The Role of Tone Choice in Improving ITA Communication in the Classroom[*]

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As the numbers of international teaching assistants (ITAs) continue to increase, cross-cultural communication has become an integral part of academic life in universities. ITA instruction programs recognize that successful communication between ITAs and their students requires an ability to use language appropriate to the classroom context and an awareness of the expectations of native-speaking discourse participants. One area of teaching discourse that is frequently overlooked in this discussion is its intonation structure. This study compares one intonational feature, tone choice, in 12 parallel teaching presentations given by 6 Chinese and 6 North American male teaching assistants (TAs). Naturally occurring presentations were recorded in the classroom, and tone choices were analyzed using instrumental and auditory analysis within Brazil's (1997) model of discourse intonation. The results showed that the native-English-speaking TAs systematically exploited their tone choices to increase the accessibility of the lecture material and establish rapport with their students. Conversely, the typical tonal composition of the ITAs' presentations obfuscated the information structure and frequently characterized these speakers as unsympathetic and uninvolved. These results suggest that tone choice contributes to communication failure between ITAs and their students and prompt the recommendation that tone choice be directly addressed in the linguistic and pedagogical components of ITA instruction programs.

Over the past two decades, the need to construct models for international teaching assistant (ITA) training programs has prompted considerable efforts to determine the features that typify teaching discourse at the university level. This body of work has established that teaching discourse in North American classrooms is subject to linguistic and behavioral norms. Effective teaching subsumes not only

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the ability to communicate a well-structured transactional message but also the ability to create a *positive affect* (Bailey, 1984) in the classroom. This requires a sophisticated communicative competence on the part of ITAs (Hoekje & Williams, 1992), necessitating some knowledge of discipline-specific language (Byrd & Constantinides, 1992; Jacobson, 1986; Shaw, 1994), different teaching contexts (Axelson & Madden, 1994; McChesney, 1994), interactional strategies (Douglas & Myers, 1989), and teacher immediacy behaviors such as vocal expressiveness or the use of inclusive pronouns (Christophel, 1990; Rounds, 1987).

A less well studied area of classroom language that has particular importance for L2 speakers is the use of intonation in teaching discourse. Intonation, narrowly defined here as variation in pitch movement (Brazil, 1997; Cruttenden, 1997; for a broader definition see Hirst & Di Cristo, 1998), bears a high communicative load in terms of information structuring and rapport building between discourse participants (Gumperz, 1982). It acts as a *grammar of cohesion* (Wennerstrom, 1998) in spoken texts, elucidating topic structure and signaling relationships between propositions and items in the discourse (Brazil, 1997; Chun, 1988; Clennell, 1997; Pierrehumbert & Hirschberg, 1990; Tench, 1996; Thompson, 1994). Intonational features also have a pragmatic function, communicating sociolinguistic information such as perceptions of status differences, and solidarity or distance, which are essential to establishing successful interspeaker cooperation (Brazil, 1997; Clennell, 1997). Gumperz (1982) shows that miscommunication in cross-cultural encounters related to L2 patterns of intonation and stress can be pervasive and frequently lead to negative stereotyping. The role of intonation in these misunderstandings is particularly poignant as it is easily overlooked by participants and analysts yet may powerfully affect the most inconsequential daily interactions.[1]

This study focuses on one intonational feature, tone choice, or the choice of a sustained rising, falling, or level pitch movement on the tonic syllable in the tone unit,[2] in the teaching discourse of Chinese and North American teaching assistants (TAs). It examines the role of tone choices in the creation of comprehensible and interactive teaching presentations within the situated context of classroom discourse. In light of a comparative analysis of teaching presentations by native-speaking (NS) TAs and ITAs, the study investigates how the tonal composition of the ITAs' discourse may negatively affect undergraduates' perceptions of teaching

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[1] Gumperz (1982), for example, describes how the unexpected intonation patterns of Indian English speakers in a workplace cafeteria in Britain caused them to be perceived as uncooperative by their British English–speaking interlocutors (p. 173).

[2] These terms correspond to what pronunciation texts typically refer to as the *focus word* in a thought group (Gilbert, 1993; Grant, 1993; Lane, 1993).

style and personality, contributing to communication failure in the classroom.

TONE CHOICE IN L2 DISCOURSE

Research in L2 discourse suggests that learners of English at every level of proficiency encounter problems in applying tone choice. Wennerstrom (1994, 1997) reports that Japanese, Thai, and Chinese speakers tended to use low, falling tones at boundaries between related propositions where NS hearers would anticipate rising or midlevel tones. Pirt (1990) reports similar results in a study of Italian learners. In a comparison of the tone choices of native and nonnative speakers in parallel readings of a scripted dialogue, Hewings (1995) also found a preference for the use of falling tones in the discourse of advanced L2 learners from Korea, Greece, and Indonesia. This was particularly problematic in situations where native speakers chose rising tones for "socially integrative" (p. 262) purposes. Hewings reports that when contradicting a previous speaker, NS informants uniformly used a rising tone to avoid the appearance of overt disagreement that might be inferred from a falling tone. He suggests that the use of falling tones by nonnative speakers in this context can give the impression of deliberate rudeness or animosity.

