A STUDY OF LISTENING COMPREHENSION OF ACADEMIC LECTURES
WITHIN THE CONSTRUCTION-INTEGRATION MODEL

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
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ABSTRACT

This study assumed that there are indeed effects of both content knowledge and L2 listening proficiency on L2 college academic listening and investigated the extent of these effects on L2 learners’ academic listening comprehension as defined to have both text-based and situation model understandings based on the Construction-Integration model. In addition, this study investigated the comparative importance between content knowledge and L2 listening proficiency in L2 college academic listening in relation to the notion of threshold. Furthermore, this study explored additional features of academic listening that might have an impact on L2 college academic listening comprehension.

This study used a quantitative design as the main research methodology in an ex post facto study and also employed a small, supplementary follow-up qualitative interview. One hundred forty-one non-native English-speaking students (80 females and 61 males) at an American university participated in this study. The results of multiple regression analyses showed that both content knowledge (as measured by a self-assessment and a checklist) and L2 listening proficiency (as measured by a self-assessment and a TOEFL test) were significant predictors in explaining L2 listeners’ academic lecture comprehension. In addition, L2 listening proficiency accounted for a larger relative contribution to L2 listeners’ text-based understanding (as measured by a
checklist and a written recall-protocol) than did content knowledge, whereas content knowledge accounted for a larger relative contribution to L2 listeners’ situation model understanding (as measured by bridging inference questions) than did L2 listening proficiency.

With regard to the notion of threshold, ANOVA results showed that the three different levels of L2 listening proficiency groups did not differ from each other on their performance of content knowledge tasks. Multiple regression analyses, which were conducted to investigate whether there was a developmental pattern whereby the effect of content knowledge increased with greater L2 listening proficiency, provided no developmental patterns of content knowledge effect with an L2 listening proficiency increase.

Interviews with selected 13 participants acknowledged the importance of both content knowledge and L2 listening proficiency in college academic lecture listening by reporting that the lack of either variable resulted in comprehension difficulty when they listened to a college academic lecture. With regard to the factors affecting L2 learners’ college academic listening comprehension, interviews with the selected participants suggested additional 10 factors such as visual aids, a lecturer’s speech rate and pronunciation, besides residency in the USA, duration of English study in native country, and gender that were identified in the quantitative aspect of this study.

Continuous studies are recommended to allow for an examination of the theoretically interesting question of a threshold for listening and the application of the Construction-Integration model in explaining the effect of content knowledge on L2 academic listening comprehension.
Dedicated to my parents,
for their endless love and support
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CHAPTER 1

INTRODUCTION

1.1 Background

Language learning primarily occurs through two mediums, the written and the spoken. With regard to the written medium, researchers have given equal attention to investigating the role of both writing and reading on L2 learning; this has been reflected by the wealth of articles that has appeared on both skills in major professional journals. When it comes to the spoken medium, however, the lack of sufficient research and the need for systematic investigation into the role of listening have been continuously pointed out (Joiner, 1986; Long, 1987; Dunkel, 1991; Rubin, 1994; Mendelsohn, 1998). The lack of research on listening has primarily stemmed from the belief that L2 learners may gradually acquire listening skills with natural exposure to spoken language, whereas the other skills should be taught through formal instructions in school settings (Herron & Sedy, 1991; Schmidt-Rinehart, 1992). This belief has resulted in the least amount of attention from language researchers in terms of the amount of research conducted and has brought about the lack of materials available to instructors who wish to emphasize the role of listening skills on students’ L2 learning.
Although still not abundant, research on L2 listening has increased over the past few decades with various emphases: models of listening comprehension processes (e.g., Valette, 1977; Lund, 1991; Bacon, 1992; Weir, 1993; Buck, 1994, 2001; Lee, 1994), listening strategies (e.g., Richards, 1983; Vandergrift, 1996, 2003; Goh, 1997, 2000, 2002; Graesser, 1999; Rost, 2001; Seo, 2003), L2 sound perception (e.g., Byrnes, 1984; Field, 2003), input features (e.g., Herron & Sedy, 1991; Shohamy & Inbar, 1991; Scarcella & Oxford, 1992; Read, 2002), affective aspects of L2 listening (e.g., Meyer, 1984; Joiner, 1986; Oxford & Lavine, 1991), speech rates (e.g., Griffiths, 1990, 1991; Tauroza & Allison, 1990; Zhao, 1997; Brindley & Slatyer, 2002), and visual effects on listening (e.g., Progosh, 1996; Brett, 1997; Gruba, 1997; Coniam, 2001; Ginther, 2001, 2002; Jones & Plass, 2002). In addition, as academic listening skills came to be recognized as an essential component of communicative competence in a university setting, distinguishable aspects of academic listening such as the discourse structure of academic lectures, the role of note-taking, and background knowledge effects have appeared to be valuable research topics with regard to pedagogical concerns.

Three concerns relevant to the current study are closely connected with L2 learners’ academic success through listening as a medium of learning. One concern is the effect of content knowledge, also referred to as topic-related background knowledge, on L2 college academic listening comprehension. Reading studies investigating the effect of content knowledge on comprehension have suggested the promising role of content knowledge on L2 listening (e.g., Schank & Abelson, 1977; Steffensen, Joag-Dev, & Anderson, 1979; Rumelhart, 1980; Carrell, 1987; Carrell & Eisterhold, 1983; Hock,
1990; Gradman & Hanania, 1991). However, findings of L2 listening studies have indicated that there has been controversy over the role of content knowledge as an aid to L2 listening comprehension. In addition, with regard to the relationship between content knowledge and L2 listening proficiency on L2 listening comprehension, L2 listening studies have shown inconclusive results.

The second concern relates to the possible application of the Construction-Integration model to L2 listening studies. Although Schema theory has proven to be fruitful in encouraging research on reading (or listening) comprehension specifically in relation to content knowledge effect, some researchers have argued that Schema theory has presented difficulties when explaining the experimental results of comprehension studies (e.g., Kintsch & van Dijk, 1978; Kintsch, 1998; Nassaji, 2002). These researchers maintained that the Construction-Integration model (Kintsch, 1998) provides a more plausible explanation for the comprehension process of learners in relation to the effect of content knowledge. The Construction-Integration model was initially developed for reading comprehension studies. However, Kintsch (1998) stated that the Construction-Integration model is applicable to listening comprehension studies. The present study accepts the possibility that the Construction-Integration model is appropriate for studying listening comprehension of L2 learners, specifically in relation to the effect of content knowledge.

The third concern relates to the difficulties that L2 learners experience while listening to L2 college academic lectures. Academic lectures of mainstream classes at US universities are provided by lecturers who typically have no specialized knowledge of
teaching English to speakers of other languages, although they are suitably qualified in their own discipline. In addition, unlike ESL classes working with a small number of students, academic lecture classes at US universities tend to have more than 20 students (Dooey, 2006). Partly due to the above-mentioned difference between mainstream and ESL classes, research on English for Academic Purposes (EAP) has indicated that L2 listeners have great difficulty in understanding lecture content in academic contexts and has emphasized the need for investigating variables that might affect the comprehension of L2 learners in college academic listening. Research on specific linguistic and non-linguistic variables that might affect L2 learners’ comprehension when listening to college academic lectures is necessary in order to contribute valuable information to improve ESL instruction for college academic listening as well as to improve understanding of L2 listeners’ comprehension problems in academic contexts.

Considering the above concerns, the present study was designed to investigate the effects of content knowledge and L2 listening proficiency on L2 college academic listening comprehension within the Construction-Integration model. Specifically, this study investigated the extent of these variable effects on L2 listeners’ college academic lecture comprehension, which was defined to have two levels of understandings based on the Construction-Integration model (i.e., text-based and situation model understandings) and examined the comparative importance between the effects of these variables in L2 college academic listening. In addition, this study attempted to identify potential variables (e.g., strategy use, residency, etc.) that might influence L2 listeners’ college academic lecture comprehension and examined the extent of the contribution of these
variables in explaining L2 learners’ college academic listening. The following section provides the rationale behind conducting the present study in more detail.

1.2 Problem statement

On November 14, 2005, the Institute of International Education (IIE) made public the results of an international college and university student enrollment survey conducted between October 3, 2005 and October 21, 2005. Regarding the total enrollment of international students, the results showed that although total enrollment was about 1% off from the previous year's totals, the number of international students enrolled in US higher education institutions in 2004-2005 remained fairly steady at 565,039 (4% of the total US enrollment) with an increase of international students from Asian countries by 0.3% to 325,112 students, which represents 58% of the total international enrollment.

As shown in the report by IIE, the number of international students enrolled at American colleges and universities is considerable and every year, a large number of new international students come to the US to study various academic programs. To these international students, listening is an essential skill to be developed immediately because listening is crucial in developing L2 speaking skills and because so much of what they need to learn is communicated through the oral medium in academic contexts (e.g., decoding oral L2 input): Taylor (1964) reported that college learners spend close to 90% of class time listening to discussions and lectures. Later, through a more detailed analysis of observed data, Feyten (1991) reported that of the total time engaged in communication, L2 learners spend 45% listening, 30% speaking, 16% reading, and 9% writing.
Despite its significance to the academic success of L2 learners, research on L2 listening comprehension in academic contexts is not sufficient when compared to the amount of research on other areas appearing in major professional journals. In addition, the lack of L2 listening comprehension studies in academic contexts could result in inadequate assumptions about many aspects of L2 academic listening (Rubin, 1994) and could thus impede the work of both applied linguists and classroom ESOL practitioners who interact with L2 learners (Mendelsohn, 1998). Systematic research on L2 academic listening comprehension is necessary.

Recent studies on L2 listening have investigated variables that are believed to affect a L2 learner’s comprehension. Content knowledge is one such variable. However, L2 listening studies have noted the controversy over the role of content knowledge as an aid to L2 listening comprehension. Some studies indicated that content knowledge considerably aided the listening comprehension of L2 learners (e.g., Markham & Latham, 1987; Long, 1990; Schmidt-Rinehart, 1994). In contrast, some studies reported that content knowledge did not promote comprehension when listening to monologue texts (e.g., Chiang & Dunkel, 1992; Hansen & Jensen, 1994; Jensen & Hansen, 1995). In addition, unlike L2 reading studies, which found that the reading comprehension of L2 learners is mainly affected by the level of L2 proficiency rather than content knowledge, L2 listening studies have shown inconsistent results: Some studies found that when L2 learners possessed appropriate or relevant content knowledge, learners’ L2 proficiency was not important (Long, 1990; Schmidt-Rinehart, 1994), whereas some studies reported that L2 proficiency played a significant role in the degree of L2 listening comprehension
(e.g., Chiang & Dunkel, 1992; Jensen & Hansen, 1995; Madden, 2004). Additional studies are required to either support or disprove the claim that content knowledge facilitates comprehension in L2 listening as well as to establish the concrete relationship between content knowledge and L2 proficiency in L2 listening comprehension.

Furthermore, the previous L2 listening studies mentioned above have focused on determining only whether content knowledge affects L2 listeners’ comprehension, classifying participants into either a group with content knowledge or a group without content knowledge, and whether a relationship could be found between content knowledge and L2 listening proficiency on L2 listeners’ comprehension. Additional research is also required to investigate the extent of the contribution for both content knowledge and L2 listening proficiency in explaining L2 learners’ academic lecture listening if there are indeed effects of these variables on L2 listening comprehension.

Studies on content knowledge effect have used Schema theory as a main theoretical framework to examine the effect of content knowledge on L2 listening comprehension. However, while Schema theory has been useful in examining content knowledge effect on comprehension, some researchers have argued that this theory has presented difficulties when explaining experimental results of comprehension because this theory tends to bias researchers towards seeing comprehension as a process often driven by the comprehender’s expectation, which can be interpreted to mean that comprehension is achieved through a matching process of schemata (e.g., Kintsch & van Dijk, 1978; Kintsch, 1998; Nassaji, 2002).
Researchers criticizing Schema theory have insisted that the Construction-Integration model (Kintsch, 1998) provides a more plausible explanation about the comprehension process and experimental results of comprehension with respect to content knowledge effect, arguing that the difficulty in comprehension arises from an inappropriate construction of content knowledge in either a text-based lower-level process or a situation model process for analysis and interpretation of a text. In addition, the empirical research results from L1 and L2 reading studies have shown support for the application of the Construction-Integration model on comprehension studies, reporting a different contribution of content knowledge effect on the levels of understanding (e.g., McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999; Trites, 2000; Trites & McGroaty, 2005).

The Construction-Integration model suggests that comprehension has two different levels of understanding (i.e., text-based and situation model understandings) that are influenced by both content knowledge and language proficiency but that the effects of content knowledge and language proficiency differ according to the levels of understanding. In addition, research supporting the Construct-Integration model has successfully measured the different levels of understanding, insisting that some measures represent an indicator of text-based understanding by heavily relying on text information or memory (e.g. recognition, text-based question, reproductive recall, etc.), whereas other measures represent an indicator of situation model understanding by integrating information in the text with prior knowledge in the long-term memory (e.g., recall elaborations, bridging inference questions, problem-solving tasks, keyword-sorting tasks, etc.).
The Construction-Integration model has already been applied successfully to L1 and L2 reading studies with regard to content knowledge effect and has also provided a foundation to examine relatively accurate levels of learners’ comprehension by separately measuring learners’ comprehension with different levels of understanding. Although Kintsch (1988) stated that the Construction-Integration model is applicable to listening comprehension studies specifically in relation to content knowledge effect, virtually no attempts have been made to apply this model to listening research. In addition, some L2 listening researchers have addressed the need to measure a deeper understanding of what L2 learners have listened to, which is distinguished from the superficial understanding of texts assessed by multiple choice questions or reproductive recalls (Bejar, et al., 2000; Rost, 2002). An examination of the Construction-Integration model’s applicability to L2 listening studies, specifically in relation to content knowledge effect, is necessary.

Research in EAP has reported that L2 learners have great difficulty with college academic listening at universities. Ur (1984) reported that L2 listeners are unable to form a mental representation from words they hear, and understand words but not the intended message underlying the words. Goh (2000) also reported that L2 listeners quickly forget what is heard, do not recognize words they know, and neglect the next part when thinking about meaning. On the basis of the findings from these studies, some variables have been examined as the focus of research, questioning the extent to which these variables have an impact on L2 listeners’ academic lecture comprehension. These variables included speech rate (e.g., Griffiths, 1990, 1991; Zhao, 1997), vocabulary (e.g., Johns & Dudley-
Evans, 1980), unfamiliar structures of lecture discourse (e.g., Olsen & Huckin, 1990; Dudley-Evans, 1994; Tauroza & Allison, 1994; Young, 1994), and etc.

Although some variables that affect L2 learners’ college academic listening have already been investigated, there might be some variables that have not been detected but may have a great impact on L2 learners’ comprehension when they listen to college academic lectures. For instance, the investigation about the contribution of strategy use or the contributions of other learner-based variables such as gender difference or residency to explaining L2 learners’ college academic listening comprehension when the effects of content knowledge and L2 proficiency are removed might be a valuable topic to explore with regard to pedagogical concerns.

Given the problems stated above, the present study investigated the effects of content knowledge and L2 listening proficiency on L2 college academic lecture listening comprehension within the Construction-Integration model. This study primarily investigated the extent of the contribution of content knowledge and L2 listening proficiency to explaining L2 listeners’ college academic lecture comprehension, which was defined to have two levels of understandings based on the Construction-Integration model (i.e., text-based and situation model understandings) and examined the comparative importance between the effects of these variables on L2 college academic listening. This study also attempted to identify potential variables (e.g., strategy use, residency, etc.) that might influence L2 listeners’ college academic lecture comprehension and examined the extent of the contribution of these variables in explaining L2 learners’ college academic lecture listening comprehension.
In keeping with the purposes of this research, specific research questions were formulated. The following section introduces the research questions of the present study.

1.3 Research questions

Focusing on the effects of content knowledge and L2 listening proficiency on L2 college academic lecture listening comprehension within the Construction-Integration model and on the relationship of these two variables to the understanding of college academic lectures, the present study addressed the following research questions.

