 1996)—an association that can be considered a cohesive link. Likewise, given intonation necessarily involves a cohesive relationship between the low-pitched item and some prior item or idea.

These pitch patterns frequently align with lexicogrammatical structure. Some contrasts involve lexical antonyms (e.g., *up* versus *down*; *early* versus *late*) or complementary members of lexical sets (e.g., *Monday* versus *Tuesday*). Likewise, given intonation often is associated with a word that is cohesive through the classic relationships defined for cohesion by Halliday and Hasan (1976)—direct repetition, synonymy, various proforms and substitutions, and so on. The following example illustrates lexical and intonational alignment. In this exchange, two men in their forties are reminiscing about a small-town boyhood activity of high jumping by rigging up some makeshift equipment in their yards. Starting in line 9, Brian begins a story about the plight of a left-handed jumper. The words *left* and *right*, antonyms within the superordinate set of lateral directions, are contrasted throughout lines 10–12. Contrast intonation (indicated with underlining) coincides with these words. Meanwhile, the verb *jump* in line 10, a repetition in the talk of high jumping, has given intonation (indicated with a low arrow ↳).

1. High jumping[3]

(1) Brian: Yeah, a galvanized pipe for a cross bar, n'. .
(2) Steve: Yah . . they had a lot . lot better than .
(3) at least y'know the inner tubes n' . .
(4) ya had y- . at least somethin' . comfortable to land on,
(5) Mom and dad . . in the uh . . cross the other way
(6) all they had wasss . . sawdust . . /just like we did in grade school.
(7) Brian: \hhhhhhhhhhhhhhhhhhhh
(8) Steve: Landing on the sawdust wasn't much fun. . .
(9) Brian: Yeah. . . . part a their . high jumpin' there at Whitman, we'd ah . . Ken Magnuson . he
(10) ∧ was a . . . left handed jumper, so he'd always ↳ jump on the other side of the ↳ pen
(11) ∧ and we were right handed jumpers, we'd . . so . we'd fluff up all the sawdust on the . .
(12) ∧ lefthand side, because that's where we'd always land n'. .
(13) he didn't have any sawdust over on his side.

Perhaps more interesting than intonational and lexicogrammatical alignment, however, are cases in which these patterns occur in the absence of clear lexicogrammatical cues. As examples throughout the remainder of this chapter show, contrast can be based not on existing lexical oppositions but on ad hoc categories set up for the purpose of the discourse at hand. (In fact, Deppermann 2004 has claimed that such nonlexical contrasts constitute the majority of cases.) Such contrasts always

involve a third, superordinate category—also ad hoc—that subsumes both elements of the contrast, creating a framework within which the contrast is made. Furthermore, only one member of a contrast need appear in the text; both the contrasting element and the superordinate category may be inferred. Likewise, items with given intonation may never have been mentioned before, so that their antecedent must also be inferred. In short, these given and contrast intonation patterns are a good starting point for a discussion of cognitive processes because they involve inference and the construction and juxtaposition of categories.

To illuminate such cases, I turn to the cognitive linguistics literature, beginning with Clark's (1992) notions of mutual knowledge and community membership. In discourse, Clark says, the choice of linguistic structure is based on participants' judgments about their mutual knowledge. Assessments of mutual knowledge, in turn, depend on three elements: what is mutually perceivable in the immediate physical environment; what has been mentioned in prior discourse; and what is understood by virtue of community membership. In the third case, the idea is that knowledge is stored in memory encyclopedically (by topics and events, organized into frames, schemas, and scenarios), and it is cross-referenced with an index of "who knows what" for both individuals and communities. Thus, in communication, participants make judgments about their common community membership, from which they assess what kinds of knowledge and assumptions—generic and specific—might be familiar to hearers. This assessment affects linguistic choices: how much detail needs to be specified, whether one can use definite reference, and so on. As succeeding examples show, the way intonation patterns are used reflects speaker judgments about what is mutually known and thus what assumptions are being made about community membership among the participants.

The role of intonation in these assessments can be illustrated with two examples. The first (transcript 2) involves a group of friends—white, American graduate students in their early thirties—who are discussing one member's (Travis's) experience living in Nepal. Regarding the cliché that Western tourists always get sick in Nepal, Travis explains that Nepali natives also get serious diseases, which they *just live with* (line 8). He uses contrasting pitch in two utterances of the word *live,* although there is no inherent lexical counterpart in the contrast (as in *live* versus *die*, for example). As figure 10.1 shows,[4] the first utterance of *live* has the more exaggerated pitch, though the second *live* is also high relative to surrounding words. The opposite element is not mentioned in the text but must be inferred.