This potential for misunderstanding the speaker's intent at an interpersonal level can seriously damage teacher-student relationships in the classroom. Tyler and Davies (1990) found that a Korean ITA's production and interpretation of intonational cues contributed to a communication failure between the ITA and an undergraduate student. The problem remained unresolved, and the interaction closed with the student muttering, "I've been reamed" (p. 398). At an informational level, Tyler, Jefferies, and Davies (1988) show that the repeated use of inappropriate falling tones in ITAs' presentations contributed to an obfuscation of the discourse structure and helped create a "flat, undifferentiated, structure" (p. 106). Hinofotis and Bailey (1980) also linked the monotonic intonation patterns that characterized ITAs' presentations to complaints from students that ITAs were boring and that it was difficult to concentrate in their classes.

The study described here sought to define more precisely the role of tone choice in these perceptions of ITAs' discourse. I first conducted a microanalysis of the complete pitch structure of classroom presentations by 12 NS TAs and ITAs and then compared ITAs' tone choices with the baseline NS data. The study's qualitative, interpretive design was consistent with the investigations of ITA discourse conducted by Tyler, Davies, and their associates (Tyler, 1992, 1995; Tyler & Davies, 1990; Tyler,

Jefferies, & Davies, 1988), based on the principle that speakers' linguistic choices could be interpreted meaningfully only within the situated context of the interaction, taking into account the surrounding linguistic and nonlinguistic setting of the discourse (Brazil, 1997; Gumperz, 1982).

THEORETICAL FRAMEWORK

Intonation and Common Ground

The analysis and description of tone choices followed Brazil's (1997) model of intonation in discourse. Central to Brazil's model is the principle that the communicative value of intonation derives from the assumptions participants bring to the interaction. In any given situation, the worlds of the speaker and hearer will intersect to differing degrees. The extent of shared background, or *common ground,* assumed between speakers may be initially unknown, as in the case of two strangers who strike up a conversation, or may be considerable, as in the case of a discussion between family members. Even two strangers can take a certain amount of common ground for granted in their shared knowledge of the world and their immediate context.

Tone choice summarizes the common ground between speakers at any particular moment in the interaction. Falling tones (including both fall and rise-fall final contours) indicate a speaker's assumptions that the matter of the tone unit is a new assertion, in some way world-changing to the hearer, and unrecoverable from the prior context. Rising tones (rise and fall-rise final contours) signify that the speaker assumes that the matter is part of the shared background between participants and agrees with the current world view of the hearer. This information may be recoverable from the preceding discourse or prior knowledge assumed to be common ground at that time. This binary opposition is exemplified below:

1. // ↗ we have SEven ions we have to <u>TEST</u> for// ↘ i'm just gonna COver our <u>PO</u>sitive ions// ↗ the SOdium poTAssium and aM<u>MO</u>nium//[3]

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[3] Transcription conventions are as follows:

// //	tone unit boundaries
UPPERCASE	prominent syllables indicating stressed or salient words
<u>UPPERCASE</u>	tonic syllable carrying the tone choice or tonal pitch movement associated with the tone unit
↘	falling tone associated with the tonic syllable, indicating that the content of the tone unit is in some way world-changing to the hearer
↗	rising tone associated with the tonic syllable, indicating that the content of the tone unit agrees in some way with the current world view of the hearer

In this extract from a chemistry lab, an NS TA is helping the students put together a scheme or checklist of what to look for when they are given an unknown chemical compound to identify. The students have covered this material in previous labs, and most have come to this lab with their scheme already drafted. The TA begins by indicating his assumption of this agreed, shared background through his use of a rising tone in "we have seven ions we have to test for." In contrast, in the second tone unit, "I'm just gonna cover our positive ions," he uses a falling tone to assert or tell the students that he will be discussing only positive (not negative) ions during the presentation. The final tone unit refers back to "positive ions," and the TA again chooses to emphasize common ground. The students have been working with sodium, potassium, and ammonium since the beginning of the semester, and he uses a rising tone to project his expectation that this group of ions is familiar to the students from their previous lab work.

Tone Choice and Convergence

Through tone choice, participants continuously negotiate toward a *state of convergence*, or roughly mutual understanding of the discourse message, by linking each new utterance to the world or context of the hearer (an additional level of tone choice with a rather different function is discussed below). This notion of confluence includes a movement toward social convergence; that is, speakers can decrease the affective distance between themselves and their hearers by projecting a broader common ground that is more inclusive of the hearer. In Example 1 above, by intentionally highlighting the students' prior knowledge, the TA shifts the perspective of the presentation from that of a *speaking I* to that of a *participating we*.

Conversely, speakers can exploit the tonal system to project a temporary withdrawal from the here-and-now negotiation with the hearer. The use of a final, level tone presents the matter of the tone unit as neither shared nor new to the participants but as simply a language specimen. Typically, this neutral tone is used for semiritualized or routinized language that is generic rather than specific to a given interaction. Characteristic examples from the classroom include the reiteration of well-established procedures (e.g., // ➜ stop <u>WRITING</u>// ➜ put your pens <u>DOWN</u>// ➜ look this <u>WAY</u>//) or of immutable truths that are nonnegotiable.

