American and Japanese Listener Assessment of Japanese EFL Speech: Pronunciation Features Affecting Intelligibility

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A study was conducted to examine what pronunciation aspects of Japanese EFL speakers cause mis-hearings for both American and Japanese listeners. Speech samples of 20 Japanese students were evaluated by Japanese and American judges for intelligibility and accentedness. Intelligibility was measured unambiguously by comparing what the subjects intended to say and what the judges transcribed. The judges also rated the accentedness of the subjects impressionistically on a scale of 7. Interviews were then conducted with the judges to discuss what pronunciation features were perceived to be the primary causes of their misunderstandings. Analysis of the data seems to indicate that intelligibility and accentedness have a quasi-independent relationship and that a strong accent does not necessarily lead to unintelligibility. Data also indicate that most of the pronunciation mistakes perceived to have caused misunderstandings are segmental, not suprasegmental. Few suprasegmental features were perceived to have caused problems, except for word stress irregularities which proved detrimental to intelligibility in quite a few cases.

Key words: EIL, accentedness, intelligibility, segmentals, suprasegmentals

INTRODUCTION

Understanding in communication is a highly complex process, but intelligible pronunciation is a basic prerequisite to successful communication. There is a wealth of anecdotal evidence to attest to the importance of intelligible pronunciation (Jenkins, 2000). Research also shows that there is a threshold level of pronunciation for nonnative speakers of English. If they fall below this level, they will not be understood regardless of how excellent and extensive their syntactic and semantic control might be (Hinofotis & Bailey, 1980).

Teachers of EFL (English as a Foreign Language) and EIL (English as an International Language) are now much more likely to set reasonable intelligibility, rather than native-like accent, as the goal of pronunciation instruction (Abercrombie, 1949; Celce-Murcia, Brinton & Goodwin, 1996; Pennington & Richard, 1986). This implies that it makes more sense for instruction to focus more on pronunciation features which contribute most to intelligibility and de-emphasize those which are less crucial, instead of trying to teach all the pronunciation features of native speech.

Issues in Intelligibility

Segmental vs. Suprasegmental Features

The question of what aspects of pronunciation are most crucial for intelligibility, however, proves to be more elusive. Many teachers as well as researchers feel that suprasegmental features are more important than segmentals, contributing more to meaning and to listener perception of nonnative speaker intelligibility (Avery & Ehrlich, 1992; Celce-Murcia, Briton & Goodwin, 1996). However, empirical evidence for this assertion is not conclusive.

A number of studies have been conducted on the relative contribution of segmentals and suprasegmentals to intelligibility, but their findings have

often been contradictory. Anderson-Hsieh, Johnson and Koehler (1992) conducted a study to examine how segmental accuracy and prosodic features affected the overall impression of NNS pronunciation. Their finding that the prosodic variable is most strongly related to the perceived intelligibility/ accentedness seemed to suggest that suprasegmental features are more important to NNS intelligibility. Other researchers (Johansson, 1978; Palmer, 1976) also found evidence to support this view.

However, Koster and Koet (1993) reported that segmental errors made by Dutch speakers were rated as "more annoying" than suprasegmental errors by both NS judges and Dutch judges. Another study also concluded that segmental errors have a more negative impact on intelligibility (Fayer & Krasinski, 1987). Rost (1990) observed that even among native speakers, most misunderstandings occur at a segmental level, even though higher level schematic effects may also be at play.

Perhaps these different findings have been derived from differences in research methodologies, as well as how intelligibility was defined and measured, as Munro and Derwing (1995) argued. In most of the studies, intelligibility was often equated with accentedness. Munro and Derwing, however, made a distinction between accentedness and intelligibility, and offered working definitions for both concepts. Intelligibility was defined as "the extent to which a speaker's message is actually understood by a listener" (p. 76), and was measured by exact word matches between intended messages and transcriptions. Accentedness was defined as "how strongly accented a speaker is" and was measured impressionistically on a Likert scale. They found intelligibility and accentedness were moderately correlated, but concluded that a strong foreign accent did not necessarily lead to decreased intelligibility. They also examined how intelligibility and accentedness were related to variables such as phonemic errors, phonetic errors, intonation, grammatical errors, and utterance length, but very few correlations were found (Munro & Derwing, 1995).

In another study, the same researchers found similar general relationships between intelligibility and accentedness, but their findings could not

determine which language features (i.e., grammar scores, phonemic scores, prosodic scores, speaking rates) contributed more to the two assessments (Derwing & Munro, 1997).

