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Native English speakers' perceptions of intelligibility in the extended discourse produced by non-native speakers

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Native English speakers’ perceptions of intelligibility in the extended discourse produced by non-native speakers

by

Jiyon Michelle Im

A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Major: Teaching English as a Second Language/Applied Linguistics

Program of Study Committee:
John Levis, Major Professor
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Iowa State University
Ames, Iowa
2007

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ABSTRACT

In pronunciation, segmental accuracy has been recognized as an important aspect in contributing to a non-native speaker’s intelligibility. Nonetheless, there has been a lack of research focusing on the role of segmental errors in understanding extended discourse. Furthermore, previous research studies on intelligibility have largely been conducted in a controlled condition where a listener’s cognitive process is more limited than in a real-life setting. In addition, proficiency level has not been considered as one of the factors contributing the intelligibility of non-native speech. This thesis uses a think-aloud methodology to investigate how native English speakers perceived how segmental errors contributed to reduced intelligibility of academic discourse produced by three Korean speakers with varying oral proficiency.

Five native American English listeners watched the teaching demonstrations performed by the three Korean speakers of English who had been rated as being at the advanced, intermediate and beginner levels or oral proficiency in English. While listening, the native speakers paused whenever they encountered a communicative breakdown and described the nature of the breakdown in understanding. Both quantitative and qualitative analyses were conducted. Listener results for the numbers of communicative breakdowns, and the numbers of the locations where communicative breakdowns were associated with segmental errors, were compared. The types of segmental errors identified by the listeners were analyzed to determine which errors appeared to impact intelligibility the most.

The findings showed that the listeners had communicative breakdowns for different reasons depending on proficiency levels. For the lower-level speakers, listeners stopped most often for segmental errors, whereas they stopped for non-phonological reasons as often as for segmental errors while listening to the advanced speaker. Also, not all segmental features were equally important for the listeners in this study. The consonants in syllable final position seemed to be important for understanding extended discourse on an academic topic. The comparison between the intermediate and beginner speakers suggested that not only was pronunciation important, but also that non-pronunciation related factors were important in being perceived as an effective speaker in an academic context. For nonnative speakers of English, and for Korean speakers of English in particular, a pedagogical approach which prioritizes certain segmental features depending on proficiency level is suggested.
CHAPTER 1. INTRODUCTION

1.1 Background

In ESL (English as a Second Language) classrooms, we often hear students wishing to speak like native speakers and sharing their embarrassing experiences of not being understood. Just like them, I myself have experienced a tremendous amount of frustration and had many questions about the details of English pronunciation that have made me sound like a nonnative speaker. Especially as a Korean learner of English, I have always questioned what features of my English contribute to sounding different from English listeners’ perspectives. I thought that my pronunciation of vowels was particularly noticeable. Pedagogical texts highlighting Korean pronunciation focused heavily on consonant sounds, especially sound contrasts such as /l/-/r/ and /ʃ/-/p/ (Avery & Ehrlich 1992). Other more recent studies have suggested that intonation may also be an important factor in marking a Korean English accent (Pickering 2001).

Current thinking about pronunciation, however, does not focus on native-like achievement, but on the ability to be understood. This is described by the terms intelligibility (defined as the ability to decode words successfully) and comprehensibility (the ability to easily understand a speaker’s intended message). Intelligible pronunciation may still have a strong accent, but listeners can usually understand the intended words and message. Research by Munro and Derwing (1995; 1997) has studied the pronunciation of second language learners in relation to intelligibility and comprehensibility. They argue that learners do not need to suppress a foreign accent but should rather focus only on those features that get in the way of their being understood. Some research has suggested that suprasegmental features such as intonation and stress affect intelligibility (e.g., Field 2005) while other research has found that segmental errors (i.e., consonant and vowel errors) are particularly important in causing misunderstandings (Jenkins 2002). This study will focus on the impact of Korean segmental errors on intelligibility.

Comprehensibility, the measure of understanding a speaker’s message, is usually measured in research studies in a general way. Munro and Derwing (1995), for example, measure comprehensibility by asking listeners to rate the perceived ease of understanding sentences spoken by nonnative speakers of English. In fact, most research studies measure understanding only at the level of the word or sentence. Only a few studies have examined
understanding of speech beyond the sentence level (such as Gallego 1990; Pickering 2001). This study focuses on discourse level understanding of Korean speakers of English.

To discover what kinds of things cause native-speaking listeners to have difficulty in understanding, the choice of methodology is particularly important. This study employs a procedure, think–aloud verbal reports, that is not common in research on intelligibility/comprehensibility. Think-aloud verbal reports seem especially relevant in measuring what causes listeners to have difficulty understanding. Because communication involves both speakers and listeners, the intelligibility of discourse level speech should be studied in light of how it affects a listener’s cognitive process of comprehending the whole speech-event, not simply disconnected words or sentences. During normal speech, listening is inevitably context-dependent. The context-dependency of listening becomes more apparent in an academic setting, from which the three teaching demonstrations used in this study were taken. Concurrent verbal reports have another benefit. Because the listeners express exactly what makes them to stop, it is possible to determine the particular phonological features the listeners perceived as key factors when they identify the words and understand the speech.

1.2 The Current Study

In this study, I examine the teaching demonstrations of three Korean teaching assistants (TAs) at Iowa State University. The three teaching assistants were distinguished by level of oral language proficiency according to the scores they received during university testing to determine whether they could teach without supervision. All three TAs met the departmental TOEFL requirements for admission to graduate study. However, their oral proficiency varied.

Because I wanted to explore which features of Korean ESL speakers’ speech caused native English listener from understanding, I chose to use approximately five minutes of continuous speech. The native listeners were able to stop each time they perceived a communicative breakdown. The use of classroom oriented speech was important because I was interested in how native English speakers perceive non-native speakers’ connected speech in a classroom setting. The comprehensibility of international TAs in American classrooms is a continual issue in American universities, where these TAs make up a large proportion of teachers in introductory classes (Boyd 1989; Widdowson 1983). ESL teachers who work with international TAs to improve their oral proficiency usually focus on pronunciation and other problems that they believe have the largest effect on making speech comprehensible. However, very little research exists to provide information about relative
importance of critical errors. I used the think-aloud technique to try to provide information about which errors were most important. The idea was triggered by my experience of working as RA for the New TOEFL research which had investigated the test taking strategies of L2 speakers (Douglas & Hegelheimer 2007). The study focuses especially on segmental errors, as these appear to be more easily identified by listeners and are actually quite frequent. The term, reduced intelligibility (RI) is used to refer a state that a listener has difficulty in recognizing the speaker’s intended words in a speech (Zielinski 2006a).

1.3 Research Questions

This study has three research questions. The first relates to the level of oral proficiency. I hypothesized that listeners would perceive more communicative breakdowns while listening to lower proficiency speakers. The communicative breakdowns were measured by the number of times the listeners stopped and provided a think-aloud report.

Research question 1.

Will NSs stop more frequently while watching beginner level oral proficiency speakers than intermediate? Will NSs stop more frequently while watching intermediate level speakers than advanced?

The second research question focuses on the number of vowel and consonant errors that caused listeners to stop. My hypothesis was that listeners would stop for segmental errors at a higher rate for lower oral proficiency speakers than they would for higher proficiency speakers.

Research question 2.

Will beginner level NNSs make more segmental errors than intermediate? Will intermediate level NNSs make more segmental errors than advanced?

The third research question asks whether all segmental errors equally cause listeners to stop. To answer this question, an outside listener, listening only for segmental errors, was employed. The errors identified by the outside listener were compared to the places the think-aloud listeners stopped. The overlap of the errors identified by the outside listener and the think-aloud listeners was used to identify the most serious segmental errors in the speech of the TAs.
Research question 3.

What confusion spots identified by think-aloud listeners will also be identified as segmental errors by an outside listener?

1.4 Organization of the Thesis

Chapter two reviews the relevant issues related to intelligibility and think-aloud verbal reports, setting up the findings from past research for this study. The section on intelligibility includes definitions of intelligibility proposed by past researchers and ends with defining intelligibility in this study, examines four key research studies on intelligibility which are relevant for this study, and reviews approaches on the importance of segmental and suprasegmental features in contributing to intelligibility of L2 speech.

Chapter three describes the procedures used for data collection, the selection of participants in this study, and the material used. It also presents the methods used for analyzing the data. The steps followed in analyzing the data from the think-aloud reports are described with reference to those used in Zielinski (2006a), including categorizing by syllable stress pattern and segmental errors in syllable-initial and final positions.

Chapter four presents the quantitative and qualitative data. The answers to the first and second research questions are presented, including the number of total pause locations and the pause locations where segmental errors were implicated. Then the answer to the third research question is presented, including a description of the sites of reduced intelligibility identified by both native-English speaking listeners and the outside listener as well as the distributions of segmental errors which occurred in each proficiency level.

Chapter five discusses the results. First, the aspects of language which are more salient to native-English speaking listeners are discussed for each proficiency level. Then the perceived segmental accuracy in each proficiency level is discussed, followed by which segmental errors were perceived as more salient in each proficiency level. This chapter then presents some limitations of the study and implications for future researchers.
CHAPTER 2. LITERATURE REVIEW

The purpose of this study is to identify the extent to which segmental errors contribute to reduced intelligibility and to identify how the segmental errors perceived by listeners are different at different proficiency levels. This study is designed to focus on listeners’ perceptions of how certain segmental errors contribute to intelligibility in the speeches produced by Korean speakers of English. Think-aloud procedures are applied to measure listeners’ perceptions. Four main areas of research on intelligibility are related to this study, including definitions of intelligibility; segmental and suprasegmental features as the factors that affect intelligibility, L1 background and proficiency level, and the use of think-aloud verbal reports.

2.1 Definitions of Intelligibility

Recent perspectives on pronunciation teaching have been shifting from native-like pronunciation to intelligibility due to the internationalization of English (Hinkel 2006, 115). Despite a number of research studies exploring intelligibility, defining intelligibility has still remained varied. Many researchers have agreed upon the complex nature of ESL learners’ intelligibility resulting in challenging their studies. As one of them, Zielinski (Zielinski 2006b) describes the difficulty of conducting research on intelligibility, saying “previous research findings related to L2 learners’ intelligibility are sometimes difficult to interpret and compare because intelligibility has been defined in a range of different ways in the literature (4-5).”

Much earlier Smith and Nelson (1985) also reported the difficulty in distinguishing between intelligibility and comprehensibility. In an attempt to clarify the terms, they defined intelligibility as the extent the listener is able to recognize words /utterances whereas comprehensibility was the listener being able to understand their meaning. They, however, admitted the interchangeability of intelligibility and comprehensibility at certain points.

Since Smith and Nelson (1985) until now, most researchers have believed intelligibility and comprehensibility to be two different areas of listening comprehension despite their close relationship. In their research studies, Munro and Derwing (1995; 1997) define intelligibility as the extent to which a listener can decode an utterance and measure it by the accuracy rate of a transcription task. Comprehensibility is assessed by a listener’s self-rating on a 9 point scale, that is ‘a listener’s perception of how difficult it is to understand an
utterance’ (Derwing & Munro 1995: 7). Their major findings are that intelligibility and comprehensibility are partially correlated but independent constructs.

More recently, some researchers have emphasized other aspects in defining intelligibility. Cutler (2000) argues that listeners first perceive the phonology of the speech they hear rather than its lexicon and grammar. In proposing her English as an International Language, or English as Lingua Franca, standards for pronunciation, Jenkins calls intelligibility ‘phonological intelligibility’ (Jenkins 2002: 86). More specifically, she defines intelligibility as ‘the production and recognition of the formal properties of words and utterances and, in particular, the ability to produce and receive phonological form’ (Jenkins 2001: 78). Similarly, Field defined intelligibility as ‘the extent to which the acoustic-phonetic content of the message is recognizable by a listener’ (Field 2005: 410). He argues that intelligibility ‘forms part of a wider construct of comprehensibility’ (Field 2005: 410).

Some researchers focus on the two-way process of communication perspectives in defining intelligibility of L2 speech. Zielinski (2006a) believes that the intelligibility of a speaker’s oral production should be decided by both the listeners’ endeavors and the extent the phonological features of the speech deviate from standards of L1 speakers. She defines intelligibility as ‘the extent to which the speech signal produced by the speaker can be identified by the listener as the words the speaker intended to produce.’ In the first place, she identifies phonological features of NS listener - NNS speaker communication as the most relevant to intelligibility. Then, she argues that reduced intelligibility is “the result of the interaction between listeners’ processing strategies and a complex mix of non-standard features in the speech signal’ (Zielinski 2006a: 2).

As shown in this section, researchers have taken different perspectives in defining intelligibility. My understanding of intelligibility is similar to that of Smith and Nelson (1985), Field (2005) and Jenkins (2002). At the same time, I strongly agree with Zielinski (2006a, 2006b), who argues that intelligibility involves the mutual process between speakers and listeners. Thus, I define intelligibility as the extent to which the phonological features of speech are recognizable by a listener in a communicative exchange. In this study, the main focus is given to identifying the phonological features that contribute to listeners’ recognition of the speech. Therefore, identifying listeners’ strategies in the listening process will not be addressed intensively in this study even though it may be consulted in analyzing listeners’ verbal reports on non-native speech samples.
2.2 The Factors that Affect Intelligibility: Segmental and Suprasegmental

This section presents the findings on the features of L2 speech which contribute to intelligibility in terms of suprasegmentals, segmentals, and both of them.

2.1.1 The Suprasegmental-Segmental Primacy Debate

In searching for pedagogical priorities for improving intelligibility, researchers have attempted to argue for the importance of suprasegmental features over segmental ones, or vice versa. For almost two decades the suprasegmental features have been claimed to have a more serious effect on intelligibility of L2 speech than segmentals, as in quotes like that from Daniels (1995) who said ‘most segmental errors, though noticeable, do not interfere with communication’ (8). The supposed importance of suprasegmentals has significantly affected the determination of pedagogical priorities in English language teaching (Avery and Ehrlich, 1992; Morley, 1991).

A handful of experimental research studies support the claim that teaching suprasegmental features allow L2 learners to adopt intelligible pronunciation more rapidly. Anderson-Hseih, Johnson, and Koelher (1992) compare the judgments of native listeners in terms of relative contributions made to intelligibility by prosody, segmentals, and syllable structure. Throughout 11 different L1 groups, prosody was found most closely related to the overall score for pronunciation. Also, Derwing, Munro, and Wiebe (1998) examined the effect of both segmentals and suprasegmental instruction on learner’s comprehensibility ratings and conclude that the latter had a greater effect on performance in a communicative context (cited in Field 2005).

Jenkins (2001), however, argues that ‘no serious comprehensive investigation of the relative contribution to intelligibility of these two areas has been conducted at all’ (32). Despite the lack of the supporting data, ‘during the past 25 years pronunciation teachers have emphasized suprasegmentals rather than segmentals in promoting intelligibility’ (Levis 2005; 369). In summary, prioritizing either segmental or suprasegmental factors suffers from a lack of the critically supporting data to either of the two sides.

2.1.2 Evidence for Suprasegmental Factors

Derwing and Rossiter (2003) addressed the importance of suprasegmental-based pronunciation teaching. Their research examined the effect of a 12-week pronunciation class with 48 adult ESL learners, focusing on segmental vs. suprasegmental features, and the listeners’ ratings of comprehensibility, accentedness, and fluency. Additionally, error gravity
was rated for the perceived errors, which were classified as salient (not interfering), bothersome (irritable), and comprehensibility errors (inhibiting). Their findings showed that only the Global group to whom suprasegmental instruction had been given was perceived as having improved comprehensibility, but both the Segmental group and control group were not rated as improving after 12 weeks. It was also found that the Segmental group produced significant fewer phonological errors but more prosodic errors while the Global group produced more phonological errors but fewer prosodic errors.

Derwing and Rossiter’s study is significant in providing research-based support for the superiority of suprasegmental features, which had been often asserted without concrete evidence. Also, their study provides useful implications for both the ESL teaching and research. Pedagogically, their findings support that a carefully designed and balanced pronunciation curriculum can help a L2 speaker to produce more understandable speech.

For ESL researchers, several interesting threads are found. Most of the implications found in Derwing and Rossiter (2003) will be discussed in regard to proficiency levels in Section 2.3.2. Here in relation to the suprasegmental debate, I will look at the paradoxical findings about the Segmental group. Even though the Segmental group was identified as having produced significantly fewer phonological errors, they were perceived as being less comprehensible. In other words, the findings suggest that the phonological errors made by the Global group may not have interfered with intelligibility owing to some unidentified reasons. It is hoped that the use think-aloud procedures may reveal some of these reasons.

2.1.3 Evidence for Segmental Factors

Jenkins (2002) proposes a set of core phonological features which consist of segmental features mainly. She claimed that segmental features play a more significant role than suprasegmental features for different L1 speakers of English to communicate in English successfully. Jenkins suggests that pronunciation priorities should be based on shifting views from English as a Second Language (NS-NNS communication) to English as an International Language (NNS-NNS communication), arguing for setting up mutual international intelligibility as a main goal of pronunciation instruction. She claims that pedagogical priorities should be determined by teachability and intelligibility.