➜	level tone associated with the tonic syllable, indicating that the content of the tone unit is presented as a language specimen
[0.44]	pause of a particular duration in seconds
. . .	omission of remainder of tone unit

2. // → the SQUARE of the hy<u>POT</u>enuse// → of a RIGHT angled <u>TRI</u>angle// // → is equal to the SUM of the <u>SQUARES</u>// ↘ on the OTHer two <u>SIDES</u>// (Brazil, 1997, p. 138)

Common features of unplanned discourse such as hesitation phenomena and fillers may also result in a momentary disengagement from the interaction as the speaker briefly focuses on language production (e.g., // → <u>AND</u>// → <u>UH</u>// → so we <u>HAVE</u> . . .//).

Tonal Composition

The particular combination of rising, falling, and level tones in any given piece of discourse establishes its tonal composition (Tench, 1996). A combination of largely falling and rising tones is termed *direct* discourse; that is, the speaker makes tone choices for the benefit of the hearer, selecting falling or rising tones based on whether the speaker believes the content of the tone unit is either world-changing or common ground; thus choices are directly oriented toward achieving a state of convergence with the hearer.

The tonal system also allows the speaker to make choices that project minimal involvement with the hearer and indicate a temporary withdrawal from the context of the interaction. This alternative selection of a combination of falling and level tones creates *oblique* discourse, or an orientation by the speaker toward the language sample itself and away from the hearer.[4] A typical condition under which a teacher may temporarily shift from a direct to an oblique orientation is shown in Example 2 above, where the teacher is reiterating a well-established formula. An utterance presented in this manner can be glossed as "these are not my words addressed particularly to you on this occasion; they are rather a routine performance whose appropriateness to our present situation we both recognize" (Brazil, 1997, p. 136). An orientation change from direct to oblique may also occur when speakers are focused on the language sample due to momentary problems with linguistic coding or because the speakers are "reading out" information, and the change reports nothing more than "this (linguistic item) is what is written here" (Brazil, 1997, p. 135). The latter condition is illustrated in Example 3. In this physics presentation the TA follows his opening remarks to the students, "so you guys had problems with the prelab,

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[4] Although the falling tone functions in this system as part of both direct and oblique discourse, shifts to oblique discourse are also characterized by additional signals, such as multiple prominences within tone units. As Brazil (1997, pp. 140–141) notes, however, naturally occurring discourse is often less tidy than would be ideal, and the system allows for ambiguities that may naturally inhere in the data.

right" with a series of falling and level tones, indicating a temporary shift in his focus away from the students to reading out the question from the textbook.

3. // ↘ so you GUYS had <u>PROB</u>lems// ↘ with the <u>PRE</u>lab// ↗ <u>RIGHT</u>//
   → <u>AND</u>// → the FIRST question <u>WAS</u> uh// ↘ QUEStion <u>ONE</u> was//
   ↘ for the exAMple on pages four and <u>FIVE</u>// → FIND out <u>TORQUES</u>//
   ↘ for an AXis at x equals <u>ZE</u>ro//

In summary, the discourse of teaching is generally characterized by a specific tonal composition (Brazil, Coulthard, & Johns, 1980; Sinclair & Brazil, 1982). Teachers are likely to choose a direct orientation, or a co-occurring selection of rising and falling tones, in order to project maximal involvement with their students. More specifically, teachers can be expected to exploit the converging functions of rising tones to foster an interactive teaching style and promote a positive affect in the classroom. Finally, teachers may select obliquely oriented, or neutral, tones if momentarily distracted by extralinguistic concerns such as board work or with the kinds of routinized language shown in Examples 2 and 3 above.

METHOD

Participants and Data

The data set consisted of twelve 2- to 4-minute extracts from naturally occurring classroom presentations given by male North American and Chinese TAs during the regular course of semester of teaching (see Table 1). The TAs were the sole instructors responsible for teaching math discussion sections or introductory labs in physics, chemistry, or electrical engineering. These classes are typically made up of first-year or second-year undergraduate students fulfilling general education or entry-level science requirements. At large state universities in the United States, courses at this level are generally taught by native- and nonnative-speaking graduate TAs rather than by faculty members.

The six ITAs were from mainland China, and their L1 was Mandarin Chinese. Each had received a score of 45–50 on the Educational Testing Service's (ETS) Speaking Proficiency English Assessment Kit (SPEAK), indicating their communication skills to be "somewhat to generally effective" (ETS, 1996, p. 9). The six NS TAs were described by their supervisors as "relatively experienced," but none was specifically described as a "model" TA.

To ensure that the extracts involved equivalent presentations of the

TABLE 1
Summary of Teaching Presentations

Subject	Topic	No. of parallel extracts	Participants	
			NS TAs	ITAs
Chemistry	Scheme for unknown analysis	3	MK	TY, KE
	Thin layer chromatography	2	SN	JA
Math	Exponential growth and decay	3	BL	BG, SM
Physics	Torques and forces in equilibrium	3	KN, LE	XG
Electrical engineering	Drawing a bode plot	1	BD	[a]

[a] There is no parallel extract for BD, as no Chinese TAs were teaching in this section at the time of recording.

same material, I recorded the opening 2–4 minutes of each presentation by the NS TAs and ITAs from the same subject area on the same day or in the same week. The material represents a cross-section of typical functions performed by TAs in these prelab presentations, including giving theoretical background, reviewing homework, explaining relevant terms or equations, and demonstrating experimental procedures (Axelson & Madden, 1994; Jacobson, 1986).

