ACADEMIC LISTENING*

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This paper surveys the principal findings of research in academic listening and their implications for teachers and second language learners. Research focused on academic listening for non-native users of a language has been concerned with (a) the nature of academic speech in lectures (lecture style, structure and content, including aspects of use of visuals, and factors influencing the comprehension of lecture content); (b) the processes second language learners undergo while listening (goals, strategies, construction of meaning); (c) the effects of academic speech on comprehension and acquisition of the second language; and (d) and the training of second language learners as listeners in academic contexts.

While the precise role of listening comprehension as input to second language acquisition is still debated (see review of issues, critiques, and discussion in Barasch & James, 1994; Courchêne, Glidden, St. John, & Thérien, 1992; Larsen-Freeman & Long, 1991; Wesche, 1994), increasingly large numbers of second language learners are engaged in academic (and other occupational) pursuits which require them to listen to and comprehend great amounts of second (target) language input. International students are faced with sometimes complex information to be understood and assimilated in order to proceed with academic life. This is true even for students in their own country's advanced educational system in which a second language is used for academic purposes, as exemplified in several academic listening studies conducted on English-speaking professors at Sultan Qaboos University in Oman: Fahmy & Bilton (1990), Flowerdew (1992), and Griffiths (1991a). In recent years, applied linguists working in academic settings have substantially increased our knowledge concerning academic listening tasks and their significance for second language learning and teaching.

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* A revised and shortened version of this paper will appear in a volume entitled *A Guide for Teaching Second Language Listening*, edited by D. Mendelsohn & J. Rubin. San Diego: Dominie Press. The author acknowledges the obvious influence especially of Pat Dunkel in this review.

University of Hawai'i Working Papers in ESL, Vol. 13, No. 1, Fall 1994, pp. 23-51.

Several excellent summaries exist on the general nature of listening comprehension and its role in second language learning and teaching (Dirven & Oakeshott-Taylor, 1984, 1985; Dunkel, 1991; Larsen-Freeman & Long, 1991; Long, in press; Morley, 1991; Rost, 1990; Rubin, 1994; cf. also special issue on "Comprehension," *Applied Linguistics* 7(3) 1986), and one significant book specifically on academic listening will soon appear (Flowerdew, in press). A central issue for second language acquisition (SLA) is whether or not comprehension activities alone are sufficient to promote SLA. Recent research has suggested that the rate and ultimate level of attainment in the target language (TL) is facilitated by more form-focussed learning activities (Lightbown, Spada, & White, 1993; Long, 1991). Concerns in teaching listening comprehension have, however, focussed more on the learners' own use of strategies, the understanding of learners' attitudes and purposes in listening, and provision to learners of information on interpreting L2 speech in context (Dunkel, 1991; Mendelsohn, 1994; Morley, 1991; Rost, 1990).

Research on teaching for comprehension in academic contexts is noticeably sparse. Instead of a focus on how best to prepare learners for listening in academic contexts, research has been on (a) describing features of lectures and factors involved in the academic listening task, (b) identifying particular learner behaviors and strategies in listening, including note-taking, (c) determining features of aural texts that directly enhance comprehensibility, and (d) discovering the effects of strategy use on comprehension. This paper will review these areas of study, and following each, suggestions and speculations about teaching practice will be made.

THE NATURE OF SPEECH IN ACADEMIC LECTURES

Some research on L2 listening and interaction in academic settings has been conducted outside a lecture-style context (e.g., the academic advising interview, Bardovi-Harlig & Hartford, 1990, 1993). However, the main source of L2 research on academic listening has come from studies involving lectures and lecture comprehension, or from simulations of lecture-type instruction. Rost (1990, chap. 5) refers to this sort of listening as "transactional" as opposed to "interactional"; it is also referred to as "non-collaborative," or "nonparticipatory." As a major source of second language exposure for international students, characteristics of lectures have interested researchers for their contribution to comprehensibility of lecture content and acquisition of TL forms.

Academic lectures have been identified as a register distinct from written texts or

conversations (see early work by Dudley-Evans & Johns, 1981; Murphy & Candlin, 1979; Shaw, 1983; Wijasuriya, 1971; cf. also L1 comparative stylistic analyses such as Chafe & Danielewicz, 1987). Obviously, lectures tend to be monologic and relatively planned with respect to the content (cf. Ochs, 1979). Still, a certain amount of adjustment and unplanned speech can be evident, indicative of the lecturer's awareness of listener presence and needs (see, for instance, the "asides" of Strodt-Lopez, 1991). In fact, Shaw's (1983) detailed ethnographic and discourse analysis of university engineering lectures noted an important paradox: that the professors expect more of an informal dialogue to arise from their lectures than in fact does happen, even though they perceive that they leave opportunities for it. This may be a result of the typical need of the lecturer to maintain control of the floor, even in the least formal type of lecture. Dudley-Evans and Johns' (1981) identification of three broad styles of lecture speech has thus been widely recognized as relevant to an understanding of the role allotted to listeners. These styles are: *conversational*, *rhetorical*, and *reading*. They fall more or less on a continuum from informal to formal and from more to less interactive with the listener.