From the analyses of various data sets obtained from different L1 speakers’ miscommunications occurred in social settings, Jenkins claims that ‘certain pronunciation deviations, particularly in consonant sounds, vowel length and the placing of tonic stress (sentence prominence) render an NNS’s pronunciation unintelligible to an NNS interlocutor’, and that ‘when this happens context and cotext do not provided help in clarifying meaning’
More specifically, her proposals for key pronunciation features include certain consonants in word initial positions (e.g., allophonic phonemic variations, voiceless stops, consonant clusters), accurate vowel quantity (e.g., shortening and lengthening vowels), and consistent vowel quality within a regional variation. In her view, sentence prominence (nuclear stress in her term) is the only important suprasegmental factor. Word stress, pitch movement, and rhythmic properties (stress-timed rhythm in her term) are not important or are unteachable.

Although this study deals with the context where English is used as a second language and American English speakers are the main interlocutors, it is there are a few significant findings in Jenkins. The first is also relevant to this study. In mutual communications with speakers of different L1 backgrounds, segments play a more important role. Second, Jenkins’s arguments that some segmental features play a more important role in causing unintelligibility imply that those segmental features may be higher priority than the others.

2.1.4 The Complex mix of Segmentals and Suprasegmentals

Zielinski (2006a) claims that neither of segmental and suprasegmental features should be more advocated in pronunciation classroom. Zielinski had three native English speakers to listen to the speech materials from non-native speakers’ conversational speech and analyzed the sites of reduced intelligibility perceived by the listeners. Zielinski found that English speaking listeners heavily depend on the pattern of strong and weak syllables in the syllable stress pattern produced by L2 speakers (a suprasegmental feature). Likewise, non-standard segments had a greater impact on intelligibility. Often, these segments were dependent on stress patterns.

Zielinski showed that English speaking listeners’ listening strategies consistently relied on English syllable stress patterns and that L1 background turned out to affect the mix of non-standard features that caused reduced intelligibility. Vowels in strong syllables had the greatest impact on intelligibility of Korean and Chinese speakers while consonants in the syllable final position of strong syllables had the greatest impact on intelligibility of Vietnamese speaker. For all L2 speakers, consonants in strong syllables had the greater impact in causing reduced intelligibility than did consonants in weak syllables. For all L2 speakers, syllable initial consonants had a greater impact in causing reduced intelligibility than did syllable final consonants. Non-standard stress patterns took the third, fifth, and
fourth places in Korean, Chinese, and Vietnamese speakers, respectively, in reducing each speaker’s intelligibility.

2.3 The Factors that Affect Intelligibility: L1 Backgrounds and Proficiency Level

2.3.1 L1 Backgrounds

Researchers on intelligibility have held some different opinions about how L1 background affect L2 speakers’ developments in different ways. On the one hand, Derwing and Munro (1997) imply that different L1 backgrounds should not be considered as a major inhibitor of intelligibility. In their study, they further expanded their 1995 study with Mandarin speakers by varying L1 backgrounds and proficiency level. Accentedness, perceived comprehensibility, and intelligibility including accent familiarity ratings, were measured with 48 L2 speakers of Cantonese, Japanese, Polish, and Spanish backgrounds. Rating scales were used to measure accentedness and comprehensibility while calculating accuracy rate in listeners’ orthographic transcriptions was measures for intelligibility. The speech materials were excerpted, ranging from 6 to 19 words from continuous speech.

They found that accent ratings and intelligibility scores were significantly correlated in both Pearson correlation and parallel comparison (with 77 percent and 81 percent, respectively). They found that listeners’ recognition of a speaker’s L1 background was not significantly related to intelligibility. All of the speakers were rated as mostly intelligible in English regardless of their L1 backgrounds. For listeners, L1 group was equally easy to transcribe accurately: Cantonese with 91 percent, Japanese 89 percent, Polish 89 percent, and Spanish L2 speakers 89 percent.

On the other hand, there are the studies indicated that speakers with different L1 backgrounds differ from speaker to speaker in terms of the intelligibility of their speech (Gallego 1990; Zielinski 2006a). In Gallego’s study with Korean, Italian and Hindi ITAs, he attributed the perceived unintelligibility of the Korean TA to the linguistic distance between English and Korean. Gallego measured intelligibility of the three international TA’s by calculating the number of communication breakdowns identified by native English speakers and rater judgments on the nature of each communication breakdown. He suggested the reason American listeners found the Korean TA less intelligible than the Italian TA regardless of the similar deviations in oral English proficiency of the two TAs was that Italian is more similar to English.
Zielinski (2006a) suggested that particular phonological errors differ depending on different L1 backgrounds. Zielinski investigated which non-standard phonological features contribute to listeners’ reduced intelligibility with Korean, Mandarin, and Vietnamese speakers of English. Three Australian English speakers listened to 177 different speech excerpts produced by the speakers which discussing the educational system in own culture. She then linked specific non-standard features in the speech signals and the difficulties experienced by a listener. The sites of reduced intelligibility identified in the listeners’ verbal reports were analyzed to determine the non-standard features that contributed to reduced intelligibility. 

The findings from this study show that the influence of L1 background was apparent. Zielinski’s major focus was to find whether English listeners’ strategies relied on the syllable stress pattern and segments in strong syllables, and she found that both non-standard syllable stress patterns and non-standard segments were important in contributing to intelligibility. However, the phonological errors identified were different depending on the speaker’s L1 background. The Korean, Chinese, and Vietnamese speakers had different problems in producing different consonants and vowels in different syllable positions (for more information see Zielinski 2006a:133-136).

2.3.2 Proficiency Level

There are no studies which have focused on L2 speakers’ proficiency level as a factor to be considered in the research on intelligibility. Nevertheless, implications can be drawn from some research. Munro and Derwing (1995) and Derwing and Munro (1997) present strikingly different findings in regard to the factors that contribute intelligibility. Both of the studies were conducted to measure accentedness, perceived comprehensibility, and intelligibility of L2 speakers by using self-ratings and listeners’ orthographic transcription accuracy rate. The differences in the later study were proficiency level, a variety of L1 background, and accent familiarity rating. Munro and Derwing (1995) found that segmental errors, intonation, grammar, and the length of utterance were found to be related with the listener’s perception on accentedness. They also found that not segmental errors but non-standard intonation and ungrammatical phrases affected perceived comprehensibility. Meanwhile, Derwing and Munro (1997) noted that none of the segmental errors, intonation, grammar, and the length of utterance were found to be significantly correlated with accent rating. The different results of the two studies implied that participants’ different proficiency levels may have caused inconsistent results. It is possible that since the errors of intermediate
speakers were spread out in all different areas, listeners may have had a harder time in rating intermediate speakers than in rating advanced speakers.

Derwing and Rossiter (2003) also suggest that their findings of the superiority of prosodic factors in improving intelligibility may be confined to the intermediate level which was the only proficiency level they studied with. As discussed in Section 2.2.2., Derwing and Rossiter found that teaching suprasegmentals had more positive impact on listener’s rating of comprehensibility than teaching segmentals to ESL students. Their study presents several interesting threads in regard to proficiency levels. First, the paradoxical results found in the Segmental group are insightful for this study. An assumption can be made that proficiency levels may be related with the inverse relationship between fluency and sentence complexity. Their study also confirmed Lennon (1990) who said learners’ fluency developed conversely to the development of sentence complexity. Thus, these studies imply that since the availability of learners’ attention resources may be limited, most L2 learners can not pay the same amount of attention to every component of language ability. Second, this study showed that phonological errors (substitution, omission, and insertion of consonants and vowels) and filled pauses accounted for a majority of the errors perceived for intermediate L2 speakers. In conjunction with the two above, a possible future suggestion can be made to investigate how different levels of L2 learners were perceived differently in terms of fluency and sentence complexity. The findings from these studies show that different oral proficiency levels have different distributions of pronunciation errors which are more salient. Motivated by the above findings, this study will look at the different oral proficiency levels in examining segmental errors produced by Korean speakers.

2.4 Think-Aloud Reports

This section introduces a brief history of think-aloud reports both outside and inside of second language learning research. Then it discusses some differences between this study and the other research on intelligibility which used verbal reports.

2.4.1 The Think-Aloud Protocol

This study used a concurrent verbal report, sometimes called a think-aloud report. The concurrent report is a form of introspective thinking. A think-aloud report is used to gain access to human thinking by asking participants to describe their successive thinking process during a task. Although introspection has been used in Psychology as a way of directly observing a subject’s mind since the early 20th century, the establishment of think-aloud
reports as a valid research method is indebted to psychologists Ericsson and Simon (1983). They set up two types of verbal reports, concurrent reports and the retrospective report, as the closest reflection of the cognitive process. Within the information processing framework, Ericsson and Simon (1983) claimed that the thinking process involves a complex of memories and levels of verbalizations. On the one hand, they hypothesize a series of memories, explaining that we process sensory stimuli at the recognition level first. Then, information can be brought into a short-term memory (STM) via the recognition process, or from a long-term memory (LTM) via an association process. On the other hand, they theorize that there are three levels of verbalizations people generally undertake prior to articulation. The first level of verbalization is ‘the vocalization of covert articulation or oral encoding’ which does not require additional intermediate processes (79). The second level of verbalization requires recoding the thought content while the third level of verbalization involves participants’ additional interpretive process about their thoughts.

In the 1980s, think-aloud reports began to be used in the second language learning. Think-aloud reports have been used to gain knowledge about leaner strategies in reading, vocabulary acquisition, and testing. Cohen (1987) identifies the characterizations of the data obtained from three types of verbal reports. Cohen (1996) also stated the potential of verbal reports as a tool to understand the strategies of test takers. Since then, numerous studies have used verbal reports in second language learning (Faerch and Kasper 1987; Cohen 1996; Ellis 1991; Smagorinsky 1994, Green 1998; Douglas & Hegelheimer 2007).

2.4.2 Think-Aloud Reports and the Study of Intelligibility

Despite its use in second language learning, think-aloud reports have not been used frequently in the research about pronunciation. Only Zielinski (2006a) used verbal reports in her study on intelligibility. She had her native-English speaking listeners to make comments on which phonological features were hard to understand. Listeners, however, did not listen to the whole discourse produced by participants but the parts of the original speech. A think-aloud report is suitable for investigating the thought process of native-English speaking listeners in processing extended discourse. When listening to a discourse which is dense and lengthy instead of the cuts from the whole speech, a listener’s mind has to process a complex set of memories. In this sense, think-aloud reports can be a suitable method for how listeners identify the intended words and understand the meaning of the discourse while watching academic presentations.
Ericsson and Simon’s (1983) explanation about information processing in human mind provides further support for using think-aloud reports as a method to investigate listeners’ perception of the phonological factors in speech. I am interested in incorporating the two concepts which introduced in Section 2.4.1., the recognition process and the first level of verbalization into using a think-aloud report in this study. Since this study focuses on intelligibility (recognition) as well as comprehensibility (understanding of meanings), it is important for participants to articulate what occurs in their mind. Although a primary focus is given to more spontaneous verbal responses as expressed as ‘the vocalization of covert articulation or oral encoding’ by Ericsson and Simon, the other two higher levels of verbalization, which focus on recoding the thought content and additional interpretive process, can be included in the verbal reports.

Support for using think-aloud reports in this study is also found in relation to the limitations pointed out by previous researchers. In second language learning, the participant’s limited linguistic skills are thought to be the greatest factor which possibly constrains the adequate description of the thought processes (Brown & Lawton 1977: Cohen 1987: Miller and Bigi 1979). In this study, however, such limitations should be not relevant since native English speakers verbalize their thought processes in English when they listen to non-native speakers’ speech samples. Since this type of listening is common in intelligibility research, that is, native speakers listening to non-native search, I hope that the use of think-aloud reports will reveal why speakers are heard as unintelligible.

To summarize, this study defines intelligibility as the extent to which the phonological features of speech are recognizable by a listener in a communicative exchange. This definition is similar to Smith and Nelson (1985), Field (2005), Jenkins (2002), and Zielinski (2006a, 2006b) with the main focus given to phonological aspects.

There have been different perspectives about relative importance of segmental vs. suprasegmental factors. For past twenty years, suprasegmentals have been believed to play a more decisive role in the intelligibility of a speaker. Derwing and Rossitter (2003) claimed a suprasegmental-superiority perspective by providing supports in their experimental study. Meanwhile, Jenkins (2002) argues that segments are key features especially in the communications between non-native speakers. More currently, the perspectives which put an emphasis on both segmentals and suprasegmentals are believed to be more pedagogically meaningful. Zielinski (2006a) supports this view, by providing evidence that listeners rely on both segmental cues and stress patterns in understanding non-native speech. The researcher holds a belief that both segmentals and suprasegmentals should be emphasized in
pronunciation instruction for optimum results. Nevertheless, this study focuses on segmental features to find which segments play more important role in listeners’ perceptions.

The think-aloud verbal report is used to see how listeners process phonological cues to understand the meaning of a speech. Procedures suggested by Ericsson and Simons (1983) are reviewed. Second language learning research have used think-aloud reports in examining learner strategies in reading, vocabulary acquisition, and test taking. Based on the findings in the think-aloud research, this study assumes that listeners’ verbal reports reflect the actual features listeners focus in listening to a speech.
CHAPTER 3. METHODOLOGY

In this chapter, I offer a description of the participants, the materials used in this study, and the procedures. Then, I present my analytical and coding decisions. Throughout the analysis I made use of the methodology of two previous studies. First, I took an approach advocated by Gallegos (1990), who had listeners stop while watching ITA presentations. He then counted the number of times the listeners stopped and analyzed what caused them to stop. The listeners did not specify what caused their understanding to break down. Instead, Gallegos and his colleagues determined the cause of the communicative breakdown. In my study, listeners (rather than the researcher) described the reasons they stopped. This allowed for a much more detailed level of analysis.

Second, I relied on Zielinski (2006a). In this study, she described two types of phonological errors: syllable stress patterns (i.e., word stress) and segmental errors, which were coded according to whether they occurred syllable-initially or finally, and whether the syllable was stressed or unstressed. I found it helpful to use her way of coding phonological features to classify the non-standard phonological features produced in the Korean speakers’ presentations used for this study.

3.1 Participants

Five American English speakers and three Korean speakers of English participated in this experiment. The native American English speakers (two male, three female) had all taken at least basic linguistics courses and were comfortable describing pronunciation errors. All were graduate students in the MA or PhD program in TESL/Applied Linguistics at Iowa State University. One listener had been trained as a TEACH rater previously while other listeners had no experience of having worked as a rater for the TEACH.

The speech samples were taken from two female and one male Korean graduate student at Iowa State University. All the Korean speakers had TOEFL scores above 550 (Paper) or 213 (CBT). Their level of English speaking ability, however, varied. This variation was measured by the results of their TEACH tests, all taken in August 2006. The TEACH test is an institutional test of oral proficiency given to prospective international teaching assistants at Iowa State. It is scored on a scale of 0-300. For their tests, the advanced student had a score of 240 (fully certified to teach), the intermediate 200 (limited teaching responsibilities), and the beginner 140 (not certified to teach).
The academic fields of the Korean speakers were varied. The beginner was in Industrial and Manufacturing Systems Engineering (ISME), the intermediate in Human Health and Performance (HHP), and the advanced in Art and Design. The advanced student had been in the US for 6 months, the beginner less than 1 month, and the intermediate for a year by the time they took the test. The beginner was from Busan, while the other two participants were from Seoul.

3.2 Materials

This section describes the think-aloud training material and three speech samples used in this study, then reports how listeners’ verbal reports were recorded.

3.2.1 Think-Aloud Training Video Clips

In order to provide training for the think-aloud procedures, a five minute training film was developed. The procedures of creating think-aloud training film were as follows. A Korean TA’s TEACH demonstration that was not rated in the study was chosen. The original demonstration recorded on video cassette was digitized for CD. JVC Player/Recorder for SVHS and MiniDC were used as hardware and Window Movie Maker was used for editing the video clip. A native English speaker was filmed demonstrating the think-aloud procedures intended, while pushing pause buttons and saying what occurred to him. The sample verbalization include saying about what was confusing, how the speech was understandable, replicating what was heard, comments on both global and specific aspects of the speech, and free comments. This training session was recorded by JVC Video Recorder and burned onto a CD.