Procedures

The data were recorded in the classroom on audio- and videotape using a Sony TCD-D8 Digital Audio Tape-corder (DAT), a Sharp VL-L49OU VHS Camcorder, a Telex FMR-150c Wireless system, and a Telex SCHF745 headset microphone. The wireless sound system and headset microphone allowed the TAs complete freedom of movement while the researcher remained at the back of the room with the sound and video equipment. This method of collection also produced high-quality sound recordings without the problems of ambient noise typically associated with natural data collection.

The DAT recordings were transferred to a Kay Elemetrics Computerized Speech Laboratory (CSL) Model 4300, and fundamental frequency traces were computed for all the data using the pitch extraction function of the CSL. Tone choices were identified through both auditory and instrumental analysis (Schuetze-Coburn, Shapley, & Weber, 1991; Watt, 1997). An initial auditory analysis of the data was supplemented by analysis of the pitch traces produced by the CSL. The tonal contours were identified and interpreted within the tonal system given in Brazil's (1997) model and transcribed using Brazil's conventions.

Analysis

Data analysis involved describing the classroom language of the NS TAs in terms of falling, rising, and level tones and describing the functions of these tones on the basis of prior investigations of tone in similar contexts. The ITAs' tone choices were also identified and compared with the tone choices of corresponding NS TAs.

RESULTS

Tone Choice in NS TA Discourse

The NS TAs purposefully employed tone choice throughout their presentations to negotiate a state of convergence between themselves and their students. The distinctive tonal composition of the extracts, including features such as solidarity markers and template constructions, suggest maximal involvement with the students and mark the extracts as typical examples of teaching discourse.

Falling Tones

The falling tones that predominate in all six presentations (see Table 2) are typical of instructional discourse, as teachers are invariably largely involved with *telling*, that is, presenting new, world-changing information to their students. Examples 4, 5, and 6 illustrate prototypical uses of a falling tone to frame and announce a new topic, and to present key facts or new procedures.

TABLE 2
Tone Choices in NS TAs' Presentations

TA	Tone choice			n^a
	Falling	Rising	Level	
BL	31	17	2	50
MK	57	31	12	100
LE	43	29	28	100
KN	66	17	17	100
SN	72	14	14	100
BD	75	13	12	100

[a] Extracts from the laboratory classes (chemistry, physics, and electrical engineering) contained 100–141 tone units, of which the first 100 were counted. The three math presentations each contained 50–70 tone units, of which the first 50 were counted.

4. // ↘ o<u>K</u>// ↘ Exponential GROWTH and de<u>CAY</u>// (BL)

5. // ↘ the equilibrium con<u>DI</u>tion// ↘ is when the sum of the <u>TORQUES</u>// // ↘ is Equal to <u>ZE</u>ro// (KN)

6. // → the SOLvent you're gonna <u>USE</u>// ↘ to deVElop the <u>PLATES</u>// // ↘ is etho<u>LA</u>cetate// (SN)

Rising Tones

The highest proportions of rising tones appeared in the extracts from BL's, MK's, and LE's presentations. These three presentations constituted a review of previously covered material, such as procedures introduced in previous labs or exercises and prelabs students had already completed for homework. The TAs could assume that this information was established common ground. They exploited the tonal system to emphasize this increased shared space and confirm or remind students of shared knowledge rather than "tell" them again. In Example 7, MK reminds the students of what they found when they conducted flame tests a few weeks earlier. The two possibilities discussed here, a purple flame indicating potassium or no color at all, are projected as established common ground based on the students' prior experience.

7. // ↗ now of course you reMEMber that potassium was <u>PUR</u>ple// ↗ gave a purple or a <u>VI</u>olet flame// ↗ you MIGHT see that as <u>WELL</u>// . . .// ↗ and the THIRD possibility is that there be no color at <u>ALL</u>//

Speakers make certain tone choices based on the context they wish to project. In Example 7 above, MK could have selected falling tones (i.e., //↘ you reMEMber that potassium was <u>PUR</u>ple//, // ↘ and the THIRD possibility is that there be no color at <u>ALL</u>//). This option would have projected the information contained within the tone units as asserted, and MK would not have taken the opportunity to build on the prior common ground between him and his students. By choosing to exploit the tonal system through his use of rising tones, the TA projected a context in which students were included rather than excluded and increased their accessibility to the lecture material.

All six TAs utilized this *deictic* function of the rising tone (Nevalainen, 1992) to allude to some kind of common ground. Established common ground included shared knowledge derived from previous classes and information that the TA assumed formed part of the students' general background knowledge. In Example 8, BD projects his assumption that the procedures used to calculate a log function will be familiar to the students.

8. // ↘ and <u>THEN</u>// ↘ inSTEAD of <u>MUL</u>tiplying// ↗ whenever you take the LOG you just <u>ADD</u>// ↗ <u>RIGHT</u>// (BD)

The NS TAs also established common ground at the moment of speaking when the content of the tone unit was recoverable from the immediate paralinguistic context, that is, when the content referred to something written on the blackboard, as in Example 9, or to a piece of equipment being demonstrated at that moment.