Kashiwagi, Snyder and Craig (2006) conducted a study of speech samples by Japanese learners of English, using the notions of intelligibility and accentedness as defined by Munro and Derwing (1995). Their finding was similar to that of Munro and Derwing in that accentedness was moderately correlated with intelligibility, but a strong accent did not automatically lead to less intelligibility. In their study, NS judges were asked to transcribe speech samples and were interviewed later to discuss what pronunciation features were responsible for their misunderstandings. The interview results indicated that most misunderstandings were caused by segmental level errors. Misplaced word stress complicated by segmental errors, and lack of sentence stress on content words were also responsible for some misunderstandings, but no other suprasegmental features led to major intelligibility problems.

More recent research does not directly debate the primacy of either suprasegmentals or segmentals, but focuses more on finding out what specific pronunciation features are responsible for the reduction of intelligibility. Hahn (2004) used three versions of a lecture in which nuclear stress was manipulated and found that those who listened to the lecture with misplaced or missing nuclear stress understood the lecture significantly less. Field (2005) manipulated lexical stress, and found that misplaced stress resulted in decrement of intelligibility. Levis (1999), however, offers a different viewpoint by pointing out that intonation contours may not be as important to meaning as is sometimes believed.

In summary, past empirical evidence suggests that not all the pronunciation features contribute equally to intelligibility, and that a strong foreign accent does not automatically lead to unintelligibility. It does not support either the primacy of suprasegmentals or the primacy of segmentals in contributing to intelligibility, but shows that deviations in certain suprasegmental features do cause misunderstandings, just as errors in the production of certain segmental features are responsible for unintelligibility. More research is needed to find

out what specific aspects of suprasegmentals as well as segmentals interfere most with intelligibility.

NNS Listeners' Perspectives

The number of English speakers in the world has been estimated at 375 million first-language speakers, 375 million second-language speakers and 750 million foreign-language speakers (Graddol, 1997). As English is spoken by more nonnative speakers than by native speakers, and instances of NNS-NNS interaction increase, no discussion of intelligibility would be complete without the perspectives of NNS listeners listening to NNS speech. Only a few studies on intelligibility, however, have been conducted with NNS listeners listening to NNS speech.

Jenkins studied NNS-NNS interaction data collected over a period of three years in social and classroom settings. She concluded that segmental errors were by far the most frequent causes of miscommunication in NNS-NNS interactions. Most suprasegmentals such as features of connected speech (elision, contractions, assimilation and weak forms), pitch movements to signal attitude or grammatical meaning, placement of word stress, stress-timed rhythm, were not found to cause any irreparable intelligibility problems (Jenkins, 2000, 2002).

Riney, Takagi and Inutsuka (2005) found that American listeners and Japanese listeners judged degrees of accent in English differently. While American listeners primarily used segmental cues in their perception of accent, Japanese listeners used non-segmental parameters (intonation, fluency, and speech rate). While their research does not directly address the issue of intelligibility, their findings have important pedagogical implications.

More empirical evidence is needed to gain insight into which pronunciation errors cause intelligibility problems in NNS-NNS interactions, as compared to NNS-NS interactions. NNS-NNS data will be invaluable in designing pronunciation curricula to prepare students for a wide range of communication situations where NSs will not be the only listeners.

THE PRESENT STUDY

How intelligibility is determined is a complex process which involves a multitude of factors. The present study is conducted in an effort to provide more empirical evidence on the many factors contributing to intelligibility by investigating 1) the relationships between accentedness and intelligibility, 2) what specific pronunciation features of NNS speech cause mis-hearings, and 3) whether NSs and NNSs react differently to pronunciation errors of NNS speech. While the present study examines some of the issues covered in the past studies, it is different from them in that it assesses not only NS listeners' reaction, but also NNS listeners' reaction to NNS speech in a controlled research setting.

In our study, the notions of intelligibility and accentedness defined by Munro and Derwing (1995) are used. Intelligibility is broadly defined as the extent to which a speaker's utterance is actually understood by a listener and unambiguously measured in percentage points by exact word matches between intended messages and transcriptions. Accentedness is defined as the extent to which a speaker's pronunciation deviates from a perceived NS version, and is measured impressionistically on a scale of seven.