Primary research questions

1. What is the relationship between content knowledge and understanding of a college academic lecture?

1.1 To what extent does content knowledge explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?

2.1 To what extent does L2 listening proficiency explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?
2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?

3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?

3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?

Given the often-cited importance of investigating the variables that affect L2 college academic listening comprehension, specifically in relation to strategy use (Bacon, 1992; Vandergrift, 1996, 2003; Goh, 1997, 2000), this study formulated several secondary research questions.

Secondary research questions

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?

5. What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?
6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?

7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

The specific research questions of this study were presented in this section. The contribution of the present study to the research on L2 college academic listening comprehension is addressed in the following section.

1.4 Significance of the study

The findings of the study are expected to offer benefits to L2 research on college academic listening comprehension in three ways. First, with regard to the effect of content knowledge on L2 listening comprehension, the current study is expected to provide valuable information that helps its readers decide to either support or dismiss the claim that content knowledge facilitates comprehension in L2 college academic listening. By examining the extent of the effects of content knowledge and L2 listening proficiency on L2 college academic listening comprehension, the findings of this study are also expected to present additional information to establish the concrete relationship between content knowledge and L2 listening proficiency in L2 college academic listening comprehension. Furthermore, because content knowledge can be regarded as an L1 trait, it is expected that the findings from an examination of the relationship between content knowledge and L2 listening proficiency in L2 college academic listening comprehension
can provide an opportunity to discuss the application of the short-circuit hypothesis, also referred to as the linguistic threshold hypothesis, to L2 college academic listening, which has already received significant attention from L2 researchers.

Second, previous L2 listening studies considered the comprehension of listening as one inseparable construct and did not attempt to distinguish one level of understanding from another level of understanding. The employment of the Construction-Integration model as a framework for explaining college academic listening comprehension makes this study valuable because it introduces a theoretical foundation to examine L2 listeners’ comprehension with separate levels based on the results from empirical research, which reported that comprehension may not an inseparable construct and that some measures represent a strong indicator of a level of understanding by heavily relying on text information/memory, whereas other measures stand for determining another level of understanding by integrating information in the text with prior knowledge in the long-term memory. Introducing the Construction-Integration model as a framework for explaining listening comprehension in this study also has significance when interpreting the contribution of content knowledge on academic listening because this study can answer not only the question of whether or not content knowledge affects L2 college academic listening but also provide a more plausible explanation for the extent to which content knowledge contributes to explaining L2 college academic listening, by separately examining the effect of content knowledge on text-based and situation model understandings (e.g., content knowledge contributes to explaining the integration among information (i.e., situation model understanding) more than the retention of information (i.e., text-based understanding)).
Third, the findings of this study may provide information about variables that either facilitate or hamper L2 learners’ listening comprehension of college academic lectures. Although many variables have already been investigated, there might be some variables that have not yet been detected but may have a great impact on L2 listeners’ comprehension in academic contexts. In addition, as mentioned by Goh (2000), knowing what might affect listening comprehension can help researchers and instructors trace the source of difficulty in L2 listeners’ comprehension and place them in a better position to help L2 learners cope with or overcome some of their listening difficulties in academic contexts. By investigating variables affecting the comprehension of L2 listeners in academic lectures and the extent to which these variables contribute to explaining L2 learners’ college academic listening comprehension, the findings of this study help to improve ESL instruction for academic listening as well as to improve understanding of L2 listeners’ comprehension difficulties in academic contexts.

1.5 Basic assumptions

For the purposes of this study, the following assumptions were formulated. These assumptions provided the basis for the researcher’s decisions and formed the basis of this study’s methodology.

1. It was assumed that listening comprehension for L2 college academic lectures is measurable.

2. L2 listening comprehension scores for a college academic lecture as measured by a written recall-protocol and a checklist (i.e., text-based understanding) were assumed to be appropriate and reliable.
3. L2 listening comprehension scores for a college academic lecture as measured by a set of bridging inference questions (i.e., situation model understanding) were assumed to be appropriate and reliable.

4. L2 listening proficiency scores as reported by a Test of English as a Foreign Language (TOEFL) were assumed to be appropriate and reliable.

5. L2 listening proficiency scores as reported through self-assessments on the basis of the listening proficiency guidelines of the American Council on the Teaching of Foreign Languages (ACTFL) were assumed to accurately reflect participants’ judgments of their L2 listening proficiency levels.

6. Content knowledge scores as reported through self-assessments for four content-related items were assumed to accurately reflect participants’ judgments of their level of content knowledge in the subject area treated by the text.

7. Content knowledge scores as reported by a content knowledge checklist were assumed to be appropriate and reliable.

8. The participants of the study were assumed to have voluntarily engaged in and completed tasks to the best of their ability.

9. It was assumed that the participants in this study have sufficient English proficiency to comprehend and complete an instrument tool designed for the study as well as to participate in a face-to-face interview.
1.6 Definition of terms

The following key terms were defined operationally and connotatively in order to establish a consistent meaning for terms as used in the present study.

Content knowledge

Connotative definition: Content knowledge refers to knowledge of the subject area treated by a text. It is also referred to as topic-related background knowledge. The term ‘content knowledge’ is different from the term ‘prior knowledge’ or ‘background knowledge’ in that prior knowledge or background knowledge normally includes knowledge of the topic, listening context, text type, and cultural or other information stored in long-term memory as schemata. Content knowledge indicates only the specific domain (or topical) knowledge of a text.

Operational definition: The level of content knowledge was reflected by the combined score from the self-assessment and the content knowledge checklist, which indicated the specific domain knowledge of participants on the text. The self-assessment instrument of content knowledge contained four items that were selected on the basis of the frequency of use in the listening lecture text and asked participants to rate their familiarity with each item with a scale from 1 to 5. Ten question items of the content knowledge checklist were formulated on the basis of the information that appeared in the listening lecture text and the lecturer’s lecture note as well as the information from an astronomy encyclopedia published by Oxford University Press (2002).
Academic lecture listening

Connotative definition: Academic lecture listening involves listening and speaking tasks in university classes. Richards (1983) suggested that academic lecture listening primarily requires skills to identify the topic of a lecture and to follow topic development. Flowerdew (1994) also mentioned that learners engaged in academic lecture listening need to activate specialized background knowledge and to develop note-taking skills. Recently, Bejar, et al. (2000) stated that the tasks for academic lecture listening need to assess L2 learners’ abilities to comprehend details and facts, and their abilities to make an inference about the lecture content and its relationship. Academic lecture listening requires learners to concentrate on and comprehend incoming information for a long period of time. Additionally, the opportunity to interact with the speakers in academic lecture listening contexts is relatively limited and thus, academic lecture listening places high demands on listeners when negotiating the meanings of lecture content (Ferris & Tagg, 1996).

Operational definition: In this study, academic lecture listening was defined as constructing an interpretation that was reflected in accurate recall of what a lecturer had said and accurate inferences about the lecture content and its meaning. Academic lecture listening has two levels of understanding: text-based and situation model.
Text-based understanding

Connotative definition: van Dijk and Kintsch (1983) stated that text-based understanding is relevant to propositional representation both at the level of the macrostructure and the microstructure as directly derived from the text itself. According to them, text-based understanding encompasses all content and structure-preserving paraphrases directly corresponding to the text. Kintsch (1994) mentioned that text-based understanding is the superficial understanding of the text since a reader (or a listener) may be able to reproduce a text quite accurately but may not have a deeper understanding of what he/she has read (or listened to).

Operational definition: In this study, text-based understanding was reflected by the scores from a checklist and a written recall-protocol task, which indicated a listener’s ability to identify the information explicitly expressed in the listening lecture text. Ten question items of the checklist were formulated on the basis of the information that appeared in the listening lecture text. In the written-recall protocol task, the total number of pausal units and the number of each level of pausal units were counted and the scoring of pausal units was compiled based on the hierarchical level of pausal units. A score of ‘3’ was assigned to the Macro-level, ‘2’ to the Primary-level, ‘1’ to the Secondary-level, and ‘0’ to the Micro-level.
Situation model understanding

Connotative definition: Situation model understanding is a representation of the text that is integrated with content knowledge. It is the situation description that a learner constructs on the basis of information from the text as well as from prior knowledge and experience. Discussing how people learn from a text, Kintsch (1994) distinguished situation model understanding from text-based understanding more precisely. According to him, a reader (or a listener) may be able to reproduce a text quite accurately but may be unable to use the information for other purposes: The reader (or the listener) demonstrates a superficial understanding of the text (i.e., provides a good text-based understanding) but does not have a deeper understanding of what he/she has read, which can be achieved by integrating information directly from the text with related information drawn from his/her prior knowledge (i.e., demonstrating situation model understanding).

Operational definition: In this study, situation model understanding was reflected by the scores from the bridging inference questions (two questions total), which indicated the participants’ ability to infer the relationships between different segments of a listening lecture text by integrating information from the segments of the lecture text.
L2 proficiency

Connotative definition: L2 proficiency refers to a learner’s ability to use L2 language to interpret what a speaker means and to then prepare an appropriate reply.

Operational definition: In this study, L2 proficiency indicated L2 listening proficiency. A participant’s listening proficiency in L2 was reflected by the combined score from the self-assessment of listening proficiency and one practice test of TOEFL listening. The instrument of self-assessment was designed on the basis of the listening proficiency guidelines of the ACTFL. It had 10 different fluency levels. One practice test of TOEFL listening published by ETS had 50 question items and a score of 1 was assigned if the answer of a question item was correct.

1.7 Limitations of the study

This study, like all studies, has limitations. One limitation is the number of participants. Because the number of participants was small, it may not be possible to generalize the findings of this study to non-native college ESL students from other contexts. A second limitation relates to the time span for listening tasks. Participants in the study were expected to perform the listening tasks for 80 minutes. An examination of listening over a longer or a shorter period of time might provide different results. A third limitation relates to tasks of recall-protocol and bridging inference questions. Participants may have been unfamiliar with the procedures of these tasks. Additionally, because the listening text was in English and the participants’ recall-protocol and answers to bridging inference questions were either in English or in their L1s, the translation from the
participants’ L1s to English might come into play when the answers were provided in participants’ L1s. Therefore, data interpretation demands careful management with help from the bilingual raters in order to correctly interpret the intentions of the participants on the recall-protocol and the bridging inference questions.

1.8 Organization of the study

This chapter introduced an overview of the research by giving a brief research background, stating the research purposes and questions, and addressing the significance of the study. This dissertation is organized as follows: Chapter 2 introduces the relevant literature for the theoretical framework of this study and reviews the literature of L2 listening comprehension as well as the literature on the interaction between content knowledge and L2 listening proficiency. Chapter 3 describes the methodological procedures including the description of research participants, the procedure for data collection, the materials used in the experiment, and the statistical methods for the data analysis of the study. Chapter 4 presents the results of the data analysis and discussions of the findings. Chapter 5 provides answers to the research questions, discusses implications and limitations, and makes recommendations for further related research studies. References and appendices are attached at the end of the dissertation.
CHAPTER 2

REVIEW OF THE LITERATURE

2.1 Introduction

In recent years, researchers working in academic areas have agreed that academic listening, in contrast to conversational listening, has distinctive features (Richards, 1983; Benson, 1989; Flowerdew, 1994; Rost, 2002) and have called for research on various aspects of listening in academic contexts. Responding to this request, researchers have identified L2 learners’ strategies in academic listening (e.g., Benson, 1989; Hale & Courtney, 1994; King, 1994; Goh, 1997; Imhof, 1998), have studied the relationship between discourse structure and comprehensibility (e.g., Olsen & Huckin, 1990; Dudley-Evans, 1994; Tauroza & Allison, 1994), and have described the nature of speech in academic contexts (e.g., Herron & Sedy, 1991).

In academic contexts, lecture is a common format for delivering information. Consequently, academic listening research has featured L2 learner performance in lecture situations, exclusively relating to the pedagogical implications for the promotion of comprehension of content. Comprehension of academic lectures is crucial to L2 learners for academic success but has only recently been the focus of an increasing number of listening studies of L2 learners in American Universities.
The present study investigated L2 listeners’ ability to comprehend academic lectures within the Construction-Integration model. Specifically, this study examined the effects of content knowledge on college academic lecture listening comprehension as well as its relationship with L2 listening proficiency. With intent to provide an overview of the research that has been done in the area of L2 listening in relation to the purposes of this study, this chapter begins with a brief review of Schema theory and the Construction-Integration model as the major theoretical framework for the study, followed by research on listening comprehension in general. Then, this chapter presents distinctive features of academic listening and reviews research with respect to key issues in academic listening comprehension. Findings of research on the relationship between prior knowledge of content and L2 listening comprehension are presented briefly.

2.2 Theoretical framework

Understanding how one comprehends oral texts has been influenced by Schema theory. However, recent criticism of Schema theory suggests the need for an additional theoretical model to explain the comprehension process. This section describes Schema theory and the Construction-Integration model in relation to L2 listening comprehension, followed by empirical research on comprehension within the framework of the Construction-Integration model.
2.2.1 Schematic comprehension

Understanding how one comprehends incoming information has been influenced by Schema theory, which is a general knowledge structure used to describe human comprehension (Rumelhart, 1980; Nunan, 1985; Markham & Latham, 1987; Mayer, 1992). Bartlett (1932) mentioned that when a new material such as reading a complex text or listening to new information occurs, human beings attempt to assimilate the new material, relating it to existing concepts or schemata that allow the new information to be used to fill in the missing gaps for comprehension. Later, Mayer (1992) maintained that the act of comprehending new materials requires “an effort after meaning” (p. 229), which indicates an attempt to make “the story fit in with the individual’s expectation” (p. 229). Supporting Bartlett’s argument that both learning and remembering are based on existing schemata, Mayer (1992) insisted that the outcome of learning relies on both what was presented and the schema to which presented information is assimilated, rather than solely the ability to duplicate exactly what was presented.

The major assumption underlying Schema theory is that an individual comprehends material by using prior knowledge to create an anticipated meaning. That is, the individual can arrive at an anticipated meaning through the interaction of the material and the individual’s previously acquired repertoire of background experience (Rumelhart, 1980). Findings from cognitive and developmental psychology and from artificial intelligence provide details for the identification of the functions of schema: Schema enables L2 learners to make predictions about a situation and helps them integrate new information by forming new schemata (Rumelhart, 1980; Carrell, 1984; Omaggio, 1986).
schema provides ideational scaffolding and thus, it is expected that the information that fits into a L2 learner’s schema is easily learned with minimal mental effort (Mayer, 1992; Hohzawa, 1998); schema is hierarchically organized from the most specific at the bottom to the most abstract or general at the top (Hohzawa, 1998).

Schema theory suggests that listening for comprehension involves the activation of knowledge networks that are composed of world-based and rhetorically-based information, and that these knowledge networks can be largely divided into three types of schema: (1) content, (2) textual or formal, and (3) linguistic schema (Carrell, 1983, 1984, 1987). Content schemata are related to factual knowledge and cultural conventions that listeners are thought to possess and actively use when confronting the topic and/or content of a text. Textual or formal schemata indicate the knowledge of the rhetorical organization of a text that listeners are thought to possess and activate to interact with the discourse structure of an incoming text in order to aid comprehension. Linguistic schemata are related to the knowledge of syntactic, semantic, and grammatical systems that listeners are assumed to use to decode incoming texts. Although there are differences among these three types of schema in the degree of the utilization to process incoming texts, all three types of schema work simultaneously and are interrelated for one to comprehend incoming texts and messages.