9. // ➔ if you <u>HANG</u>// ↘ like a ten gram <u>MASS</u>// ↗ from THIS <u>SIDE</u>// (KN; simultaneously gestures toward a diagram on the board)

As mentioned above, the communicative value of rising tones encompasses both informational and social convergence. Throughout their presentations, the NS TAs employed rising tones to promote a sense of mutual involvement and build rapport with their students. In Example 10, BL uses a falling tone to pronounce the new terminology and continues with a sequence of rising tones as he gives a number of examples. These choices may be loosely glossed as "I'm telling you that R is a growth constant. I assume you understand that if R is positive, the element is increasing. Let's think together of what that means."

10. // ↘ R is what's <u>CALLED</u>// ↘ it's a GROWTH <u>CON</u>stant// ↗ if r's POsitive the thing's getting <u>BIG</u>ger// ↗ you're getting MORE <u>MO</u>ney// ↗ <u>RIGHT</u>// // ↗ you WANT <u>THAT</u>// ↗ you want your money to GROW in a <u>BANK</u>// (BL)

A second rapport-building strategy identified was the NS TAs' use of rising comprehension checks, such as // ↗ <u>RIGHT</u>// and // ↗ o<u>K</u>//. In the literature, these checks are typically described as communication devices used by the speaker to seek clarification from the hearers and verify that they are following the informational content (Nattinger & DeCarrico, 1992; Pica & Long, 1986). In the classroom, the expectation is that the teacher will pause directly following the check and continue after some affirmative response from the students. Certainly this function can be subsumed under the common ground metaphor as teachers seeking confirmation that they are right in assuming the students can interpret the discourse message.

Analysis of these data, however, showed that rising checks frequently did not indicate a genuine request for verification from the hearers. These markers were habitually followed by barely audible pauses that allowed no time for a response from the students. I suggest that these devices acted rather as solidarity markers and that the TAs used this technique to engage in "a ritual of understanding or agreement" (Ashton, 1986, p. 139) with their students. The choice of a rising tone

implicitly acknowledges a negotiation between speaker and hearer and implies that the speaker is directly confirming common ground, thereby increasing the shared space between participants. Thus, using this device, the TAs may have been projecting solidarity with their students and building a sense of mutual participation into their teaching discourse.

Finally, the NS TAs exploited the converging function of the rising tone in their responses to incorrect answers from the students during teacher-student exchanges. Essentially, this choice of the rising tone was a prosodic realization of the "Yes, but . . ." strategy commonly used by teachers in this situation (Smith, Meyers, & Burkhalter, 1992). In Example 11, MK temporarily withholds his assessment of the student's response by choosing an initial level tone on "pH." This deliberate disengagement from a direct negotiation with the student implicitly indicates a problem. He then reorients to the student and partially validates her response with a rising tone, "and it will tell us some things," before asserting the correct answer in a falling tone, "but it's best to keep that off to the end."

11. MK: // ↗ any su<u>GGES</u>tions//
    S: // pH//
    MK: // ➔ p<u>H</u>// ↘ we'll HAVE to do that e<u>VEN</u>tually but// ↗ and it
        will TELL us some <u>THINGS</u>// ↘ but it's <u>BEST</u> to keep that// ↘
        OFF to the <u>END</u>//

In Example 12, following an incorrect answer from the student, MK responds with an initial rising tone, "well if you remember that didn't work too well," conveying the implication of a matter agreed between them and avoiding the overt contradiction that would be inherent in a falling tone choice (i.e., // ↘ well if you reMEMber that didn't <u>WORK</u> too well//).

12. MK: // ↘ how would we TEST for NH <u>FOUR</u> specifically//
    S: (response)[5]
    MK: // ↗ well if you reMEMber that didn't <u>WORK</u> too well// ↘ we
        had to do SOMEthing other than just <u>HEAT</u> it//

These examples show how the NS TAs exploited the communicative value of rising tones to establish common ground, project solidarity, and avoid open disagreement with their students. They suggest the TAs may have used these tones to promote a sense of community and shared experience in the classroom (Sinclair & Brazil, 1982). In addition, tonal

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[5] The headset microphones worn by the TAs did not record student responses. When possible, student responses were transcribed from notes taken by the researcher during the recording.

analysis sheds some light on how teachers may create crucial qualities such as positive affect through their linguistic choices.

Level Tones

Co-occurring selections of rising and falling tones far outweighed the number of level tones found in these presentations (see Table 2). This result conforms to the expectations of teaching discourse: The assumption is that teachers are intentionally orienting their discourse toward their students. When level tones, or co-occurring selections of falling and level tones, appeared, they indicated a temporary disengagement from the ongoing negotiation between speaker and hearer for reasons anticipated under the model, including routinized language and on-line verbal planning. (This phenomenon accounts for the comparatively large number of level tones in LE's presentation, which included an unusually large number of filled pauses and similar kinds of level tones while he wrote on the blackboard.)

Two particular functions of the level tone bear additional mention. The first was illustrated in Example 11, in which the TA exploits the neutral value of this tone to signal an incorrect student response. The second is its use in a specific kind of teaching activity termed the *template technique* (Brazil, 1997). This construction, shown in Example 13, is marked by a sustained level tone (or a slight continuing rise) followed by a short pause, "because sodium would have been [pause] bright orange." This device is often used to encourage students to "fill in the blank" when the teacher believes the answer is recoverable.