3.2.1 Korean Speakers’ TEACH Demonstration Video Clips

Each videotaped demonstration included a mini-lecture given by the Korean TAs on a topic from their field of study. As Table 1 illustrates, the three speech samples lasted around five minutes and varied in topic. The type of speech given was the same: a one-way presentation. Each of the three speakers had been asked to prepare their presentation by writing on the board before starting speaking. This provided visual support for the original listeners and those used for this study.
Table 1. Speech material

<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Duration (minute/sec)</th>
<th>The type of speech event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>What is a grid</td>
<td>4:57</td>
<td>Lecture in a classroom</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Bowling symbols and scoring</td>
<td>4:20</td>
<td>Lecture in a classroom</td>
</tr>
<tr>
<td>Beginner</td>
<td>Techniques for inventory planning and control</td>
<td>5:15</td>
<td>Lecture in a classroom</td>
</tr>
</tbody>
</table>

Table 2 illustrates the number of words and syllables in each speech sample. The rate of speech varied. The advanced and intermediate speakers had similar rates while the syllable-per-second ratio was lower for the Beginner speaker.

Table 2. Speech rate

<table>
<thead>
<tr>
<th></th>
<th>Total word counts</th>
<th>Total syllable counts</th>
<th>Total length of speech</th>
<th>Speech rate (# of syllables divided by seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>551</td>
<td>736</td>
<td>297 secs/4:57</td>
<td>2.48 syllable/sec</td>
</tr>
<tr>
<td>Intermediate</td>
<td>593</td>
<td>669</td>
<td>260 secs/4:20</td>
<td>2.57 syllable /sec</td>
</tr>
<tr>
<td>Beginner</td>
<td>420</td>
<td>630</td>
<td>315 secs/5:15</td>
<td>2.00 syllable /sec</td>
</tr>
</tbody>
</table>

To prepare the speech recording, the same procedures as used in recording a think-aloud training film were taken. The videotaped recordings of the three Korean speakers were digitized and produced into WMV files.

3.2.3 Screen Capture Recorder

To record the think-aloud reports produced by listeners, Camtasia studio\(^1\), a screen recorder and video editor that comes with Camtasia studio software, was used. Verbalizations as well as actions on LCD including pressing pause buttons and playbacks were recorded. Native English speaking listeners spoke to a microphone attached to the laptop.

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\(^1\) For further information about Camtasia, Consult http://www.techsmith.com/camtasia.asp?CMP=KgoogleCStmhome
3.3 Procedures

After the video clips were prepared, the researcher met each of the five native English speaking listeners to record their verbal reports. Each session took about one hour including the following interview.

The procedures had three steps. First was a ten minute training session. The participants were asked to watch the think-aloud training video and were given verbal instructions by the researcher. Next, each participant watched the three speech samples. Each speech sample was about five minutes long. The native English speaking listeners were asked to watch the video clips and to pause whenever they found it hard to understand the Korean speakers’ presentations. When the listeners stopped the video, they were asked to verbalize their thoughts about the communicative breakdowns they were experiencing. The listeners were asked to rate the intelligibility and comprehensibility of the presentations on a 9-point Likert scale based on the procedure developed by Munro and Derwing (1995). A five minute break was given between each rating session. Finally, the researcher interviewed each listener.

In giving instructions how to verbalize their thoughts on the presentation samples, a primary focus was given to the listeners’ immediate perceptions on the extent to which the speech materials were phonologically recognizable. The special instructions aside from watching the think-aloud training video were: “when you don’t get what the speakers were talking about, click the pause button and identify the lost parts without reflecting upon them too long,” and “When you want to talk about your understanding of the speech, feel free to talk about it.” The first instruction was intended to identify the site of reduced intelligibility in the listeners’ minds and the second was intended to obtain a broader range of cognitive processes taking place. In the analysis, the utterances which did not specify a communicative breakdown were excluded. The examples of such excluded utterances included comments to praise a speaker’s performance, personal remarks on the associated items, a speaker’s suggestion for the particular speaker and a speaker’s self-evaluation. See Figure 1.
Suggestions: He will do well to spell out the words so that I would have the visual reference of the actual word he’s saying each time I hear him saying something like economic either economic of then.

Self-evaluations: Also I don’t sit and listen to technical economics lectures very often so I’m less adaptive

Praises: She does a good job she is incorporating a lot of good gestures, and illustrations, paralinguistic cures, eye contacts..

Personal comments: . .assuming this scores. . that’s very . . .good score. . .so I thinks even though it’s bowling out of contexts it is very difficult. how come we’re.

Figure 1. Examples of Excluded Utterances

3.4 Analysis

Data analysis included a number of steps. In preparation for the statistical analysis, all TEACH presentations were transcribed. Second, all listeners verbal reports were transcribed. Third, each pause location was identified according to its location in the TEACH transcripts. Then, the pause locations were classified by the language or performance reasons given by the listeners.

Statistical analysis was carried out to determine if proficiency level was connected to the number of pauses made by the listeners and the number of segmental errors implicated in the pause locations. Descriptive analysis of the listener reports was given for non-phonological reasons for communicative breakdowns.

Transcriptions of listeners’ verbal reports
I transcribed all of the utterances the listeners produced in the fifteen think-aloud recordings. The transcriptions presented the numbers of pause locations and the remarks made by the listeners. (See Appendix A.)
Transcription of Korean TA presentations
The speech samples were transcribed by the researcher. After being transcribed, an ITA professional checked the transcriptions. Changes were made where necessary. (See Appendix B.)

3.4.1 Identifying the Pause Locations where Reduced Intelligibility was Indicated

The pause locations indicated by the listeners were matched with the transcripts of the TA presentations. Once pause locations were clarified, I then phonetically transcribed the words and phrases replicated by the listeners for original words and phrases in speech material as shown in Figure 2. This step led me to identify how the listeners actually heard the words and phrases.

<table>
<thead>
<tr>
<th>Step 1. Verbal reports:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS 1. Beg: Utterance 25. . . .pause. . .you can also ‘kyoonggreet’?? I’m not sure what that word is.</td>
</tr>
</tbody>
</table>

| Step 2. Phonetic codification: |
| calculate → /kylwgreit/ |

| Step 3. Explanation: |
| Utterance 25 indicated that NS 1 heard ‘calculate’ as /kylwgreit/ in listening to the beginner speaker. |

Figure 2. Phonetic codification of non-standard segments

The coding procedure was extremely complicated. I had to listen to the speakers’ verbal reports repeatedly to decode. Moreover, one pause location often had several phonological errors. Figure 3 shows an example of a Korean speaker who mispronounced one word which involved three phonological errors.
Step 1. Verbal reports:

NS3. Beg: Utterance1. . .ohhhh. . .quantity orders???. quantity orders???
Demand?? Quantity orders. . .but he says KANTITY orders

Step 2. Phonetic codification: quantity → /kəntɪti/

Step 3. Explanation: Utterance 1 indicated that NS 3 heard ‘quantity’ as /kəntɪti/ and this one pause location involves three phonological errors including two segmental errors (e.g. /w/-Deletion and /ə/ in weak syllable was changed into /ɪ/) and one supersegmental errors (e.g. stress).

Figure 3. Phonetic coding of non-standard phonological features

Finally, Figure 5 shows the sequence of steps taken to identify the pause locations where the linguistic features contributed to reduced intelligibility. The classification of the linguistic features was made at two levels. At the first level, they were divided into three categories: phonological, non-phonological, and unidentified features. At the second level, phonological reasons were divided into segmental and suprasegmental features. Non-phonological reasons were classified as related to grammar, inappropriate use of language, and awkward expression. Figure 4 presents the examples of the above categories except the pauses where segmentals are implicated.
Pauses where suprasegmentals are implicated:
NS 2. Int: Utterance 28 . . . I don’t know what the last word is. Deposits?? Opposites?? . . . Opposites?? Oh.

Pauses where grammar is implicated:
NS 3. Adv: Utterance 1 . . . she started out saying ‘we’ll gonna talk about what is grid’ so grammatically she already hasn’t even phrased a proper grammatical structure. I have already heard her saying like as as what we would call that interjection.

Pauses where pragmatics is implicated:
NS 2. Adv: Utterance 6 . . . again spoken, gonna gonna rather than more formal ‘going to’ when teaching a class, so changing registers appropriate to the context

Pauses where awkward expressions are implicated:
NS 3. Int: Utterance 6 . . . strike doesn’t mean the symbol, spare doesn’t mean the symbol, miss doesn’t mean the symbol, the symbol means strike, so that was

Pauses with unidentified features:
NS 3. Int: Utterance 9 . . . confusing I couldn’t tell what kinds of bowler she said something bowler, . . . . . a part of bowler, . . . . . sort of makes sense though it’s hard to follow

Figure 4. Examples of the pauses where RI were identified

It is important to explain that my classification of the linguistic features was grounded in the tool by Zielinski (2006a) who established classification of the phonological features in terms of the segments in different syllable positions and different syllable strength, and syllable stress patterns. Nonetheless, the difference is made in my classification tool with regard to focusing on segments only. I focus on non-standard vowels and consonants in syllable initial and final position and in strong and weak syllables, adopting most of the Zielinski framework.
Figure 5. The procedures taken to identify the pause locations where the linguistic features contributed to RI
3.4.2  Analysis

3.4.2.1  Numbers of Pause Locations and Proficiency Levels

Two steps were taken to consider research question 1. First, the total number of pause locations where a communicative breakdown was indicated in each of three Korean speakers was computed. Then the t-tests ($p<.05$) were used to compare among the advanced, the intermediate and the beginner speakers. The numbers of pauses are a continuous variable and the comparisons between the two levels were possible. Since speaking proficiency levels flow one way, I hypothesized that the number of pauses for an advanced learner would not exceed an intermediate learner and an intermediate learner would not exceed a beginner learner. Also one-sided t-tests were conducted since I expected that a null hypothesis could not be kept, in other words, some difference was expected to be found between speaking proficiency levels.

Next, the types of communicative breakdowns in the pause locations were analyzed. I classified the types of communicative breakdowns for each level of speakers. All of the pause locations where communicative breakdowns were perceived were categorized into 6 categories: segmental errors, suprasegmental errors, grammatical errors, pragmatic errors, awkward expressions, and unidentified errors. See Figure 1 for more information. The percentage of the pause locations were calculated for each error type.

3.4.2.2  Non-Standard Segments and Proficiency Levels

To answer research question 2, a similar approach was taken as used in Section 3.4.2.1. The pause locations produced where non-standard segmental features were implicated in each of three Korean speakers of English were computed first. Then the t-tests ($p<.05$) were calculated to compare among the advanced, the intermediate and the beginner speakers.

While I was identifying the pause locations where segmental errors were implicated, I found that several segmental errors sometimes occurred at one pause location. I also found that just calculating the number of sites where segmental errors were perceived could not provide specific information about how segmental accuracy were related to oral proficiency level\(^2\). These findings lead me to look at some of the findings obtained from the answers to research question 3. Thus, the non-standard segments perceived in the pause locations that

\(^{2}\) Compare with Zielinski (2006a), who examined only the number of sites where non-standard phonological features were identified.
were identified both the think-aloud listeners and an outside listener were used for further discussion about segmental accuracy.

3.4.2.3 Analyzing the Pause Locations where an Outsider Listener Identified Segmental Implications

To answer research question 3, the segmental features implicated in the pause locations where both the five listener group and an outsider listener identified segmental problems were analyzed. This question sought to find which segmental errors were perceived by the listeners as the ones that had caused a communicative breakdown out of all the existing segmental errors. First, I calculated the proportion of the pause locations identified by the think-aloud listeners and an outside listener to the whole pause locations. Then, I calculated the types and position of segmental errors implicated in the overlap (the pause locations identified by the think-aloud listeners and an outside listener). I categorized the segmental errors into non-standard vowels, non-standard syllable initial consonants, and non-standard syllable final consonants. Also the strength of the syllable where the segmental errors occurred was examined. See Table 5 and 6 in Section 4.3.

For further understanding, I examined the data qualitatively. I analyzed how the listeners actually heard the segments errors produced by the speakers. The segmental errors were categorized into vowels and consonants in syllable initial and final positions. They also were categorized by the strength of the syllable. See Table 10, 11, 12 in Section 5.3. The categorization of the types and position of segmental errors were grounded in Zielinski (2006a). It was modified by adopting the phonetic symbols system presented in Cele-Mercia (1998).
CHAPTER 4. RESULTS

The results address three issues: (1) the relationship between the number of communicative breakdowns and the levels of English speaking proficiency, (2) the relationship between the number of pause locations where non-standard segments are implicated and the levels of English speaking proficiency, and (3) the extent to which non-standard segmental features contributed to reduced intelligibility.

4.1 The Number of Pause Locations and Levels of Speaking Ability

Research question 1.
Will NSs stop more frequently while watching beginner level oral proficiency speakers than intermediate? And will NSs stop more frequently while watching intermediate level speakers than advanced?

In order to discuss hypothesis 1, the number of pauses made by native English speakers while watching video clips of Korean speakers of English was calculated. Most listeners stopped more frequently watching the beginner level NNS than the intermediate. They also stopped more frequently while watching intermediate level of NNS speeches than advanced. The five NS listeners’ total number of pauses for each of three Korean speakers of English is shown in Table 3.

The results showed that the numbers of pauses were strongly related to the proficiency levels of the Korean speakers of English between the advanced and intermediate levels (p=0.0238) and between the advanced and beginner levels (p=0.0069) in this study. The numbers of pauses, however, was not strongly related to the difference in proficiency level between the beginner and intermediate (p=0.2481). The advanced speaker was perceived very different from the beginner and intermediate speakers while the beginner and intermediate speakers were perceived not very different in terms of the intelligibility of a speech. The number of times the native listener 1 (NS 1) paused while listening to the speeches was greater than for the rest of the listeners. Nonetheless, there were no significant changes when the t tests were conducted without NS 1’s pause number included.
Table 3. The number of five listeners’ total pauses while listening to each speech

<table>
<thead>
<tr>
<th></th>
<th>Advanced Total pauses</th>
<th>Intermediate Total pauses</th>
<th>Beginner Total pauses</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS 1</td>
<td>20</td>
<td>34</td>
<td>41</td>
</tr>
<tr>
<td>NS 2</td>
<td>15</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>NS 3</td>
<td>13</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>NS 4</td>
<td>12</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>NS 5</td>
<td>9</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>121</td>
<td>142</td>
</tr>
</tbody>
</table>

4.2 The Number of Pause Locations where Non-Standard Segments were Implicated for Each Level of Speaking Ability

Research question 2.
Will beginner level NNSs make more segmental errors than intermediate? And will intermediate level NNSs make more segmental errors than advanced?

In order to discuss hypothesis 2, the number of pause locations where native English speakers identified non-standard segments in speech signals produced by Korean speakers of English was calculated. The beginner speaker produced a similar number of non-standard segments as the intermediate. The intermediate speaker made more segmental errors than the advanced speaker.

The t-tests showed that the numbers of pause locations where non-standard segmental features were implicated were related to oral proficiency levels. There was a significant difference observed in between the intermediate and advanced speakers (p=0.01175). There was also a significant difference between the beginner and advanced speakers (p=0.0074). The difference between the beginner and intermediate speakers, however, was not found to be statistically significant (p=0.2679). The advanced speaker was perceived very different from the beginner and intermediate speakers while the beginner and intermediate speakers were perceived not very different in terms of the number of segmental problems. Again, the times NS 1 paused for the segmental errors while listening to the speeches were larger than the rest of the listeners. The differences among the speakers, however, became far more significant when the t tests were conducted without NS 1’s pause number included.
As shown in Table 4, half of the pause locations where reduced intelligibility was perceived in the advanced speaker were implicated with non-standard segments whereas non-standard segments were implicated at 82.6 percent of the pause locations where reduced intelligibility was perceived in the intermediate and 82.4 percent in the beginner speaker.

Table 4. The number of segmental pauses

<table>
<thead>
<tr>
<th></th>
<th>Advanced</th>
<th></th>
<th>Intermediate</th>
<th></th>
<th>Beginner</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total pauses</td>
<td>Pauses where segmentals are implicated</td>
<td>Total pauses</td>
<td>Pauses where segmentals are implicated</td>
<td>Total pauses</td>
<td>Pauses where segmentals are implicated</td>
</tr>
<tr>
<td>NS 1</td>
<td>20</td>
<td>18</td>
<td>34</td>
<td>34</td>
<td>41</td>
<td>40</td>
</tr>
<tr>
<td>NS 2</td>
<td>15</td>
<td>2</td>
<td>34</td>
<td>20</td>
<td>34</td>
<td>23</td>
</tr>
<tr>
<td>NS 3</td>
<td>13</td>
<td>6</td>
<td>17</td>
<td>16</td>
<td>27</td>
<td>21</td>
</tr>
<tr>
<td>NS 4</td>
<td>12</td>
<td>7</td>
<td>16</td>
<td>15</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>NS 5</td>
<td>9</td>
<td>2</td>
<td>20</td>
<td>15</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>35</td>
<td>121</td>
<td>100</td>
<td>142</td>
<td>117</td>
</tr>
</tbody>
</table>

4.3 Comparing Segmental Features Identified by Both the Think-Aloud Listeners and an Outside Listener

Research question 3.
What confusion spots identified by think-aloud listeners will also be identified as segmental errors by an outside listener?