Although Schema theory has proven to be fruitful in encouraging research in L2 listening comprehension, there are researchers arguing that Schema theory has presented difficulties when researchers attempt to apply the schema concept as a framework to explain experimental results. Kintsch (1988), for instance, mentioned that a fixed
structure of knowledge in explaining language understanding such as semantic nets, frames, scripts, and schemata is empirically questionable since “such fixed structures are too inflexible and cannot adapt readily enough to the demands imposed by the ever-changing context of the environment” (p. 164). Kintsch (1998) further argued that there is a need to conceive comprehension as a more bottom-up, loosely structured process since “there exist enough psychological data to question whether the top-down guidance of comprehension is as tight as Schema theory suggests” (p. 94). Nassaji (2002) also stated that Schema theory confounds a concept of a theory of knowledge with theories of how to store knowledge. He insisted that the over-emphasis on using and activating schemata rather than creating schemata in comprehension may lead to “a problem wherein schemata are needed to fill slots in schemata ad infinitum” (p. 445).

Nassaji (2002) maintained that the Construction-Integration model (Kintsch, 1988) provides a more plausible explanation about the comprehension process, which insists that the difficulty in comprehension arises from an inappropriate construction of either a text-based lower-level process or a situation model process for analysis and interpretation of a text. The Construction-Integration model that was extended from the earlier model on comprehension proposed by Kintsch and van Dijk (Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1985) primarily focuses on the role of prior knowledge during the process of comprehension. Although this model was originally developed for reading studies (e.g., Moravcsik & Kintsch, 1993; Swaffar & Bacon, 1993; McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999; Trites, 2000; Zwanna, et al 2000; Trites & McGroaty, 2005), Kintsch (1988) stated that the Construction-Integration model is
applicable to listening comprehension studies. However, virtually no attempts have been reported to apply the Construction-Integration model to L2 listening comprehension studies. The present study accepts the possibility that the Construction-Integration model is appropriate for the approach to study listening comprehension of L2 learners.

2.2.2 Construction-Integration model

Kintsch (1998) suggested that comprehension of a text can be achieved through two phases: “a construction phase, in which an approximate but incoherent mental model is constructed locally from the textual input and the comprehender’s goals and knowledge, and an integration phase that is essentially a constraint-satisfaction process that rejects inappropriate local constructions in favor of those that fit together into a coherent whole” (p. 119). In the construction phase, a learner (reader or listener) first produces disorderly, redundant, and even contradictory output (basic propositions based on the input text) by using the text and his/her background knowledge and experience. The capacity of working memory constrains the construction of the rough output of the learner in this phase. In the integration phase, the output that the learner produced in the construction phase undergoes a constraint-satisfaction process in which the learner’s retaining propositions help to result in a well-structured mental representation of the text. This model makes intuitive sense and has been a partial influence in designing the present study.

The Construction-Integration model differs from a strictly top-down, schema-controlled comprehension process. Kintsch did not refute the idea that “a schema serves
as a control structure that regulates comprehension processes in a top-down fashion and works, on the one hand, like a perceptual filter, in that it admits material consistent with itself but blocks irrelevant materials, and on the other hand, it serves as an inference machine, in that it fills in the gaps that are inevitably found in the actual stimulus material.” (Kintsch, 1998, p. 94). However, he stated that although the end result of comprehension is the same according to both Schema theory and the Construction-Integration model, the way the comprehension is achieved is quite different. The following excerpt describes the different process of constructing comprehension between Schema theory and the Construction-Integration model.

“Upon hearing ‘the hiker was surprised to see a bear blocking his path’, a schema-based inferencer might readily infer that ‘the hiker was sacred’ but hardly that ‘bears like honey’. Hence, on a naming task, schema theory would predict a priming effect for ‘scared’ but not for ‘honey’; Construction-Integration model would predict priming effects for both, as long as the target word was presented right after ‘bear’ in the sentence. In every case, the smart rules of a schema-based theory would prevent the wrong constructions from ever being formed. In contrast, the production rules in the Construction-Integration model are weak and dumb and do not discriminate what is contextually appropriate from what is not; they are just as likely to instantiate the wrong as the right meaning of a word, or to form an irrelevant as a relevant inference. The construction of the ‘correct’, contextually appropriate meaning results from the integration process that quickly deactivates contextually inappropriate constructions” (Kintsch, 1998, p. 95)

The Construction-Integration model assumes that the meaning of a text can be represented by a network of propositions that consists of one predicate and one or more arguments, and that the network of propositions again establishes two basic forms of structural relation of a text: (1) the micro-structure and (2) the macro-structure. The micro-structure, also referred to as the local structure of the text, is the lowest level and contains propositions that have sentence-by-sentence information of the text. On the other
hand, the macro-structure indicates the global structure of the text and has “a hierarchically ordered set of propositions” (Kintsch, 1998, p. 50) derived from the micro-structure. The macro-structure is reflected by the macro-proposition that represents the meaning of a text in a reduced or summarized form, that is, the overall point or gist (Roloff, 1999). The Construction-Integration model emphasizes the importance of the macro-structure level for longer comprehension texts. According to Kintsch (1998), “the macro-structure of a text may dominate the comprehension process to such an extent that material contradictory to what the reader takes to be the text’s macro-structure is simply ignored” (p. 214).

In the Construction-Integration model, the comprehension of a text requires reflection at two levels of understanding: (1) text-based understanding and (2) situation model understanding. Kintsch (1998) mentioned that the main focus of the Construction-Integration model is how the text-based understanding and the situation model understanding come together. van Dijk and Kintsch (1983) stated that text-based understanding is relevant to the propositional representation both at the level of the macro- and micro-structure and is directly derived from the text itself. According to these researchers, the text-based understanding encompasses all content and structure-preserving paraphrases directly corresponding to the text itself. The situation model understanding is a representation of the text that is integrated with prior knowledge. It is the situation description in which a learner constructs meaning on the basis of a text as well as prior knowledge and experiences.
Discussing how people can learn from a text, Kintsch (1994) distinguished situation model understanding from text-based understanding more precisely. He stated that a reader (or a listener) may be able to reproduce a text accurately but be unable to use the information for other purposes. That is, the reader (or the listener) demonstrates a superficial understanding of the text (i.e., provides a good text-based understanding) but does not have a deeper understanding of what he/she has read (or heard), which can be achieved by integrating information from the text with related information drawn from one’s prior knowledge (i.e., demonstrates the situation model understanding). However, situation model understanding is not a separate understanding from text-based understanding. These understandings are separate aspects of the same comprehension created by readers (or listeners) (McNamara, et al., 1996).

The Construction-Integration model emphasizes the role of making inferences in constructing situation models since inferences, according to Kintsch (1998), fill coherence gaps in text comprehension. In the classification system introduced by Kintsch (1998), inference appears to have four different types: (1) automatic retrieval, (2) controlled retrieval, (3) automatic generation, and (4) controlled generation. The automatic retrieval process of inference-making can be observed when a learner unconsciously uses information stored in long-term memory to bridge a meaning gap in the comprehension of a text. A prototypical example of the automatic retrieval process would be the activation of “with a hammer” by “John nailed down a board”, or “cars have doors” by “A car stopped” (Kintsch, 1998, p. 190). The controlled retrieval process of inference-making is a strategic and resource-demanding process to retrieve relevant
cues from one’s long-term memory by using cues available in one’s short-term memory. This inference-making process, according to Roloff (1999), is the case when propositions at the text-based level are not interrelated and, therefore, may not be coherent as a whole. For instance, in the sentences “Danny wanted a new bike. He worked as a waiter” (Kintsch, 1998, p. 191), an automatic retrieval process of inference-making might not occur to search for the causal chain from “want-bike” to “money to work.” Specific strategies looking for causal connections between two sentences exist to guide such reflection search processes.

While retrieval processes are related to how to access the information in the long-term memory, generation processes are related to creating new information on the basis of the text and background knowledge and experience of a learner. An automatic generation process of inference is assumed to be relevant to propositional representations for imagery. For instance, when a learner encounters the sentence, “Three turtles rested on a floating log, and a fish swam beneath them” (Kintsch, 1998, p. 191), the statement “The turtles are above the fish” (Kintsch, 1998, p. 191) is immediately available to the learner. This statement does not exist in the long-term memory or is not retrieved. It is generated during a comprehension process through the encoding procedure of turning the fish-log-and-turtle scene into an image. A controlled generation process of inference is observed when the automatic process does not provide the necessary links between textual information and relevant information in one’s short-term memory. Kintsch (1998) insisted that the term inference really should be reserved for the controlled generation type of inference. Kintsch (1998) additionally stated that controlled generation is “the
domain of deductive reasoning and extends far beyond text comprehension…. When the network does not integrate and the gaps in the text cannot be bridged any other way, then reasoning is called for as the ultimate repair procedure” (p. 192).

The Construction-Integration model assumes that if a learner forms only a text-based understanding, he/she is judged to have achieved only a superficial understanding of the text that is sufficient for reproductive recall and recognition tasks but not for reconstructive recall and inference tasks. On the basis of this assumption, reading research has documented the usefulness of the Construction-Integration model with regard to comprehension (e.g., Moravcsik & Kintsch, 1993; Swaffar & Bacon, 1993; McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999; Zwanna, et al., 2000). However, Kintsch (1998) himself has acknowledged limitations of this model. He admitted that naturalistic texts, usually longer than one paragraph, are problematic since the length of the text may prevent learners from reproducing the micro-structure of the text. As a solution to this problem, he suggested the inclusion of the macro-structure explicitly in the text or the consideration of only a macro-structure of the text. Another limitation Kintsch (1998) mentioned is that the Construction-Integration model assumes an ideal reader (or listener), that is, one who can process the whole text and form a mental representation of the text without errors as the author intends. However, a learner’s misunderstanding can occur quite frequently in real life. Furthermore, as also recognized by Kintsch (1998), a learner may form idiosyncratic mental text representations depending on the nature of their misconceptions, which can be inadequate and unpredictable. Because it should not be expected that the Construction-Integration
model provides an account of all learners’ behaviors relevant to text comprehension, more consideration seems to be needed in order to make the Construction-Integration model yield a better prediction of the level of text comprehension of a learner.

The other problem in application of this Construction-Integration model to comprehension studies is concerned with the unit of analysis in recall, i.e., the atomic proposition. Kintsch (1998) stated that “propositions are designed to capture the semantic relations that are most salient in text comprehension” (p. 69) and hence, the proposition is the most useful form for the Construction-Integration model. Because complex propositions generally correspond to sentences and have a central proposition and various associated elements such as modifiers, Kintsch (1998) insisted that the smaller propositional element (i.e., the atomic proposition) is more appropriate as the functional processing units of text comprehension. However, research insisting that long naturalistic texts are difficult to analyze by means of the atomic proposition proposed by the Construction-Integration model has appeared (e.g., Kintsch & Franzke, 1995; Roloff, 1999). Later, Kintsch (1998) also admitted that it is difficult, not impossible, to analyze the data in terms of atomic propositions, and that complex propositions, which are more global units than atomic propositions, are better units for analyzing recall data and for comparing predictions with data. These views of comprehension with respect to the unit of analysis helped shape the present study.
Section summary

The comprehension of L2 listeners to what someone has said is assumed to be heavily influenced by L2 listeners’ schema. Since L2 learners do not construct the meaning of a text in a vacuum, schema is considered to help L2 learners to configure incoming oral messages, to take a broader view of the meaning of passages, and to make predictions for them. Research has shown that the activation of schemata in the domain of the text is crucial to comprehension (Carrell, 1983; Sherman, 1997; Bonk, 2000). However, while Schema theory has been useful in explaining comprehension processes, some researchers (e.g., Kintsch & van Dijk, 1978; Kintsch, 1988, 1998; Nassaji, 2002) have argued that this theory tends to confound theories of knowledge with theories of how knowledge is stored. They further argued that Schema theory tends to bias researchers towards seeing comprehension as a process often driven by the comprehender’s expectation, which can be interpreted to mean that comprehension is achieved through a matching process. As a supplement, not an alternative, to Schema theory with regard to comprehension process, the Construction-Integration model was introduced by Kintsch (1988).

Kintsch (1998) stated that the Construction-Integration model differs from a strictly top-down, schema-controlled process in the way in which comprehension is achieved. The Construction-Integration model explains comprehension through a two-stage process: (1) the construction stage and (2) the integration stage. The rough output that a learner produces in the construction stage undergoes a process of constraint-satisfaction in the integration stage and becomes a well-structured mental representation.
of the text. The Construction-Integration model also emphasizes the role of inferences in constructing situation models since inferences are assumed to fill coherence gaps in text comprehension.

The major reason for employing the Construction-Integration model as an additional framework of theoretical background of this study in spite of the limitations pointed out above is that through the Construction-Integration model, the concept of two levels of text comprehension (i.e., text-based and situation model understandings) can be utilized to assess the comprehension of L2 listeners and the contribution of content knowledge to L2 listening comprehension more accurately. Rost (2002) expressed the idea of two levels of text comprehension, stating that “the listener may know everything that the speaker is saying, but there is no comprehension unless the listener integrates information from the speaker’s text with what they already have” (p. 61). Therefore, the employment of the Construction-Integration model can be considered to shed light on listening comprehension by introducing a theoretical framework for measures that can distinguish listening for text-based comprehension (e.g., listening for reproduction) and situation model comprehension (e.g., listening for learning) from the more traditional listening construct called basic comprehension and by providing a more plausible explanation about the effect of content knowledge on listening comprehension as well.

2.2.3 Empirical research within the Construction-Integration model

The Construction-Integration model emphasizes the distinction between creating a representation of the text itself and integrating the information in the text with prior
knowledge, noting that the former is the understanding of the text-based and the latter is the understanding of the situation model. Situation model understanding is not the same as text-based understanding because situation model understanding primarily results in the learning by integrating the information from the text with information from long-term memory, whereas text-based understanding primarily taps into memory of the text itself (Kintsch, 1994). Because of this, the Construction-Integration model maintains that the assessment of situation model understanding involves going beyond reproductive or recognitory measures of recall such as recognition, text-based questions, free-recall measure, or summarization (Goldman, 1997).

There have been several studies to experimentally separate the two levels of understanding proposed by the Construction-Integration model (e.g., Schmalhofer & Glavanov, 1986; Fletcher & Chrysler, 1990; Kintsch & Welsch, 1991; Moravcsik & Kintsch, 1993; McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999; Trites & McGroaty, 2005). These studies have focused on determining either the psychological reality of the understandings of text-based and situation model (e.g., Schmalhofer & Glavanov, 1986; Fletcher & Chrysler, 1990) or the effect of a number of variables related to the construction of these two levels (e.g., Moravcsik & Kintsch, 1993; McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999).

Schmalhofer and Glavanov (1986) conducted three experiments to support the theoretical position that a reader forms a cognitive representation of the situations in addition to propositional text representations. Schmalhofer and Glavanov assumed that the examination of the encoding processes (experiment one), the cognitive products
(experiment two), and the retrieval processes of the verbatim, propositional, and situational processing components (experiment three) would provide the evidence of different levels of cognitive representation a reader constructs while reading a text. Sixty-four university level students participated in all three experiments after being assigned to two groups, a text summarization group (TS: text-based) and a knowledge acquisition group (KA: situation model). Because of different reading goals, TS students were predicted to show better propositional text memory than KA students through the examination of the different encoding processes, the cognitive product, and the retrieval processes. KA students were expected to develop more accurate situational representations than TS students. A short computer programmer’s manual of LISP was employed for all experiments. Sentence reading times were collected (experiment one), and a sentence recognition task (experiment two) and an interpolated task (experiment three) were provided. The results from the first experiment showed that TS students spent the most time processing the highest level (i.e., macro-information) in the text hierarchy, whereas KA students showed the longest word reading time for the second text level, which presented substantial information about the text. Experiment two revealed that contrary to the experimental predictions, KA students showed better verbatim memory than TS students. However, the second experiment also indicated that TA students remembered more propositional information while KA students remembered more situational information. In the third experiment, it was found that “accessing situational information is faster and proceeds at a higher speed than accessing text information” (p. 292). Schmalhofer and Glavanov concluded that investigating the encoding processes, the
resulting cognitive structures, and the retrieval processes confirmed the need of distinction between text-based understanding and situation model understanding addressed in the Construction-Integration model.