The present study is different from Munro and Derwing (1995) or Derwing and Munro (1997) in that readings of prepared passages, instead of spontaneous speech, are used as stimuli to prevent factors other than pronunciation, such as grammar mistakes and inappropriate word choices, from interfering with intelligibility. It has been shown that judgments of pronunciation are often influenced by the syntactic and semantic errors made by the speaker (Briere, 1967; Varonis & Gass, 1982).

Recognizing that intelligibility is highly listener-dependent, the present study emphasizes the perception of listeners, rather than the production of speakers. Intelligibility is calculated based on listeners' transcriptions, accentedness is determined impressionistically by listeners, and causes of misunderstandings are identified by listeners themselves in later interviews, rather than the researchers making speculations based on their analysis of

pronunciation errors.

The present study investigates not only the perception of NS listeners but also that of NNS listeners of the same stimuli. In the study, however, NS listeners are represented only by American English native speakers and NNS listeners only by Japanese speakers due to the difficulties of finding qualified judges from different nationalities. The findings, therefore, may not apply strictly to other NS or NNS groups, but they will serve to provide preliminary data on which to design more studies.

The present study had the subjects read sensical passages of certain lengths, rather than collections of words or sentences, in order to provide context for listeners in their transcription tasks. Listeners are known to remedy pronunciation errors by using contextual cues (Derwing & Munro, 2005; Suenobu, Kanzaki & Yamane, 1992), and the purpose of the study is to find out what pronunciation errors still interfere with intelligibility after the help of contextual cues.

While in some of the past studies, "suprasegmental features" were used to refer only to prosody, we define suprasegmental features more broadly as phenomena occurring over one sound segment such as word stress, sentence stress and rhythm as well as adjustments in connected speech, and segmental features are defined as vowels and consonants.

Participants and Procedures

We replicated much of the research procedures of our previous research in collecting speech samples and evaluating them (Kashiwagi, Snyder & Craig, 2006). Speech samples were collected from 20 Japanese students at a private women's university in Tokyo. The students' English abilities ranged from false-beginning to intermediate with their TOEIC scores ranging from the high 200s to the low 600s. None of them had lived in an English-speaking environment for more than six months.

Each student read two short passages. The total 40 passages were taken from various lower-intermediate English textbooks to control their difficulty

and were all different. They ranged in length from 37 words to 55 words with a mean length of 47.7 words. Before recording themselves in a college language laboratory, the students were allowed to practice the passages aloud and to ask us about any questions regarding pronunciation or meaning in order to decrease the chance of simple orthographic or comprehension errors interfering with the results.

The 40 passages were then randomized on a cassette tape, and played to three native speaker judges and three nonnative speaker judges to be transcribed in standard orthography. All of the native speaker judges were American EFL instructors teaching in Japan and knowledgeable in English phonology. All three nonnative speaker judges were Japanese EFL instructors, who had obtained their MA degrees in TESOL in the U.S. and had an equally good understanding of English phonology. Upon completion of the transcription, they were given a short break and they listened to the 40 passages a second time to rate the accentedness of each utterance impressionistically on a scale of 7 with 1 indicating "very strongly accented" and 7 "no accent."

Before the accentedness rating task, the judges practiced by listening to and rating examples of readings from our 2006 study. The transcriptions and the accentedness ratings were done separately to assure that they did not influence each other.

A few days after the transcriptions, two researchers had an interview with each of the judges. During the interview, the judges compared their transcriptions and the original passages, and were asked to comment on what they believed to be the causes of their misunderstandings while listening to the speech samples again. Their judgments as to the causes of their misunderstandings were noted by the researchers and later tabulated.

Intelligibility was calculated in percentage points by exact word matches between intended messages and transcriptions just as in the studies by Munro and Derwing (1995), and Derwing and Munro (1997). Transcription errors which were considered to have been caused by regularizations (e.g., *he walks* for *he walk*), word insertions, and semantic substitutions (the substitution of

one word for a semantically similar word) were ignored in calculating intelligibility.

General American pronunciation was used as "a point of reference" in this paper; there is no intention on our part to imply that General American pronunciation is the only target for Japanese students to achieve. The IPA-modified system used in *Longman Dictionary of Contemporary English* (2003) was used for phonetic transcriptions.