2. Living with *giardia*

(1) Sadie: You'd think they'd / get resistant to it eventually though.
(2) Mindy: \You mean lotta kids die?
(3) Travis: I don't think it's I mean it's not pos /sible to be resis /tant t:::o (.5)
(4) Mindy: \mmm \mmm
(5) Travis: I mean I think=
(6) Mindy: =t' that kind of thing=
(7) Travis: =yeah. I mean even- (.4)
(8) ∧ they just live with giardia and they live with amoebas you know.

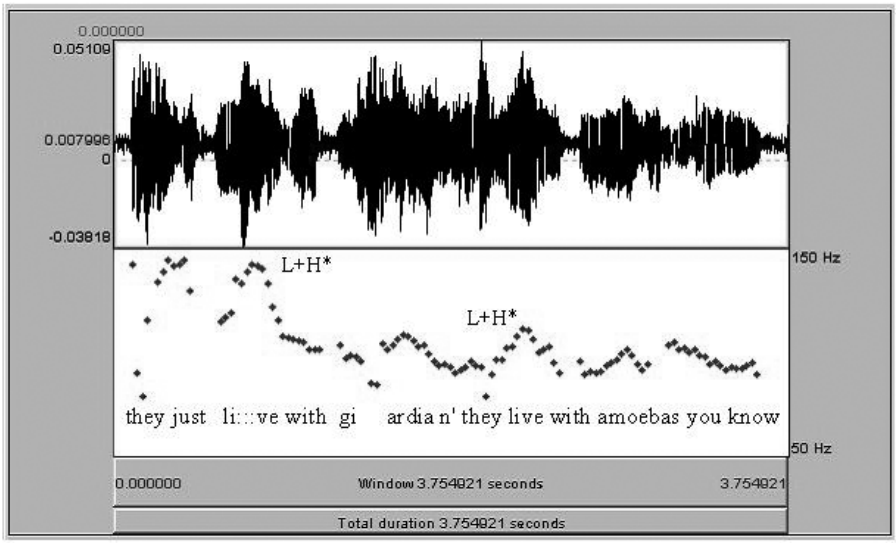

Figure 10.1. An ad hoc contrast on *live* without lexical antecedant

In Clark's (1992) model, this ad hoc contrast might be interpreted with reference to the communities involved: Travis has lived in Nepal but Sadie and Mindy have not. Travis can judge the community of Sadie and Mindy as having a scenario of Western medicine and health norms in which one would try to fight and cure most diseases rather than living with them. A superordinate category—lifestyle choices surrounding diseases—also can be inferred. The speaker can be economical and not spell out these details in the text. It is noteworthy that this contrast interpretation is triggered more by intonation than by lexicogrammatical structure. If we changed the intonation of *giardia* and *amoebas*, for example, to extended plateaus or "listing contours"—*they just live with gia::::rdia:: ; they live with amoe:::::::ba:::s*—line 8 could be interpreted not as a contrast but as a list of diseases and a comment on how difficult the lives of Nepalis are.

This analysis is consistent with Deppermann's (2004) observation that in conversation, many contrasts have moral implications: They clarify and exemplify dispreferred social behaviors—or, in his words, they "warrant a deviation category." In example 2, the speaker implies that members of this (less-traveled) Western community might think it strange to *live* with diseases because curing them should be the norm. From such implied contrasts, then, we can learn what speakers are taking for granted about community membership and what sort of mutual knowledge and values they assume.

Example 3 illustrates given intonation associated with an item that has no direct antecedent in the text. The excerpt is from a lecture on correlation in which a genetics study of ducks is described. In the description of the study, the lecturer uses the word *parents* four times between lines 3 and 6 with given intonation and no antecedent (line 3 is illustrated in figure 10.2). In Clark's (1992) terms, the speaker thus reveals

assumptions about the community membership of the audience: "Typical" American undergraduates belong to a generally educated academic community, which she presumes to be familiar with a basic genetics schema. Given these judgments, she can treat the word *parents* intonationally as given, although it is neither an exact repetition nor a synonym of a prior item.