It would seem, therefore, important for second language teachers to be aware of the marks of general lecture style, in order to prepare their students to anticipate both general lecture structure and signals of information flow, and the signals in lectures of opportunities for questions and interaction with the lecturer.

Discourse Features of Lectures

Examples of typical analytical descriptors of discourse features are shown in the following Table 1. One of the more prominent characteristics of lectures is the use of certain *lexical phrases* or *rhetorical markers* which help to signal the major content and sequence in argument, and to demarcate boundaries of non-essential information (DeCarrico & Nattinger, 1988; Lebauer, 1985; Nattinger & DeCarrico, 1992; Olsen & Huckin, 1990; Rounds, 1987a; Shaw, 1983). These have attracted researchers' attention both for their inherent usefulness in understanding the structure of the discourse, and as potential aids in training listeners to understand better.

Table 1
Selected Features of Academic Lectures

Feature & Sample source	Description/Label	Example
Global macro-organizers:	Topic markers--	*Let's first deal with...*
Nattinger &	Topic shifters--	*This leads to...*
DeCarrico, 1992	Summarizers--	*The main point is that...*
Local macro-organizers:	Exemplifier--	*One of them was ...*
Nattinger &	Relator--	*This ties in with...*
DeCarrico, 1992	Evaluator--	*No problem with that...*
	Qualifier--	*It's only in X that Y...*
	Aside markers--	*Where was I?*
Move types:	Focussing, concluding, describing,	
Cook, 1975;	asserting, relating, summarizing,	
cf. Sinclair &	recommending, justifying,	
Coulthard, 1975	qualifying, contrasting, explaining	
Transaction types and Sequence structure:		
Shaw, 1983	Problem-solving--[possible sequences]:	
	Posal, solution, evaluation	
	Concept-giving--[possible sequences]:	
	Orientation, definition,	
	extended account,	
	formal/informal account,	
	interact/evaluate, recapitulation	
Asides:	An episode of discourse with a	*by the way*
Strodt-Lopez, 1991	distinct topic framework which	
	occurs between discourse episodes	
	having the same topic framework	
Definitions:	Formal	[class + characteristic]
Flowerdew, 1992	Semi-formal	[characteristic only]
	Substitution	[appositives]
	Ostensive	[pointing]
Vocabulary Elaborations:	Typical structures:	*funds*, or money
Chaudron, 1982	apposition, parallelism, definitions	
Fahmy &	Semantics:	Where is the biggest *strip*
Bilton, 1990	definitional types, illustrations,	*city* in the world?
	paraphrases, synonyms	Boston to Washington

Although we still lack research on the effects of teaching these, Nattinger & DeCarrico (1992, chap. 6) display at some length the differences in such forms between less and more formal lecture styles, making the further distinction between "global" and "local" macro-organizers. Supporting Lebauer's (1984, 1985) approach to using clozed versions of lecture transcripts, they argue that if students are trained to recognize such markers as guides to lecture structure, to understand their sometimes metaphorical and formulaic functions, students' processing of lecture information will be enhanced. They illustrate ways in which such markers (such as "now"), with only slight changes in tone or context, can have quite distinct functions. Similarly, Strodt-Lopez (1991) shows that asides, which have identifiable markers, internal structure, and functions related to the main lecture, are important features of lectures that maintain audience-speaker rapport and may in fact clarify the speaker's orientation to the main points. Learners can be helped to identify and process such segments within a larger monologue.

Secondly, some research has been devoted to identifying broader informational *discourse functions* in lectures: definitions (Flowerdew, 1992), vocabulary elaborations (Chaudron, 1982; Fahmy & Bilton, 1990), and various move types (as in the discourse analytical tradition of Halliday seen in Sinclair & Coulthard, 1975). Moves have been further identified either according to functional move categories (Cook, 1975) or transaction types (Shaw, 1983). While the identification of specific realizations that are associated with such functions and moves is not likely, listeners can expect general types of lecture transactions and moves and some natural sequencing of functions to occur. So instruction has a sound basis in presenting and evaluating sample lectures that illustrate these. In all cases, making learners more aware of the forms and variable function of such features of lectures should improve their ability to process lectures--to predict, identify, and associate meanings and references both within and outside the lectures.

There have, finally, been some studies of other features such as atypical pragmatic use of especially first-person pronouns (Rounds, 1987a, 1987b; Shaw, 1983), which the researchers illustrate as means for lecturers to establish group and social identity. For example, increased use of inclusive "we" appears to create a stronger bond between lecturers and their audience.

Rate of Speech

Additional research has been directed at the rate of speech and the pacing of information in lectures (Blau, 1990; Griffiths, 1991a, 1991b, 1992; Griffiths & Beretta, 1991; Rounds, 1987a; Shaw, 1983; Tauroza & Allison, 1990; cf. Chaudron's, 1988, chap. 3 review of teacher talk and rate factors in classroom studies). Much of this research has aimed at determining whether teachers address learners of lower levels of competence at a slower rate, and whether such a slower rate would affect comprehensibility of the content. Rounds (1987a) addresses the topic of speech rate with respect to the amount and use of silence (her categories of silence were *administrative*, *strategic*, and *empty*). She suggests that the appropriate use of silence may be an important adjunct to lecturers' talk. Listeners, of course, need to be conscious of the potential meaning of silence, to recognize it as an intentional or inadvertent signal of a break in organization and thus as an opportunity to summarize the content mentally and prepare for the upcoming material.