As seen in Table 5, the proportion of overlapped pause locations identified as having non-standard segments by an outside listener increases as oral proficiency levels go down. For examples, 25.6 percent of the advanced speaker’s pause locations were found to be implicated with non-standard segments by an outside listener whereas 32.1 percent was taken in the intermediate speaker and 37.9 percent in the beginner speaker.
Further analysis of the overlap between pause locations and outside analysis indicates which non-standard segmental features influenced English speaking listeners’ perception of intelligibility. As shown in Table 6, speaking ability level varied with the frequency with which each phonological feature was implicated. The advanced speaker was perceived as having produced fewer non-standard segments than the other levels, and the intermediate was perceived as having produced fewer non-standard segments than the beginner speakers.

For all three speakers, the non-standard segmental features that had the greatest impact on intelligibility occurred in syllable final positions. For the advanced speaker, 73.3 percent of segmental errors occurred in syllable final position. Also in syllable final position, 41.5 percent of segmental errors occurred for the intermediate speaker and 53.9 percent for the beginner speaker. The advanced and intermediate speakers had syllable final consonants in strong syllables while the beginner speaker in weak syllables.

As shown in section 3.1, a wide gap was identified in terms of the scores achieved at TEACH test between the intermediate and beginner speakers. Nevertheless, the intermediate and beginner speakers had a similar proportion of non-standard segments. Nonetheless, the specific features of non-standard segments indicated in the speech produced by the intermediate speaker were distinctively different from the beginner speaker. Table 6 shows that the beginner speaker indicated non-standard syllable final consonants in weak syllables to the greatest extent at 19.7 percent of all non-standard segmental features located. Also 8.3 percent of non-standard vowels indicated in weak syllables in the pause locations identified in the beginner speaker.

For all three speakers, vowels were implicated relatively less than consonants. The advanced speaker was perceived as having produced the fewest number of non-standard

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of</td>
<td>Number of</td>
<td>Number of</td>
<td>Number of</td>
<td>Percentage</td>
</tr>
<tr>
<td>pause</td>
<td>segmental</td>
<td>Overlapping</td>
<td>Overlapping</td>
<td></td>
</tr>
<tr>
<td>locations</td>
<td>errors</td>
<td>A+B</td>
<td>C to A (%)</td>
<td></td>
</tr>
<tr>
<td>Advanced</td>
<td>39</td>
<td>17</td>
<td>10</td>
<td>25.6</td>
</tr>
<tr>
<td>Intermediate</td>
<td>82</td>
<td>83</td>
<td>27</td>
<td>32.9</td>
</tr>
<tr>
<td>Beginner</td>
<td>87</td>
<td>77</td>
<td>33</td>
<td>37.9</td>
</tr>
</tbody>
</table>
vowels. Vowels were implicated in different syllable positions for the intermediate and beginner speakers. The intermediate speaker was perceived to produce non-standard vowels in strong syllables to a greater extent than in the beginner speaker. Finally, the beginner speaker was perceived to produce vowels in weak syllables in a non-standard manner to the greater extent.

To summarize, the answers to the first research question showed that the listeners stopped more often when oral proficiency deceased. The numbers of pauses were not very different between the intermediate and beginner speakers whereas the listeners paused significantly fewer times for the advanced speaker. The answers to the second question showed that the numbers of the pauses where segmental errors were identified by the listeners related with oral proficiency level. Nonetheless, the listeners stopped for the intermediate speakers as often as did they for the beginner speaker. The answer to the third research question suggested that the segmental errors identified by both the think-aloud listeners and the outside listener were one third of the total pauses. The analysis of the pause locations identified by both the listeners and an outsider listener showed that the number of segmental errors related with speaking proficiency ability. In addition, the listeners perceived the segmental errors in syllable final position more often. Syllable initial position was also perceived often but not as often as final position. The listeners perceived segmental errors in strong syllables frequently.
Table 6. The mix of non-standard segmental features that contributed to reducing intelligibility

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Advanced</th>
<th>Intermediate</th>
<th>Beginner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Syllable Final consonants (Strong)</td>
<td>Syllable Initial Consonants</td>
<td>Syllable Final Consonants (Weak)</td>
</tr>
<tr>
<td>2</td>
<td>Syllable Initial Consonants (Weak)</td>
<td>Syllable Final Consonants (Strong)</td>
<td>Syllable Initial Consonants (Strong)</td>
</tr>
<tr>
<td>3</td>
<td>Syllable Final Consonants (Weak)</td>
<td>Vowels (Strong)</td>
<td>Syllable Final Consonants (Strong)</td>
</tr>
<tr>
<td>4</td>
<td>Vowels (Strong)</td>
<td>Syllable Final Consonants (Weak)</td>
<td>Vowels (Weak)</td>
</tr>
<tr>
<td>5</td>
<td>Syllable Initial Consonants (Weak)</td>
<td>Vowels (Strong)</td>
<td>Vowels (Strong)</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Syllable Initial Consonants (Weak)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9.6 %</td>
<td>33.8 %</td>
</tr>
</tbody>
</table>

Note. The total frequency is 157. Percentages are rounded to the nearest 1/10.
CHAPTER 5. DISCUSSION AND CONCLUSION

This study was designed to investigate which features that contribute to reduced intelligibility, the extent to which segmental features play a significant role in listeners' perceptions of reduced intelligibility, and the segmental features that contribute to reduced intelligibility in the academic presentations of Korean speakers of English. To this end, I first discuss what features the listeners attended to while listening to presentations given by speakers of different oral proficiency levels. I then consider the relationship between listeners’ perceptions of segmental accuracy and oral proficiency levels. The segmental features which contributed to reduced intelligibly in the speech of the Korean speakers is also considered. The last part of this chapter examines the methodological, theoretical and pedagogical implications of the study.

5.1 The Features which Affect Intelligibility and Levels of Speaking Ability

Research question 1 examined the number of times listeners paused during the presentations of the three Korean speakers. I hypothesized that the number of pauses would increase as oral proficiency decreased. Four of the five listeners paused more frequently when watching the beginner speaker than the intermediate speaker and the intermediate speakers than the advanced speaker, as initially hypothesized. See Table 3 in Section 4.1.

The advanced speaker’s words were perceived as the easiest to identify the speaker’s intended words as shown in the number of total pauses (advanced= 69; intermediate= 121; beginner= 142). The clarity of the advanced speaker’s pronunciation likely caused listeners to stop significantly less frequently than while listening to the intermediate and beginner speakers. Most listeners commented that the pronunciation of the advanced speaker was very clear. None of the listeners made such a comment about the other speakers.

The numbers of pauses for the intermediate and beginner speakers were not significantly different. This result was somewhat surprising, since the intermediate speaker scored considerably higher on the original TEACH test (intermediate score was 200; beginner was 140). The listeners in this study, however, paused almost as often. This difference may have occurred from the different demands of the original test and the think-aloud listening. In the TEACH test, the intermediate speaker was noticeably more interactive and engaged with the audience. Although she had many language errors, her manner seemed to help compensate. This was not true of the beginner speaker, whose
manner was noticeably less interactive. Those who work with international teaching assistants recognize the value of compensatory communicative strategies. For example, in a commonly used ITA training manual, *Communicate* (Smith, Meyers & Burkhalter, 1992), trainers are told that “although language skills are important in getting and receiving messages clearly, teaching skills are equally important to ensure that the messages are communicated in a way that is easily understood” (p. vii). The think-aloud task, in contrast, asked for more detailed feedback on communicative effectiveness. By allowing listeners to stop, the numbers of pauses reflected more bottom-up listening processes, in which a more detailed analysis of errors could be given.

In addition, the intermediate speaker’s topic, bowling, was one that most of the original listeners in the TEACH test would have had previous knowledge of. The beginner speaker, however, spoke on a topic that was more technically demanding. During the test, listeners would have started out with greater topic familiarity, thus allowing them to compensate for language errors that otherwise may have caused them greater difficulty.

Although listeners stopped primarily for phonological errors, listeners also paid attention to non-phonological aspects, especially of the advanced speaker’s speech. The pronunciation of the advanced speaker was clear overall. On the other hand, listeners commented that her choice of expressions and discourse organization did not keep abreast with her pronunciation. One listener remarked that ‘again all of the words are very very clear I don’t know why she’s struggling to put it into complete sentences, it’s almost like the way I speak Spanish. There are hesitations because I translate it as I go from my English thoughts to Spanish. It’s amazing she is not being very fluent, she’s got the words but she hasn’t got the syntax.’

The discrepancy between the pauses and the TEACH scores of the intermediate and beginner speakers, coupled with listeners’ attention to non-phonological aspects in the advanced speaker’s speech, caused me to further analyze the features which caused listeners to stop. As presented in Table 7, the advanced speaker’s speech was particularly perceived as having grammatical deviations and inappropriate use of language. Grammatical deviations were perceived to impact intelligibility as the second greatest problem area at 32.4 percent of the pause locations, with only non-standard segmental features being higher. In addition, her use of language that was perceived as inappropriate for lectures at 9.5 percent of the pause locations. Tables 8 and 9 also show that the number of the listener comments about these two non-phonological areas decreases as oral proficiency levels go down, approaching zero for both the intermediate and beginner speakers. Since these two speakers had many more grammatical difficulties and struggled more with vocabulary choices than the advanced
speaker, this was surprising. It seemed that the listeners exerted themselves to figure out the intended words; the pronunciation error were so frequent that listeners had difficulty paying attention to other language errors.

To summarize, different reasons caused the listeners to have communicative breakdowns while listening to academic presentations. Although the advanced speaker was the easiest to understand, a lot of times the listeners perceived her grammatical errors and inappropriate use of language. The intermediate and beginner speakers were perceived as far more difficult to understand. For the lower speakers, the segmental errors were the greatest problems. The comments from the listeners implied that although the two lower speakers may have produced similar number of segmental errors, the intermediate speaker’s presentation skills may have helped her to be rated as a better speaker in giving a classroom presentation.
Table 7. The summary of the linguistics features that are perceived by listeners as implicated in the speech of the advanced speaker

<table>
<thead>
<tr>
<th></th>
<th>Total pauses</th>
<th>Phonological Pauses</th>
<th>Non-Phonological Pauses</th>
<th>Pauses Where Unidentified Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pauses Where Segmentals are implicated</td>
<td>Pauses Where Suprasegmentals are implicated</td>
<td>Pauses Where grammar is implicated</td>
</tr>
<tr>
<td>NS 1</td>
<td>20</td>
<td>18</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NS 2</td>
<td>15</td>
<td>2</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>NS 3</td>
<td>13</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>NS 4</td>
<td>12</td>
<td>7</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>NS 5</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>35</td>
<td>1</td>
<td>24</td>
</tr>
</tbody>
</table>

Note. The sum of the pauses does not necessarily match the total number of pauses because a listener paused for several reasons some times.
Table 8. The summary of the linguistics features that are perceived by listeners as implicated in the speech of the intermediate speaker

<table>
<thead>
<tr>
<th></th>
<th>Total pauses</th>
<th>Phonological Pauses</th>
<th>Non-Phonological Pauses</th>
<th>Pauses With unidentified features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pauses Where Segmentals are implicated</td>
<td>Pauses Where Suprasegmentals are implicated</td>
<td>Pauses Where grammar is implicated</td>
</tr>
<tr>
<td>NS 1</td>
<td>34</td>
<td>34</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NS 2</td>
<td>34</td>
<td>20</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>NS 3</td>
<td>17</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NS 4</td>
<td>16</td>
<td>15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>NS 5</td>
<td>20</td>
<td>15</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>100</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note.* The sum of the pauses does not necessarily match the total number of pauses because a listener paused for several reasons some times.
Table 9. The summary of the linguistics features that are perceived by listeners as implicated in the speech of the beginner speaker

<table>
<thead>
<tr>
<th></th>
<th>Total pauses</th>
<th>Phonological Pauses</th>
<th>Non-Phonological Pauses</th>
<th>Pauses With unidentified features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pauses Where Segmentals are implicated</td>
<td>Pauses Where Suprasegmentals are implicated</td>
<td>Pauses Where grammar is implicated</td>
</tr>
<tr>
<td>NS 1</td>
<td>41</td>
<td>40</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>NS 2</td>
<td>34</td>
<td>23</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>NS 3</td>
<td>27</td>
<td>21</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>NS 4</td>
<td>16</td>
<td>14</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>NS 5</td>
<td>24</td>
<td>19</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>117</td>
<td>24</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note. The sum of the pauses does not necessarily match the total number of pauses because a listener paused for several reasons some times.*
5.2 Perceived Segmental Accuracy and Levels of Speaking Ability

This section considers the findings about how the listeners perceived non-standard segmental features. Research question 2 examined the number of times the listeners stopped for segmental errors. I hypothesized the proportion of segmental errors implicated in the pause locations would increase as oral proficiency decrease. Since just calculating the pauses which were implicated with segmental errors did not tell us about how many segmental errors contributed to the pauses, I looked at the part of Research question 3 which examined the segmental errors identified at the pause locations.

The advanced speaker had distinctively fewer non-standard segments than had the other speakers. As shown in Figure 6, the advanced speaker had segmental errors at 50.7 percent of the pause locations while the intermediate and beginner speakers had 82.6 percent and 82.4 percent respectively. The result of t-tests showed that the intermediate speaker and the beginner speaker were not differentiated (p=0.2679), as presented in Section 4.3.

![Figure 6. The percentage of the pause locations where segmental errors were located](image)

In Figure 6, a great divide between the advanced speaker and the other speakers suggests that segmental accuracy may be critical for a non-native speaker to be rated as being advanced. No matter how effective a speaker is with other communicative skills, sufficiently frequent errors in the pronunciation of vowels and consonants will keep the speaker from being rated as advanced in oral proficiency. Paradoxically, fewer segmental errors seem to lead listeners to notice other types of errors, such as the morphosyntactic errors which were
noticed for the advanced speaker. Since most of the errors the intermediate and beginner speakers were related to non-standard segmental errors, the listeners may have had to struggle at the micro level of the discourse:

![Graph showing the percentage of segmental errors identified for each speaker proficiency level.]

**Figure 7. The percentage of the segmental errors identified in the overlap**

Figure 7 illustrates that the overlap between the errors identified by the outside listener and the think-aloud listeners also reveals a large gap between the advanced and non-advanced speakers. While the outside listener tried to identify all segmental errors found in the speeches, the five think-aloud listeners only verbalized when the segmental error caused a communicative breakdown for them. When the think-aloud listeners paused for a communicative breakdown, often the one pause location had several segmental errors. This finding was consistent with Zielnski (2006a). In her study, each pause location often had a mix of several segmental errors.

The proportion of non-standard segments identified for the speakers correlate with the TEACH test results. For the advanced speaker, only 9.6 percent out of all the segmental errors were identified by the outside listener and those doing the think-aloud. This suggests that most of the errors made by the advanced speaker did not lead to breakdowns, likely because of the generally intelligible language she exhibited. In contrast, segmental errors made by the intermediate speaker were identified in 33.8 percent of the communicative breakdowns, while 56.7 percent of the communicative breakdowns for the beginner speaker.
To summarize, the calculation of the pauses where the listeners identified segmental errors showed that the advanced speaker had the fewest number of errors while most of the pauses indicated segmental errors for the lower speakers. The analysis of the segmental errors occurred in the overlap segmental accuracy suggested that the intermediate speaker had fewer numbers of segmental errors than the beginner speaker.

5.3 The Non-Standard Segmental Features which Contributed to Reduced Intelligibility Identified in Korean Speakers of English

Research question three investigated the non-standard segmental features which caused reduced intelligibility. I hypothesized that certain segmental errors would be more likely to contribute to reduced intelligibility while others would not. I also assumed that the patterns of error locations found in Zielinski (2006a) would be repeated in this study. The results discussed in Section 4.3. showed that the proportion of the pause locations where non-standard segmental features were identified by both listener group and an outside listener was about one-third. 25.6 percent of the pause locations indicated for the advanced speaker, 32.9 for the intermediate, and 37.9 percent for the beginner speaker. The proportion of the overlapped pause locations with segmental errors was lower than I had expected.

For further understanding, analysis of the types and positions of the segmental errors identified was conducted. I considered the distribution of non-standard vowels, non-standard syllable initial consonants, and non-standard syllable consonants implicated in the overlap (the pause locations identified by the think-aloud listeners and an outside listener). Table 6 in Section 4.3 shows that 61.7 percent of non-standard segments were found in strong syllables as was expected from the previous research (Zielinski 2006a; Bond & Small 1983; Cutler & Butterfield 1992; Cutler & Carter 1987).

Surprisingly, 51.5 percent of the segmental errors that caused problems occurred in syllable final position. The finding is compared to Zielinski (2006a) who found syllable/word initial positions were more important. Zielinski found that non-standard syllable initial consonants in strong syllables and 81.1 percent of the sites of reduced intelligibility for consonants were in strong syllables, but were word initial.