3. Ducks and their parents

(1) . . . and the question that was being addressed by this particular study, (.5)

(2) was whether (.6) crossbreeds, (.4)

(3) ∧ so (.2) ducks that had (.4) a- one mallard →parent and one pintail →parent, (.5)

(4) if you look at them, (1.4) and (.1)

(5) ∧ you notice that a particular duck looks more like the pintail →parent than it does like (.2)

(6) ∧ th- the mallard →parent (.5) is it also true that its behavioral charact- behavioral

(7) characteristics (.3) will be more like the pintail.

In sum, followers of Clark's (1992) model can apply intonation analysis to learn what speakers are taking for granted about the mutual knowledge and values of the communities to which the participants belong. This analysis could be especially important in studies of discourse in which speech communities meet; for example, in the case of marginalized groups in the school system, such an analysis might provide information that would be helpful in the design of instructional materials.

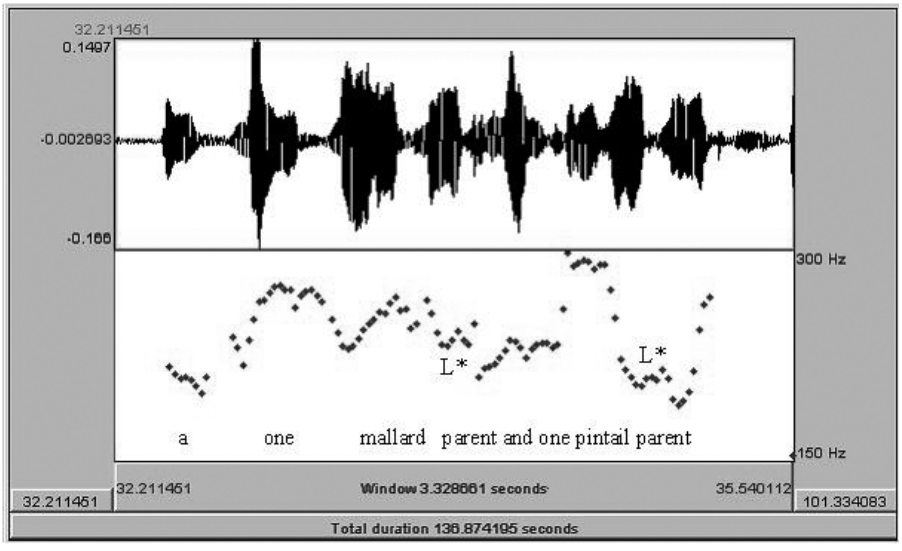

Figure 10.2. *Parents* has given intonation but no antecedent

Next I turn to a second set of claims about conceptual structure: Fauconnier's (1985) mental space theory. In essence, his idea is that mental representation in discourse involves the participants' setting up of one or more temporary mental spaces that contain referents, events, and their properties and relations. Mental spaces can be underspecified by linguistic structure because we fill in the gaps with background knowledge. The elements of one mental space are connected to the elements of other mental spaces via several relations, such as identity of reference, time, space, and metaphorical extension.

Part of this research program involves identifying linguistic structures called "space builders" that trigger—or, in Fauconnier's words, "give instructions for" (1985, 20)—the establishment of mental spaces, the elements in them, and the connections among them. Space builders may be grammatical: For example, Sweetser (1996) investigated how conditionals trigger mental spaces for hypothetical worlds. They may be lexical: Michaelis (1996) looked at the adverbial *still* as a trigger for a present-time mental space linked to an earlier-time mental space when the action of the verb also was in force.

Turning to intonation, I submit that contrast and given intonation also are linguistic structures that trigger certain mental space configurations in the minds of participants in discourse, just as lexicogrammatical structures have been claimed to do. Contrast intonation is a mental space builder that triggers the construction of a new mental space for the contrasting element. Further, it triggers a "generic space" (Fauconnier and Turner 2002) in which the superordinate category that encompasses both of the contrasting members also is constructed. Given intonation "points to" an element that is already available in the mental space network. This analysis is reminiscent of Fauconnier's (1985) discussion of definite and indefinite articles, in which the definite article also is said to "point to" an element already in a mental space whereas the indefinite article triggers the addition of a new element.