Griffiths (1991a, 1991b) argues in fact that overall rate of speech can be a misleading approach to assessing comprehensibility, as the key factors affecting comprehension of orally delivered information relate more likely to the location and duration of pauses in speech. He points out that speech rate varies little among different lecturers addressing different audiences, and that the common measures of rate of speech are inappropriate. In fact, Griffiths and Beretta (1991) found no differences in a number of measures of rate of speech between live lectures to NS and high and low proficiency NNS listeners, while one would anticipate there to be reductions for the latter groups (notably, they did find evidence of other sorts of modifications, to be discussed in a later section). Tauroza and Allison (1990) concur with Griffiths in preferring a syllable-based measure to a word-based one, although they do find that rate of speech distinguishes between lecture style and other speech styles (radio monologues, conversation, and interviews), with lecture style being the slowest.[1] Yet, according to Griffiths' own continuation studies, to be discussed in a later section, something can be said in favor of a certain level of slow speech.

While second language learners may not be able directly to influence a lecturer's speech rate, the recognition that pause placement and length is a likely indicator of semantic or discourse units in a lecture can be an aid in learning to process faster rates of speech in monologues.

Non-verbal Factors

In addition to the verbal characteristics of lectures, a few researchers have noted the significance of non-verbal factors, such as the use of visuals, paralanguage, and gestures (English, 1985; Kellerman, 1992; King, in press; Shaw, 1983). Visuals can range widely, from the use of slides, transparencies, writing on the blackboard, and varieties of writing such as words, diagrams, formulae, and so on. This research has demonstrated that the second language listener can obtain valuable secondary information to support the interpretation of the lecture material, but in some cases this will only occur if the primary verbal information or key signals (e.g., deictic reference to the proper visual or part of a diagram, formulae, or transparency) are comprehended. In addition, however, Shaw (1983) illustrates how lecturers' use of blackboard information constitutes in significant ways the primary source of information being conveyed. King (in press) provides a similar illustration, pointing out that this is likely to be so especially in science or engineering lectures, although he also notes high inter-lecture variability.

For these reasons, teachers of listening comprehension would probably do well to prepare their L2 learners with as diverse and authentic samples of visually assisted lectures as possible, depending on the disciplinary specializations of their students.

Cultural Content/Background Knowledge

A final factor involved in lectures, the semantic content, has most particularly been studied with reference to differences in prior knowledge of content and their effects on comprehensibility. In an investigation of the difficulties of Chinese scientists while following courses in their field, Yuan (1982) found that the high percentage of unfamiliar non-technical vocabulary encountered in the lectures caused his subjects considerable difficulty, while they generally could understand the technical vocabulary, unless its pronunciation was highly divergent from the Chinese usage. At the same time, U.S. culture-specific terms, such as use of non-metric measurement terminology, was a further complication in the subjects' ability to visualize lecture content. Fahmy and Bilton (1990) note similar sorts of problems likely for their Omani listeners who were not familiar with their English-speaking expatriate lecturers' references to unknown cultural phenomena (e.g., freeze-drying or bubble-gum). It should be clear that teachers of listening need to assess their students' understanding of TL pronunciation of technical vocabulary, as well as to

anticipate a certain amount of use of culture-specific terms and metaphors in academic lectures (such as the use of expressions from baseball, U.S. football, or poker--"three strikes and you're out," "do an end run," "here's the kicker").

Markham and Latham (1987), Chiang and Dunkel (1992) and Long (1990) are among the few L2 researchers who have focussed on prior differences in knowledge and its effects on listening comprehension. Following similar research on L2 reading comprehension, they have proposed and demonstrated that listeners would have greater difficulty understanding lecture material on unfamiliar topics.[2] As these researchers are aware (they do not in fact refer to "culture"), it is inappropriate to attribute a generic notion of "culture" to such findings, as opposed to the less presumptive notion of "familiar" versus "unfamiliar," for similar results can be obtained with respect to any differences in listeners' prior knowledge (cf. L1 listening studies such as Lambiotte & Dansereau, 1991).

Obviously, teachers of second language listeners cannot possibly prepare their students for the extremely diverse knowledge which may be needed to understand lectures. Yet one might safely presume that instructing learners in retaining lecture content in its most verbatim, least synthesized form as long as possible would allow for the best eventual construction of the internal schema of the lecture, and association of key points to prior learner knowledge, or knowledge that the learner could thus seek after listening. This suggestion must, however, be balanced against the learner's need to summarize and synthesize whenever possible, in order to avoid an extra load on memory. The later section on note-taking will illustrate this dilemma.

LEARNER BEHAVIOR IN LECTURES

A few researchers have been concerned with the process of listening from the point of view of the second language learner/student who is required to attend to the lecture in order to learn the relevant course material. Listening behavior in general has of course been the topic of a certain amount of research (cf. Mangubhai, 1991; O'Malley & Chamot, 1990), but the major focus of research on academic listeners has been on their note-taking strategies, which we will describe shortly.