Further analysis of the non-standard vowels and consonants in syllable initial and final positions was conducted (Table 10, 11, 12). The distribution and frequency of non-standard vowels seemed to vary depending on oral proficiency. The advanced speaker had only one non-standard vowel whereas the intermediate and beginner speakers had considerably more (5 different vowels for each). Yet, the beginner speaker produced those
non-standard vowels more frequently than did the intermediate (the Beginner had 18; the Intermediate 11).

An interesting pattern was found for the beginner speaker. He produced a non-standard short vowel /æ/ often (N=11). Extra analysis of the pause locations showed that these non-standard /æ/s occurred along with non-standard syllable stress patterns. Non-standard suprasegmental features may tend to combine with this segmental error, especially this non-standard vowels. Further discussion will be made in relation to some pedagogical implication in Section 5.4.4.4.

The main non-standard vowels which caused reduced intelligibility were:

- vowel /ɔ/s was mispronounced by the intermediate and beginner speakers
- schwa /œ/ was consistently tensed in the beginner speaker
- Vowel /ɛ/s was substituted with /æ/

These findings about did not match the recommendations of pedagogically oriented materials for teaching Korean students pronunciation (Avery & Ehrlich 1992). In this study, both the intermediate and beginner speakers were perceived to have problems in producing a tense vowel /ɔ/ correctly. The intermediate and beginner speakers substituted for /ɔ/ with /œ/ and /ʌ/ back and forth. These vowels are all mid vowels. The mid vowels are hard for Koreans to produce correctly as shown in this study. The difficulty in pronouncing a tense vowel /ɔ/ may be also relevant to some of challenging vowels such as /ɔy/ and /aw/.

Another difficulty was non-standard consonants in syllable initial position. Table 11 presents the distribution of non-standard syllable initial consonants. Speaking proficiency seems to be related with the distribution and frequency of non-standard syllable initial consonants. The advanced speaker was perceived to have weakness in voicing of affricates only. In terms of frequency, the beginner and intermediate speakers were perceived to produce a similar number of consonant errors in strong syllables (both had 19 errors of this type).

The non-standard errors found for the beginner and intermediate speakers presented similar results as expected in Avery and Ehrlich (1992). The intermediate speaker mispronounced a labial stop /b/ as labio-dental fricative /v/. The beginner and intermediate speakers substituted a voiceless stop /p/ with a voiceless fricative /f/ most of time. /s/-/ʃ/ and /r/-/l/ substitutions were found for the speakers.

Nonetheless, Avery and Ehrlich (1992)’s observation about /dʒ/ typically pronounced by Korean was not supported by this study. They stated that /dʒ/ is often mispronounced as
/g/ or /d/, which I have not observed while teaching English to Koreans. Based upon my experience, I have thought that Koreans tend to replace /dʒ/ by other sibilants such as /ʃ/, /z/, and /ʒ/. The findings in this study indicated two things as to /dʒ/. First, this particular consonant was identified only for the advanced speaker. Second, /dʒ/ was substituted by other sibilants. In syllable initial position, /ʃ/ and /z/ were replaced for /dʒ/ as shown in Table 11.

The main findings in the distribution of non-standard syllable initial consonants illustrate as following:

- Voiced affricate /dʒ/ was the only problems perceived for the advanced speaker
- Voicing or aspiration of labial stops /p/ and /b/ were not correct for the intermediate and beginner speaker.
- Voicing of labiodental /f/ and liquid /l/ were frequently perceived for the beginner speaker

The non-standard consonants in syllable final position were also examined. As stated earlier, half of the segmental errors were in syllable final position. The advanced speakers had a relatively larger number of errors in final position than in initial position. Again /dʒ/ was problematic in final position for the advanced speaker. She was perceived to produce non-standard /dʒ/ more frequently than in syllable initial position (N=3 in initial position; N=8 in final position). A lot of /r/-/l/ substitutions were found for the intermediate and beginner speakers, and non-standard /n/ in syllable final position was found frequently for the intermediate and beginner speakers.

In this study, the listeners perceived a large number of consonants errors in syllable final position. An examination of the pause locations suggests a reason the errors were salient to the listeners. Often the errors were in words that carried crucial information about grammar. Gilbert (1995) argues for the importance of word final position saying that ‘students should be trained to hear a few critical sounds which occur at the end of word’ (108). She makes this argument because the ending consonant sounds are very likely to signal morphsyntactic information. Figure 8 illustrates syllable final consonants errors. The words in the example carried critical information for processing a speech including number, possession, and tense.
Figure 8. Syllable final non-standard consonants with grammatical cues

Figure 9 shows that another type of the words which were important in understanding an academic discourse. Key terms provided an important semantic axis in processing a lecture. The terms such as ‘titles’ and ‘calculate’ were important for understanding the beginner speaker’s presentation about techniques for inventory planning and control because it dealt with a lot of formulas and math. Similarly, ‘ball’ was the most important word for the intermediate speaker who talked about bowling and scoring. The words in Figure 9 present that non-standard /l/s in syllable final position misguided the listeners.

The examples of syllable final non-standard /l/s:

titles ➔ type /təɪp/

Calculate ➔ kyoongreet /kwɔŋgreet/ 

NS 2. Int: Utterance 16.
ball ➔ vur /vər/

Figure 9. Syllable final non-standard consonants important for identifying key terms
The main findings in the distribution of non-standard syllable final consonants illustrate as following:

- Non-standard voiced affricate /\d3/ was consistently perceived in the advanced speaker
- Non-standard voiced affricate /\z/ were perceived
- Non-standard Liquids /r/ and /l/ were consistently perceived in Intermediate and Beginner speakers.

To summarize, the analysis of the segmental errors in the overlap showed that syllable final position was perceived as more challenging for all levels. Also syllable final position seemed to play a crucial role in providing important cues for understanding an academic discourse because they provide information about grammar, the content of a lecture, and organization. Syllable initial position was also important, yet the advanced speaker was hardly perceived as having produced the segmental errors in initial position. The segments in strong syllables were important for a speaker’s intelligibility.

It seemed that prioritizing some segments for the lower level Korean speakers of English would benefit them. The lower level speakers had problems in producing liquids /l/ and /r/, voicing or aspiration of labial stops /p/ and /b/, and labiodental /f/. Mastering voiced affricate /\d3/ may not be as crucial as mastering the above segments for lower level speakers. Pronouncing accurate voiced affricate /\d3/ seemed to be hard for advanced speakers.
Table 10. The non-standard vowels related to RI at the overlapped pause locations

Non-Standard Vowels in Weak and Strong Syllables

<table>
<thead>
<tr>
<th></th>
<th>Non-Standard Vowels In Strong Syllables</th>
<th># of Type/# of Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short Vowel (weak)</td>
<td>Lax Vowels (Strong)</td>
</tr>
<tr>
<td></td>
<td>θ</td>
<td>ƛ</td>
</tr>
<tr>
<td>Advanced</td>
<td>iy (1)</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td>ay (1)</td>
</tr>
<tr>
<td>Beginner</td>
<td>α (11)</td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Adaptation is made from the categorization in Celce-Mercia, Brinton&Goodwin (1996; 103). Short Vowels were implicated in weak syllables while the rest of vowels were implicated in strong syllables.
Table 11. The non-standard initial consonants related to R1 at the overlapped pause locations

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Non-Standard Syllable Final Singleton Consonants</th>
<th># of Type/ # of Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>Strong</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 (0)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Strong</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 (3)</td>
</tr>
<tr>
<td>Beginner</td>
<td>Strong</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 (3)</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>6 (19)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Non-Standard Syllable Initial Consonants</th>
<th># of Type/ # of Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced</td>
<td>Strong</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Strong</td>
<td>6 (19)</td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Beginner</td>
<td>Strong</td>
<td>6 (19)</td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Totals</td>
<td>19 (47)</td>
<td></td>
</tr>
</tbody>
</table>
Table 12. The non-standard final consonants related to RI at the overlapped pause locations

<table>
<thead>
<tr>
<th>Syllable Level</th>
<th>Strong</th>
<th>Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advanced</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td>3 (4)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Weak</td>
<td>0 (1)</td>
<td>0 (1)</td>
</tr>
<tr>
<td><strong>Intermediate</strong></td>
<td>1 (2)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Strong</td>
<td>0 (1)</td>
<td>0 (1)</td>
</tr>
<tr>
<td>Weak</td>
<td>0 (1)</td>
<td>0 (1)</td>
</tr>
<tr>
<td><strong>Beginner</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td>6 (2)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Weak</td>
<td>4 (2)</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type/ # of Totals</th>
<th># of Type/ # of Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>d3</td>
</tr>
<tr>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
</tr>
<tr>
<td>Beginner</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
</tr>
</tbody>
</table>
5.4 Limitations and Further Suggestions

5.4.1 The Small Number of Both Listeners and Speakers

This study was based on the assumption that L2 learners who share the same L1 background will differ according to proficiency level in the types of errors that cause listeners not to understand their oral English. Although the Korean speakers were expected to represent learners at the beginner, the intermediate, and the advanced level, only one of each was used in the study. This may mean that the speakers were not representative of all speakers rated at that level. Although the findings from this study present some characteristics of the L2 learners’ phonological development, future study should involve larger number of L2 speakers as representatives of each proficiency level. Similarly, future research would benefit from a larger number of native speaking listeners to do the think-aloud.

5.4.2 More detailed Think-Aloud Training

I had expected that the listeners would behave similarly after training, but the five listeners all seemed to bring unique perspectives to the think-aloud task. They did not consistently listen for phonological features only. This may have been due to the open-ended instruction given by the researcher. Yet, future studies could consider conducting more detailed think-aloud training session in order to get the listeners to be more attuned to segmental features. For example, the researcher could create two video clips. A listener could watch a think-aloud training video clip in which someone exemplified the think-aloud methodology. Then, the listener could watch another video clip and practice doing a think-aloud. After watching the two video clips, the listeners could discuss further questions about how to focus on language related issues during the think-aloud process.

5.4.3 Observing Listener Behaviors

This study used the listeners’ verbal production as a source to locate the site of reduced intelligibility. An installation of video camera or a web camera may be useful to examine related topic as investigated in this study. The visual connection may provide information about listeners’ facial expressions, body language, and so on, which may reveal how intensely they feel the communicative breakdowns.
5.5 Implications

This section presents the methodological and theoretical implications found in this study, followed by some implications for teachers.

5.5.1 Methodological Implications

5.5.1.1 The Think-Aloud Verbal Report

One of the important contributions of this study is found in the use of think-aloud verbal reports to gain access to how listeners processed the speech of the Korean speakers. The basic assumption about how a listener perceives the phonological cues signaled in a speech, stems from the information processing model which provided a theoretical framework for Ericsson and Simon’s (1983) idea of concurrent verbal reports3. According to them, a listener first recognizes the audio-acoustic [phonological] features in speech first and proceeds to further levels by relying on a complex mixture of memory and other cognitive activity. Think-aloud reports make it possible for a participant to talk instantly about what occurs in her/his mind. Based upon this model, phonological features were the first things the listeners perceived as key features in identifying the words and understanding the speeches in this study.

Using think-aloud verbal reports allowed a clearer understanding of which features the listeners paid attention to in recognizing the intended words and how they used top-down and bottom-up processing strategies to understand. Native speakers’ transcriptions have been used a primary source to identify site of reduced intelligibility by some researchers (Munro & Derwing 1995; Derwing & Munro 1997). It is hard to know, however, whether listeners actually heard the words because they could draw on information from the context and existing knowledge about vocabulary and syntax (as argued in Zeilinski 2006b: 5). Munro and Derwing (1995) also talked about the likelihood of additional processing time being needed for transcribing certain words and ascribed it for the reason why intelligibility scores were not congruent with comprehensibility ratings (91).

Another strength of the use of think-aloud verbal reports is that this method helped demonstrate how different errors and different phonological features were perceived as being more or less crucial for a listener. The listeners in this study listened to a whole presentation and stopped whenever they ran into a communicative breakdown. Stopping at the locations

3 Ericsson and Simon (1984) said ‘the concurrent repost reveals the sequence of information heeded by the subject without altering the cognitive process, while other kinds of verbal reports may change these processes’ (30).
where the listeners could not identify the words allowed them to decide spontaneously about which cues were more crucial for them. The way a listener decided a confusion spot as shown in this study is different from the way samples were listened to in Zielinski (2006a). In her study, the listeners listened to a number of speech excerpts with a length of 10 to 18 words and identified the sites of reduced intelligibility for each speech excerpt. Consequently, the way the speech samples were excerpted and edited may have affected how the listeners perceived certain non-standard phonological features as being more critical than others. In the same way, the presentation of the speech samples may have affected which phonological features and word positions received more attention. The choice of methodology may have caused listeners in her study to place more emphasis on errors in word-initial positions whenever a new speech excerpt was presented. In contrast, this study, which used extended discourse, found a greater importance for consonants in word-final positions.

5.5.1.2 The Use of Screen Capture Recording

In this study the listeners watched a video clip of an academic presentation and talked about the problems in identifying the words and understanding the meaning. Camtasia, a screen capture recording technique, was used to collect the raw data. The use of screen capture recording had some advantages.

The environment in which the listeners watched the presentations was close to a real-life setting. They watched on the LCD and had access to visual cues including facial expressions, gestures, eye contact with the original audience and blackboard. When hearing a lecture, listeners are expected to sit in a classroom and watch the speaker. Since the focus of this study was to look at how the listeners actually understood a lecture type presentation, this real-life setting was useful.

I also found that using video files made it easy to use for the listeners and made it easy for me to locate the data. It was uncomplicated to play back the original recordings of the Korean speakers and the think-aloud listeners’ verbal responses. Keeping the digital files and Word files in the folders designated for each listener and speaker made the inventory job easier.

5.5.2 Theoretical Implications

5.5.2.1 Reduced Intelligibility and the Level of Oral Proficiency

This study investigated how a native speaker perceives the intelligibility of non-native speech depending on oral proficiency. It was clear that segmental accuracy was
important for the listeners in this study. It was also evident that although segmental features were the most important contributor to intelligibility, most speakers stopped for other reasons also, especially while listening to the advanced speaker.

As discussed in Section 5.1, the listeners’ perceptions seemed to be tuned to different parts of the information depending on the oral proficiency of the speakers. The answers to research question 1 and 2 showed that oral proficiency level paralleled with the total number of the pause locations identified by listeners and the proportion of the pause locations where non-standard segments were implicated. Meanwhile, the analysis of what had caused the listeners to pause showed that the listeners commented far more frequently on the grammatical deviations and the inappropriate use of language for the advanced speaker, not for the intermediate and beginner speakers (See Table 7, 8, 9).

This finding suggests that there may be a hierarchy of listeners’ attention in their perception of intelligibility. According to the information processing model that provides verbal reports with a theoretical framework in Ericsson and Simon (1983), certain features are noticed first, and others become more noticeable after initial attention demands are satisfied. It should be noted that these data were primarily gathered based on listeners’ perception about the extent to which the speakers’ intended words were identifiable. From an information processing standpoint, listeners in this study appeared to first recognize errors in phonological features. When these features were adequately produced, other parts of the message, including word choice and morphosyntax became more noticeable. Thus listeners noticed these features more in the advanced speaker’s presentation precisely because her pronunciation had relatively few noticeable errors. The large number of pronunciation errors in the speech of the intermediate and beginner learners overwhelmed the listener’s ability to hear other types of language difficulties.

It may also be that other areas identified by the listeners may relate to perceived comprehensibility. The listeners paid additional attention to the meta-level including discourse organization and register for the advanced speaker despite her clarity of pronunciation. It also seemed evident that non-pronunciation related elements of speech could impact the rating given to different speakers. The intermediate and beginner speakers had a similar proportion of the sites where non-standard segmental features were identified. The numbers of pauses and the numbers of the sites which had segmental errors were also similar for the speakers. Nevertheless, the TEACH raters evaluated them as being part of different proficiency levels. Since the TEACH test rewarded interactive speaking, the skills and lively attitude of the intermediate speaker may have caused the raters to better understand the topic in the long run.
In addition, the verbal reports given by the native English speaking listeners showed that the moments when they experienced reduced intelligibility led them to have a communicative breakdown. Nonetheless, the listeners did not have a communicative breakdown when they identified some words as unintelligible. For example, when the advanced speaker produced the words with non-standard /ðʒ/ as, the listeners could identify the speaker’s intended words as time went on although they felt irritated by the mispronunciations. The case of the advanced speaker shows that reduced intelligibility and a communicative breakdown are related yet not identical.

5.5.2.2 The Use of Extended Discourse to Examine Intelligibility and Comprehension

The type of speech sample used in this study made it possible to model the complex nature of intelligibility in understanding spoken discourse. The range of linguistic/non-linguistic information the listeners responded to was different from Munro and Derwing (1995). The think-aloud listeners had to process information on many levels to understand the meaning of a speech. It was especially evident that the listeners used both top-down and bottom-up strategies to make sense of the presentations. In contrast, because the listeners in Munro and Dewring’s study only listened for about 10 seconds to a part of a speech which described a series of cartoons, the comprehension processes were likely to have been more restricted.