The next set of examples illustrates these relations as we return to the two men reminiscing about high jumping (reprinted from 1 as 4). Steve makes an ad hoc contrast between *inner tubes* (line 3) and *sawdust* (line 6)—hardly lexical antonyms. The superordinate framework for the contrast also is an ad hoc category: "surfaces to land on in backyard high jumping"—mentioned in line 4 as *somethin' comfortable to land on*. This contrast is paired with a second one between two locations: Brian's yard, which had the inner tubes, and "mom and dad's" place (line 5), where there was only sawdust to land on.

4. High jumping

(1) Brian: Yeah, a galvanized pipe for a cross bar, n'. .
(2) Steve: Yah . . they had a lot . lot better than .
(3) ∧ at least y'know the <u>inner</u> tubes n' . .
(4) ya had y- . at least somethin' . comfortable to <u>land</u> on,
(5) Mom and dad . . in the uh . . cross the <u>other</u> way
(6) ∧ all <u>they</u> had wasss . . <u>saw</u>dust . . /just like we did in grade school.
(7) Brian: \hhhhhhhhhhhhhhhhhhhh

(8) Steve: Landing on the sawdust wasn't much fun. .

(9) Brian: Yeah. . . . part a their . high jumpin' there at Whitman, we'd ah . Ken Magnuson . he

(10) ∧ was a . . . left handed jumper, so he'd always →jump on the other side of the →pen

(11) and we were right handed jumpers, we'd . . so . we'd fluff up all the sawdust on the . .

(12) lefthand side, because that's where we'd always land n'. .

(13) he didn't have any sawdust over on his side.

Drawing on Fauconnier's (1985) model, I suggest that as soon as we hear the contrast intonation on *inner tubes* in line 3, we are triggered to construct a new mental space for the expected contrast. The result, sketched in figure 10.3, consists of three mental spaces: an input space with high jumping onto inner tubes in Brian's yard; a second contrast space with empty slots for the anticipated landing surface and place; and a third, generic space created to encompass the superordinate categories. Other elements in the input space (such as the activity itself, the boys, and so forth) also appear in the contrast space and the generic space because it is anticipated that they will be common to all. The potential nature of these links is indicated with dotted lines. As the discourse continues, these lines can be solidified, the contrast slots can be filled in appropriately, and other adjustments can be made in the network if necessary.

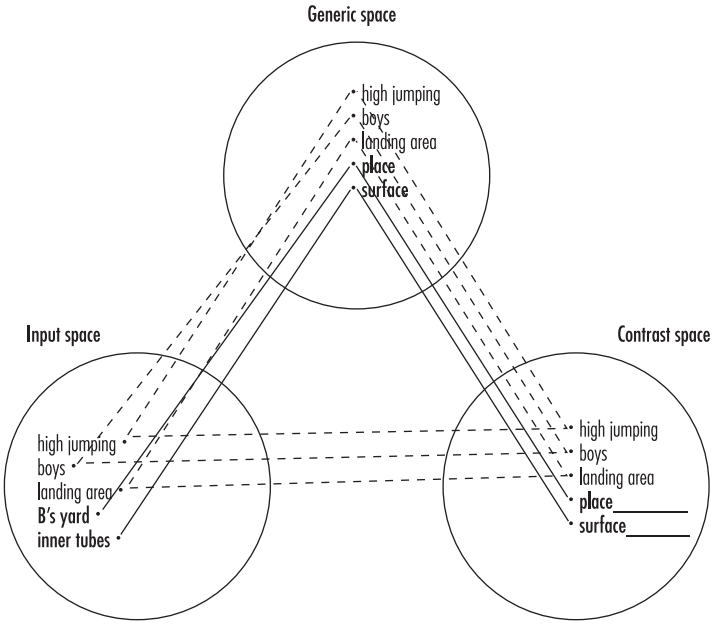

Figure 10.3. Mental space network triggered by contrast intonation

We can notice that the word *pen* in line 10, though not mentioned previously, is treated intonationally as given. This intonation can be said to "point to" an element already in place in the mental space network. In high jumping, a pen is the area that encloses the landing surface (inner tubes or sawdust). Rather than creating a new mental space or adding a brand new element to an existing space, the speaker's intonation "points to" what should already be present. Although I would not have chosen the word *pen*, I can easily elaborate my own existing mental space for this discourse by adjusting the label from "landing area" to "pen" throughout the mental space network.