13. // ↘ but you Also know there CAN'T be SOdium// ➔ because SOdium would have BEEN// [0.44] // ↘ bright Orange// (MK)

Tone Choice in ITA Discourse

The breakdown of tone choices in the ITAs' presentations showed that the tonal composition of their discourse differed from that in the equivalent NS TA presentations (see Tables 3 and 4). In general, the ITAs' presentations contained a noticeably higher number of level tones and fewer rising tones. The results of a chi-square test for the statistical significance of the observed differences (see Table 5) indicated that the overall pattern of tone choices was not independent of group, χ^2 (2 *df*) = 29.82, *p* < .0005. The significant chi-square means that the ITA and NS TA presentations exhibited different tonal structures. Follow-up *t* tests revealed a significant difference in the proportion of rising tones found in each presentation by NS TAs and ITAs, *t* (10 *df*) = 3.21, *p* = .012 (NS TA

TABLE 3
Tone Choices in ITAs' Presentations

| ITA | Tone choice | | | n^a |
	Falling	Rising	Level	
JA	68	19	13	100
TY	68	10	22	100
XG	67	8	25	100
KE	85	6	9	100
BG	34	3	13	50
SM	41	2	7	50

[a] See Table 2, Note a.

group, $M = 23.00$, $SD = 9.36$; ITA group, $M = 8.83$, $SD = 5.38$).[6] No significant difference was found between the proportion of falling and level tones in the NS TAs' and ITAs' presentations.

Rising Tones

The paucity of rising tones in the ITAs' presentations corresponded to a lack of exploitation of the tonal system for both referential and pragmatic functions (see Table 6). Rising tone choices identified as performing a deictic function include those used by the TA to refer to common ground established in previous classes (see Example 7 above) and those in which the TA refers to the immediate paralinguistic context

TABLE 4
Tone Choices in Parallel NS TA and ITA Presentations (%)

| Tone choice | NS TA | ITAs | | NS TA | ITAs | | NS TAs | | ITA | NS TA | ITA |
	BL	SM	BG	MK	KE	TY	LE	KN	XG	SN	JA
Rising	34	4	6	31	6	10	29	17	8	14	19
Falling	62	82	68	57	85	68	43	66	67	72	68
Level	4	14	26	12	9	22	28	17	25	14	13

Note. To report percentages, tone choice counts for BL, SM, and BG were doubled. This decision was made because presentations of each math problem were virtually identical in organization and composition, and the features found in these presentations match those found in analyses of similar data conducted by other researchers (Byrd & Constantinides, 1992; Rounds, 1987).

[6] Levene's test for equality of variances was significant, indicating that equal variances cannot be assumed.

TABLE 5
Tone Choices in All NS TA and ITA Presentations

Tone choice	NS TAs ($n = 6$)		ITAs ($n = 6$)	
	n	$\%$	n	$\%$
Falling	344	63	363	73
Rising	121	22	48	9
Level	85	15	89	18
Total	550	100	500	100

(see Example 8 above). The category of rapport-building functions is divided into solidarity markers and a smaller category comprising other rising tone choices identified as reducing the affective distance between teacher and students, such as a response to a student's incorrect answer (see Examples 10 and 11 above).[7]

A chi-square test showed that there was a significant difference between the NS TAs' and ITAs' presentations in the distribution of functions performed with a rising tone, χ^2 (3 df) = 10.30, $p < .02$. In terms of deictic functions, the ITAs rarely exploited tone choice to refer to established common ground between themselves and their students even though these groups had the same background knowledge and shared experience as those taught by the NS TAs. Recall that the three NS TA extracts with the highest proportion of rising tones (from

TABLE 6
Functions Performed With a Rising Tone in the NS TA and ITA Presentations

Function	NS TA		ITA	
	n	$\%$	n	$\%$
Deictic				
Common ground	27	22	2	4
Paralinguistic context	58	48	34	71
Rapport-building				
Solidarity markers	26	22	8	17
Other affective uses	10	8	4	8
Total	121	100	48	100

[7] Brazil's (1997) notion of convergence is necessarily more fluid than these categories might suggest. A speaker may choose a rising tone to build on established common ground or to project an assumption of common ground and thereby build rapport. Rising tones are assigned to overall categories to highlight differences in the kinds of functions they tended to perform in the data sets.

presentations by BL, MK, and LE) involved a review of previously covered material. As shown in Table 4, the four parallel ITAs, SM and BG (corresponding to BL) and KE and TY (corresponding to MK), used almost no rising tones in their discourse and did not use them to project common ground based on prior knowledge held by the students. (XG was not considered to be directly parallel to LE in this respect, as LE reviewed a prelab report that the students had already completed whereas XG introduced procedures for a new experiment. In this regard, XG parallels KN.) Example 14, from KE's presentation, roughly corresponds to Examples 7 and 13, in which MK uses rising tones and a template construction to exploit common ground. Although KE's students have also already conducted one set of flame tests, he does not refer to this prior knowledge through his choice of tone but instead projects a context in which the information is reasserted.

14. // ↘ the FIRST STEP// ↘ you do is FLAME TEST// ↘ for SOdium ion// // ↘ if YOU have SOdium ion// ↘ you will get BIG yellow Orange// ↘ but if you HAVEn't// → there will be NO// ↘ BIG yellow Orange// (KE)

Almost exclusively, the ITAs used rising tones to mark common ground only in terms of the immediate paralinguistic context, that is, at the moment of speaking. As an illustration, in Example 15 rising tones mark the sequence of items as currently shared as JA demonstrates the equipment the students will use.