General Learner Strategies

Rost (1990, pp. 122—136) outlines a broad categorization of ways in which learners' comprehension of lectures may be "accessed" by researchers (cf.

classification in Chaudron et al., 1986, in press): (a) "on-line" (immediate), "retrospective" (delayed) or "prospective," (b) "open" or "closed" tasks, and (c) tasks requiring an original or a verbatim formulation of the content. A small number of studies have investigated general listener behavior in lectures, usually employing one or more of the above approaches (Benson, 1989; Clerehan, 1992; Flowerdew & Miller, 1992; Olsen & Huckin, 1990; O'Malley, Chamot, & Kupper, 1989; Yuan, 1982). Some of the interesting features they have investigated are outlined in the following Table 2.

Table 2
Features of Listener Behavior in Lectures

Feature	Example source
Translation into L1	Yuan, 1982 O'Malley et al., 1989 Flowerdew & Miller, 1992
Taking time to think/concentrate	Flowerdew & Miller, 1992
Decoding sentence by sentence	Yuan, 1982, Olsen & Huckin, 1990
Self-monitoring, elaborating, inferencing	O'Malley et al., 1989
Pre-, during- and post-reading of text	Flowerdew & Miller, 1992
Asking classmates for help	Flowerdew & Miller, 1992
Asking lecturer afterwards	Flowerdew & Miller, 1992
Note-taking	See references below

What these researchers have not been able to determine is the extent to which any one or combination of such behaviors improves comprehension. This represents a serious project for research by listening teachers: to determine what particular listening behaviors can be taught, improved on, and lead to improved comprehension by learners. Three studies exemplify the direction such research may take.

Benson (1989) identifies three aspects of one learner's process of learning in a lecture format, each of which he claims reflects a "generally reproductive learning conception:" "a) adding to and making new relationships between things he already knew, b) localizing ideas to [the home country], and c) assimilating and personalizing the teacher's perspective." (p. 439) Benson acknowledges that this

learner was probably not strongly involved in learning this material, which affected the learner's approach. He laments such a learning-free attitude, and ventures the implication that listening courses should enforce a stronger content-learning component, in which listening behaviors would be integrated more fully with other skills, including productive target use (pp. 440-441).

O'Malley, Chamot, and Kupper (1989) describe a detailed exploration of Spanish-speaking high school students' self-reported strategies in listening to short lecturettes and other academic tasks. Subjects were selected for the study following discrimination between "effective" and "ineffective" listeners, based on teachers' evaluations of them. Their self-reports revealed that "effective" listeners (a) were more able to self-monitor--notice their loss of attention or over-elaboration of the message, and redirect themselves to the task; (b) listened for more global, larger "chunks" of the lectures, instead of focussing on word-by-word decoding; (c) inferred word meanings from context; and (d) elaborated on text meanings--related new information to old--by bringing personal or world knowledge to bear, and by self-questioning. Whether and how these behaviors can be taught remains to be seen.

On a more general level, Olsen and Huckin (1990) make the important point that different disciplines and lecturers will tend to adopt distinct argumentation or presentational styles. Therefore, listeners' strategies should be oriented toward discovering the underlying structure and argument of a lecture. Specifically, they illustrate non-native listeners' variable success in recognizing the main points of a lecture as derived from their following either "point-driven" or "information-driven" strategies in listening.[3] The former is necessary in the case of lectures that present a Problem-Solution structure of argument, while the latter is more appropriate perhaps to descriptive and relational presentations. A mismatch in strategy with lecture structure can lead to serious miscomprehension of main points. Most likely, both strategies are needed for more complex lecture presentations.

Note-taking

The topic of note-taking has been addressed widely in L1 literature (see brief surveys in Chaudron, Cook, & Loschky, 1988, in press; Dunkel, 1988a, 1988b). L2 studies have followed similar lines, although they have perhaps been more focussed on details of the forms and functions of language in L2 learners' notes. Notes have been examined in the literature for their value either as a form of "external storage"

of the information in the lecture, for use in later retrieval, or as a way for the listener to "encode" the information while listening (see discussion in Chaudron et al., 1988; Dunkel, 1988b). The main finding of L1 research was summed up by Chaudron et al.:

> The results to date tend to favor the external storage position, but this situation may be biased by the reliance of researchers on sometimes gross measures of lecture content recall, and their failure to develop more refined measures of learners' internal encoding and representation of lecture content. (1988, p. 5)

The evaluation of note quality relative to lecture content is therefore a key research goal of several studies. While Hull (1988) outlined a basic set of objective norms for tabulating note content, as Clerehan (1992) points out, this scheme was inadequate to evaluate note-to-lecture relationships. Rost (1990, p. 126) proposes a general schematic breakdown for analyzing notes relative to the lecture content:

Topic-relation--topicalizing, translating, copying, transcribing, schematizing;
Concept-ordering--sequence cuing, hierarchy cuing, relation ordering;
Focusing--highlighting, de-highlighting; and
Revising--inserting, erasing.