I turn last to Lakoff's (1987) idealized cognitive models (ICMs) and his discussion of categories and prototypes. According to Lakoff, as we go through life we develop conceptual categories to understand and store our experiences in the world. Categories are organized radially around central prototypes, which are further organized into more complex structures called ICMs. As Lakoff (1987, 45) puts it, ICMs are "theories of some subject matter." Cultures and individuals make decisions about what categories in the realm of experience need to be distinctive and what constitutes a prototypical case for each category. In any new situation we can compare the present circumstances to our ICMs and thus engage in cognitive processes such as recognition, reasoning, inferencing, making judgments, and so on.

One of Lakoff's methodologies is to identify linguistic structures from languages of the world—for example, classifier words in Dyirbal and Japanese—to demonstrate how human classification systems are organized. As with the other models, we see a methodology in which linguistic form acts as an entry point to conceptual structure.

Once again, I argue that the intonation patterns I am discussing are another kind of linguistic structure that gives us a tool to understand categorization and ICMs. Contrast by definition involves a category-based organization scheme in which two elements are juxtaposed within a third superordinate category. Ad hoc categories are especially interesting in this regard. As Barsalou (1983) discovered through a series of experiments in which subjects performed word association and listing tasks, even ad hoc contrasts showed prototype effects. In other words, the subjects consistently judged certain items as better members of the ad hoc categories than others. Therefore intonation, which highlights category juxtapositions, can reveal more about categories and their prototypes in the mind of a speaker.

Example 5 illustrates a contrast between a prototype and an actual situation, as Steve of the high-jumping dialogue again reminisces about his childhood. This time he relates an episode in which his older brother duped him into mowing the lawn by pretending it was fun, to avoid doing the chore himself. In line 4, the word *handlebars* has contrast intonation but does not have a lexical opposite. Within Lakoff's (1987) model, this ad hoc contrast might be interpreted as follows: If we posit an ICM in which equipment typically is proportioned so that adult-sized people can use it effectively, there is a contrast between this prototype and our mental representation of the little boy mowing the lawn and having to reach upward to grasp the handlebars.

5. Reaching the handle bars

(1) Steve: n' then finally. after he'd mow a couple a times n . .
(2) he sai- y'know d'you wanna do this? he said- it's really a lot of fun . .
(3) hhh ((barely audible laugh)) I don wan- h
(4) ∧ yea::h y'know I could hardly reach the top of the handlebars but . . .
(5) ((breath in)) I start m- mowin' 'n . . next thing you know .
(6) Don wasn't around any more h h huh .
(7) he was in the house ?and he was h h tahuh . .
(8) an' . from that point on, I basically became the lawn mower . .
(9) person for our . for our yard.

The final example, transcript 6, involves given intonation with no antecedent for the low-pitched item. Steve and Brian, who in previous text have said that they enjoy skiing, are talking about some friends who went on a ski vacation in midweek, taking time off from work. In line 3 Steve says, sarcastically: *must be nice!* Brian then comments in line 4 that their ski trip *ticked Brandon off* (Brandon being another friend). The crucial word is *off,* with given intonation: Normally, the verbal compound *ticked óff* would have stress on the particle, but in this context Brian treats it intonationally as given. Again, proponents of Lakoff's model might interpret this intonational choice with reference to an ICM of "normal work-a-day life" in which one doesn't just breeze off to the slopes in midweek. In that context, Steve's sarcasm and the fact that Brandon was *ticked off* is given. One obviously could be envious of people who behaved contrary to the prototypical, socially sanctioned work ethic.

6. Ticked off

(1) Brian: They went up . last Tuesday, Jeff and Shell took the day off n' .
(2) went snow ski hhh ing h=
(3) Steve: =((sarcastic)) must be nice=
(4) Brian: ∧ =huh yeah . ticked Brandon →off cause he didn't getta go.
(5) Steve: /hhhhh
(6) Brian: \hhhhh

To conclude, I have explored three cognitive models in which past investigations have shown how lexicogrammatical structure of discourse interacts with conceptual structure. I have proposed that in such research, an additional type of linguistic structure—namely, intonation—can fruitfully be included as part of the methodology. The facts are particularly striking with ad hoc contrasts and inferred cohesive relationships, where the lexicogrammatical structure alone may not reveal the full story. The pitch patterns of contrast and given intonation can be used as an entry point for understanding the relationships between language and the mind.