15. // ↗ you put INto the JAR// ↗ this is BOTtle// ↘ THIS your PLATE// ↗ HERE your STARting LINE// (JA)

The ITAs' extracts also contained fewer examples of the pragmatic functions they fulfilled in the NS TA data. As shown in Table 6, only 8 solidarity markers (e.g., // ↗ RIGHT//, // ↗ oK//) were used in the ITAs' presentations compared with 26 in the NS TAs' presentations. In conjunction with the overall change in tonal composition, this lack of exploitation of the converging functions of the rising tone identifies the ITAs as primarily *nonassimilated participants,* or as essentially outside the group.

Other affective uses of the rising tone in the NS TAs' presentations occurred in teacher-student exchanges. An issue raised by ITA researchers is the frequent lack of interaction between ITAs and their students during classroom lectures (Rounds, 1987). This was also the case in the majority of the presentations discussed here. However, when ITAs initiated or engaged in interaction with their students, exploitation of the tonal system played an important role in its success and either encouraged or discouraged further student participation. In Example

16, TY initially responds to the student's answer using level tones. In the real time of the interaction, the student is likely to interpret this as an indication of an incorrect answer (see Example 10, from MK's parallel presentation). This interpretation is then presumably revised a moment later when TY uses falling tones to affirm the response.

16. TY: // ↘ what's the <u>SE</u>cond step//
     S: Do a solution test for potassium . . .
     TY: // → <u>UH</u>// → o<u>K</u>// ↘ you can do <u>THAT</u>// ↘ so make so<u>LU</u>tion//

Equally problematic were instances in which ITAs used falling tones in response to incorrect answers from the students, which signaled a direct contradiction and tended to be avoided by NS TAs.

Level and Falling Tones

Perhaps the most critical issue associated with the lower number of rising tones used by the ITAs was the correspondingly higher number of level and falling tones found in their extracts. As noted above, a co-occurring selection of falling and level tones projected an oblique orientation, that is, an orientation toward the language rather than the hearer. The NS TAs clearly adopted a direct orientation toward their students; level tones appeared as isolated occurrences and resulted in only brief changes of orientation in very specific circumstances. In contrast, the ITAs employed long sequences of falling and level tones regardless of the informational or social value of the matter contained within the tone units. These choices tended to create a flat, monotonic pitch structure unfamiliar to NS hearers.

The two math ITAs (SM and BG) fall into a category Bailey (1984) describes as *mechanical problem solvers* partially because of this lack of a familiar pattern of pitch movement. In addition, this selection of tone choices frequently obscured the information structure of the discourse. In Example 17, the propositional content of one utterance is separated into three autonomous parts, each of which is marked as a new assertion and falls from a middle to low pitch.

17. // ↘ the <u>IONS</u>// ↘ con<u>TAINED</u>// ↘ in the <u>SAM</u>ple// are . . . (TY)

This mismatch between syntactic and prosodic cues increases the processing load for the hearers, as they must continually adjust their representation of the text and predictions of what will follow (Cutler, Dahan, & Donselaar, 1997). By extension, the loss of redundancy and explicitness in the discourse may increase the chance of listener error (Wright, Frisch, & Pisoni, 1997).

In some cases, an orientation toward the language sample was the result of obvious problems with linguistic coding. In comparison with the NS TAs' presentations, repetition or correction of lexical items, redrafting of entire phrases, and filled pauses were more extensive and disruptive to the structure of the ITAs' discourse. In Example 18, XG is clearly having some difficulty coding the message, which causes the informative content to be presented in a series of short tone units with co-occurring falling and level tones.

18. // ↘ I DON'T think YOU will have any <u>PROB</u>lem// ➔ ex<u>CEPT</u> in a// ➔ WELL in <u>A</u>// ↘ in a <u>FI</u>nal// ➔ <u>AND</u>// er// ↘ one ONE <u>CASE</u>// ➔ is that YOU <u>ARE</u>// // ↘ <u>BA</u>sically// ↘ you Always have the <u>CEN</u>ter// ↘ Meter stick <u>CEN</u>ter// (XG)

However, even when no overt signals of on-line verbal planning were present and the ITAs seemed comfortable with the actual exposition of the message, there was a recurring pattern of level and falling tone combinations, or strings of falling tones such as those shown in Example 17. These patterns disturb both the internal cohesion and the overall coherence of the discourse structure. For the NS hearer, the disturbance is likely to result in difficulties in processing the information structure and may mean that hearers must *replay* (Munro & Derwing, 1995) parts of the discourse message. This, in turn, may lead to *listener irritation* (Eisenstein, 1983), a negative affective response to reduced comprehensibility.

The prevailing use of falling or co-occurring level and falling tone choices, false starts, hesitations, and shorter tone units found in the ITAs' presentations accords with previous studies of nonnative speaker discourse and Pirt's (1990) suggestion that nonnative speakers may tend to adopt an oblique orientation. There are relatively few situations in which NS hearers would anticipate this withdrawal from the interaction, particularly for any length of time. In the context of the classroom, it results in less accessibility to the lecture material and may exacerbate potential problems in relationship building between ITAs and their students.