Dunkel (1988b) outlined the major means of assessing quality quantitatively, to which Chaudron et al. (1988) added one final measure:

Total words;
Information units;
"Efficiency"--ratio of information units to total words;
"Completeness"--ratio of information units in the lecture to information units in notes;
"Test-answerability"--based on the relation of note content and later test content. [Dunkel, 1988b, p. 265]
Amount and proportion of higher order information relative to lower order information [Chaudron et al., 1988, p. 6]

Most of the empirical studies of L2 notetaking have pointed to the failure of subjects to record the important and higher-order information, as L2 learners tend to focus on verbatim transcription and individual words. Nonnatives are often aware of their short-comings, however, as evidenced in Dunkel & Davy (1989). Clerehan (1992), for example, found L2 learners omitting 19% of major headings in a

lecture, and 34% of sub-headings, compared to L1 subjects' near-100% recording. One source of such omissions, she suggests, is the students' failure to simplify their notes, along the lines hypothesized as characteristic of notes in Janda (1985).[4] King (in press) also noted subjects failing to fully abbreviate in their notes, and Fahmy and Bilton (1990) found about 25% of their subjects keeping very disorganized notes, making virtually no use of abbreviations. It is likely that lecturer factors, such as appropriate focussing or emphasis, can improve such behavior. On the other hand, providing too much aid, such as providing handouts, may negatively influence listeners: Fahmy and Bilton (1990) also noted that students tended to take better notes on the key vocabulary elaborated by the lecturers when they had to take their own independent notes, as opposed to when they had a handout with the lecture outline provided.

It should be evident to the practitioner that the training of non-native speakers in note-taking is a complex task, requiring patience in guiding learners to recognize main and subordinate points, to take rapid and well-abbreviated notes instead of verbatim text, and to maintain organization in their notes for later reference. Thus far, we lack sufficient research in the success of note-taking instruction.

RELATIONSHIPS BETWEEN LECTURE STRUCTURE OR LEARNER STRATEGIES AND COMPREHENSION

Whether the applied linguist is addressing the training needs from lecturers of non-native learners, or the direct needs of the learners themselves, it is essential to determine those lecturing and listening strategies that are most effective for comprehension and retention. Several speculations for teaching of listening comprehension have been made here, based on primarily descriptive research. Yet the preferred source of teaching principles should be the concrete findings of correlations or causal relationships between lecture structure or learner strategies and comprehension. This has been the focus of several researchers. As a question of SLA, however, to date, little research has explored the further issue: the extent of learner acquisition of new L2 lexis and rules as a result merely of listening to lecture material (though see Toya, 1992, discussed later, and cf. research on general comprehension-based instruction such as that of Lightbown, 1992).

Lecture Structure and Effects on Comprehension/Retention

Rate effects. A number of studies have been conducted to investigate the

effects on comprehension of slowing the rate of presentation of lectures (see review of earlier teacher-talk studies in Chaudron, 1988, chap. 6). As noted above, Griffiths (1990a, 1991a, 1991b) has been (justifiably) critical of the manner in which rate of speech has been measured in such research. Several comparative studies of comprehension of normal versus reduced speed speech did not fully contrast rate of speech with other modifications (see review in Parker & Chaudron, 1987, summarized in Larsen-Freeman & Long, 1991).

Griffiths' views are borne out somewhat in three independently conducted studies. Derwing (1990) investigated speech rate in NS-NNS interactions in pairs in order to determine the effects on comprehension of NS's rate adjustments. She found, against expectations, that while NSs did not make substantial adjustments in rate of speech, they did in pause frequency and length, and that NNS listeners did more poorly in comprehending when slower speech was addressed to them. The likely source of this was the fact that the NSs made more pauses and other adjustments precisely when they sensed that the information was not being or might not be conveyed. In contrast to this more naturally generated interactive task, in two related studies Blau (1990) constructed pre-recorded short listening passages at differing rates of presentation, and with varying degrees of pauses inserted (a further factor of type of modification will be discussed below). While she found no particular effect for comprehension of the material at a slower rate of presentation (though the differences were only between 170 and 145 w.p.m. and between 200 and 185 w.p.m.), passages presented with inserted 3-second pauses (resulting in a 150 w.p.m. overall rate) were comprehended significantly better.

In contrast to his earlier presumptions, Griffiths (1990b, 1992) did report two experiments in which relatively slow speech rates (at around 2.0 and 2.5 syllables per second, or about 100 and 125 w.p.m., respectively, for the two studies) resulted in superior comprehension of lecture material by lower intermediate adult students to that of listeners to more rapidly spoken texts (150 w.p.m. or faster, up to over 200 w.p.m.).

The obvious suggestion following from these studies is that lecturers addressing second language learners should attempt to speak at a slower rate, achieving this principally by inserting more pauses at appropriate moments.