Acknowledgments

Transcripts used with kind permission from "Dialects of the Pacific Northwest," an ongoing project at the University of Washington Phonetics Laboratory by Alicia Beckford Wassink and Richard Wright.

NOTES

1. Chafe (1994, 1998) has long made a similar argument using different types of evidence.
2. I believe (Wennerstrom 2001) that deaccent overlaps in some cases with Pierrehumbert's (1980) L* pitch accent, whose discourse meaning is described in Pierrehumbert and Hirschberg (1990) as salient but mutually believed.
3. Data for examples 1, 4, 5, and 6 are from "Dialects of the Pacific Northwest."
4. The top half of the graph indicates the amplitude (roughly the volume); the bottom half shows the pitch. Figures 10.1 and 10.2 were made with Praat software.

Transcription Conventions

. . .	unmeasured pause
(.3)	measured pause
a::::	extended syllable
/text	overlapping speech
\text	
=	latch (no pause between speakers)
,	continuing intonation boundary
.	final intonation boundary
-	cutoff intonation
<u>contrast</u>	contrast intonation
⌞	given intonation
hhh	laughter syllables
((text))	metacomment

REFERENCES

Barsalou, Lawrence W. 1983. Ad hoc categories. *Memory and Cognition* 11:211–27.

Chafe, Wallace L. 1994. *Discourse, consciousness, and time: The flow and displacement of conscious experience in speaking and writing.* Chicago: University of Chicago Press.

———. 1998. Language and the flow of thought. In *The new psychology of language: Cognitive and functional approaches to language structure,* ed. Michael Tomasello, 93–111. Mahwah, N.J.: Lawrence Erlbaum Associates.

Clark, Herbert H. 1992. *Arenas of language use.* Chicago: University of Chicago Press.

Deppermann, Arnulf. 2004. Lexical contrasts and conversational contrasting. In *Syntax and lexis in conversation,* ed. Auli Hakulainen and Margret Selting. Amsterdam: John Benjamins.

Fauconnier, Gilles. 1985. *Mental spaces: Aspects of meaning construction in natural language.* Cambridge, Mass.: MIT Press.

Fauconnier, Gilles, and Mark Turner. 2002. *The way we think: Conceptual blending and the mind's hidden capacities.* New York: Basic Books.

Halliday, Michael A. K., and Ruqaiya Hasan. 1976. *Cohesion in English*. London: Longman.

Ladd, D. Robert. 1980. *The structure of intonational meaning.* Bloomington: Indiana University Press.

Lakoff, George. 1987. *Women, fire, and dangerous things: What categories reveal about the mind.* Chicago: University of Chicago Press.

Michaelis, Laura A. 1996. Cross-world continuity and the polysemy of the adverbial *still*. In *Spaces, worlds, and grammar,* ed. Gilles Fauconnier and Eve Sweetser, 179–226. Chicago: University of Chicago Press.

Pierrehumbert, Janet. 1980. *The phonology and phonetics of English intonation.* Ph.D. diss., Massachusetts Institute of Technology.

Pierrehumbert, Janet, and Julia Hirschberg. 1990. The meaning of intonational contours in discourse. In *Intentions in Communication,* ed. Philip R. Cohen, Jerry Morgan, and Martha E. Pollack, 271–311. Cambridge, Mass.: MIT Press.

Rosche, Eleanor. 1978. Principles of categorization. In *Cognition and categorization,* ed. Eleanor Rosche and B. B. Lloyd, 27–48. Hilldale, N.J.: Lawrence Erlbaum.

Rudolph, Elisabeth. 1996. *Contrast: Adversative and concessive relations and their expressions in English, German, Spanish, Portuguese on sentences and text level.* Berlin: Walter de Gruyter.

Sweetser, Eve. 1996. Mental spaces and the grammar of conditional constructions. In *Spaces, worlds, and grammar,* ed. Gilles Fauconnier and Eve Sweetser, 318–33. Chicago: University of Chicago Press.

Terken, Jacques, and Julia Hirschberg. 1994. Deaccentuation of words representing "given" information: Effects of persistence of grammatical function and surface position. *Language and Speech* 37, no. 2:125–45.

Wennerstrom, Ann. 2001. *The music of everyday speech: Prosody and discourse analysis.* New York: Oxford University Press.

———. 1998 Intonation and second language acquisition: A study of Chinese speakers. *Studies in Second Language Acquisition* 20, no. 1:1–25.