Arguing that the texts employed by Schmalhofer and Glavanov (1986) could bring alternative interpretations of the experiment results that memory for a text or discourse consisted of separate representations “because all changes within a level of representation may not be equal and inference based on one level of representation may be responsible for difference attributed to another” (p. 175), Fletcher and Chrysler (1990) replicated the study of Schmalhofer and Glavanov (1986). They insisted that in order to provide a strong converging evidence for the psychological reality of the different levels of understanding, a researcher needs to demonstrate that all changes within levels of representation are equal, and that inferences cannot account for any observed differences in performance. Four experiments were conducted with three versions of the texts designed to make different levels of representation relatively easy to identify. In experiment one, three two-alternative, forced-choice recognition tests were presented to 54 undergraduate students who were randomly assigned to one of three conditions (i.e., surface, text-based, and situation) in order to replicate the findings of Schmalhofer and Glavanov (1986). In experiments two and three, the same designs and procedures of the test were conducted in order to show that the probability of guessing the correct response was the same in all three recognition tests and that all prepositional changes were likely equal, respectively. In the fourth experiment, 180 undergraduate students were recruited to demonstrate that the change (or effect) in the situation model can be explained as an
inference and that it is impossible to attribute that change to anything other than the situation model. Through these four experiments, the researchers demonstrated that “subjects can reliably discriminate between sentences they have seen and meaning-preserving paraphrases of those sentences” (p. 188), that performance improves when the distracters differ at the prepositional level but are consistent with the situation described by the text, and that “recognition is best when the distracters are inconsistent with all levels of representation” (p. 175). The researchers concluded that the results of these experiments provided strong support for Kintsch’s distinction among different levels of mental representations.

While earlier studies such as Schmalhofer and Glavanov (1986), and Fletcher and Chrysler (1990) focused on providing evidence of the different levels of mental representation with regard to the Construction-Integration model, other researchers have focused on investigating the affective factors on the construction of the different levels of understanding. These studies have paid great attention to the effects of prior knowledge, text coherence, and reading ability on comprehension; they have demonstrated that these factors facilitate and enhance comprehension and learning of high and low reading ability learners in different ways (Roloff, 1999).

Moravcsik and Kintsch (1993) insisted that only domain knowledge helps readers to achieve a deeper level of understanding, in the sense that domain knowledge “made possible the construction of an appropriate situation model that enabled readers to correctly elaborate on the textual materials” (p. 371). Moravcsik and Kintsch questioned whether good writing could compensate for lack of domain knowledge and whether
readers’ use of the linguistic cues in the texts depended on their reading skills. Three factors (i.e., domain knowledge, writing style, and reading skill) were manipulated to investigate how these factors facilitate the construction of text-based understanding and situation model understanding. The three tasks (i.e., a recognition task, a reproductive recall, and a reconstructive recall) were given to 103 university students who were randomly assigned to one of three experiment groups. The researchers found that all three factors significantly affected reproductive recalls but there were no interactions among these factors. However, they also revealed that while good writing was sufficient to improve the reproduction of the texts, good writing could not replace the missing domain knowledge that one needs to form an appropriate elaboration on reconstructive tasks. The researchers concluded that the availability of appropriate domain knowledge is crucial in the formation of the situation model, and that “good writing and domain knowledge are not simply substitutable, but affect comprehension in somewhat different ways” (p. 374). Regarding the issue relevant to the factor of reading skills, the researchers found that more skilled readers performed better in recall than less skilled readers but there was no interaction of the reading skill with either domain knowledge or writing style.

Similar results were found by Voss and Silfies (1996). The study of Voss and Silfies looked at how two reader characteristics, prior knowledge and reading comprehension skill, are related to learning from a text and how the contents of the text are related to the way in which prior knowledge and reading comprehension skill respectively operate in learning from a text. Based on previous research adopting the Construction-Integration model, they hypothesized that “comprehension skill components
and domain knowledge components can have a differential influence on learning from
text” (p. 55). Reading comprehension, reading rate, and GPA scores were termed the
reading comprehension set while the person’s score of an history knowledge test, interest
of history, number of history courses taken, number of political science courses taken,
and interest in current events constituted what was termed the history knowledge set (i.e.,
the prior knowledge set). Two pairs of texts were developed, and each text had two
versions: unexpanded and expanded text versions. Twenty completion questions and an
essay writing task were presented to 40 university students. The results of the study
revealed that participants who had more correct responses and wrote higher quality
essays for the expanded texts tended to have higher reading comprehension scores,
whereas domain knowledge was not related to such performances. The results also
showed that for texts having a less developed causal structure (i.e., unexpanded version),
correct-response performance and essay quality were related to only person’s knowledge
of and interest in history. The researchers concluded that the need for individuals to use
their knowledge in constructing text representations depends on the information in the
text, and that “the results of this study support the notions derived from the Kintsch
model, that reading-comprehension skill and not prior knowledge is primarily responsible
for text-base construction, for the understanding of the contents of the text per se,
whereas prior knowledge and not reading-comprehension skill is primarily responsible
for situation model development, for relating the text contents to the reader’s prior
knowledge” (p. 58).
Turning to the role of prior knowledge in text-based understanding, McNamara and Kintsch (1996) found no difference between high- and low-knowledge individuals with respect to text-based operation. McNamara and Kintsch (1996) conducted two experiments. In experiment one, they investigated the interactive effects of prior knowledge (e.g., high and low) and text coherence (e.g., high and low) on learning. Forty native undergraduate students who were divided into two groups participated in experiment one. Participants’ comprehension was examined through free recall, multiple-choice questions, and a keyword-sorting task. The free recall and multiple-choice questions were employed to examine the ability to remember, which is a text-based understanding, whereas a keyword sorting task was used to measure the ability to integrate information, which is an indirect measure of learning (i.e., situation model). In experiment one, the researchers observed that both high- and low-knowledge learners performed better in the high-coherence text on recall and multiple-choice questions than in the low-coherence text, but that there was no significant difference in the recall of the high-coherence text between high- and low-knowledge learners. The researchers also found that high-knowledge learners reading low-coherence texts performed better on sorting tasks than high-knowledge learners reading high-coherence texts. Based on the findings of experiment one, McNamara and Kintsch argued that facilitating comprehension by increasing the coherence of a text might supersede a deeper understanding (i.e., situation model) of the text, and that a deeper understanding might result when readers make their own bridging inferences and derive their own macrostructure. Experiment two was conducted to examine whether open-ended
questions were more sensitive to a reader’s situation model than were the multiple choice questions, as well as to examine long-term effects by including a delayed retention test.

Forty native undergraduate students were divided into two groups (e.g., high and low prior knowledge groups); one text-based comprehension measure (i.e., text-based questions) and two situation model comprehension measures (i.e., keyword sorting and bridging inference questions) were administered. Results showed that high-knowledge learners performed better on the open-ended questions, and that “questions that present all of the information to the readers, as do multiple-choice questions, require only recognition of the answer and thus only a text-based understanding” (p. 277-279), whereas answering an open-ended bridging inference question clearly relies on a thorough understanding of the relation between two sentences. It was also found with regard to the long-term effects that delay caused very little effect, although the researchers observed that more forgetting occurred with the low-coherence text than with the high-coherence text.

Roloff (1999) obtained similar results to those of McNamara and Kintsch (1996) about the performance of high- vs. low-knowledge learners reading two versions (i.e., fully explicit and less explicit) of a text with an additional interesting fact. Roloff (1999) attempted to examine a deeper level of text representation, or what Kintsch and his associates labeled the situation model, with participants of two reading ability levels in EFL (e.g., low and high). Ninety two Brazilian university-level students participated in this study. Comprehension was measured quantitatively through the task of immediate written reconstructive recalls. The number of propositions recalled from two versions of
reading was counted in relation to text-based recall and inferential recall. The influence of text difficulty, topic interest, and topic familiarity was considered as a factor related to the construction of a deeper level of text representation. The findings of this study indicated that there is no significant difference in recall of the fully explicit text between high- and low-knowledge learners, and that the fully explicit version of the text had an advantage over the less explicit version only with respect to the construction of text-based understanding. It was also found that text difficulty and topic familiarity were not determining factors in the reconstructive representation, and that topic interest was shown to be a significant factor in the construction of the text-based understanding as well as in the reconstructive process of low reading ability as a whole.

Recently, Trites and McGroaty (2005) also employed the Construction-Integration model as the basic framework of their research. Unlike previous research that investigated affective factors in the construction of two different levels of understanding addressed in the Construction-Integration model, Trites and McGroaty (2005) employed the Construction-Integration model to develop the tasks for measuring the ability of reading to learn (i.e., situation model) as opposed to the ability of reading for basic comprehension (i.e., text-based understanding). They insisted that the tasks for reading to learn require the ability to integrate and connect information presented by the author with what learners already know; thus, reading to learn should be distinguished from reading for basic comprehension, which can be assessed through recall, summarization, and text-based multiple-choice questions. A chart task for problem solving was developed for reading to learn. This task was designed on the basis of the insistence of Spivey (1997)
that “readers’ categorization of information in a text offers insight into their cognitive processes and their making of meaning” (as cited in Trites & McGroaty, 2005, p. 180). In this task, participants were asked to identify and categorize information from the text on a chart reflecting the macro-rhetorical structures of the text (i.e., causes, effects, and examples). Text-based multiple choice questions were used to assess the ability of reading for basic comprehension. Two-hundred-fifty-one university level students (105 native learners of English and 146 non-native learners of English) took comprehension tests. The researchers found that reading to learn had a lower correlation with basic comprehension, which suggested a possible distinction between reading to learn and reading for basic comprehension. They also found that successful completion of the new task (i.e., the completion of a chart task) demanded a deeper understanding of the text, while the multiple-choice questions required only a superficial grasp of content. Additional interesting findings such as the effects of level of education, computer familiarity, and medium of presentation on reading to learn and reading for basic comprehension were reported.

Section summary

The Construction-Integration model distinguishes several different levels in the understanding of a text while a learner reads. The two levels of understanding that are relevant here are the text-based and the situation model. Several studies have investigated either the psychological reality of the understandings of text-based and situation model or the effect of a number of factors related to the construction of these two levels.
Schmalhofer and Glavanov (1986) and Fletcher and Chrysler (1990) provided evidences of the different levels of understanding by using recognition tests that contained different types of distracters. Some studies (e.g., Moravcsik & Kintsch, 1993; McNamara & Kintsch, 1996: Voss & Silfies, 1996; Roloff, 1999) investigating the effects of background knowledge and text coherence on comprehension have demonstrated that these factors facilitate and enhance comprehension of high and low reading ability learners in different ways. Recently, Trites and McGroaty (2005) employed the Construction-Integration model to develop the tasks for measuring the ability of reading to learn (i.e., situation model understanding) as opposed to the ability of reading for basic comprehension (i.e., text-based understanding). The Construction-Integration model has been successfully applied to numerous studies of L1 and L2 reading comprehension. As suggested by Kintsch himself (1998), an attempt to apply the Construction-Integration model to listening comprehension studies is expected.

2.3 Listening

Listening is a covert activity and has heavy processing demands (Rubin, 1995). Listeners need to attempt to make sense of information at the same time they are internalizing that information. There is little time for listeners to reflect upon the information and have opportunities to ask for repetition. Because of these aspects of listening and other factors, there has not been sufficient research in the field of listening. The following section is an overview of the research that has been done in the area of L2
listening in general. This section provides a foundation for the next section, which describes the nature of academic listening and factors that are considered to affect academic listening comprehension.

2.3.1 Defining listening

Unlike reading, listening needs to deal with spoken language that is often unplanned and typically exhibits short idea units (Vandergrift, 2006). Listening takes place in real time and is ephemeral, thus a listener does not have the option of reviewing the information presented and has little control over the rate of speech at which the speech is spoken.

One of the chief problems in the field of listening research is the lack of consensus on the definition of listening (Witkin, 1990). Joiner (1984) stated that one of the fundamental reasons listening has been so difficult to define is that it is a covert activity. Byrnes (1984) mentioned that although listening literature in the past decades has attempted to unify all components of listening found in related studies and to formulate a common base for a definition of a listening, the conceptualization of listening still needs more research since listening is a “high-complex problem solving activity” (p. 318) that can be broken down into a set of distinct sub-skills. Coakley and Wolvin (1986) insisted that the stem of the difficulty in defining listening is in part from the complex relationship between listening skills and thinking skills since “the emphasis on comprehension in the tests used to measure listening skills illustrates how closely listening skills are related to thinking skills” (p. 15). Recently, Rost (2002) maintained
that the difficulty of defining listening may be due to the fact that most researchers’ personal definitions of listening have typically drawn upon one of four perspectives; that is, receptive, constructive, collaborative, or transformative, which is changeably selected in relation to their theoretical interests in the studies.

Although researchers have expressed difficulty in defining listening, some researchers have introduced definitions of listening from various perspectives. Purdy (1991) defined listening as “the active and dynamic process of attending, perceiving, interpreting, remembering, and responding to the expressed (verbal and nonverbal) needs, concerns, and information offered by other human beings” (p. 11). Carroll (1993) described listening as a set of activities that involve “the individual’s capacity to apprehend, recognize, discriminate or even ignore” (p. 364). Rubin (1995) conceived listening as “an active process in which a listener selects and interprets information which comes from auditory and visual clues in order to define what is going on and what the speakers are trying to express” (p. 151). Imhof (1998) described listening as “the active process of selecting and integrating relevant information from acoustic input and this process is controlled by personal intentions which are critical to listening” (p. 83). Reviewing listening studies done in the past decades, Buck (2001) wrote that listening is personal and individual, and a series of processes which begin with deciphering incoming sounds and later make meaning out of them. Recently, Rost (2002) stated “listening = experiencing contextual effects” (p. 3) which can be translated as “listening as a neurological event (experiencing) overlaying a cognitive event (creating a change in a representation)” (p. 3). These varying definitions of listening have all, to some extent, helped shape the focus of this study.
Section summary

Even though difficulties in defining listening have been expressed in the professional literature, the definitions have been conceived by a variety of researchers (e.g., Purdy, 1991; Rubin, 1995; Imhof, 1998; Buck, 2001; Rost, 2002). Listening has been characterized as a set of activities that involves an individual’s capacity to apprehend, recognize, discriminate, or even ignore certain information. It has also been considered to contain complex and active processes that are involved in linguistic knowledge, personal expectation, cognitive processing skills, and world knowledge. Listening involves interaction and negotiation with a speaker and requires prior experience of a listener to best understand and interpret what a speaker says. Yet, more investigation and attempts to formulate a comprehensive definition of listening acceptable to researchers to use for their studies are still needed.

2.3.2 Types of listening

When listening is referred to during discourse, it tends to be connected automatically to comprehension. This is due to the fact that “comprehension is often considered to be the first-order goal of listening, the highest priority of the listener, and sometimes the sole purpose of listening” (Rost, 2002, p. 59). Especially for L2 learners who are acquiring a new language, the term ‘listening comprehension’ typically refers to all aspects of listening since comprehension through listening is considered to be a foundation for enabling learners to process the new language, and since L2 listening research has focused exclusively on the comprehensive aspect of academic listening.
(Long & Macian, 1994). However, Rost (2002) insisted that the term ‘comprehension’ needs to be used in a more specific sense in listening studies. Additionally, research has shown that learners behave differently in listening by the purposes of listening to incoming texts (e.g., Mills, 1974; Devine, 1982; Richards, 1983; Ur, 1984; Wolvin & Coakley, 1988, 1993). These studies have suggested that building a taxonomic model of listening functions may be useful in expanding the understanding of the complex human listening behaviors.

Just as readers can be assisted in reading by the purpose they have for reading, listeners function differently in listening according to the purpose they have for listening. The earlier categorization of listening function was proposed by Mills (1974). Mills categorized listening as responsive listening, implicative listening, critical listening, and nondirective listening: Responsive listening can be identified as agreeing with a speaker and implicative listening as identifying what is not being said; critical listening indicates evaluating the message from a speaker; and nondirective listening is relevant to providing a sounding board for a speaker. Another categorization of listening was suggested by Devine (1982). He mentioned that similar to reading instruction, instruction in listening could be built around critical listening, accurate listening that needs a skill to pay attention, and purposeful listening that needs a skill to follow spoken discourses.