DISCUSSION

This study has focused on tone choice within a discourse intonation framework in the situated context of teaching discourse. Comparison of the tonal composition of parallel extracts from NS TA and ITA discourse revealed critical differences in the numbers of specific tone choices and the way these tones were used. Whereas the NS TAs oriented their tonal structure toward a state of informational and social convergence with

their hearers, a significant difference in the number of rising, or converging, tones found in the ITAs' presentations and the functions they performed reflected the limited number of negotiation moves toward students identified in these presentations.

These differences in tonal composition crucially altered the tenor of the ITAs' presentations relative to the parallel extracts from the NS TAs' teaching. The largely oblique orientation and underutilization of the pragmatic functions of tone choice found in the ITAs' classroom discourse routinely excluded the students from the business at hand. Such tonal composition increases the distance between the speaker and the hearer and may be interpreted by the students as disinterest and lack of involvement on the part of the ITAs.

Exploitation of the tonal system is only one way in which teachers routinely perform pragmatic and informational functions in discourse. Cohesive ties are created by lexicogrammatical means, such as clause relations to signal logical relationships between propositions, or reiteration or collocation of lexical items (Thompson, 1994). Teachers can build rapport by using inclusive pronouns, increasing teacher-student interaction, and building more personal connections with the students by learning and using their names (Byrd & Constantinides, 1992). Tone choice interacts with these linguistic and interactional devices and can enhance or detract from their effectiveness. In a comparative analysis of NS TAs' and ITAs' math presentations, Rounds (1987) describes the use of inclusive pronouns such as *we, ours,* and *let's* by NS TAs as a way to develop a "sense of group consensus" (p. 665). In the NS TAs' math presentation analyzed here, the use of rising tone choices promoted a similar kind of social convergence.

Rounds (1987) and Byrd and Constantinides (1992) emphasize the importance of linking material from one class to another, which the NS TAs also achieved in part through their choice of rising tones to emphasize common ground. In contrast, TY, an ITA, used an alternative questioning strategy to establish this kind of connection with previous classes and elicit information that the students should be able to recall (e.g., "What's the first step you wanna take?" "What ion can you check out simply by flame test?"). However, consistent problems with tone choice in teacher-student exchanges in this presentation (illustrated in Example 15) largely reduced the effectiveness of this strategy. Examples such as this, which may appear to increase positive affect in the classroom by increasing interactivity, highlight the independent role played by intonation in discourse and the particular importance of the largely tacit nature of intonational features.

Although aware of the lexical or grammatical components of discourse, as a rule participants are unaware of the role played by tone choices, and native speakers cannot easily retrieve tone choices on a

conscious, analytical level, leaving them particularly vulnerable to misinterpretation. Hearers are likely to assume a mutual understanding of these discourse conventions and infer speaker intent within their own interpretative framework (Green, 1989; Gumperz, 1982). For the students in these introductory classes, the ITAs' consistent use of abruptly falling tones in conjunction with a lack of rapport-building choices is more likely to lead to negative judgments about the teacher's personality than to a recognition of limited language proficiency. As the students may reasonably feel that they have considerably more at stake than the ITA, tone choices may directly contribute to the underlying tension so often noted in these cross-cultural interactions.

IMPLICATIONS FOR ITA INSTRUCTION

Although certain aspects of the intonation system in English, such as declination or final lengthening at unit boundaries, may be universal (Vaissiere, 1983), there is no a priori reason to suppose that all nonnative speakers exploit the tonal system in English discourse in a similar way. Analysis of the ITAs' presentations suggests that whereas some L2 speakers may have acquired devices such as rising solidarity markers as formulaic chunks, many L2 learners are probably unaware of the social and informational functions of these tone choices (Hewings, 1995; Pirt, 1990). This is hardly surprising, as materials in use in ESL programs are often extremely limited in their approach to teaching suprasegmentals. In current ESL teaching practice, the intonation system is still largely taught in isolation, and priority is given to grammatical contrasts or attitudinal effects with little or no discussion of discourse functions (Levis, 1999). With limited input in a formal context, ITAs may not have been given the tools they need to develop this aspect of their communicative competence. This need can be addressed in the linguistic component of ITA instruction programs. Consciousness-raising activities, including the analysis of videotaped presentation and the use of visual feedback, can build familiarity with the role of intonation in discourse (Anderson-Hsieh, 1990; Pickering, 1999).

A second important issue for ITA programs lies in conceptions of the function of classroom presentations. A distinction is often made between the transactional nature of lecture presentations and the interactional nature of teaching activities such as office-hour meetings or individual tutorials in which "attention is devoted in greater measure to the listener" (Yule, 1994, p. 189). The analysis of the NS TAs' presentations presented here suggests a need to reconsider this traditional division between monologic and dialogic discourse. Interpretation of the rising and falling tones in these presentations points directly toward an

assumption on the part of the NS TAs of an ongoing negotiation with their hearers. The deictic reference function of the rising tone, for example, requires hearers to recall common ground and supports a view of discourse as a cooperative achievement between participants whether the hearer can verbally respond to the message or not (Duranti, 1986; Jacoby & Ochs, 1995). Restructuring the role of the teacher as a coparticipant will help ITAs recognize the importance of the kinds of immediacy behaviors they frequently lack. ITA programs and material development would especially benefit from a continued refinement of the understanding of how teachers typically construct their discourse in order to give students the best possible chance of success in the classroom.

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