RESULTS AND DISCUSSION

Accentedness and Intelligibility

Both American judges and Japanese judges found most students in the study more than moderately accented. They rated a majority of the speech samples between 2 and 4, with the ratings of 2 and 3 accounting for more than half the cases (See Figure 1). There was a significant difference between the judges when the accentedness ratings of the six judges were subjected to ANOVA. A Sheffe's test found significant differences between six pairs of judges. American Judge A was found significantly stricter in his accentedness ratings than three of the other judges (American Judge B, Japanese Judge A and Japanese Judge B) and Japanese Judge C was found significantly stricter than two judges (American Judge B and Japanese Judge A). The results seem to suggest that accentedness ratings vary considerably among the judges, but the differences are influenced more by individual factors than the judges' language backgrounds.

TABLE 1
Descriptive Statistics (Intelligibility and Accentedness)

	Judges	Minimum	Maximum	Mean	SD
Accentedness	NS Judge A	1.00	4.00	2.28	0.96
	NS Judge B	2.00	6.00	3.85	1.12
	NS Judge C	1.00	5.00	2.68	1.16
	NS Mean	1.30	4.70	2.93	0.92
	NNS Judge A	2.00	6.00	4.03	1.14
	NNS Judge B	1.00	7.00	3.38	1.41
	NNS Judge C	1.00	5.00	2.70	1.09
	NNS Mean	1.30	5.30	3.35	1.01
Intelligibility	NS Judge A	59.00	100.00	89.30	11.15
	NS Judge B	70.00	100.00	92.40	8.53
	NS Judge C	49.00	100.00	85.80	12.52
	NS Mean	59.67	100.00	89.17	9.72
	NNS Judge A	57.00	100.00	84.97	11.41
	NNS Judge B	44.00	92.00	67.05	11.57
	NNS Judge C	35.00	97.00	69.38	12.77
	NNS Mean	47.33	95.33	73.39	9.99

FIGURE 1
Distribution of Accentedness Ratings

1= very strongly accented   7= no accent

The judges' language backgrounds, however, did seem to affect their

intelligibility scores. The Japanese judges, with the exception of Japanese Judge A, clearly had more trouble understanding the speech samples than the American judges did. When the intelligibility scores of the six judges were subjected to ANOVA, there was a significant difference. A Sheffe's test found that the intelligibility scores of Japanese Judge B and Japanese Judge C were significantly lower than the scores of all the other judges. Both Japanese Judge B and Japanese Judge C seemed less capable of using contextual cues to repair pronunciation errors than the other judges, and often produced nonsensical transcriptions. They also seemed to lose longer stretches of speech once they had their comprehension impeded by pronunciation deviances. Even though the three Japanese judges all had studied in the U.S., Japanese Judge A was the only one who had lived in the U.S. as a child. Her exposure to English as a child could have put her phonological processing capacity on par with that of American judges.

The results here seem to support Jenkins' claim that pronunciation errors tend to cause more problems for NNSs than for NSs since the latter have a wider range of phonetic and phonological tolerance and are more able to make use of contextual information to negotiate meaning, while NNSs "tend to focus on the acoustic signal and direct his or her efforts to decoding what has been heard" (Jenkins, 2002, p. 89). Jenkins based her claim on NNS-NNS interaction data, in which the subjects did not share the same L1, but reported that in cases where the subjects shared the same L1, pronunciation errors, most of which were presumably caused by L1 interference, did not impede mutual intelligibility. The results in this study, however, seem to suggest that the Japanese judges found pronunciation errors, even those caused by interference from their L1, more problematic to intelligibility than the American judges did.

Pearson's Correlation analyses between accentedness ratings and intelligibility scores showed a sizable variation among the judges (See Table 2), with moderate correlations found only for three judges. To examine the relationships between intelligibility and accentedness more closely, we looked at the 23 cases which were perfectly transcribed, and examined how the accentedness

ratings for those cases varied. Figure 2 shows that accentedness judgments for those 23 cases were evenly distributed across a wide range of scores, with five utterances rated as 1 and 2. These data indicated that these judges understood some utterances perfectly even when they perceived the speakers to have a strong accent. This gives further evidence that some features of foreign accent do not necessarily reduce intelligibility.