A well-known categorization of listening has been introduced by Wolvin and Coakley (1988, 1993). Wolvin and Coakley identified five types of listening whose functions are correlated with general purposes of listeners: (1) discriminative listening, (2) listening for comprehension, (3) therapeutic (empathic) listening, (4) critical listening,
and (5) appreciative listening. Discriminative listening serves as the base for all other purposes of listening behaviors and indicates distinguishing behaviors for the auditory and/or visual stimuli and for identifying the auditory and the visual messages; listening for comprehension is relevant to the understanding of the information with avoiding critical judgment to the message through assigning the meaning intended by a speaker instead of assigning his/her own meaning; therapeutic (empathic) listening serves as a ‘sounding board’ for a speaker and is the act of discriminating and comprehending a message to provide necessary supportive behaviors and responses to a speaker; critical listening is identified as evaluating what is being said and discriminating and comprehending the message to form judgment about the message in order to accept or reject the persuasive appeals; and appreciative listening is to enjoy or gain a sensory impression from the material.

Second language researchers have also attempted to categorize listening. Introducing an extensive taxonomy of micro-skills required for listening, Richards (1983) categorized listening as either conversational listening or academic listening. He identified conversational listening as listening that involves skills such as the skill to discriminate among the distinctive sounds of the language, to retain chunks of language of different lengths for short periods, and to adjust listening strategies to different kinds of listener purposes. Academic listening, according to Richards, is the act of listening that requires the skill to identify the purpose and scope of a lecture, to identify relationships among units within the discourse, and to deduce meanings of words from contexts.
Ur (1984) is another L2 researcher who classified listening by its function. She has distinguished listening as listening for perception and listening for comprehension. Listening for perception indicates the act of listening to correctly perceive “the different sounds, sound-combinations, and stress and intonation patterns of foreign language” (p. 33). Listening for comprehension is relevant to content understanding. Listening for comprehension is classified into two sub-categories, passive listening for comprehension and active listening for comprehension. According to Ur (1984), passive listening implies the act of simple listening with attempting no response, whereas active listening indicates the act of making a basis for other language skills with imaginative or logical thought. However, she stated that these two sub-categories of listening for comprehension do not represent two strictly independent listening types. Rather, she insisted that listening for comprehension should be considered as a continuum from passive listening on the left side to active listening on the right side of the continuum.

Rost (1990) introduced four types of listening suggested by Galvin (1985, as cited in Rost, 1990, p. 11) with a small modification: (1) transactional, (2) interactional, (3) critical, and (4) recreational listening. He identified transactional listening with learning new information, which typically occurs in formal listening settings such as lectures. In transactional listening situations, a listener has limited opportunities to interfere or to collaborate with a speaker for negotiating message meaning. Interactional listening, according to Rost (1990), is relevant to recognizing the personal component of a message. In interactional listening situations, a listener is explicitly engaged in the cooperation with a speaker for communicative purposes and focuses on building a
personal relationship with the speaker. Regarding critical listening and recreational listening, Rost addressed that critical listening, similar to the one suggested by Wolvin and Coakley (1988, 1993), indicates the act of evaluating reasoning and evidence, while recreational listening requires a listener to be involved in appreciating random or integrating aspects of an event. He further stated that listening requests a cognitive and social skill as well as a linguistic skill, and that the purpose of listening guides a listener as he/she listens.

Listeners function differently according to purposes they have for listening. The categorization of listening on the basis of its purpose can assist listeners in developing listening strategies. It can also help listeners understand their own listening behaviors. Researchers in the area of listening need to conduct studies with clear acknowledgement of the type of listening they seek to study and its effects on listeners.

Section summary

When listening is referred to during discourse, people tend to associate it automatically with comprehension. This is due to the fact that “comprehension is often considered to be the first-order goal of listening, the highest priority of the listener, and sometimes the sole purpose of listening” (Rost, 2002, p. 59). However, research has shown that listening functions in the complex process of listening may be different due to the purposes of listening, and that the categorization of listening on the basis of its purpose can assist listeners in developing multi-discipline listening strategies with varying purposes as well as in understanding of their own listening behaviors. Mills
(1974), Devine (1982), and Wolvin and Coakley (1993) are among L1 listening researchers who have attempted to classify the types of listening with regard to listening purposes. Second language researchers have also attempted to categorize listening. Introducing an extensive taxonomy of micro-skills required for listening, Richards (1983) categorized listening as either conversational listening or academic listening. Ur (1984) distinguished listening as listening for perceptions and listening for comprehension. Recently, Rost (1990) introduced four types of listening: (1) transactional, (2) interactional, (3) critical, and (4) recreational listening. Before designing and conducting listening studies, researchers in the area of listening should have a clear understanding of the type of listening that they are investigating.

2.3.3 Information processing through listening for comprehension

Researchers have accepted the notion that listening comprehension may be technically similar to reading comprehension and have explained the processes of listening comprehension with the principles derived from reading comprehension research (e.g., Carroll, 1972; Anderson 1983; Chaudron & Richards, 1986; O’Malley, Chamot, & Kupper, 1989; Lund 1991; Tsui & Fullilove, 1998). These studies have argued that listening comprehension, like reading comprehension, involves two stages: (1) apprehending linguistic information (text-based; low level) and (2) relating that information to a wider communicative context (knowledge-based; high level). These studies have also introduced two processing models for comprehension: (1) bottom-up and (2) top-down.
The earlier studies of listening assumed that comprehension is achieved through bottom-up processing (Buck, 1994). These studies have suggested that listening comprehension occurs through a number of consecutive stages in a fixed order, starting with the lowest-level of processing and moving up to higher-levels of processing. However, some studies (e.g., Bruce, 1958; Marslen-Wilson, 1980; Marslen-Wilson & Tyler, 1980) have found that listening comprehension did not occur in a predetermined order of the process from lower-levels to higher levels but, rather, it occurred with the higher-level pragmatic and inferential process as the starting point before processing lower-levels of linguistic data.

Bottom-up processing starts with the lower-level decoding of the language system evoked by an external source such as incoming information and then moves to interpreting the representation through a working memory of this decoding in relation to higher-level knowledge of context and the world (Morley, 1991). On the contrary, top-down processing explains that listening comprehension is achieved through processing that involves prediction and inferencing on the basis of the hierarchies of facts, propositions, and expectations by using an internal source such as prior knowledge (Buck, 1994). This process enables listeners to bypass some detailed information and makes researchers consider that listening comprehension is not an unidimensional ability.

Research has suggested that listening may be assisted by ‘an interactive-compensatory mechanism’ (Stanovich, 1980), suggesting that a large number of knowledge sources and skills simultaneously interact with each other during listening comprehension. For instance, Chaudron and Richards (1986) insisted that the two
approaches of information processing work in an interactive fashion to enhance the comprehension of connected discourse by both L1 and L2 listeners through the observation that bottom-up approach helps a listener to assign a grammatical status to words on the basis of syntax and word order, or the meanings of lexical items used in the message, and that the top-down approach allows a comprehender to use prior knowledge as a part of the process of comprehension. Flowerdew and Miller (2005) also maintained that the explanation of comprehension in listening by an interactive mechanism has an important advantage over the hierarchical mechanism, whether it is bottom-up or top-down, in that it allows for the possibility of individual variation in the listening process. Similarly, Field (2004) claimed that the relationship between top-down and bottom-up approaches for information processing is not a constant one but can be varied according to “the listener’s confidence as to the reliability of each” (p. 367) after he found that L2 listeners used neither a top-down nor a bottom-up processing while dealing with the new vocabulary.

Section summary

Researchers have argued that listening comprehension can be achieved through either a top-down or a bottom-up process. Bottom-up processing assumes that listening comprehension occurs through a number of consecutive stages in a fixed order, starting with the lowest-level of processing and moving up to higher-levels of processing. Top-down processing, on the other hand, explains that listening comprehension is achieved through processing that involves prediction and inferencing on the basis of the hierarchies
of facts, propositions, and expectations by using an internal source such as prior knowledge (Buck, 1994). However, researchers have also encountered more complicated notion; thus making it difficult to reach a definitive conclusion about one of the two processing models learners preferred. Tsui and Fullilove (1998) have pointed out that information processing is complex, and much knowledge and a large number of skills are simultaneously interacting with each other during the comprehension process. Considering the observational facts and findings of Tsui and Fullilove (1998), it is reasonable to accept the statement that “listening to L2 may be assisted by an interactive-compensatory mechanism already available in L1, which compensates for gaps in understanding” (p. 363) in L2. However, this dichotomy has not been resolved in the researcher’s mind as the present study is being developed.

2.4 Academic listening

Academic listening is usually referred to listening to lectures or discussions in academic settings. Richards (1983) provided taxonomy for academic listening contrasted with conversational listening, suggesting that the listening skills needed for academic tasks may need to be distinguishable from skills in daily conversational listening. Flowerdew (1994) and Chaudron (1995) also contended that academic listening is different from conversational listening in that academic listening is characterized by one-way transactional language that aims to deliver information and knowledge, whereas conversation listening focuses on maintaining social contact between a speaker and a listener.
The following section provides an overview of the research done in the area of L2 listening in academic lecture contexts.

2.4.1 Conversational listening vs. Academic listening

Since academic listening obviously has different purposes from conversational listening, it can be assumed that academic listening has its own distinctive features in comparison with conversational listening. Related to the difference between academic listening and conversational listening, Flowerdew (1994) insisted that the distinguishable features between the two types of listening can be explained by the differences in both degree and kind.

With regard to the differences in degree, three differences such as the type of required background knowledge, the ability of distinguishing main points and ignoring others, and the frequency of turn-taking were introduced as the classification scheme between the two types of listening. Flowerdew (1994) pointed out that the required knowledge for academic listening is relevant to specific subject matters because topics of lectures or discussions are closely related to listeners’ professional fields. Both academic listening and conversational listening need background knowledge already stored in listeners to integrate with new information for better comprehension. However, as pointed out by Flowerdew (1994), in conversational listening situations, the required background knowledge is more general world knowledge for interpreting and comprehending the speech of others, whereas more specific knowledge is needed for academic listening in order to understand texts containing dense information, with
comparatively long lengths. The ability to distinguish main points and ignore other points
is another key feature of academic listening. Hansen (1994) stated that the key to
successful academic listening is how quickly listeners can figure out important points of
the discourse and distinguish major points from minor points. Richards (1983) also
mentioned that the skill to distinguish important information and ignore other information
has a higher priority over other skills needed to develop academic listening. Although an
ability to distinguish between what is relevant to the main purpose and what is less
relevant is needed for any type of listening for comprehension (Flowerdew, 1994), this
ability is perhaps more necessary for academic listening than for conversational listening.

The third difference in degree between academic listening and conversation listening
relates to the frequency of turn-taking conventions. Chaudron (1995) pointed out that
academic listening tends to be relatively carefully planned with respect to the content;
thus, turn-taking occurs only if questions are raised from a lecturer or fellow students. On
the other hand, turn-taking in conversational listening is obviously essential to maintain
interactional cycles of activity as each participant makes equal contributions; therefore,
turn-taking occurs frequently in conversational listening activities.

With respect to differences in kind, the type of listening strategies employed by
listeners would be the first to distinguish academic listening from conversational listening.
O’Malley, Chamot, and Kupper (1989) described a detailed exploration of L2 learners’
self-reported strategies for listening to academic texts, for instance, listening for more
global and larger chunks of information instead of focusing on word-by-word decoding.
They insisted that L2 learners tend to use different and complex strategies for academic
tasks. Note-taking could be a well-known example of strategies that L2 learners employ for academic listening (e.g., Dunkel, 1988; Chaudron, Loschky, & Cook, 1994; Chaudron, 1995). Another difference in kind could be found from the fact that particular skills are associated with academic listening but are not needed for conversational listening. Flowerdew (1994), for example, stated that the skill “to integrate the incoming message with information derived from other media” (p. 11-12), such as handouts or overhead projectors, is needed only for academic listening. The skill of retaining information through note-taking that Power (1986) mentioned in relation to effective listening would be another instance of a listening skill needed for only academic listening.

While Flowerdew (1994) attempted to distinguish academic listening from conversational listening by both the difference in degree and kind, Imhof (1998) summarized the critical aspects of academic listening with regard to the situational context through the extensive review of relevant literature. As the first prominent feature of academic listening distinctive from other types of listening, Imhof pointed out the transactional feature of academic listening. She stated that in academic contexts, a substantial amount of new concepts and information is provided with little interaction with a speaker. Due to this aspect of academic listening, a listener in academic contexts needs to develop mental preparation for a rational selection of information and for a systematic integration of the new information into existing cognitive structures for effective learning. The asymmetric interaction between a speaker and a listener is another distinctive aspect of academic listening. Imhof (1998) stated that academic listening is, to some extent, “characterized by a certain degree of asymmetry between the speaker and
the listener(s) on the knowledge dimension due to the information gap between the listener and the speaker” (p. 84-85). The asymmetric interactional aspect of academic listening is closely related to the third aspect of academic listening: the social distance between a listener and an instructor or other speakers. The social distance which can be observed whenever a learner listens to an instructor is different from when a listener listens to peers in reciprocal teaching. This distance is assumed partly from the authority that the situational context gives the instructor over the learner. In academic listening contexts, information exchange and presentation is also constrained by social conventions. When a listener has the opportunity to interact with the speaker in order to negotiate meaning, they follow an established order or conventional procedure as a way of showing respect to the speakers. Imhof described this aspect of academic listening as ‘formality.’

The last aspect Imhof introduced as a distinctive feature of academic listening concerns time. In an academic classroom, a substantial amount of information is conveyed for relatively long periods of time, normally about 50 minutes. This implies that a listener needs to develop self-regulation strategies for distinguishing important information by ignoring others. It also indicates the need of concentration from a listener. Regarding this final aspect of academic listening, Imhof emphasized developing skills and activities that systematically facilitate information-intake in an hour-length class setting.
Section summary

In spite of the fact that some features of academic listening are the same as conversational listening, academic listening has its own distinctive features. Flowerdew (1994) has distinguished peculiar features of academic listening by focusing on differences in degree and kind. The type of required background knowledge, the ability to distinguish relevant points and ignore others, and the frequency of turn-taking are introduced as distinctive features of academic listening under the topic of degree. The distinctive features of academic listening that are under the topic of kind include particular strategies and skills which are used only for academic listening. Recently, Imhof (1998) summarized the critical aspects of academic listening with regard to the situational context through an extensive review of relevant literature. The transactional aspect, an asymmetric interaction, formality, social distance, and time were introduced as critical dimensions which distinguish academic listening from other types of listening. Other researchers also introduced distinctive features of academic listening with respect to taxonomies of academic listening skills (e.g., Richards, 1983; Power, 1986; Weir, 1990). However, research is still necessary regarding the relationships between academic listening and conversational listening.

2.4.2 Empirical studies of factors in academic listening

Research has shown that L2 listeners have difficulty in comprehending academic lectures (Flowerdew & Milller, 1997; Buck, 2001; Smidt & Hegelheimer, 2004). Unique discourse structures of lectures (e.g., Olsen & Huckin, 1990; Dudley-Evans, 1994;
Tauroza & Allison, 1994; Young, 1994), rate of speech (e.g., Griffiths, 1990, 1991; Tauroza & Allison, 1990; Zhao, 1997), and roles of discourse markers (e.g., Chaudron & Richards, 1986; DeCarrico & Nattinger, 1988; Dunkel & Davis, 1994; Flowerdew & Tauroza, 1995) are often reported as factors contributing to listener difficulties in academic lecture comprehension. At the same time, research has been launched on factors such as prior knowledge (e.g., Long, 1990; Chiang & Dunkel, 1992; Schmidt-Rinehart, 1994; Hansen & Jensen, 1994; Jensen & Hansen, 1995; Hohzawa, 1998), general strategy use (e.g., Benson, 1989; O’Malley, Chamot, & Kupper, 1989; Mason, 1994; Lynch, 1995, 1997; Vandergrift, 1996), and note-taking (e.g., Dunkel, 1988; Dunkel, Mischra, & Berliner, 1989; Chaudron, Loschky, & Cook, 1994; King, 1994).