The listeners in Zielinski (2006a) also were encouraged to listen for errors at the micro level of discourse, even though her study used a methodology similar to this study. Because she used speech material which had been excerpted and edited from conversational speech, the type of speech sample was real speech. However, each speech sample consisted of at most 18 words. This means that the listeners were deprived of the larger discourse context in reporting their understanding.

When the listeners listened to the whole speech, they attended to not only word level and sentence level information, but to the discourse level as well. The listeners in this study perceived non-phonological features as well. This macro-level information, such as organization and pragmatic use of language, helped them to comprehend, but it also sometimes caused difficulties in understanding.
5.5.3 Pedagogical Implications

5.4.3.1 ITAs

The findings in this study suggest that ITA testing is complicated. A single linguistic factor can not determine a speaker’s oral proficiency as shown in the performance of the intermediate and beginner speakers. Despite the similar distribution of segmental errors, one was rated as being a better speaker than the other. The analysis of reasons for the pauses showed that listeners paid attention to grammar, language use, expressions, and organization. Interpersonal skills and personality may also have influenced the ratings.

ITA trainers are encouraged to focus on not only phonological aspects of language but other aspects as well. For all levels, learning about American rhetorical styles and organizational cues is thought to be effective. Solid organization may be important for advanced speakers because the listeners pay more attention to non-phonological aspects of a speech when pronunciation is good. It is also important for the lower levels. With good organization, listeners likely will find it easier to follow a speech despite some imperfections in pronunciation. In this study, although the intermediate speaker was perceived to be similar to the beginner speaker in term of the types and number of errors, she was rated as performing better than the beginner because of her strength in other areas. Likewise, a mastery of effective presentation skills is expected to benefit all speakers, but especially lower level speakers.

This discussion leads to some suggestions for ITA training. Depending on oral proficiency level, taking different approaches for different levels of oral proficiency may be more effective. Accurate as well as appropriate use of language can be prioritized for advanced speakers. Instruction for lower level speakers should focus more heavily on pronunciation of segmental as well as mastery of effective interpersonal skills which are appropriate for American classroom culture.

5.4.3.2 Pronunciations in General

This study found that not all segments are equally important for the listeners to understand extended discourse. As discussed in Section 5.3, non-standard /e/ and non-standard /ɔ/ were not equally critical for intelligibility. Jenkins (2002) argues that /e/ and /ɔ/ are not important in contributing intelligibility and excludes them in her set of core segmental features. The findings from this study support Jenkins especially about the role of non-standard /e/. Further research can focus on finding how the listeners perceive non-standard /e/ and /ɔ/ in other type of speech events.
Also this study found that syllable final consonants are important in an academic presentation regardless of the strength of syllables. When listening to extended discourse, syllable final consonants often carry important information inducing grammatical information (Gilbert 1995). As shown in Section 5.3, the syllable final consonants in the words which had grammatical information including number, possessive, and tense were often perceived. Additionally, the syllable final consonants in the key terms of the lectures were perceived as being particularly important. While Zielinski (2006a) found that listeners tend to focus more the initial syllables, this study suggests that final consonants may be more important in real life listening.

5.4.3.3 Korean Speakers of English

The findings from Section 5.3 suggest that English teachers may target different segmental problems in teaching pronunciation to Korean speakers of English depending on their oral proficiency. Avery and Ehrlich (1992) wrote about the typical phonological problems area for Korean speakers of English without prioritizing them. This study found that their approach may not be very effective in giving pronunciation instruction to Korean speakers of English. The L2 speaker may have the different priorities depending on their interlanguage development. For example, the substitution of /k/-/q/ is a priority for the lower level speakers, but may be not for the advanced level speakers.

It is possible that advanced level Korean speakers may have difficulty in producing voiced affricates, as did the advanced speaker in this study because the particular problem seems to be L1 interference. The lower level speakers may have to prioritize voicing or aspiration of labial stops /p/ and /b/, and labiodental /f/ as emphasized in Avery and Ehrlich (1992).

The results of this study suggest that English teachers should also consider Korean dialect as a variable that can affect a Korean speaker’s English. In this study, Busan Korean may have transferred its typical tonal aspect in the speech produced by the beginner speaker. One of the noticeable characteristic of a Busan Dialect is to put a word stress in a second syllable. In this study, the beginner speaker consistently stressed the second syllable in words. Consequently, the listeners perceived a lot of stress errors combined with inaccurate vowels. As shown in Table 10 in Section 5.1, the listeners identified non-standard syllable stress patterns at 17 percent (N=24) of the pause locations. The non-standard syllable stress patterns accompanied non-standard vowels in weak places, this is, a schwa /ə/. All of the 8 pause locations where non-standard vowels in weak syllables indicated in the overlap had non-
standard syllable stress patterns. Also non-standard syllable stress patterns indicated at the 50 percent of the same pause locations.

Figure 10 presents that the beginner speaker had a complicated problems mixed with segmental and suprasegmental errors. He consistently stressed the second syllable and the vowels placed next to the syllable lost their original vowel qualities as a result.

Beg: Utterance 7
Total → /tōtə/
   • •

Analysis:
- non-standard word stress
- /ow/ in strong syllable was changed into /ə/
- final /l/ in weak syllable was omitted

Figure 10. The pause locations with both suprasegmental and segmental errors implicated

This study found a similar result in regard to L1 interference as claimed by Ryoo (2001)’s study about a tone transfer of Seoul Korean into English as a second language. Avery and Ehrlich (1992) noted that a high pitch of word initial position is typically found in Korean speakers of English. Their observation pertains to the findings in Ryoo (2001), but not to the Busan Koreans who put a high pitch to the second syllable position. Although this study examined segmental aspects, the findings present that the mix of suprasegmental and segmental may play a significant role for reduced intelligibility as revealed in the beginner speaker.

5.6 Conclusions

This study investigated the contribution of non-standard segmental features to the reduced intelligibility of extended discourse produced by the Korean speakers of English with different oral proficiency abilities. Native English speakers’ think-aloud verbal reports were analyzed to understand how they perceived some segmental deviations as more crucial in causing reduced intelligibility. Here are presented the findings and suggestions which apply to nonnative speech in general, and to Korean speakers of English in particular.
**General findings and suggestions:**

1. **The listeners stopped for different reasons depending on proficiency levels.**
   
   The listeners experienced more moments of reduced intelligibility while watching the lectures given by the lower level speakers than watching more the advanced speaker. Although the advanced speaker who was perceived as the easiest to understand in identifying the speakers’ intended words, the listeners stopped more frequently to comment on her organizational structure and the use of language appropriate for American classrooms. This was a surprising finding since the lower proficiency speakers actually had an equal or greater number of these kinds of errors. For the intermediate and beginner speakers, noticing these kinds of errors was harder since the listeners were hampered by their difficulties at a more basic level of understanding in identifying the speakers’ intended words.

2. **The number of segmental errors identified at the sites of reduced intelligibility correlate with their oral proficiency level**
   
   Although the advanced speaker was differentiated from the two lower level speakers by the numbers of times when the listeners experienced reduced intelligibility, the distribution of segmental errors showed that as oral proficiency level decreased, the number of segmental errors identified at the sites of reduced intelligibility increased. Analysis of the sites of reduced intelligibility revealed that the beginner speaker had a larger number of segmental errors than had the intermediate speaker. In addition, the beginner speaker had a greater number of suprasegmental errors than did the intermediate speaker. This may have been a result of dialect interference, or it may have been related to proficiency.

3. **The findings in this study also support the arguments for the importance of segments in strong syllables in the previous research**
   
   The vowels and consonants in strong syllables were important for the listeners in identifying the speaker’s intended words in extended discourse as well. Consistent with the results in Zielinski (2006a), these results suggest that priority for consonant and vowel errors should be given to the sounds occurring in stressed syllables.

4. **Consonants in syllable final position were important for understanding extended discourse on an academic topic.**
   
   Previous empirical research on intelligibility has emphasized the importance of consonants in syllable initial positions, arguing that segments in initial position carry important information. While the importance of initial positions was confirmed in this study,
final consonant sounds also were critical in the extended academic discourse used in this study. These final consonants provided critical information about grammar, the flow of a speech, and the content of the discourse.

5. The target for pronunciation instruction should be differentiated depending on oral proficiency.

   This study showed that not all segmental features were perceived as being equally crucial in terms of intelligibility. Some of these differences appeared to depend on the oral proficiency levels of the speakers.

6. An effective speaker was judged holistically in an academic setting.

   In this study the listeners identified the same number of the confusion spots for the intermediate speaker as did they for the beginner speaker. TEACH results, however, seemed to reflect her skillful interaction and confident attitude toward the audience. These non-pronunciation oriented issues seemed to make a large difference in how speakers were actually perceived. Coupled with the comments on the advanced speaker, not only clear pronunciation important but also the meta-level of language, including organization, grammar, and the appropriate use of language should be emphasized for all levels.

For Korean speakers of English

   All of the above findings and suggestions were generated by a study using Korean speakers of English. In addition to the general recommendations, the following suggestions are made particularly for L2 speakers with Korean background.

   Listeners frequently commented that the advanced speaker in this study did not voice /\dʒ/. Nonetheless, the problem in producing /\dʒ/ may not be perceived as being salient in lower level speakers. Focusing on voicing of affricates may be most important when teaching advanced speakers of Korean.

   For the lower level speakers, segments including liquids /l/ and /r/, voicing or aspiration of labial stops /p/ and /b/, labiodental /f/ and the tense vowel /s/ seemed to be most important and should be targeted early.
APPENDIX A. THE FIVE LISTENERS’ THINK-ALOUD VERBAL REPORTS

A.1 Native Speaker 1 (NS1)

<table>
<thead>
<tr>
<th>Utterance</th>
<th>Text</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>‘We’re gonna talk a little bit what is a grid’ but then it sounds like she says green but then on the bord it says grid so maybe maybe she means a grid.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>lay out the page how you gonna how you gonna, kinda seems run together just a bit but how you gonna lay out the page or segin a page I still understand it though.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>kinds of gain she has to say grid because it is written on the board but she still sounds grease maybe the d isn’t very yeah the de isn’t very clear almost sounds like grease or something.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>before we go into designing art work she said art work but it kinds of came out urrrr ar work run together with the next word, artwork.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>this one sounds like gread almost, instead of grid.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>again the gread the gread again</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>though she was writing the error she said this part but then she said these parts so I’m not sure what the first part these or it was this but she’s just changed it.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>we tell the margin? We can tell the margin? maybe that’s what she said but if she said I couldn’t head the can this is uh we tell the margin</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>harfort reader to read, it’s little confusing it sounds like a one word</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>cOmplexicity um she pronounced it cOmplexicity instead of complEexity stress seems to be on the first syllable instead</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>this part is the where? The where you?</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>this is called one column but almost sounds like colon</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>again sounds like colon but probably column</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>one two three colons column but yeh it almost sounds like colon but I didn’t hear that s colon colon</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>your desire work? Almost like it sounds like desire work</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>when we design big designs? Or book design</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>grit system? Almost sounds like grit yeah</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>the first days? Or the first stage? first stage maybe those words are little run together</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>any any mutual? Yeah almost sounds like any mature in this building probably means material</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>you can offer um visual materials? You can get offered any visual materials? Something about offering and materials</td>
<td></td>
</tr>
</tbody>
</table>

Intermediate Korean speaker —HHP

<table>
<thead>
<tr>
<th>Utterance</th>
<th>Text</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>today we will gonna talk about valling game? I think this is what she says about bowling.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>valing symbors? Its almost sounds like more of r that symbols</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>game of valling? It sounds like</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>consist of take frams almost sounds like I am assuming she says ten frames</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>the Fowler? Again it sounds like the v sound</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>has a uh tice?? I’m not sure</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>frame taise? I am not sure</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Frame taise? Frame tens? Maybe. I am not sure what she saying</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>we had we have urrr five symbols that’s what she says Ok.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>symbol, it means strike? I think that’s what she saying but that’s really um kinds of run together. It’s been strak.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>almost she sounds like she said stark but since she has strike on the board I’m assuming that that’s strike</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>all things knocked down it sounds like ‘things’ but maybe she said pins that would make sense of the context of bowling</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>first vur? Vul? Vur?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>the second is fair</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>of a fins are knocked down?</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>again kind of vul? Vur? again we kinds of have valls? Or Vur? Vurrrrr</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>the spare means just draw?? I think that’s what she says</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>it’s offer first bow</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>tumor?? It’s what she says I think it kinds of run together so it sounds like tumor</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>two or .two or more balls remain</td>
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<tr>
<td>21</td>
<td>intermediate voices it sounds like almost voices like almost voices or again I think valls??</td>
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<tr>
<td>22</td>
<td>it means . . .she pointed out foul but it almost sounds like far or fur something like that</td>
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<tr>
<td>23</td>
<td>there is no score on difference . . . .almost sounds like one word I am assuming that frame in that frame there is no score it sound like different or something- - - - ,spoken by Jiyon—</td>
<td></td>
</tr>
</tbody>
</table>
-it almost sounds like one word U know? Like dafferon different---- that frame?? I know but almost sounds like one word
Utterance 24 you know how to make score without?? I’m not sure that sounds what she says 2
Utterance 25 just end up all the score? Probably just add up all the score I guess
Utterance 26 the strikes and spare happen in that frame . . .I think that’s what she says
Utterance 27 so the tour?? . . .or the total . . .almost sounds like the tour is eight
Utterance 28 if forever?? Something like that I don’t understand what she says
Utterance 29 a bonus? I think that’s what it is but it almost sounds like Vonus with V
Utterance 30 the frame happens dh[^3]/s pairs . . . . that doesn’t make sense. That can’t be that I am not sure what she says though
Utterance 31 tur?? When she says total it sounds like tur sounds like R tur sounds R
Utterance 32 almost sounds like tense frame but because she wrote tenth on the board it makes more sense if it is tenth frame
Utterance 33 you can get at tense . . . . that’s almost what it sounds like but I think what she says chance to more balls but it almost sounds like tense
Utterance 34 the mess total?? What almost sound like maybe the math total?? But almost sounds like the mess total??—spoken by Jiyon “ math? MATH?—yes math but---

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<th>Utterance</th>
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<td>1</td>
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<td>41</td>
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</table>
### Advanced Korean speaker ---Art and Design

<table>
<thead>
<tr>
<th>Utterance</th>
<th>Text</th>
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<tbody>
<tr>
<td>1</td>
<td>grid, sounds like great</td>
</tr>
<tr>
<td>2</td>
<td>very spoken using like, reduction of urrs</td>
</tr>
<tr>
<td>3</td>
<td>pron, clear, umm, urrr confusing, may appropriate for casual speech but not</td>
</tr>
<tr>
<td>4</td>
<td>grease, sounds different... spoken</td>
</tr>
<tr>
<td>5</td>
<td>what we call this part?? (It should be) first this is what we call this part</td>
</tr>
<tr>
<td>6</td>
<td>again spoken, gonna gonna rather than more formal 'going to' when teaching a class, so changing registers appropriate to the context</td>
</tr>
<tr>
<td>7</td>
<td>this part is the where you... confusing</td>
</tr>
<tr>
<td>8</td>
<td>again article, if you make a two column, if it is a two-column grid, that makes sense but then she stopped and just came out of a two column, sounds confusing</td>
</tr>
<tr>
<td>9</td>
<td>J asking about read. E said it’s not a big issue cuz it’s so context-dependent</td>
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</table>