Vocabulary. There has as yet been insufficient research on the acquisition or retention of vocabulary based on lecture presentation. Fahmy and Bilton (1990) had suggested that a slightly higher rate of retention in students' notes of one lecturer's

vocabulary elaborations may have been a result of that lecturer's clearer signalling of vocabulary. Thus, following the suggestion of L1 reading findings (Carroll & Drum, 1983), Toya (1992) manipulated vocabulary elaboration and definition in an experimental L2 study of retention of aurally presented vocabulary. Using two different texts of between 285 and 302 words, she constructed recorded lectures incorporating explanatory modifications of 12 vocabulary items in each: "explicit" explanations which followed an explicit definitional format; "implicit" explanations which involved paraphrases or appositions; and both of these contrasted against "baseline" conditions of no elaboration. Each final text version had a mixture of these three types of elaboration. Comprehension measures of overall content and specific knowledge of the vocabulary were prepared. 109 Japanese university students of English as a second language listened to the two passages three times each, responding each time to vocabulary tests (translation or explanation in L1). For virtually every vocabulary item (24 in all), comprehension of its meaning increased steadily and significantly in the explicit condition, contrasted with little or no increase for the other two conditions (overall, the implicit condition was slightly better than the baseline). The continual increase over three listenings was likely due to the priming effect of the test, but as this tended only to be an effect for the explicitly elaborated vocabulary, it appears certain that the explicit definitional form enhanced awareness. Unfortunately, a delayed post-test four weeks later showed subjects returning to their pre-listening level of knowledge for all items equally, indicating that surprisingly, long-term retention was not directly affected.

Toya's (1992) study confirms the hypotheses posed by earlier work on vocabulary elaboration and definition, that clarity of elaboration can impact learners' comprehension. In view of the long-term reversion to earlier levels in her study, however, it may be necessary to follow up on learners' initial comprehension of difficult vocabulary with some other active tasks incorporating the vocabulary productively.

Complexity and interactive discourse markers/rhetorical structure. In light of the less impressive findings relating speech rate to comprehension, greater attention has been turning to research on the effects of discourse signals and other forms of modification in lecture presentation. Again, Parker and Chaudron (1987), and other research reviewed in Larsen-Freeman and Long (1991), illustrate that a variety of discourse modifications of speech to non-natives can enhance comprehension, to the point that other complexities of text are overridden. Of special interest recently have

been modifications at a high level of discourse structure, as in Chaudron and Richards' (1986) study contrasting the comprehension of texts with inserted macro- and micro-markers. Their widely discussed results parallel those of an L1 study by Hron, Kurbjuhn, Mandl, & Schnotz (1985): high-level signalling of the content of the lecture resulted in superior comprehension of high-level text content on immediately following tests, as well as on delayed written tests. Several recent studies have now added substantially to our understanding of the power of these and other syntactic and discourse modifications.

In addition to assessing the effect of differential speech rate, Blau (1990) attempted to confirm her earlier finding (1982) for reading comprehension by using the same passages with adjustments in syntactic complexity. She could not find any significant effect, however, for either syntactically simplified passages or passages with the underlying structure of complex syntax left opaque. Given other findings for listening comprehension, it is possible that Blau's syntactic modifications (simplifying or elaborating) were not appropriate in a listening mode for the short passages employed. A contrast to Blau's finding, which adopted a similar design, was Cervantes and Gainer's (1992) pair of studies. They factored in both a) syntax with quite low and high degrees of complexity (comparing between 1.2 and 2.5 S-nodes per T-unit, and between 1.33 and 3 S-nodes per T-unit), and b) the effect of repeating the presentation. They found a significant effect on cloze comprehension measures, favoring the less complex passages. But they also found that the repetition effect in their second experiment resulted in the more complex passage having equivalent results to those of the less complex passage.

Cervantes and Gainer's study is a further support for the notion that discourse modifications of a text can counteract other potentially negative effects. A final study of this issue is that of Chiang and Dunkel (1992). They incorporated a number of elaborative modifications in both the familiar and unfamiliar texts of their lecture passages (see description above as well as comment in the following section). These were principally redundancies--rephrasings and repetitions of information, occasionally definitional elaborations. As has been typically the case in such experiments, the modified passages tended to be longer and more complex--they were presented, however, at the same rate of delivery (around 100 w.p.m., quite slow by previous standards). Chiang and Dunkel found a significant effect for the modified passages, apparently entirely the result of an interaction effect with the proficiency level of the subjects: a higher proficiency group showed a much more

marked advantage for the modified versions than a lower proficiency group. They refer to this as a "language competence ceiling," not unlike effects observed in reading comprehension and in previous listening comprehension comparisons (cf. Parker & Chaudron, 1987), where learners of only a certain level appear to enjoy the enhanced effects of such modifications.

Lecturers to non-native listeners should certainly be aware of the value of discourse markers to make their organization and elaboration of meanings clearer. But teachers of listening should also consider the likelihood of there being such a "ceiling," as grounds for helping especially the weakest listeners to recognize and process elaborations such as paraphrase, definitions, and repetitions. In light of Nattinger and DeCarrico's (1992) call for a more elaborated analysis of macro-markers in lectures, and the on-going interest in other modifications of lecture speech which may enhance comprehensibility, it seems that further research is greatly needed in this specific area.