The next section provides a brief overview of the research in the field of L2 academic listening. Since the effect of prior knowledge of content on L2 college academic listening comprehension is the main research focus of this study, empirical studies regarding this factor are reviewed in a different section.

2.4.2.1 Effects of discourse structure on L2 academic listening

Researchers have observed that the discourse structure of lectures in different subject areas has different patterns of organization, and that the unawareness of the difference on organization results in comprehension difficulties of L2 learners (e.g., Olsen & Huckin, 1990; Dudley-Evans, 1994; Tauroza & Allison, 1994; Young, 1994). Olsen and Huckin (1990) insisted that L2 learner difficulties in comprehension lie at the discourse level, not at the sentence level related to linguistic inadequacies, observing that
L2 learners failed to grasp the gist of a lecture despite adequate sentence-level English proficiency. A 16 minute-videotaped lecture on a topic in mechanical engineering was provided to 14 learners of L2 for a free recall summary task. The data from the analyzed summaries revealed that these L2 learners fully understood the linguistic content of the lecture and had copious and accurate notes on the details of the lecture but did not see how the information fit together. As an explanation of this result, Olsen and Huckin (1990) maintained that the lack of familiarity of L2 learners with the problem-solution rhetorical structure of American academic lectures prevents them from seeing “the discourse as having a single overriding main point and a number of subordinate points supporting it” (p. 41) and from using the point-driven strategy to get the gist of the lecture.

Motivated by the finding of Olsen and Huckin (1990), Dudley-Evans (1994) analyzed the discourse structures of four graduate academic lectures in order to either support or dispel the claim that the discourse structure of lectures may differ according to the discipline concerned. Lectures from plant biology and highway engineering were selected for this purpose and the constant-comparative approach was employed to analyze the discourse structures of the lectures. The analysis of these lectures reported that the lectures in plant biology have an information-driven type of structure whereas the lectures from highway engineering have an argument-building structure, that is, a point-driven problem-solution structure. This analysis confirmed the claim that the discourse structure of lectures differs according to the discipline concerned. Based on the analysis of the lectures, Dudley-Evans (1994) suggested that rather than concentrating on common
structural features that are found in all types of lectures, L2 learners need to be aware of the particular features of the discourse structures of lectures in different subject areas.

Criticizing Olsen and Huckin (1990) with regard to their use of the ambiguous term and the methodology employed, Tauroza and Allison (1994) extended the study of Olsen and Huckin (1990) with a few modifications. They assumed that if a lecture has a more complex discourse structure such as a problem-solution-evaluation pattern, then L2 learners who are familiar with a problem-solution structure of discourse have difficulty with the evaluation section of the lecture because those L2 learners are not familiar with ‘evaluation’ part of the discourse. An extract from a video-recorded lecture on humans as information processors, which has a problem-solution-evaluation pattern of academic discourse, was selected and provided to 50 first year undergraduate students of electronic engineering. As evident in Olsen and Huckin (1990), engineering lectures have a problem-solution (e.g., a situation-what to do) structure of discourse. The immediate-recall summaries were recorded and analyzed as categorized responses. The results showed that L2 learners had difficulty with the evaluation section of the lecture as was assumed. Based on this finding, Tauroza and Allison concluded that “the failure in lecture comprehension can be explained by the difficulties students encounter when they try to fit information conveyed in an unfamiliar discourse structure into the pattern of a more familiar and less complex discourse structure” (p. 47).

Insisting that L2 learners’ difficulties in processing spoken academic discourse can be overcome by a knowledge of the macro-structure of academic lectures (i.e., formal schema), Young (1994) analyzed seven lectures that were presented by either native or
non-native instructors in the fields of study in which L2 learners were most engaged. She assumed that characterizing the formal schema of university lectures facilitates L2 learners’ lecture comprehension. Using the phrasal analysis within the model of Systemic Functional Grammar (SFG), Young revealed that the macro-structure of lectures is composed of largely three meta-discoursal phases: a discourse structuring phase, a conclusion phase, and an evaluation phase. These three phases indicate an announcing phase of new directions of the lecture, a summarizing phase of uttered point by a lecturer, and a reinforcement phase to the strands of the conclusion phase, respectively. Young concluded that each phase recurs discontinuously throughout a lecture, and that an acquaintance with the correct schematic patterning of lectures aids L2 learners in comprehension.

Section summary

The discourse structure of lectures in different subject areas has different organizational patterns. And the unawareness of the difference in organization results in comprehension difficulties of L2 learners. Olsen and Huckin (1990) maintained that the unfamiliarity of L2 learners to the problem-solution rhetorical structure of American academic lectures causes comprehension problems of L2 learners when listening to lectures. Tauroza and Allison (1994) also insisted that the lack of familiarity of discourse structure brings about the failure in lecture listening comprehension. Since it is assumed that difficulties in processing spoken academic discourse can be overcome by the knowledge of macro-structured lectures (i.e., formal schema), some researchers have
suggested that learners need to be aware of the particular features of discourse structures of lectures in different subject areas, rather than concentrating on common structural features that are found in all lectures.

2.4.2.2 Effects of speech rate on academic listening

Researchers have also considered speech rate to be one of the key factors affecting listening comprehension of college academic lectures. Griffiths (1990) raised a question about which rates of speech most facilitate comprehension of L2 learners with different levels of L2 proficiency. He hypothesized that the mean of listening comprehension test scores would be significantly higher for passages delivered at slower speech rates. Three texts which were recorded with three different speech rates (200 wpm, 150 wpm, & 100 wpm) were presented to a group of 15 lower-intermediate level L2 learners. Unlike the expectation that lower-intermediate L2 learners would significantly benefit from an excessively slow speech rate, results of the study showed that the comprehension scores of passages delivered at a slow rate did not significantly differ from those of passages delivered at an average rate, and that an artificially slow speech rate did hinder the comprehension rather than helped. In a follow-up study, Griffiths (1991) updated the research results, reporting that the highest mean of listening comprehension test scores for the passages could be obtained when the passage was delivered at 188 wpm.

Similar to Griffiths (1990), Tauroza and Allison (1990) questioned to what extent of variation in the speech rate L2 learners cope with for comprehension. They argued that
the standard range of speech rates provided by Pimsleur, et al. (1977) is not applicable to different speech events of English since it is limited to one particular variety of speech (i.e., radio news) and since it was constructed on the basis of French speakers as well as English speakers. Considering that reliable information about standard speech rate is of value to listening-material developers as well as researchers, Tauroza and Allison (1990) decided to investigate whether there is a consistent difference in word-length within and between different categories of speech events. Speech from four different situations (i.e., radio news, conversations, interviews, and academic lectures) were selected and analyzed. The results indicated that average speech rates differ significantly for each event. With regard to the rate of lecture speech, Tauroza and Allison (1990) reported that the average rate of the lecture speech in their samples (22 lectures) lies within the range of 125 to 160 wpm, and that 33 percent of the lecture sample data has a speech rate slower than 130 wpm, whereas speech rates above 185 wpm are recognized as being faster than normal rates of lecture in their samples.

Recently, Zhao (1997) conducted a listening comprehension study related to speech rates with a different angle. Instead of focusing on the effect of different rates predefined by researchers, he gave the control of the speech rate to the students and administered an individual-based listening test. In addition, unlike previous studies, the effect of speech rate was measured by the listeners’ behavior of modification instead of their comprehension. Four different listening conditions in which L2 learners controlled the presentation of input were designed and were administered to 15 learners of L2. Results of the study showed that L2 learners comprehended better when they had control
of the speech rate, and that L2 learners tended to vary speech rates when possible, depending on the difficulty of the text. Based on the findings, Zhao (1997) concluded that “in order to better understand how speech rate is related to listening comprehension, researchers should consider students as unique individuals, who operate with different perceptions and internal references” (p. 62).

Section summary

It has been a common belief among L2 learners and instructors that a slower speech rate facilitates L2 learners’ listening comprehension. However, in recent years, results from a growing body of research have not supported this belief and yielded contradictory findings (e.g., Griffiths, 1990, 1991; Tauroza & Allison, 1990; Zhao, 1997). For instance, Griffiths (1990, 1991) reported that the comprehension scores of passages delivered at slow rates of speech did not significantly differ from those of passages delivered at average rates, and that artificially slow speech rates hindered comprehension, rather than helped it. Tauroza and Allison (1990) also reported that only 33 percent of lecture data delivered information with a slower rate of speech, after analyzing 22 lecture samples. Further research needs to investigate the complex relationship between speech rates and L2 listening comprehension with consideration of the uniqueness of individuals as pointed out by Zhao (1997).
2.4.2.3 Functions of discourse marker in academic listening

Studies of listening comprehension of L2 learners have confirmed that L2 learners have difficulties in recognizing the markers of information organization in L2 lectures (Yuan, 1982). The markers of organization of information, that is, discourse markers, have been classified into two categories, a macro-marker and a micro-marker. Macro-markers indicate the discourse marker “which signals the information structure of discourse by emphasizing direction and relations within discourse” (Chaudron & Richards, 1986, p. 115), whereas micro-markers signal lower-level information in the text, serving as “filled pauses giving listeners more time to process individual segments of a piece of discourse” (Chaudron & Richards, 1986, p. 116). Unlike studies in L1 listening comprehension which have suggested that listeners benefit from the presence of both macro- and micro-markers placed in discourse messages, L2 research has presented different results.

Chaudron and Richards (1986) conducted an experimental study that explores the effect of discourse signals and markers on L2 lecture comprehension. Four versions of lectures (i.e., Baseline, Micro, Macro, and Micro-Macro versions) were developed and presented to two groups of L2 learners (71 pre-university L2 learners and 81 ESL learners). A recall cloze measure, true-false responses, and a multiple-choice test were administered. On the basis of results, Chaudron and Richards stated that L2 listeners benefited from the presence of macro-markers on recall when these cues were added to a text. However, they also stated that micro-markers did not provide a positive effect on L2 lecture comprehension. As an explanation of the result that micro-markers did not aid L2
learners’ recall on lecture content, Chaudron and Richards stated that micro-markers do not have a function to aid content enough to make the subsequent information more salient or meaningful, and that the quantity of the markers scattered through the lecture may distract the L2 learners’ attention by making the lecture appear less well-organized.

While Chaudron and Richards (1986) mainly focused on showing which markers led to a more recall of the text materials in a lecture, DeCarrico and Nattinger (1988) focused on investigating the role of lexical phrases as macro-markers in academic lecture comprehension. They argued that researchers need to investigate how many and what types of macro-markers actually occur in L2 lectures with different lecture styles on a variety of topics. Natural classroom lectures and prerecorded lectures on nine topics delivered with three different lecture styles were transcribed, and all the lexical phrases used as macro-markers in those lectures were listed. These lexical phrases were also classified into eight categories, which were sorted with regard to the functional role in discourse structure: “topic markers, topic shifters, summarizers, exemplifiers, relators, evaluators, qualifiers, and aside markers” (p. 94). These eight categories were further divided into either global macro-organizers (topic markers, topic shifters, and summarizers) or local macro-organizers (exemplifiers, relators, evaluators, qualifiers, and aside markers). DeCarrico and Nattinger (1988) insisted that teaching the functional categories of macro-markers can enhance the ability of L2 learners to comprehend academic lectures, principally by allowing L2 learners “to predict what type of information is coming up next and to organize and interpret the flow of information more easily” (p. 91).
Dunkel and Davis (1994) reported no significant effect of discourse markers (both macro- and micro-markers) on the amount of notes L2 learners wrote and on the quantity of information that L2 learners recalled in the comprehension metrics of lectures. They questioned whether the inclusion or exclusion of discourse markers has an effect on lecture comprehension by L1 and L2 learners. Two versions of a lecture (one with discourse markers and one without discourse markers) were prepared. Fifteen learners of L1 and 12 learners of L2 were assigned to listen to the lecture containing discourse markers, and 14 learners of L1 and 14 learners of L2 were assigned to listen to the lecture containing no discourse markers. Regarding the performance difference between L1 and L2 learners, the researchers found a predictable result that L1 learners were superior to L2 learners on the amount of notes and on the quantity of recalled information about the lecture. However, regarding the effect of the discourse marker on lecture comprehension, the researchers observed no significant difference in the propositional number of information units on recall between two groups (group with discourse markers and group without discourse markers) although they noticed that the group listening to lectures without discourse markers recorded more words in their protocols than did the group with discourse markers. Dunkel and Davis concluded that the different structures of the listening material, the different measures of comprehension, and the allowance of listeners’ referring to notes might have caused the observed results to be different from those of previous studies showing that the presence of macro-markers enhances the academic lecture comprehension of L2 listeners (e.g., Chaudron & Richards, 1986).
While both Chaudron and Richards (1986) and Dunkel and Davis (1994) indicated that micro-markers do not assist L2 listeners’ comprehension in lecture contexts, Flowerdew and Tauroza (1995) found that micro-markers such as ‘so, right, well, ok, and now’ play a significant role in L2 lecture comprehension. They analyzed 25 lecture videotapes for the type and number of micro-markers and selected one of the lectures as an appropriate material for an experimental study. Sixty three electronic engineering students were recruited and divided into either a control group or an experimental group. A video recording of an extract of a naturally occurring lecture was presented to the control group, whereas the same video with deleted discourse markers was given to the experimental group in order to investigate whether the deletion of micro-markers affects the subjects’ comprehension of the lecture. Self-assessment, a written-summary test, and a short answer test were administered. The researchers found that the subjects comprehended the lecture better when micro-markers were present than when they were absent. Flowerdew and Tauroza (1995) concluded that the micro-marker can assist lecture comprehension of L2 learners, and that the contrastive finding between theirs and others might be due to differences in the experimental procedures they employed.

Section summary

Studies of listening comprehension problems of L2 learners have confirmed that L2 learners have difficulties in recognizing the markers of information organization in L2 lectures (Yuan, 1982). Unlike studies in L1 lecture comprehension which have suggested that listeners benefit from the presence of both macro- and micro-markers placed in
discourse messages, L2 research has presented different results. Chaudron and Richards (1986) reported that L2 listeners benefited from the presence of macro-markers on recall when these cues were added to a text, but noticed that micro-markers did not provide a positive effect on L2 lecture comprehension. Dunkel and Davis (1994) found no significant effect of discourse markers (either macro- or micro-markers) on the amount of notes and quantity of information L2 learners recalled. However, Flowerdew and Tauroza (1995) found that subjects comprehended the lecture better when micro-markers were presented than when they were absent. Further research is required to investigate the relative contribution of each discourse marker to L2 lecture listening comprehension.

2.4.2.4 Effects of note-taking on academic listening

Note-taking is intuitively appealing as an external storage for learning and retention of lecture content (DiVesta & Gray, 1972). A considerable amount of research on note-taking in L1 has been conducted. However, these studies produced mixed findings: Some studies have found a positive effect of note-taking (e.g., DiVesta & Gray, 1972; Fisher & Harris, 1973; Einstein, Morris, & Smith, 1985) while other studies have failed to find a positive effect (e.g., Hartley & Davis, 1978). With regard to L2, similar results have appeared and a general conclusion was induced: “The effects of note-taking may depend heavily on the conditions under which note-taking effects are assessed” (Hale & Courtney, 1994, p. 31).