### Intermediate Korean speaker ---HHP

<table>
<thead>
<tr>
<th>Utterance</th>
<th>Text</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>today we were gonna talk about, maybe we are gonna talk about</td>
</tr>
<tr>
<td>2</td>
<td>What? Boring game?? I dunno what she’s talking about</td>
</tr>
<tr>
<td>3</td>
<td>boring?? Boating?? Now I realized bowling. Again this visual context. w/o I could not get what she’s saying. Score is OK.</td>
</tr>
<tr>
<td>4</td>
<td>bowler... between b and v</td>
</tr>
<tr>
<td>5</td>
<td>has a... she says has a tess sounded like, maybe she meant chance, but sounded like tess</td>
</tr>
<tr>
<td>6</td>
<td>tess, I don’t</td>
</tr>
<tr>
<td>7</td>
<td>we have a five, eight... oh maybe the symbols she marks in the boxes</td>
</tr>
<tr>
<td>8</td>
<td>This symbol izzz</td>
</tr>
<tr>
<td>9</td>
<td>ball sounds like vurr, between b and v. that’s very difficult to understand</td>
</tr>
<tr>
<td>10</td>
<td>oh she says all things? Or all pins?? knocked down, probably pins, but I don’t understand that either...</td>
</tr>
<tr>
<td>11</td>
<td>strike means X doesn’t sound right. X should mean strike. so it’s opposite</td>
</tr>
<tr>
<td>12</td>
<td>all of these are on backwards.</td>
</tr>
<tr>
<td>13</td>
<td>at first ones I don’t understand the transitions</td>
</tr>
<tr>
<td>14</td>
<td>two or more balls, two or more balls...</td>
</tr>
<tr>
<td>15</td>
<td>this is problem with singular and plural also. it’s less important the other words are more difficult to understand</td>
</tr>
<tr>
<td>16</td>
<td>no intermediate balls... I don’t understand</td>
</tr>
<tr>
<td>17</td>
<td>I understand what a split is so I know what she means by intermediate. if I was just listening to try to understand I don’t think I will understand</td>
</tr>
<tr>
<td>18</td>
<td>part of bowler... when the foot goes over foul line... I understand for bowler but from what I hear... when part of bowler... it could be head or hand or something else... in the bowling that’s not how it works, only a foot goes over foul line. You could be your arms, but there is a sensor in bowling alleys... maybe in bowling maybe there is a different way to explain it, foot of the bowler crosses the line rather than a bowler... so I don’t know it’s lexical item choice or it’s understanding herself what a bowl actually is. I don’t know</td>
</tr>
<tr>
<td>19</td>
<td>on the bowl game, awkward.</td>
</tr>
<tr>
<td>20</td>
<td>again like, spoken enough as a teacher in a classroom, confusing L and R.</td>
</tr>
<tr>
<td>21</td>
<td>Make a your scores, extra vowels</td>
</tr>
<tr>
<td>22</td>
<td>just like something, I didn’t hear. But she faced the board also</td>
</tr>
<tr>
<td>23</td>
<td>no strike, rather than no strikes, so I didn’t hear it, sounded awkward, though.</td>
</tr>
<tr>
<td>24</td>
<td>this frame happen?? this frame happen?? No happens to have, maybe?? She means strikes happens, frames cannot happen, very strange also, not happen, habban, but it sounded like happen</td>
</tr>
<tr>
<td>25</td>
<td>bonus of next two balls, because of what she says</td>
</tr>
<tr>
<td>26</td>
<td>So she should be saying words like add or addition combined to show the score is added up. Bonus of but not completing the process how it works... OK, there is plus</td>
</tr>
<tr>
<td>27</td>
<td>Again happen, I don’t know it’s have or has... she has more trouble with consonants than vowels.</td>
</tr>
</tbody>
</table>
Utterance 28  Sounded au, rather than all, Au the scores
Utterance 29  Bonus of number of next balls, I understand but It sounded like awkward construction
Utterance 30  It’s added up the first frame, OK it’s added to the first frame
Utterance 31  so language I understand she didn’t show that’s understood, it interferes the meaning, after I heard the third times, when you score five in the next frame if you knocked down five pins, I could explain a lot more what is actually happening, . . . . . I guess if some one who hasn’t bowl before, it should be a lot more difficult, I have advantages I can do this w/o her explaining it
Utterance 32  so I guess if you are not a bowler it would be what the tenth frame means you can bowl two more balls. Is sounds iZZah
Utterance 33  the man make a strike, the player makes a strike is OK
Utterance 34  has a chance two more balls, so the player can bowl two more balls, . . . . . assuming this scores . . . that’s very . . . . good score . . . so I thinks even though it’s bowling out of contexts it is very difficult. how come we’re

Beginner Korean speaker— ISME

Utterance 1  he’s having trouble with L and R
Utterance 2  the what? The technologist? See I don’t know what he’s gonna talk about so heavily context dependent right now
Utterance 3  control, difficult Ls and Rs
Utterance 4  primarily purpose, difficult
Utterance 5  OK. Cost. Must be economics or business?
Utterance 6  the order cost? Engineering. OK
Utterance 7  it’s difficult to understand. Could be the context rather than the words. Ordering could be sorting. The chart looks like
Utterance 8  something concept of inventory, INventory
Utterance 9  I don’t know what this is . . . I’m wondering he’s speaking this way cuz he learned it as a written form, or he learned to himself how to pronounce rather than oral forms
Utterance 10  no more concepts . . . titles? I don’t know
Utterance 11  I don’t know what this PC cost is.
Utterance 12  OK procurement cost. But he pronounced I t differently. procure month
Utterance 13  kettal cost? C. C cost. My lack of vocabulary in engineering
Utterance 14  quantity . . . orders? I don’t know what that is either. So even though I Know these terms I am not understanding what he’s saying to help me to learn them. more difficult more than I knew what it was . . . the score for him would be difficult. I think intelligibility I can catch the words but I don’t understand what he is talking about . . . I don’t know what he’s saying rather than explaining the formula.
Utterance 15  calCUlate. Calculate.
Utterance 16  formula, PC over Q, sounded like of Q.
Utterance 17  this is the same thing, number of quantity, number of something, so confusing
Utterance 18  or year? Or for a year? for a year is OK but sounded like for year
Utterance 19  still don’t understand, kettal cost.
Utterance 20  kenning cost? I really don’t understand.
Utterance 21  calendar cost? Is that it?
Utterance 22  Inventory again, inVENtory.
Utterance 23  by this formulas, agreement problem
Utterance 24  Pish, not PC
Utterance 25  so times sounds like type of s
Utterance 26  carrying cost?? I don’t now
Utterance 27  at this point, should be
Utterance 28  I don’t know what the last word is. Deposits?? oPPOsites?? . . . Opposites?? Oh.
Utterance 29  pigure
Utterance 30  order many quantities, order in this case could be purchase, in the beginning it didn’t fit. Ordering like sorting. order ascending or descending it took me a while
Utterance 31  so less, R and L.
Utterance 32  would be increased, would increase, passive and active problems
Utterance 33  total, difficulty with that word; and there should be an equilibrium that I did not hear if he said that exactly; the cross, maybe it is mispronounced or it could be something else
Utterance 34  I give you, I will, future tense

A.3 Native Speaker 3 (NS3)

Advanced Korean speaker. —Art and Design

Utterance 1  she started out saying ‘we’ll gonna talk about what is grid’ so grammatically she already hasn’t even phrased a proper grammatical structure. I have already heard her saying like as what we would call that interjection.
Utterance 2  not only like but she is ‘lik ah, likah designing’
I’m surprised this is a prepared material that she isn’t more prepared with clear grammatical structures, un she does sound she is nervous cuz she uses a lot of interjecting like and urrrs
and verbal pauses, and I didn’t notice that if she was prepared to give this speech, she should have had some grammatical sentences that says ‘we are going to look at’ which girds are used for which circumstances. . . something you know something like parallel sentence but she just interrupts herself and says ‘now we are gonna look at the what and how we make this I don’t remember exactly but . . .

Utterance 1: today I will gonna talk about I dun know she was trying to say we are or we were
Utterance 2: I couldn’t understand what she said there . . . bowler have . . heavy a chance.
Utterance 3: I’m gonna let it go for a little bit and let her explain cuz she said it’s frame tense frame tense but she should have said ten frames but she did say ferame
Utterance 4: symbors, this symbor,
Utterance 5: it’s very hard to say ‘all pins on the first bowl’. I think she’s saying ‘urr pinz first burr’
Utterance 6: strike doesn’t mean the symbol, spare doesn’t mean the symbol, miss doesn’t mean the symbol, the symbol means strike, so that was confusing
Utterance 7: she got split but she said ‘izuh split’
Utterance 8: this is the hardest for her to say . . . I wish she could have a different subject , two or more bowls, two or more bowls there are so many Rs and Ls. She got ‘split’ though, she got ‘split’. . . . wow ‘two or more bowls will remain’ she could tell she was not getting that and she repeated and by the third time its was clear that she was trying to say ‘two or more urrr’ but her vowel sounds, all were ‘ohu ohu ohu’ yeah so if she could clarify the vowel sounds it would be easier to distinguish . . . so far I comprehend somewhat . . . I knew bowling and graphics. . . .
Utterance 9: I couldn’t tell what kinds of bowler she said something bowler, . . . . a part of bowler, . . . sort of make sense though it’s hard to follow
Utterance 10: too bad it sounds like a ‘boring’ game!
Utterance 11: it’s easy to make score to buy your hands . . . I couldn’t . . . dunno what she is trying to say
Utterance 12: ‘aid’ up all the scores
Utterance 13: she says ‘store’ so ‘the store is twenty’ I couldn’t tell
Utterance 14: sounded like ‘us, us, us pair, us pair’ ‘this frame happens as pair’ then when she drew the line I realizes ohh it’s a spare but if I hadn’t seen her showing me there was a spare, ‘this frame happens as a pair’ I would have thought ‘oh it goes as a pair! Oh not it’s spare!’ so comprehension was impeded by that pronunciation.
Utterance 15: one more verr I think the vowel sounded the same and the curve of the sound the same, it should be ‘more balls’, o a, o a, more vurs
Utterance 16: more vurs
Utterance 17: the what score?? The masteral score?? The last?? The masteral score?? The lasteral?? The tle I don’t remember what she says

Intermediate Korean speaker — HHP

Utterance 1: Ke start?? What’s what he said Ke star. . . and in the last kurass
Utterance 2: I think he meant to say . . . techniques for inventory . . . . . planning and control???? But I don’t think very many people will hear it???? He slows down might be better
Utterance 3: word stress. . . appropriate . . . . . appropriate should be . .
Utterance 4: I don’t know he missed grammatical ending but associated cost? associated cost? But he said appropriate. . . so word stress and grammatical ending missing
Utterance 5: OK he’s trying to say . . . frequency if the frequency of the order’s being placed then the cost I think he’s trying to say frequently? frequency?? but it sounded like EnqueUEtei
Utterance 6: again word stress . . InVEN tory. . . Inventory
Utterance 7: CONCept should be. He said conCEPT...that could be hard to get if I couldn’t stop in between like I couldn’t stop so I can digest it. . . . but I’d have to go back to figure out what he meant . . and I would be missing what heis saying now if I wouldn’t stop it . . . just

Beginner Korean speaker — ISME
because he does not put the right stress on words. I think that’s the most significant. ...content of inventory? ...content of inventory? ...content of inventory? Ohhhh

Utterance 8 Divided by procurement monthly cost? Should be but I don’t think that’s what he meant

Utterance 9 we need to know more this type? First type co? I can’t understand this word but I know this is an important tool because it’s part of his formula

Utterance 10 procurement cost

Utterance 11 ohhhh ... quantity order? quantity order? Demand? Quantity orders. ... but he says KANTITY orders

Utterance 12 this type? If you understand or memorized this????? Taicure? I want to say if this formula or equations. ... is the second time he uses this word yet I don’t know this words yet

Utterance 13 ohhhhh so many time he kept saying annual and I kept thinking ‘And your’ annual AndYOUal he says and your and this is the first time I heard annual procurement cost and your. ... something cost and your. ...

Utterance 14 number of all quantity? O quantity? ... Overall quantity? Or all quantity??

Utterance 15 number of quantity of ear? Did he mean ear??

Utterance 16 OK Q of 2.....he’s trying to say Q over 2 cuz it’s actually 2 over Q but 2 over Q I mean, Q over 2 but he says ov-F ... so it’s not quite of. ... Q of 2... he’s not saying over Q over 2 I think I’ve heard average not knowing what it was... now I know it’s average. ... cuz he’s saying said ‘auers’ ‘auers’ ‘auers’. he’s not saying ‘over’ and now it’s a-e-re ‘auers’ and he says /z/ ... with the d in front of it you know doesn’t close it at all

Utterance 17 total cus. cos. ... TOTAI cos ... TOTAI... I think he’s putting equal stress on both syllables instead of TOTAI... and he is not doing ‘ai’ sounds, he’s doing ‘ai’ sounds, TOTAI.

Utterance 18 PC taise. ... fish taise

Utterance 19 Q of 2... and then these Cs aren’t good either, instead of PC. ... Sh Sh taise

Utterance 20 total cost...

Utterance 21 you can also create ... either ... equation of quantity? equation of quantity? Economics of quantity? E, I’m not sure what the e stands for.

Utterance 22 I didn’t hear what kind of managers, somebody... it’s very important for productivity managers to find this? productivity managers

Utterance 23 aha! Eco. ... nomiy of quantity... so it’s economy of quantity... it’s very important for production managers to find this economy of quantity... something... ot...

Utterance 24 in this picture...

Utterance 25 If we order rest... quantities? ... Economic order consequent. ... quantities? He will do well to spell out the words so that I would have the visual reference of the actual word he’s saying each time I hear him saying something like economic either economic of then I would learn to associate the sound he makes with the words... cuz I am used to the word native speakers make but by the tenth times he says the same words if it happened written what he’s been saying I think by the third time by the fourth time I would have known what his pron was like I wouldn’t have to decode each time. Also I don’t sit and listen to technical economics lectures very often so I’m less adaptive

Utterance 26 I give you I give you

A.4 Native Speaker 4 (NS4)

**Advanced Korean speaker. — Art and Design**

Utterance 1 right away just noticed filler here and there and ummm. ... like it’s common this is going to be more academic presentations you would try to clean up as filler as possible

Utterance 2 page almost like page’/’ almost sounds like /s/ or /z/

Utterance 3 grease’ she was missing that dental stops./d/ especially it seems like there is a main topic about grids in design you want to make sure you pronounce the vocabulary

Utterance 4 three kind of grammar, she like using ‘like’ a lot. This is like a filler.

Utterance 5 these, or this, almost sound like dense, did, th sound is lacking a little bit

Utterance 6 margin. /s/.

Utterance 7 edge, again, edge and margin, like a zzzzz sound coming in it’s like middle consonant cluster, at the beginning of words fairly fine, so the ones in the middle are flagging her, so to speak.

Utterance 8 once again there was a margin around the edge, so... yes both of them, edg /g/, you can probably get away from things like that but when the main content words you’re emphasizing, that was main topic, definitely draw more attention, I think it is very important to make sure you at least in this type of setting, pronounce specific those specific content words, or names labels effectively. ... just from teaching perspectives as well.

Utterance 9 seems like she is lacking an article, this is called three kind of grid... she did this couple of time like this is called one-column grid, or a two-column grid ahead so this is like the or a two-column grid, just small grammar errors but nothing major though.

Utterance 10 say/g/ overall. ... Rhythm, intonation and stress seem pretty since not like she... is completely monotonous there is like a fairly decent Rhythm. ... the main thing I think is just e couple of consonants here and there vowel seems most parts pretty good. Just retrospect so far

Utterance 11 vseems like she really like basically, or so. ... she use that phrases a lot, we all have our
| Utterance 1 | sound like we are talking about bowling here but according to her valing?? valing?? |
| Utterance 2 | even got with bowler, bowling, she constantly got V |
| Utterance 3 | frame test? I dunno she is saying test? I dunno there’s supposed to be th in there I don’t know, I don’t know what she is talking about there sounds like bowling. specifically I don’t really know |
| Utterance 4 | five symvors,.. was that Ls but Rs, vowel consonants things going on .. tired. |
| Utterance 5 | sfare, almost f sound, Ster-like, little uurr sound before, consonants |
| Utterance 6 | still got Vall problem. sticking with that,.. main subject you how you talk about .. that maybe affect people hard to hear ten times. .. but U understand her though |
| Utterance 7 | the symbol after the spare, .. I don’t ; understand what she says I didn’t hear a word, just a sound, I like a slush.. I can not make a word she just speak a different sound. |
| Utterance 8 | there seems like she so substituted that, the V for the F, the Vive instead of F, she voiced when it’s not supposed to voice it. There is an interesting thing going on, .. interesting is her rhythm or just pacing those kind of almost choppy at times. .. I can’t really put my finger on it but I mean it wasn’t a major issue this sections is almost tilted, maybe she’s got the spare thing going on, Maybe not one-time occurrence definitely need to fix that with the bowlers |
| Utterance 9 | there she said like scurrying?? Something like O sound for U |
| Utterance 10 | there seems what this.. theease.. but still th is here so. .. it is d combined with little bit of /th/ .. seems like th could be more like clear, sound more like D(More) |
| Utterance 11 | all da /da/ scores. .. but she’s like a nineteen pretty clear, seven and nine she’s being doing pretty clear |
| Utterance 12 | I can’t tell there where she was saying ‘is total or .. its total’ .. is/is/ total or its /itz/ total??.. this score is? Or its score?? Either way it was really fast |
| Utterance 13 | nothing happen? Nothing happens probably? There is small grammar, and there’s been couple of other grammar things like that. Nothing happened or nothing happens, either way she’s gonna fix the problems |
| Utterance 14 | test frame, didn’t sound like tense, certain consonant cluster or vowel and consonant cluster are causing problems or .. |
| Utterance 15 | there she said a Vonus. .. so.. definitely I didn’t know if I was at first if it was just vovling with that you know what that? because maybe if its was just in different environment, maybe the bowl with B was mispronounced. .. but seems like almost all over The bs are pronounced as Vs |