Visuals/kinesics. Unfortunately, despite the general interest in the impact of non-verbal aspects of speech and visual information presented in lectures, there has been insufficient study of their effects on listener comprehension. There are indications (in Benson, 1989; Clerehan, 1992; King, in press) that visuals are observed and recorded, but the use made of general non-verbal behavior is not widely reported. When English (1985) attempted an experiment to instruct one group of Chinese scientists in observing non-verbal behavior and its significance for comprehending the lecture material, no significant differences were found between their measures of comprehension and those of either a control group or a group trained in "guessing, predicting, and data collecting for hypothesis-formation." Yet, as English's study focussed primarily on lecturers' gestures, rather than on, say, audio-visuals, the recommendation earlier in this paper to train learners in visual processing of lecture information is not refuted.

Background knowledge. The previously presented results of Markham and Latham's (1987) study of ESL learners' background knowledge of religious practices, Long's (1990) study of Spanish L2 subjects' comprehension of differentially available (current versus past history) knowledge, and Chiang and Dunkel's (1992) study of Chinese L2 learners of English, all converge on the not-too surprising finding that people comprehend more if they know more about the topic beforehand (O'Malley et al., 1989, had also found evidence of this result). Nonetheless, in Chiang and Dunkel's study, when comprehension items were

differentiated with respect to the ability to respond to them independently of exposure to the passage, it was the passage-independent items which were better recalled on the familiar lecture test. This interesting finding suggests that future research, as well as teachers of listening strategies (!), will need to be more careful in evaluating the contribution to listeners' performance of their general knowledge and inferential capacity, as opposed to their ability to recall specific lecture content.

Learner Strategy Effects on Comprehension/Retention

General strategies. As in the case of non-verbal components of lectures, the extent to which listeners' strategies have affected their comprehension and retention of lecture material has not been investigated to any degree. O'Malley et al.'s (1989) findings reported earlier are among the only studies attempting to relate specific strategies to listening outcomes, though their inferences are based primarily on prior identification of effective and ineffective listeners. The major source of information about such effects, aside from an occasional mention of retrospective listener subjective assessments (as in Benson, 1989; Yuan, 1982), has come from studies of the effects of listeners' notetaking on their retention of lecture information.

Quality of notes/Presence or absence of notetaking. Dunkel, Mishra, and Berliner (1989) studied 136 native English speakers and 123 nonnatives listening to a nearly 23-minute lecture on the evolution of the Egyptian pyramid structure. Both a notetaking and a no-notetaking condition were employed, though the subjects were not allowed to keep their notes (this tested thus for "encoding" effects). Dunkel et al. found no effect for note-taking on comprehension test scores in either the NS or NNS groups, though NSs were superior overall to NNSs, and subjects with higher short-term memory ability recalled more concept and detail information than subjects with weaker memory abilities. This was a further support for a "storage" effect of notes, under the assumption that there was adequate note quality.

As a follow-up to this study, however, Dunkel (1988b) evaluated the relationship between the measures of note quality listed above and the subjects' comprehension scores for concepts and details in the lectures. L2 subjects showed a significant relationship between number of information units recorded in notes and their correct responses to concept information, as well as a significant negative effect of total words in notes (i.e., the more in notes, the less ability to recall the principal content, pointing again to the problem of non-natives recording too much information verbatim). Likewise, there was a positive relationship between amount

of information units and detail recall, while "completeness," or the ratio of the target lecture units to subjects' information units, was the second best predictor of detail recall.

A final study which looked closely at the relationship between note presence and quality and test performance was that of Chaudron, Cook, and Loschky (1988). They allowed some groups of their subjects to keep their own notes, while other groups had the notes removed, after they listened to three different lectures. Chaudron et al. also applied several detailed, objective measures of note quality to determine any likely relationships between quality of notes kept and comprehension test scores. The result was that there was a more positive relationship between some note qualities (especially abbreviations) and success on lecture comprehension measures. Lacking more complete relationships, the authors in a later paper (Chaudron, Loschky, & Cook, in press) have conceded that there are still insufficient grounds to consider any particular measures of note quality as a direct measure of lecture comprehension. If the "encoding" value of note-taking proves to be weak, then clearly, the adequacy of the notes as storage, and the relevance of specific information taken down in such notes, will depend heavily on the task-specific demands on listeners following listening (i.e., test-specificity, opportunity to review, etc.).

It is perhaps premature to try to point to clear recommendations for teaching listening comprehension derived from the current research on learner behavior. A considerable amount of research is needed in order to determine the best strategies in listening and note-taking, and to demonstrate the "teachability" of such strategies. To the extent that well-organized and abbreviated notes (avoiding the tendency to take notes verbatim) provide a good source for later recall and study, it is surely incumbent on listening teachers to provide practice in producing and using these--not, however, to the exclusion of encouraging learners to apply other on-line listening strategies.

CONCLUSION

The target second language that learners encounter in academic settings is highly variable, making it difficult to predict for a given learner what he or she should be specifically prepared for in listening tasks. Many factors lead to possibly greater problems for second language learners than the specific difficulties encountered in academic lectures: cultural adaptation, adjustment to the typically

different study skills required in the TL academic environment, and the slow learning of TL forms that are common to general spoken language (e.g., reduced forms). These areas are also vital to a comprehensive training program for second language learners. To take one example, SLA research has shown that L2 learners can enhance their comprehension by learning to interact and negotiate with TL speakers (e.g., Rost & Ross, 1991), and presumably by learning appropriate interactive patterns in TL classrooms and lectures, they can improve overall academic functioning.