TABLE 2
Correlation between Intelligibility and Accentedness

American	American	American	Japanese	Japanese	Japanese
Judge A	Judge B	Judge C	Judge A	Judge B	Judge C
.306	.561**	.355*	.546**	.219	.257

$* = p < .05 ** = p < .01$

FIGURE 2
Accentedness Distributions for the 23 Cases Transcribed Perfectly
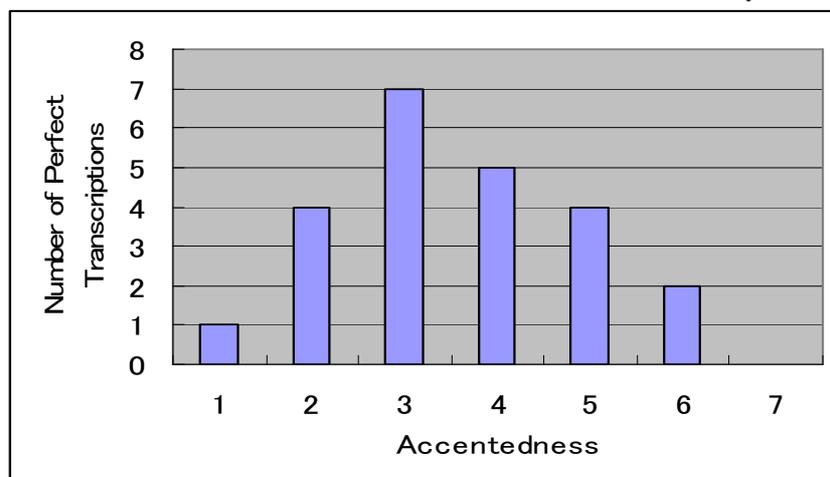
1=very strongly accented   7=no accent

Pronunciation Errors Causing Misunderstandings

The results in the present study suggest that in the data of both American

and Japanese judges, accentedness and intelligibility are quasi-independent, and that a strong accent does not automatically lead to misunderstandings. However, we still need to find out which pronunciation features directly affect intelligibility, and which features are relatively harmless ones easily repaired by contextual cues.

Table 3 shows the types of pronunciation errors which were perceived by the judges to be the causes of unintelligibility. A Chi-square analysis compared the answers by the 6 judges across the three main categories of error types (segmental errors, suprasegmental errors, and segmental + suprasegmental errors). The result, $\chi^2(10) = 7.50$, p= .67, showed there were no significant differences between the judges.

TABLE 3
Identified Causes of Misunderstandings by Error Types

Error Types	NS Judges			NNS Judges		
	A	B	C	A	B	C
Segmental errors						
Consonant errors	14	10	13	13	17	27
(Incl. consonant clusters)						
Vowel errors	24	16	22	18	33	26
Combination (of segmental errors)	10	8	10	10	10	11
Epenthesis (Sound insertion)	5	5	7	2	4	2
Subtotal	53	39	52	43	64	66
Suprasegmental errors						
Word stress error	2	3	4	3	6	5
Stress error on noun phrase	1	2	1	3	1	2
Irregular sentence stress	3	2	2	2	2	2
Subtotal	6	7	7	8	9	9
Suprasegmental errors + Segmental errors						
Word stress error + segmental error	3	1	5	5	3	8
Stress error on noun phrase + segmental error	0	0	3	0	1	1
Irregular sentence stress + segmental error(s)	0	0	0	0	0	0
Subtotal	3	1	8	5	4	9
Overall Total	62	47	67	56	77	84

Chi-square = 36.97 (not significant at p = .92)

Segmental Errors Causing Misunderstandings

Mispronunciation of segmental sounds, especially vowels, was perceived by both American and Japanese judges to have caused the bulk of the problems.

Vowels

For both American and Japanese judges, vowel mispronunciation was the most problematic. Similar vowel problems were reported by both American and Japanese judges. The vowel /æ/, substituted with a Japanese vowel /a/ in most cases, was thought to have caused 15 instances of misunderstandings: e.g., *mad → much*; *manuscripts → money scripts*; *distracted → destructed*. The vowel /aː/ and /ʌ/, substituted with /a/ and often with another Japanese vowel /o/, proved problematic in five and four instances respectively: e.g., *collars → colors*; *won → want*. Other vowels, such as /ɒː/, /oʊ/, and /ɪ/ also caused misunderstandings for all the judges.

R-colored vowels (/ɜːr/,/ər/,/aːr/,/ɔːr/) were perceived to be problematic in 48 cases: e.g., *workmen → walkmen*; *letters → little*; *pried apart → proud about*; *horns → home*. Mispronunciation of diphthongs was cited as the primary causes for 21 misunderstandings. The diphthong /eɪ/, substituted with Japanese /e/, was responsible for four cases of misunderstandings. Most diphthong errors seemed to be caused by orthographical mistakes: e.g., *intensifies* pronounced as /ɪnˈtensɪfiːz/; *labeling* pronounced as /ˈlabəlɪŋ/.