**Intermediate Korean speaker — HHP**

| Utterance 1 | favorite phrases so.. just an advantage of watching a video just scrutinizing .. defiantly, architect. An architect or for architects, plural. ..I think why pops out more is at the beginning of sentence, there is pause after it, maybe her audience has more time to think about it. ..she is good at using second pronoun, you do this and that.. it’s a good strategy ..it’s good she is suing personal pronouns. .. |
| Utterance 2 | a small verb-subject agreement, he create |
| Utterance 3 | She does a good job she is incorporating a lot of good gestures, and illustrations, paralinguistic cues, eye contacts. |

**Beginner Korean speaker — ISME**

| Utterance 1 | right away, his consonants are mixed up, last class, L was different, but I could tell it’s class, thought just seems like quiate a few consonant issues going |
| Utterance 2 | I have no idea, maybe field terms or.. all blurred together |
| Utterance 3 | sounded like when he says, is, it sounds like /yis/, both vowel and consonants, /yis/.. such as a common verb like is, is so prominent, |
| Utterance 4 | the rhythm seems to be weird, it’s kind of dadadadadada very even very quick though.. I am having a hard time to understand something about even about market. .. or something it’s very hard to grasp..maybe he is using quite a lot of field terms I dunno. ..pretty difficult.. ..I can’t major words. .. |
| Utterance 5 | sounded like we like Ve /wvy/, he is voicing the w, his we sounds weird. |
| Utterance 6 | dunno what quite to say, the quantity sounds like the prominence and stress on that is different with bunch of different words, he’s talking about variables and equations. I understand he is talking about equations, it’s hard to grasp exactly what he is saying I know he is generically talking about, it’s pretty hard to follow.. ..I dunno part of it seems like there is not enough variance of consonants, they sound so similar.. could be some of the stresses maybe make it difficult as well(but there are more) |
| Utterance 7 | it sounded like TOTA cost, doesn’t sound like TOtal, so he is missing the L there, oh yeah missing L |
| Utterance 8 | almost sounds like shishi, like shishi times, I dunno |
| Utterance 9 | I didn’t understand what the first word was, something a procreate, or procrate.. I dunno what word that was, a lot of main words I can not get |
| Utterance 10 | I procurement cost, that was pretty clear |
| Utterance 11 | this, he says dYis. couples of times, da instead of the, th thing is defiantly he is missing there |
| Utterance 12 | I don’t think I know the one or two words our of that last sentence. he is pointing out something on the graph. The way he inter-related. But how I missed it, ..did it opposite?? I
didn’t hear opposite...word stress...

sounding like enquantity but there is something related it though...maybe he is talking in formulas instead of talking in normal sentences, so its makes kinds of difficult syntactically it seems there are things that are flowing just because of the subject, it seems like just like it doesn’t connect...just not related it...saying like cost here and cost there thinks of this cost here and cost there equals that. I can not hear many transitions ‘rather, when’ when we look at this formula, we see that this happens here he just constantly say CC post as...very straightforward and very mechanical, there is no really actual conversational speech going on...I am dealing with already so mechanical so something easier I think to at least I would suggest...I would think of student following this...students would have very hard time they understand symbols and what's going on board they can get that. I am he is confident in his field but...

there he’s got the TOTA cost, cost he seems like he’s gotten every times he said it, there is one word I always understand, that is cost.

he said I give a/uh/...extra vowel...stumbling of whatever I did not hear through email...you can contact me by email...maybe word choice...

A.5 Native Speaker 5 (NS5)

Advanced Korean speaker — Art and Design

Utterance 1 couple of grammatical things like what is grid and I don’t remember what she just said, how something designs, and then he says like a lot, her pron seems clear.
Utterance 2 I don’t think she made plural, just three kinds of grid.
Utterance 3 edge, sounded like ege.
Utterance 4 she said, the where you put your text in it
Utterance 5 I did keep hearing ege, margin has a little softer g too, margin.
Utterance 6 again, the plural, these are three grid that you can design, column is clear
Utterance 7 if you don’t have grid, probably you would word it differently, of you use grid system something like that, awkward expressions
Utterance 8 again, that should be plural, should be ‘when architects’.
Utterance 9 this is the verb structure s, she says he create

Intermediate Korean speaker — HHP

Utterance 1 this is little harder to understand, wasn’t not I
Utterance 2 the game of what??? Volley?
Utterance 3 now I think she’s talking about bowling, that doesn’t sound like bowling though 1:00 I hear V I don’t hear even B.
Utterance 4 this symbols is means strike,
Utterance 5 fins, instead of pins
Utterance 6 I have to think about what that means so I know...what it means but when I a, listening the way she said it I think she means that ‘it happened on you have to try to knock down all the pins’
Utterance 7 more with the understanding the message than the pronunciation on that, strike doesn’t mean symbolize
Utterance 8 she must have said first one, but sounded force one
Utterance 9 no idea what it was...more vuerrs??
Utterance 10 10. that was really hard to understand, that one somewhat frustrating, unclear
Utterance 11 I think she said five, but sounded like Vaa
Utterance 12 the wording of that, we probably would not say make a score for that, figure out or
Utterance 13 . did she say ‘no strikes or spares happened in the frame’? I didn’t really hear the no and spare sounded like shares, could not clear
Utterance 14 sounded like she says ‘ten plus next opponent of the two frame’ I am not sure what word that was
Utterance 15 this frame happens of spares? The phrasing would be different
Utterance 16 16. the next frame happens five... in the next frame the score would be five. Probably the way I would say
Utterance 17 more of a U sound in the last of the word, happUnED, happUnED, happened that was stronger....I thought it was really natural how about this frame, it sounded very good
Utterance 18 . you can get a tess to more Vuurs, not really sure what that was
Utterance 19 sounds like est frame, instead of tenth frame
Utterance 20 it seems like maybe she uses is too much

Beginner Korean speaker—ISME

Utterance 1 I am not sure what they read about. Sounded like Rast, instead of last. Still understand it but those couple of words, I don’t know what they read about.
Utterance 2 techniques for inventing something and control??... but the techniques were hard to understand
Utterance 3 I’m not sure if it is appropriate(a) or appropriate(v) it seems like it should have been
<table>
<thead>
<tr>
<th>Utterance</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>have a hard time for understanding ‘cost’ since he saying it a lot kinds of think about the other things</td>
</tr>
<tr>
<td>5</td>
<td>I’m not sure what those words were</td>
</tr>
<tr>
<td>6</td>
<td>is he saying INventory? Sound like inventory, has to do with stress. And really affects. . . . not necessarily with stress only, there are kind of a lot going on</td>
</tr>
<tr>
<td>7</td>
<td>I’m not sure what those words were before month</td>
</tr>
<tr>
<td>8</td>
<td>INventory is really different. all I hear is middle syllable</td>
</tr>
<tr>
<td>9</td>
<td>this subject is a lot harder to understand than the other two. No background. More complicated. Having a hard time</td>
</tr>
<tr>
<td>10</td>
<td>per year sounded like fur year</td>
</tr>
<tr>
<td>11</td>
<td>Q could have been conducting others ?orders??</td>
</tr>
<tr>
<td>12</td>
<td>did he say fish ties oer Q</td>
</tr>
<tr>
<td>13</td>
<td>I figured out that was quantity, sounded KAntity. it took a minute for me to get that</td>
</tr>
<tr>
<td>14</td>
<td>calculate, sounded like carculate, I hear an R there</td>
</tr>
<tr>
<td>15</td>
<td>I’m not sure what those words were, unis you have in inventory? Oh, units. I didn’t hear the T</td>
</tr>
<tr>
<td>16</td>
<td>when I thought he was saying fish, maybe he was saying PC. Cuz P has more of an uh sound with it,</td>
</tr>
<tr>
<td>17</td>
<td>I hear prus.</td>
</tr>
<tr>
<td>18</td>
<td>the sentence with carculate and quantity, both challenging words 6: 53</td>
</tr>
<tr>
<td>19</td>
<td>I head conCEPts instead of CONcepts</td>
</tr>
<tr>
<td>20</td>
<td>oPPOsites instead of Opposite</td>
</tr>
<tr>
<td>21</td>
<td>I didn’t hear the first half of sentence</td>
</tr>
<tr>
<td>22</td>
<td>pigure instead of figure</td>
</tr>
<tr>
<td>23</td>
<td>less sounds like rest and less quantities isn’t the best grammar either, maybe lower quantities or. . .</td>
</tr>
<tr>
<td>24</td>
<td>givuh instead of give</td>
</tr>
</tbody>
</table>
APPENDIX B. THE PHONETIC DESCRIPTION OF THE FIVE LISTENERS’ THINK-ALOUD VERBAL REPORTS

B.1 Native Speaker 1 (NS1)

<table>
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</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

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<tr>
<th>Intermediate Korean speaker — HHP</th>
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</tr>
</tbody>
</table>

发音注释：
- Grid: /ɡriːd/  
- Margin: /ˈmærɪŋ/  
- Column: /ˈkəlmən/  
- Frame: /frem/  
- Design: /dɪˈzaɪn/  
- Book: /bʊk/  
- Magazine: /ˈmæɡəˌziːn/  
- Poster: /ˈpəʊstər/  
- Grid system: /ɡrɪd sɪˈstəm/  
- Structure: /ˈstrʌktʃər/  
- Material: /ˈmæterɪəl/  
- Bowling symbol: /ˈbəʊliŋ sɪˈməlbɔrəm/  
- Strike: /striːk/  
- Spare: /sپər/  
- Miss: /mɪs/  
- Split: /splɪt/  
- Frame: /frem/
or more balls uh two more or two more or balls remains uh standing with a not uh low intermediate balls
between uh in front of or between. So that is a split. So that means its foul. Foul means a part of bowler uh goes
beyond the foul line. So if someone make a foul there is no score on that frame. OK? So there is. So we learned
about five symbols on the bowling game. And the next is scoring. Uh if you know like a make how to make a
scoring four method it so easy to make your score too by your hands. So first this no no strike or no like a no
strike no spares that means just add it up all the scores. that is six and there is three. So that is score is nine, right?
And then next is seven and no strike and no no spares happens in that frame. so that is seven and one. So their
total is eight. And just add it up. OK? so its total is seventeen. Right? How about this this scoring? This frame
happen. It’s one strike right so if it happen, some one has a one strike, that means ten plus next uh a bonus of next
two frames uh next two balls. So their bonus is seven and then plus the bonus of two. OK? So here is ten plus
seven plus two is nineteen, right? And the next frame happens total is nine. So add it up all the score is twenty
Eight OK? And this case this frame happens are spare. Spare means spare ten plus a bonus of number of next
ball. So this frame. So ten plus five. This add it up the first frame. So its total score is fifteen. OK? So the next
frame happens five and then nothing happen. Right? so this is total twenty. OK? How about this frame? this is the
tenth frame. if you make a uh if you make a uh strike at the tenth frame, you can get you can get a chance two
more balls.It’s a bonus. And If you get a like a spare at the tenth frame, you can get a one more ball as a bonus.
So in that case The the man make a strike, right? so the man has a chance two more balls. Right? So in that case
here is like a we just assume like a one fifty. How about in that case we can add it up ten plus seven, right? And
plus its nothing happens. its zero. So add it up how many? Seventeen? so one sixty seven. so the man’s total score
is one sixty seven. OK?

Beginner Korean speaker --- ISME

in the last class you learned about demanding forecast function. Now we are going to talk about the techniques
by using this formulas you can also compute total cost

or more
this total cost is PC times D of Q plus CC times Q of 2. Procurement cost plus carrying cost is total cost. Last, we can also calculate economy order quantity. This economy order quantity is at the same procurement cost as carrying cost in this point. It is very important for inventory managers to find because this two concepts very different or opposite, so its is economy order quantity so called EOQ. In this figure In this figure If we order if we order many quantities the carrying cost is would be increased however if we order less quantities the procurement cost would be increased. so finding this economy order quantity point is to reduce total cost. So I’ll give you I’ll give you reports through email for this related with inventory cost and total cost and EOQ. Thank you. So any questions?

B.2 Native Speaker 2 (NS2)

About grid we are gonna talk little bit about what is grid. OK. Uh Grid is uh very important. It’s like a basic instrument for like organizing graphical elements of text and images. Um Like designing a grid is like a designing a page layout. So it’s basically um if there is a piece of paper you basically uh like uh lay out the page that how you gonna design on this piece of pa.....paper and there is um kinds of grids that we could use when we design. So like before we go into un this designing art work uh we need to like think about uh what grid we’re gonna use so there is like a grid that I am just gonna talk about like a three kinds of grids today just to give an idea what it is. So uh first what we call this part these parts around the edge these are called margin we need to have a margin because if you don’t have a margin when you design like a page then un the text will be like un from the very edge if the text starts very uh starting from the very edge, it’s gonna be too packed for this page so it’s gonna be un like hard for readers to read and it’s gonna give some complexity so our designer when we design something we need to always have a margin around it so this part is the where you put your text in it. So this is called one column grid because it has one column right here so basically you create a frame around the page so it is like a page layout. And then once you create a frame you put start to put text inside your column so this is one column grid. And there is a. So if you make a two columns that’s called two column grid. And there is one more. so you need to always have a margin around the edge. so this is called three column grid so you have one two three column so these are like basic um grid that you could use to create um your design work especially when you design like book design or magazine design or like posters, you always need to have like grid system for that. if you don’t have like grids for your design work, the first stage you need to have grid creating a frame and then you start to put like text or images into it so it’s easier for you to um design something and for example umm for easier understanding for architect when architect design a building he doesn’t like put windows or carpets like any material inside the building first what he does is um he create the structure first and then he starts to put everything inside the building so it’s like a bone and human body. so bone is like a grid in design. ok and I will show you some examples of grids for visual materials that I brought so if you see the book uh this is the book. And you see inside
Intermediate Korean speaker ---HHP

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Beginner Korean speaker --- ISME

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**Intermediate Korean speaker — HHP**

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there is one more. so you need to always have a margin around the edge. so this is called three column grid so you have one two three column so these are like basic um grid that you could use to create um your design work especially when you design like book design or magazine design or like posters, you always need to have like grid system for that. if you don’t have like grids for your design work, the first stage you need to have grid creating a frame and then you start to put like text or images into it so it’s easier for you to um design something and for example umm for easier understanding for architect when architect design a building he doesn’t like put windows or carpets like any material inside the building first what he does is um he create the structure first and then he starts to put everything inside the building so it’s like a bone and human body. so bone is like a grid in design. ok and I will show you some examples of grids for visual materials that I brought so if you see the book uh this is the book. And you see inside

intermediate korean speaker ---HIP

Hi, everybody. uh today we will gonna talk about the bowling symbols and then bowling scoring. so the game of bowling for individuals consist of ten frames. OK? so the bowler uh has a chance to get a ball. Uh It’s frame 

tenth So we have a five symbols. So this is this symbol is means strike. strike means like a all pins knocked down on the first ball. OK? the second is spare. Spare means all pins knocked down uh first and the second second ball OK?This symbol is miss. Miss means no strike or no spares. OK? So strike means is ex and then spare means just one. And then miss means like that. And then the forth one is split. Split means it’s after first ball two or more balls uh two more or two more or balls remains uh standing with a not uh low intermediate balls between uh in front of or between. So that is a split. So that means its foul. Foul means a part of bowler uh goes beyond the foul line. So if someone make a foul there is no score on that frame. OK? So there is. So we learned about five symbols on the bowling game. And the next is scoring. Uh if you know like a make how to make a scoring so four method it so easy to make your score too by your hands. So first this is no strike or no like a no strike no spares. that means just add it up all the scores. that is six and there is three. So that is score is nine, right? And then next is seven and no strike and no no spares happens in that frame. so that is seven one. So their total is eight. And just add it up. OK? so its total is seventeen. Right? How about this this scoring? This frame happen. It’s one strike right so if it happen, some one has a one strike, that means ten plus next uh a bonus of next two frames uh next two balls. So their bonus is seven and then plus the bonus of two. OK? So here is ten plus seven plus two is nineteen, right? And the next frame happens total is nine. So add it up all the score is twenty Eight OK? And this case this frame happens are spare. Spare means spare ten plus a bonus of number of next ball. So this frame. So ten plus five. This add it up the first frame. So its total score is fifteen. OK? So the next frame happens five and then nothing happen. Right? so this is total twenty. OK? How about this frame? this is the tenth frame. if you make a uh if you make a uh strike at the tenth frame, you can get you can get a chance two more balls.It’s a bonus. And If you get a like a spare at the tenth frame, you can get a one more ball as a bonus. So in that case The the man make a strike, right? so the man has a chance two more balls. Right? So in that case here is like a we just assume like a one fifty. How about in that case we can add it up ten plus seven, right? And
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**Beginner Korean speaker --- ISME**

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**Advanced Korean speaker --- Art and Design**

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like grid system for that. if you don’t’ have like grids for your design work, the first stage you need to have grid
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put windows or carpets like any material inside the building first what he does is um he create the structure first
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**Intermediate Korean speaker —HHP**

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APPENDIX C.  THE SEGMENTAL ERRORS MARKED BY AN OUTSIDE LISTENER

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