Research on this area of second language use will continue, due in part to the convenience of conducting research on and with academic lectures, and in part to the recognized need of second language learners to cope with real academic input in the TL. We should constantly be striving to understand better what it takes to comprehend a lecture well, to isolate the factors that enhance retention of the information for later application, and to point to which features of either the lecture or the learners' behavior in response, if any, can lead to learner acquisition of the TL from input in such an exposure. By increasing our understanding of these issues, practitioners in applied linguistics will be much better able to serve their colleagues in the academic community than heretofore.

A NOTE ON APPLICATIONS OF ACADEMIC LISTENING RESEARCH

Although we lack a great deal of information about academic listening behavior and the effects of it on general L2 acquisition, there has been rapid development in a number of areas of research directly derived from the investigations reviewed in the preceding pages. These include the general measurement literature on listening comprehension, and continuing studies of the effects of differential speech adjustments to non-native listeners. Due to lack of space, only brief reference to this literature is provided here for follow-up.

Measurement of Comprehension

As mini-lectures have been used for a long time in global listening tests such as the TOEFL, it is not at all surprising to find them used in continuing listening research. Chaudron (1985) employed videos of lectures in order to determine the most reliable measure of lecture recall, comparing among multiple-choice, fixed-ratio, and rational cloze measures (the latter proved the most reliable). Shohamy and Inbar (1991) evaluated the differential effects of lecturettes, dialogues, and news

broadcast formats on listening comprehension scores, finding lecturettes to fall in the middle of a range of difficulty. Most recently, Dunkel, Henning, and Chaudron (1993) provide a global overview and a model of listening comprehension measurement, including academic lectures as a text type.

Training of ITA's

A highly active area of investigation has resulted from the increased need to assess and train international teaching assistants at universities in which the target language is the TA's second language (Bailey, 1982; Davies, 1989). Topics of research range from the pedagogical problems of selecting key areas for instruction--as in Anderson-Hsieh's (1990) proposal to teach suprasegmentals, Rounds' (1987a) citing of pronouns, discourse markers, and vocabulary clarification as problem areas, to general identification of sources of non-comprehensibility in non-native speech--Anderson-Hsieh and Koehler (1988), Hoekje and Williams (1992), a series of studies by Tyler and her associates (Tyler, 1992; Tyler & Bro, 1992, 1993; Tyler, Jeffries, & Davies, 1988), and Williams, 1992. The principal finding of these studies is that non-natives can overcome difficulties in comprehensibility of their segmental productions by means of more global strategies of signalling and proper stress and pacing of information.

SLA: Learner Strategies and Differential Speech to Non-natives

Finally, as indicated in the preceding, continuing studies of learner strategies in listening and interactive processing, and on the effects of modifications in speech to non-natives in academic contexts, are of critical significance in the study of the overall effects of instruction on acquisition (e.g., Carroll & Swain, 1993; Lightbown et al., 1993; Robinson & Ha, 1993; Rost & Roth, 1991). As second language research pursues the current questions concerning the degree of formal instruction and input, and the extent to which learners' interaction with formal instruction can influence rapid and successful attainment of TL competence, the study of the intentional and incidental impact of teachers' lecture and interactional styles on learners' comprehension will be of increasing value to both theoreticians and practitioners.

Notes

[1] It is interesting to note that Griffiths' (1991a) common speech rate obtained (around 3.3 syllables per second = 198 s.p.m., with a range between 2.5 and 4.5 s.p.s. = 150-270 s.p.m.) corresponds almost exactly to Tauroza and Allison's (1990) syllables per minute range and mean found for lecture style (157-273, mean 194.5 s.p.m.). Similarly, Shaw's (1983) finding of a range of 107.1 to 174.2 (mean = 136.5) words per minute rates for 9 different professors' lectures in the U.S. (each with 3 lectures of 50 minutes duration) compares very closely to Tauroza and Allison's finding of 102—199 w.p.m (mean = 141.7) for British lecture style. While these norms are important, most researchers will recognize Griffiths' caveat, that the rate of speech alone is likely not the most critical factor in affecting comprehension.

[2] In Markham & Latham (1987), ESL subjects of differing religious backgrounds listened to passages on either Islamic or Christian prayer rituals. In Chiang & Dunkel (1992), Chinese students listened to a passage about the Amish in contrast to a passage about Confucius. In Long (1990), U.S. students' listened to L2 Spanish passages about the California gold rush—unfamiliar, and the music group U2—familiar.

[3] Such a distinction in difficulty was noted as well in Yuan (1982). The two lecture types correspond to Shaw's two transaction types, shown in Table 1 (cf. also Bonnie Meyer's work on schema for content structure analysis of written texts--Meyer 1985, Meyer & Rice 1984--with Problem-Solution as one type, and several other text types following a more information-driven structure).

[4] Janda was clearly not anticipating the evidence that would arise from nonnative note-takers.

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