Vowel lengths before voiced and voiceless stops also seemed to cause misunderstandings. In casual speech where final stop consonant sounds are often not released, the only perceptual clue in discriminating a voiced stop and a voiceless stop is the length of a preceding vowel (Celce-Murcia, Brinton & Goodwin, 1996). The failure to lengthen vowels before voiced stops were perceived to have caused six misunderstandings: e.g., *bag → back*; *pad → path*.

Consonants

Mispronunciation of a consonant was the second most often cited reason by both American and Japanese judges, and the consonants perceived to be problematic were quite similar across the two groups of judges. The most problematic consonants for the two groups of judges were /l/ (both word-initial and word-final positions) and /r/, which are often confused with each other, or substituted with Japanese /ɾ/ (Avery & Ehrlich, 1992). Each consonant was cited as the primary reason for misunderstanding in 14 cases: e.g., *laws → in order*; *light → xxx* (i.e., nothing transcribed); *frames → flames*; *role → law*. Consonant clusters including /l/ and /r/ were also perceived to be problematic in 18 cases; e.g., /sl/, /pr/, /tr/, /gr/, /fr/, /dr/. The consonant /f/ was thought to have caused misunderstandings in eight cases, of which six were reported by Japanese judges. No cases of misunderstanding involving /v/ were reported in this study.

The two consonants /θ/ and /ð/ were responsible for two and six cases respectively: e.g., *thousands → someone's*; *they → take*. Most of the misunderstandings involving /θ/ and /ð/ were also reported by Japanese judges.

Final /t/ and /d/ were also thought to be problematic for both American and Japanese judges. When /t/ and /d/ in word-final positions are followed by another consonant, they often assimilate at the same place of articulation to the following consonant and are not released: e.g., *that pen → /ðæpˀpɛn/*. As a result, /t/ and /d/ become inaudible signaled only by a pause which psychologically accounts for the deletion. The failure to put in a sufficient pause was thought to have caused ten misunderstandings in this study: e.g., *can't move → can move*; *movie stunt work → movie star work*; *old property → all property*.

Combination of Segmental Errors

The problematic segmentals described above, both vowels and consonants,

also caused many misunderstandings when combined. The phrase "not so" was misunderstood as "also" by five judges when there was not enough pause to account for the unreleased final /t/, and / ɑː / in "not" is replaced with a Japanese vowel /o/. The word "thought" was misunderstood as "solved" when /θ/ is substituted with /s/, and /ɒː/ was replaced with /oʊ/.

Mispronunciation of the consonant /w/, while it caused few problems alone, was responsible for five misunderstandings when compounded by vowel errors. The word "worn" wasn't understood when the initial /w/ was pronounced with not enough rounding of the lips and the vowel /ɔːr/ was substituted with Japanese /o/. Another word "warm" was misunderstood as "bone" when the mispronunciation of /w/ is added to by a vowel error. Other consonants, such as /v/ and word-initial /p/, were also perceived to be problematic when combined with other segmental errors.

Epenthesis

Japanese speakers' tendency to insert a vowel after a consonant, either on its own or coupled with other pronunciation errors, was cited as the primary reason for misunderstanding in 25 cases, of which 17 were reported by American judges. For example, the word "drills" was misunderstood as "riddles" when a Japanese vowel /ɯ/ was inserted after /d/. Most epentheses occurred in consonant clusters including /l/ and /r/, before a plural suffix or before a past tense suffix, suggesting that students tended to insert a sound before what they considered a difficult pronunciation task.

Suprasegmental Errors as Causes of Misunderstandings

Intonation, rhythm patterns and features of connected speech were not cited to have caused misunderstandings by either of the two groups of judges, even though some suprasegmental features such as irregular word and sentence stress apparently led to some mis-hearings. This could be because the subjects are reading passages as opposed to that of using spontaneous

speech, a limitation we acknowledge in our conclusions.