Several L2 researchers have examined the effectiveness of note-taking on lecture comprehension. Dunkel (1988) developed a set of indexes of content of notes that can
predict the degree of lecture retention of L1 and L2 note-takers: (1) the total number of words, (2) the number of information-units, (3) the number of test questions answerable from the notes, (4) the completeness of the notes, and (5) the efficiency of the notes. In order to identify the relative weight of the indexes in accounting for the variance in performance on the post-lecture retention of L1 and L2 note-takers, she conducted an experimental study with a videotaped lecture. Sixty six learners of L1 and 63 learners of L2 were recruited, and multiple-choice tests with 30 question items and a written recall-protocol were administered. Three step-wise multiple regression analyses were employed to identify the relative predictive power of the index on lecture retention. Dunkel (1988) found that note-taking terseness (information-units) has the greatest power to predict lecture retention of L1 and L2 note-takers, but unlike the expectation, the total number of words has no influence on lecture retention of L1 and L2 note-takers. She also found that the other indexes have no significant difference in influencing lecture retention.

As a follow-up study of Dunkel (1988), Dunkel, Mischra, and Berliner (1989) examined the effects of concurrent note-taking, short-term memory ability, and L2 proficiency on academic lecture comprehension. One hundred thirty six speakers of L1 and 123 speakers of L2 were recruited and divided into two groups, one of which was to apply only listening and the other of which was to apply listening and note-taking. The Digit Span subtest of the Wechsler Intelligence Scale for Children was revised and administered to measure short-term memory ability of participants, and a multiple-choice test with 30 items covering the content of video-taped lecture was given to measure participants’ lecture comprehension. A Multivariate Analysis of Variance (MANOVA)
was used to determine the impact of note-taking, short-term memory, and L2 proficiency on lecture comprehension. Test results showed that there was no significant difference between those who took notes and those who did not, and that high level of short term memory and L2 proficiency participants performed better in lecture comprehension than low level of L2 learners. Results of this study also revealed that L2 learners have a distinctive linguistic disadvantage in an L2 speaking lecture environment. Further research regarding the effect of individual cognitive difference on lecture comprehension was recommended at the end of the study.

Similar to Dunkel (1988), Chaudron, Loschky, and Cook (1994) examined the effect of retaining notes on L2 learners’ comprehension and the relationship between L2 learners’ comprehension and their note quality. They recruited 98 adult L2 learners for the study and divided them into two groups, a group with note-taking and a group without note-taking. Three lectures, each six to seven minutes in length, on academic topics were recorded as materials, and all participants were asked to listen to all three lectures with time intervention. Multiple-choice tests and cloze tests for each lecture were administered, and one-way Analysis of Variance (ANOVA) and step-wise regression as well as factor analysis were used to determine the effect of the note-retention condition and the relationship between the note quality (scored by using the system of Hull (1986)) and lecture comprehension. The researchers found no significant effect for note retention on lecture comprehension scores and no strong or consistent relationship between the note quality and comprehension. However, they also noticed that L2 learners were able to take advantage of note-taking in test situations, and that certain note quality measures, such as
the appropriate use of abbreviation, are more related to successful lecture comprehension than others. The need for further research on lecture style and lecture quality was recommended since it was found through this study that L2 learners’ comprehension of lecture content seemed to be influenced by the clarity of the structure and presentation of the lecture.

Arguing that previous studies which conducted laboratory-type post-lecture testing with or without students being allowed to take notes provide meaningless information about the effectiveness of note-taking on comprehension, King (1994) insisted that direct observation and case histories are needed to provide helpful information to practitioners with regard to the effect of note-taking. A naturalistic approach investigating real lectures was employed to examine the systematic relationship between the notes taken by postgraduate engineering majors (L2 learners) and the visual/verbal aspects of the lecture. Four students who were identified as having different levels of note-taking skills participated in the study. The notes of four students over fourteen lectures given by three different lecturers were analyzed. Descriptive analysis revealed that students’ notes were made up largely of reproductions of the visual displays, and that students’ notes had a very low proportion of verbal elements. It was also observed that students generally agreed to write down the verbal message, but there was a disagreement regarding the extent to which they captured the verbal message: Students who were identified as better note-takers captured more of the verbal message. Insisting that “evaluation features strongly as part of the verbal message, it is seldom given
visually” (p. 234), King made a request for further investigation about the relationship between the amount of the non-visual element which is captured and success in the course in general.

Unlike the above research examining the effect of note-taking in academic lecture contexts, Hale and Courtney (1994) investigated the effect of note-taking in a TOEFL test situation. Since one of the purposes of the TOEFL is to assess students’ ability to comprehend spoken text typically occurring in an academic setting where learners are allowed to take notes, the researchers assumed that results of this study might provide useful information applicable to the studies that investigate note-taking effect on the comprehension of academic lectures. A total of 563 learners of L2 were divided into four groups and were tested under the condition of either “note-taking urged” or “note-taking allowed” (p. 30). Two TOEFL test sets (for each group), both with a multiple-choice format, were given. The tests were given to each group in a different order. Results showed that note-taking had little influence on the students’ performance, and that there was a negative effect on students’ performance under the condition of “note-taking urged”. The researchers also found through the questionnaire responses that although there was little effect of note-taking on test performance, L2 learners considered taking notes help to understand a class lecture. Referring to speech rate, text length, and question types as factors that might either facilitate or impede the effectiveness of note-taking on comprehension, the researchers called for further research about the impact of note-taking on L2 lecture listening comprehension.
Section summary

L2 lecture comprehension studies investigating the effects of note-taking have provided mixed findings. King (1994) reported that students who were identified as better note-takers captured more of the verbal message. However, Dunkel, Mischra, and Berliner (1989) and Chaudron, Loschky, and Cook (1994) found no significant effect of note-taking on lecture comprehension scores. Hale and Courtney (1994) even reported that under the condition of “note-taking urged,” note-taking had a negative effect on students’ performance. Overall, the studies of note-taking effect indicated that “the opportunity to take notes does not necessarily produce beneficial effects” (Hale & Courtney, 1994, p. 31). However, researchers noticed that L2 learners are able to take advantage of note-taking in certain test situations, and that certain note-quality strategies such as appropriate use of abbreviation are more related to successful lecture comprehension than others. Further research is necessary.

2.4.2.5 Effects of strategy use on academic listening

Another issue often noticed in L2 academic listening research is the effect of strategies L2 listeners use for lecture comprehension. Research relative to language learning has described that three different types of strategies are used by L2 learners: (1) meta-cognitive strategies, (2) cognitive strategies, and (3) socio-affective strategies. Meta-cognitive strategy, such as planning or monitoring, indicates the step of using knowledge about cognitive processes (O’Malley & Chamot, 1990). Cognitive strategy, referring to elaboration, inferencing, or note-taking, is defined as the operations of direct
analysis or synthesis of learning materials in problem solving (Rubin, 1987). Socio-affective strategy is related to the ways that L2 learners select to interact with others (Ellis, 1994) and includes cooperation and self-encouragement. Vandergrift (1996), investigating strategy use of high school French learners, reported that the use of strategy is related to the success of listening behavior, and that the effective use of meta-cognitive strategies is more important for successful listening comprehension. He also reported that successful listeners tend to employ monitoring and selective attention (meta-cognitive), although cognitive strategies, such as elaboration and inferencing, are more frequently observed. Regarding the relationship between strategy use and gender, Bacon (1992) revealed that female L2 learners used meta-cognitive strategies more frequently than male L2 learners.

Recognizing the importance of strategy use in academic listening comprehension, some researchers have focused on which specific strategies effective L2 listeners employ for comprehending a lecture (e.g., Benson, 1989; O’Malley, Chamot, & Kupper, 1989; Mason, 1994; Lynch, 1995). O’Malley, Chamot, and Kupper (1989) recruited 11 high school ESL learners who were designated as effective or ineffective listeners for their study and employed think-aloud protocols to collect students’ comments. They reported that effective listeners were more able to self-monitor about loss of attention or over-elaboration of the message and to listen for more global and large chunks of the lectures instead of focusing on word-by-word decoding. They also showed that effective listeners were more able to infer word meanings from contexts and to elaborate text meanings by relating new information to old information which is pre-stored within learners as world knowledge or by self-questioning.
Benson (1989) examined notebooks of an Arabic graduate student during lectures, and found that the student took notes primarily for main points and used background knowledge for personal interpretation of the materials. Participant observation records, a key-informant interview, the teacher’s class outline, a L1 counterpart’s written work, and the participant’s written work were collected and analyzed. This ethnographic research project revealed that the participant tended to reduce incoming linguistic data, to make connections within already familiar concepts, to localize ideas or concepts to the home country, and to identify the teacher’s viewpoints, which are all related to the idea of “test-wiseness” (Dunkel, 1988, p. 272).

While Benson (1989) investigated the strategy use of only one L2 graduate student, Mason (1994) investigated lecture comprehension strategies of 26 postgraduate students of L2. Twenty six participants from eight graduate programs were interviewed twice. Interviews with L2 learners revealed that L2 postgraduate students employed eight types of strategy to overcome the difficulties of lecture listening comprehension: relying on previous background in the subject matter; compensating with a concentrated study of the reading materials; beginning with a reduced course load or including EFL or other course support; listening to or seeking out American peers; following TV and print media regularly; speaking to professors or advisors; seeking outside help in the subject matter in a student’s language; and dropping a course during the semester.

Lynch (1995, 1997), on the basis of the study looking at the strategy use of L2 learners in classroom seminar listening, insisted that getting a strategy, such as asking questions to resolve listening comprehension, is desirable but complicated. He assumed
that the analysis of L2 learners’ strategy use could help to identify the source of significant comprehension problems L2 learners encounter in academic contexts. Twelve learners of L2 in a thirteen-week pre-sessional program participated in the study, and classroom recordings and observations were used to reveal L2 learners’ strategies for seminar-type classes. The extracts from the performances of participants indicated that L2 listeners used the strategy of questioning in order to signal a problem in understanding the speakers or to request the speakers to elaborate or expand the practical consequences of what they have said: new informational queries or questions forward to a new point, not backward to something already covered. In addition, the analysis of the extracts and observation notes revealed that L2 listeners intervened only when the presentation was completed, which resulted in negotiation delay. Since it was considered that delayed negotiation might occur due to listening difficulties, the recordings of class interaction and observation notes were closely scrutinized again. Lynch (1995) concluded that the difficulties of comprehension are caused by the listener’s inability “to decipher a speaker’s pronunciation, interpret an unfamiliar use of a familiar word, deduce the meaning of unfamiliar lexis, recognize cohesive ties, and interpret propositional sense” (p. 174).

Section summary

The effect of strategy use on comprehension and retention of academic lectures has been investigated to any degrees. For instance, O’Malley, Chamot, and Kupper (1989) revealed that effective listeners utilized top-down strategies (e.g., using prior
knowledge of a topic), whereas ineffective listeners relied almost exclusively on the application of bottom-up strategies (e.g., using word-recognition). Benson (1989) reported that a L2 learner primarily used a note-taking strategy. Mason (1994) noticed that L2 learners relied heavily on background knowledge of their subject and were willing to spend long hours on reading assignments in order to clarify understanding. Although utilizing strategies to resolve problems in listening comprehension is desirable, finding strategies appropriate to L2 learners’ proficiency level might be complicated (Lynch, 1995).

2.5 Content knowledge and comprehension

Once it was widely viewed that comprehending meaning is affected by linking what is heard to what is already stored in the long-term memory (Bartlett, 1932; Rumelhart, 1980; Adams & Collins, 1985; Anderson, 1985; Mayer, 1992), studies investigating the contribution of prior knowledge of content on comprehension have received great attention from L2 researchers. As a result, research evidence concerning the effects of content knowledge on L2 reading comprehension is abundant and it has been established that content knowledge is an important facilitator for reading comprehension. Only a few L2 listening researchers have empirically investigated the potential relationship between content knowledge and L2 listening comprehension. However, their studies have provided inconsistent results about the roles of content knowledge on L2 listening comprehension. Studies relative to the effect of prior knowledge of the content on L2 learners’ performance are reviewed in following sections.
2.5.1 Effects of content knowledge on reading comprehension

In L2 reading research, content knowledge has been proven to play a significant role in comprehension. Earlier, Steffensen, Joag-Dev, and Anderson (1979) investigated the effect of content knowledge of Americans and Indians through readings of passages about an American wedding and an Indian wedding. Nineteen Indian adults and 20 American adults were recruited and a vocabulary test and a free recall-protocol as well as a multiple-choice question task on the two experimental passages were administered. In this cross-culture study, Americans recalled more about the American wedding and elaborated more culturally-appropriate passages in their recall about the wedding information than did the Indians. Similarly, Indians recalled more about the Indian wedding, indicating the pervasive influence of the content knowledge as a significant factor in reading comprehension. The researchers concluded that readers who have the same cultural background with the writer have more schematic advantages on comprehending a given text than readers from different cultures have.

Carrell (1987) maintained that more research is needed to investigate the simultaneous effects on ESL reading comprehension of both content and formal schemata as well as any potential interaction between them. Analyzing the quantity and quality of the idea units recalled from two cultural groups, Catholic/Spanish (24 students) and Muslim (28 students), of high-intermediate level ESL learners, she found that the group given familiar content and familiar rhetorical form performed best, and that reading familiar content in an unfamiliar rhetorical form was easier than reading unfamiliar content in a familiar rhetorical form. However, her research also revealed that rhetorical
form was a more significant factor in the comprehension of the top-level episodic structure of a text and of event sequences, and temporal relationships among events. The overall findings of this study reported that both content and form schemata play an important role in the comprehension in a different way.

Considering prior knowledge as a predictor of the level of reading comprehension, Hock (1990) conducted an experiment with 317 Malaysian undergraduate students. He hypothesized that comprehension of a text could be predicted to a significant extent by the amount of content knowledge in the topic domain of the text and proficiency in the target language. A general English test, a prior-knowledge test, and a discipline-related English reading test were employed in order to measure the relative effect of prior knowledge and L2 proficiency on English reading comprehension. The results showed that although foreign language readers utilized both their prior knowledge of the topic domain and their knowledge of the target language to reconstruct and interpret the meaning of a text, “the weight of language proficiency is about twice the weight of subject specific background knowledge in the prediction of how well a reader can extract and interpret the meaning of a foreign language text on the subject matter” (p. 222).

Similarly, Hammadou (1991) studied the relationship between prior knowledge and inference in reading for 89 French and 77 Italian learners by employing recall protocols. She agreed to the idea that “inference is a thinking process that involves reasoning a step beyond the text, using generalization and explanation” (p. 28) and assumed that only readers with prior knowledge of topic were able to infer main idea sentences from texts. Although, overall, she reported the importance of prior knowledge
in L2 reading, through this study she raised several issues relative to measuring the effect of prior knowledge on reading. For instance, Hammadou found that the subjects’ ratings of their own familiarity with a topic were unable to predict their ability to comprehend what they read about that topic: “The manner in which prior knowledge is measured seems to make an important difference in the resulting effect” (p. 31). Besides, she also pointed out the problem of defining proficiency as a measure of context dependency when measuring comprehension of meaning, stating that the relationships between inferencing and prior knowledge as they relate to language proficiency might aid attempts to better understand the construct of proficiency.

Clapham (1998) conducted an experiment looking at the relative contribution of background knowledge and the level of language ability to reading comprehension of EAP. Eight hundred forty two learners of L2 who spoke 77 different first languages agreed to provide their information of reading scores of the International English Language Testing System (IELTS) test and of a grammar test, and completed a background knowledge questionnaire. Multiple regression equation was used to look at the comparative contribution of background knowledge and English language ability on reading comprehension. MANOVA was employed to examine how much effect the levels of language ability have on the L2 learners’ ability to use background knowledge when reading. The research results revealed that the reading performance of L2 learners was mainly affected by the level of language ability. However, when comparing the mean scores of groups on tests inside and outside L2 learners’ own fields of study, Clapham found that background knowledge becomes more important. Results also showed that L2
learners who have low-level language ability did not use background knowledge, whereas higher level L2 learners made increasing use of it. Clapham insisted that the findings of the study support Clarke’s (1980) short-circuit hypothesis that the limited controls of L2 language short-circuit the transfer of effective L1 reading skills.