Word Stress

While Jenkins (2000, 2002) as well as Kashiwagi, Snyder and Craig (2006) reported that word stress deviations did not lead to many unintelligibility problems unless they occur in tandem with segmental errors, the present study found that word stress error alone seemed to be powerful enough to cause misunderstandings for both American and Japanese judges. A total of 23 cases was reported: e.g., *communities* (no clear stress) → *comments*; *bystanders* (no clear stress) → *xxx*; *proc'ess* → *possess*; *as'pects* → *xxx*. When word stress irregularities were coupled with other problems, they were responsible for an additional 25 cases.

What is important to note is that many cases of word stress errors were caused when the speaker did not make a clear enough distinction between stressed and unstressed syllables; the speaker pronounced the stressed syllables a little more loudly than the unstressed syllables, but it was not accompanied by a higher pitch and longer duration as the English stress rules require, and apparently was not perceived as the correct word stress pattern by the listener.

Stress in Noun Compounds vs. Adjective-Noun Phrases

English stress rules dictate that in noun compounds the main stress be placed on the first component, but that in adjective-noun phrases, it be put on the noun: e.g, 'black,board, but ,black 'board. Failure to observe these rules caused ten misunderstandings; it was responsible for an additional 5 misunderstandings when coupled with segmental errors. The adjective-noun phrase "Dead Sea," when the main stress was placed on "Dead," caused problems for five of the six judges. Other compounds that caused problems were "grape growers," "slow waltz," "clay pot," and "precious way."

Sentence Stress

While failures to reduce function words in sentences did not cause any problems, insufficient sentence stress on content words was reported to have caused 13 cases of miscommunication. For example, the failure to place sufficient sentence stress on "think" in "some think" resulted in four of the six judges misunderstanding it as "something."

CONCLUSION

The present study suggests that in the data of both American and Japanese judges, a stronger accent does not automatically lead to less intelligibility, and that not all the pronunciation errors detract from intelligibility.

Closer examination of each instance of mis-hearing showed that American and Japanese judges tended to experience difficulties with similar pronunciation errors. Mispronunciation of segmental sounds, especially vowels, was perceived by both American and Japanese judges to have caused the bulk of their problems. Deviations in suprasegmental features were thought to be less problematic by both groups of judges. Even though irregular word and sentence stress did seem to lead to some problems, other suprasegmental features such as intonation, rhythm patterns and features of connected speech (elision, contractions, assimilation and weak forms), while they may have contributed to foreign accent, were not found to be detrimental to intelligibility.

The data obtained in the study resemble those of Jenkins (2000, 2002) and Kashiwagi, Snyder and Craig (2006) in the relative contributions of segmental and suprasegmental features to intelligibility, while there are some differences. The earlier two studies did not find irregular word stress causing unintelligibility, but the present study seemed to show that word stress affected intelligibility in quite a few cases. In addition, while the present study suggested that vowels were more problematic than consonants, Jenkins consistently found that consonant errors caused more problems than vowels.

There is another important difference with earlier research. While Jenkins (2002) reported that in cases where the subjects shared the same L1, pronunciation errors did not impede mutual intelligibility, the present study showed that the Japanese judges did not find Japanese student EFL speech samples easier to understand than American judges did. Even though most of the pronunciation errors seemed to be caused by L1 transfer, the Japanese judges were not always able to draw on their L1 knowledge to compensate for pronunciation deviations. Presumably hampered by processing overload, they seemed to rely more on acoustic information and less on contextual cues. Further research is needed to answer why some of the findings of the present study did not agree with those of previous studies.

The present study, while providing some important pedagogical implications, is limited in several ways. First, it is limited by using readings of prepared passages as opposed to spontaneous conversations in which prosodic features may be more important in conveying intentions and emotions. Secondly, more research is needed to obtain perspectives of NS judges who are unfamiliar with Japanese speakers of English as well as non-Japanese NNS judges' perspectives to understand a more complete picture. Finally, though the six judges in the present study are all experienced EFL teachers with some training in English phonology, it is still possible that they failed to associate their misunderstandings with suprasegmental errors as suprasegmental features are more subtle in their impact. Further research which examines the influence of specific suprasegmental features on intelligibility will help provide valuable information.

Teachers are constantly faced with the difficult task of choosing how to best spend their class time in increasingly crowded English curricula. More empirical evidence on what specific aspects of L2 speech have the greatest impact on intelligibility for both NS and NNS listeners is essential for prioritizing pronunciation instruction, and defining a more realistic goal. Further studies are needed in order to refine our understanding of what constitutes basic intelligible pronunciation and help teachers make good choices for the pronunciation part of their EFL/EIL classes.

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