Inspired by the articles of Clapham (1998, 2000) that raised the possibility of the existence of two thresholds in language learning, Krekeler (2006) investigated the effect of background knowledge in Languages for Specific Academic Purposes (LSAP) tests with the application of the linguistic threshold hypothesis. He questioned whether L2 learners would enable to use their background knowledge only at certain levels of L2 proficiency. More than 500 international students who studied two different disciplines, business and science/technology, in German universities participated in this study. Two reading tests which contained short-answer questions and a summary completion, and C-TEST were administered to measure L2 learners’ reading ability and linguistic proficiency, respectively. Background knowledge was assessed by three different variables with dichotomous scales. Results indicated that groups of students with background knowledge performed better than groups without background knowledge, and that the effect of background knowledge did vary according to the level of language proficiency. The results of this research also showed that very advanced L2 learners did not rely on background knowledge as much as L2 readers with intermediate levels of L2 proficiency, which could be used as an evidence of a support for the existence of two thresholds in language learning. However, this observation only occurred in the reading test based on a business topic. Although this study did not disapprove the threshold
hypothesis, Krekeler concluded that it is inappropriate to apply the theory of linguistic thresholds to the study of the interactional effect of background knowledge and L2 proficiency because there was not a cut-off point at which the effect of background knowledge changed markedly and because, if thresholds existed at all, they were fuzzy and might even be chance events. He also added that it is doubtful to apply the linguistic threshold hypothesis to the construction of LSAP tests in a meaningful way because the text used in LSAP tests does not have a very high degree of subject specificity which needs to see the threshold effect clearly.

Section summary

While the earlier studies (e.g., Steffensen, Joag-Dev, & Anderson, 1979) mainly focused on looking at the role of content knowledge as an important facilitator for reading comprehension, recent research has centered on investigating the interactional effect between content knowledge and L2 proficiency on reading comprehension (e.g., Hammodou, 1991; Clapham, 1998; Krekeler, 2006). These studies found that the reading performance of L2 learners was mainly affected by the level of language ability rather than content knowledge, and that the effect of content knowledge varies according to the level of L2 proficiency. However, when the interactional effect was investigated in relation to language tests for academic purposes, research reported contradictory results, saying that the effect of content knowledge on reading test performance was stronger than that of L2 proficiency (Clapham, 1998; Krekeler, 2006). In addition, the finding that the effect of content knowledge varies according to the level of L2 proficiency led some
researchers to apply the threshold hypothesis to reading studies, but the results were inconclusive. More research is needed to provide a clear idea about the comparative importance of language proficiency and background knowledge in L2 reading comprehension.

2.5.2 Effects of content knowledge on listening comprehension

Compared to reading studies, relatively few empirical studies have explored the potential relationship between background knowledge and listening comprehension. Markham and Latham (1987) conducted research to assess the influence of religious-specific background knowledge on listening comprehension of adult ESL students. Sixty five ESL students who were categorized as Muslim, Christian, and neutral, respectively, participated in the study. The analysis of recalled data indicated that students adhering to a specific religious group recalled more ideas, and produced more appropriate elaborations and fewer inaccurate distortions regarding passages associated with their particular religion. The researchers concluded that background knowledge does significantly influence ESL students’ listening comprehension.

Long (1990) highlighted the need to investigate how background knowledge affected auditory comprehension in L2. Results from a survey, recall protocols, and a checklist administered to 188 students enrolled in university Spanish courses showed that background knowledge could help L2 listening comprehension, and that linguistic knowledge played a prominent role in comprehension when appropriate background knowledge was not available to L2 listeners. However, she also found that students who
possessed very good linguistic knowledge overextended the pre-stored background knowledge onto a new set of data that were clearly incongruent. That is, she noticed that activated background knowledge could result in dysfunctional effects on comprehension, which indicated that good listeners had a tendency to abandon linguistic knowledge in favor of the familiar schema.

Similarly, Chiang and Dunkel (1992) provided two lectures regarding Confucius and The Amish for 388 Chinese listeners in order to assess the effects of prior knowledge of lecture topic and speech modification on the listening comprehension. They found that Chinese EFL listeners scored higher in their postlecture multiple-choice comprehension test that contained both passage-dependent and passage-independent items, when they listened to the familiar-topic lecture (Confucius) than when they listened to the unfamiliar-topic lecture (The Amish). However, a significant effect of prior knowledge was found only on the passage-independent items, which resulted in an interesting insistence that only passage-independent items can provide a measure of a listener’s prior knowledge for language comprehension. Learners’ performance on passage-dependent items did not differ significantly whether the familiar or unfamiliar topic was presented. The effect of prior knowledge itself on comprehension of information from the passage remains unclear. Regarding the effect of speech modification on listening comprehension, the researchers reported that high-intermediate listening proficiency learners benefited from speech modification which entailed elaboration and redundancy of information, but the low-intermediate listening proficiency learners did not.
Schmidt-Rinehart (1994) conducted a research project relative to the interaction between topical knowledge and L2 listening comprehension. Arguing that the effect of background knowledge itself on listening comprehension remains unclear when it is related to L2 listening ability, she extended the research of Long (1990) and Chiang and Dunkel (1992) by adding proficiency level as a variable. Ninety first, second, and third quarter university students of Spanish classes (three levels of proficiency) participated in this study and the immediate written recall-protocols were administered. The results showed that topic familiarity affected the scores of the recall measures, and that the means of the course-level groups had a consistent increase in comprehension scores across the three levels. However, the results also indicated no interaction between the two variables, topic familiarity and course level (L2 listening proficiency), revealing that all students, regardless of their course levels, scored higher on the familiar passage. Several caveats, such as only one measure of comprehension or the potential confounding of construct of language proficiency, were notified by Schmidt-Rinehart for the interpretation of results of this study.

The effect of prior knowledge on lecture listening comprehension was also measured by Hansen and Jensen (1994) and Jensen and Hansen (1995). Hansen and Jensen (1994) hypothesized that a test could be biased in favor of listeners with prior knowledge. Two lectures (history and chemistry) were prepared for listening tests and 235 university level L2 learners were recruited. Of the 235 learners of L2, only 30 learners reported prior knowledge of the non-technical lectures (history lecture) and only eight learners reported the experience of studying the topic of chemistry. When prior
knowledge was added as a predictor of performance on the listening test, Hansen and Jensen found that prior knowledge of the history topic did not improve listening scores, whereas prior knowledge was a significant factor to the prediction of test takers’ performance on the chemistry test. Later work about the effect of prior knowledge on the 11 lectures, Jensen and Hansen (1995) posited that the accessibility of prior knowledge on specific topics in lectures is determined by listening proficiency. Results from multiple regression correlations revealed that listening proficiency of 128 university level L2 learners had a significant main effect for all 11 lecture performances, whereas prior knowledge had statistical significance for 5 of 11 lectures. In addition, the examination of interaction between listening proficiency and prior knowledge for lecture listening showed that 10 out of 11 lectures have no significant interaction, which indicated no support to the hypothesis that listening proficiency moderates the effect of prior knowledge. An interesting finding in this study was that the effect of prior knowledge was more likely to show up for technical lectures than for non-technical lectures although the effect size was small. Jensen and Hansen concluded that prior knowledge does not significantly attribute to L2 academic lecture comprehension, and that further investigation would be needed to investigate the reason prior knowledge is more likely to affect technical lecture comprehension.

Recently, Hohzawa (1998) found, by studying 58 Japanese English learners, that listeners with high prior knowledge understood more familiar text than unfamiliar text and more proficient L2 listeners understood more than less-skilled listeners in either familiar or unfamiliar text. Students were assigned to a background-information group
(experimental group) and to a no background-information group (control group). A proficiency test was given to measure their prior knowledge about the topics of three news stories. Students in the experimental group discussed the content of the stories briefly after the introductions to the news stories were provided. Collected scores from a written recall-protocol and a comprehension test revealed that students who lacked background information tended to produce more instances of inaccurate recall of the text or distortions, which was similar to findings of Markham and Latham (1987).

As presented in the related literature, findings of L2 listening studies have indicated that there is some controversy over the role of content knowledge as an aid to L2 listening comprehension. In addition, with regard to the relationship between content knowledge and L2 listening proficiency on L2 listening comprehension, L2 listening studies have shown inconclusive results. The findings of inconclusive role of content knowledge and its relationship with L2 proficiency on listening comprehension supported the need and design of the present study, main purpose of which was to investigate the effects of content knowledge on comprehension of L2 college academic lecture listening.

Section summary

Unlike L2 reading comprehension studies that have found that the reading performance of L2 learners is mainly affected by the level of language ability rather than by content knowledge, and that the effect of content knowledge varies according to the level of L2 proficiency, L2 listening studies have shown somewhat inconsistent results. Long (1990) found that when subjects possessed an appropriate or relevant content
knowledge, learners’ L2 proficiency seemed less critical because content knowledge might compensate for L2 proficiency, at least in L2 listening comprehension. Schmidt-Rinehart (1994) also reported that topic familiarity affected the scores on recall measures, and that students, regardless of listening proficiency levels, scored higher on the familiar passage. However, Chiang and Dunkel (1992) reported that content knowledge did not support comprehension of listening to monologue texts, whereas L2 proficiency played a significant role in the degree of L2 listening comprehension demonstrated. Similarly, Jensen and Hansen (1995) reported that listening comprehension performance of L2 learners was mainly affected by their level of L2 proficiency, not by their prior knowledge. Additional studies are required to establish the relationship between content knowledge and L2 proficiency in L2 listening comprehension, especially in examining the specific roles learners’ L2 proficiency and content knowledge play in comprehension.

Chapter summary

Listening is a process that involves linguistic knowledge, personal expectations, cognitive processing skills, and world knowledge. For L2 learners involved in academic listening situations, comprehension is a high priority for listening, and sometimes it is the sole purpose of listening (Rost, 2002). Since much information in academic contexts in colleges and universities is delivered through the lecture format, being able to comprehend an academic lecture based mainly on its content is crucial to L2 learners in relation to their academic success.
Comprehending lectures does not simply indicate the retention or memorization of the content of academic lectures. As stated by Rost (2002), “the listener may know everything that the speaker is saying, but there is no comprehension unless the listener integrates information from the speaker’s text with what he/she already knows” (p. 61). Rost’s statement has a connection with the two main theories of comprehension, Schema theory and the Construction-Integration model. The strictly top-down, schema-controlled comprehension process of Schema theory brought about criticism from many researchers and prompted additional theories such as the Construction-Integration model proposed by Kintsch (1988), which explains comprehension as arising from an interaction between the text information and the prior knowledge activated by learners. The Construction-Integration model assumes several different levels of understanding, and the ones most relevant for the present study with regard to the Construction-Integration model are the text-based and the situation model understandings.

Acknowledging major assumptions underlying comprehension theories, L2 listening researchers have investigated variables that might affect comprehension of academic lectures and their relative contribution to comprehensibility while learners listen to lectures in L2 academic contexts. The unique discourse structure of lectures, the rate of speech, and the role of discourse markers have been identified as variables that contribute to difficulties of academic lecture comprehension of L2 learners. At the same time, in an effort to find variables enhancing academic lecture comprehensibility, research has been conducted especially to focus on the causal relationship between learner strategies and comprehension of academic lectures.
Content knowledge is one of the variables that have been assumed to enhance comprehension of an academic lecture. Even though the facilitative role of content knowledge on L2 listening comprehension is intuitively appealing, and studies investigating the effect of content knowledge as a facilitator of comprehension have suggested its promising role on L2 listening comprehension (e.g., Mueller, 1980; Herron, 1994; Berne, 1995; Sherman, 1997), findings of L2 listening studies indicate that there is still controversy over the role of content knowledge in L2 listening comprehension. In addition, unlike L2 reading comprehension studies which found that the reading performance of L2 learners is mainly affected by the level of language ability rather than content knowledge, L2 listening studies have shown inconclusive results.

This study investigated L2 listeners’ comprehension of college academic lectures within the Construction-Integration model. Specifically, this study investigated the extent of the contribution of content knowledge and L2 listening proficiency to explaining L2 learners’ college academic listening defined to have two levels of understandings on the basis of the Construction-Integration model and examined the comparative importance between the effects of these variables on L2 college academic listening. This study also attempted to identify potential variables (e.g., strategy use, residency, etc.) that might influence L2 learners’ college academic listening and examined the extent of the contribution of these variables in explaining L2 learners’ college academic listening.
CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology of the study and provides the rationale behind selected instruments and procedures for data collection. This chapter includes the following sections: research questions and design, participants, materials, data collection and procedures, data analysis, and pilot study.

3.2 Research questions

Focusing on the effects of content knowledge and L2 listening proficiency on college academic lecture understanding within the Construction-Integration model and the relationship of these two variables to the understanding of college academic listening lectures, the present study used a quantitative design as the main research methodology in an ex post facto study and also employed a small, supplementary follow-up qualitative interview. The following research questions were addressed.

Primary research questions

1. What is the relationship between content knowledge and understanding of a college academic lecture?
1.1 To what extent does content knowledge explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?

2.1 To what extent does L2 listening proficiency explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?

3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?
3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?

Given the often-cited importance of investigating the variables that affect L2 listening comprehension, specifically in relation to strategy use (i.e., Bacon, 1992; Vandergrift, 1996, 2003; Goh, 1997, 2000), this study formulated several secondary research questions.

Secondary research questions

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?

5. What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?

6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?

7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

3.3 Research design

This study was designed to investigate content knowledge and L2 listening proficiency as major predictors of college academic lecture listening comprehension within the Construction-Integration model. In addition, this study investigated additional
features of college academic lecture listening that may have an impact on L2 learners’ comprehension, specifically with regard to strategy use. For research purposes, this study used a quantitative design as the main framework in an ex post facto study and employed a supplementary follow-up qualitative interview. Nine measures were selected and administered based on the quantitative research approach. Seven measures were selected to explain college academic listening comprehension by using two variables: content knowledge and L2 listening proficiency. Two of measures, a written recall-protocol and a checklist, were used to determine L2 learners’ text-based understanding after listening to a college academic lecture. One measurement task, answering a set of bridging inference questions, was used to establish L2 learners’ situation model understanding. Two measures, an instrument of self-assessment and a content knowledge checklist, were employed to assess the level of participants’ content knowledge of a college academic lecture topic. Additional two measures, a self-rating instrument and a TOEFL listening section, were used for assessing the level of participants’ L2 listening proficiency. Two of the total nine measures were related to the investigation of the L2 learners’ overall performance on college academic lecture listening comprehension. Both were self-rating tasks and were developed to assess the L2 participants’ self-rated listening comprehension of college academic lectures and their strategy use when listening to college academic lectures. The self-rating measure to L2 learners’ strategy use was initially developed by Vandergrift (2005).

For additional information on college academic listening comprehension of L2 learners, a follow-up interview was implemented. Lynch (2001) mentioned that a clear
picture of what a learner is able to do is obtained through the close examination of both quantified reports and qualitative profiles of learners. The narrative inference from the descriptive analysis of the data collected in the interviews was expected to provide information about participants on the conceptual importance of content knowledge and L2 listening proficiency in college academic lecture listening, factors affecting L2 college academic lecture listening comprehension, and their different strategy uses while listening to college academic lectures.

By employing both quantitative and qualitative approaches to collect data for the study, it was expected to achieve a better understanding of L2 learners’ performance in academic lecture listening comprehension tasks. A model of the relationship among the variables for this research is presented in Figure 3.1.
Figure 3.1: The relationship between independent variables and dependent variables
Figure 3.1 shows that this study was primarily designed to investigate content knowledge and L2 listening proficiency as major predictors of college academic lecture listening comprehension when the effect of strategy use was removed. Figure 3.1 also reveals that this study aimed to investigate additional features of college academic lecture listening that may have an impact on L2 learners’ comprehension. The following section provides information of participants of the study.

3.4 Participants

Participants of this study were 141 non-native speakers of English enrolled at a large Midwestern US university. The minimum number of participants (i.e., the sample size) in this study was calculated on the basis of the suggestions by research methodologists. Cohen (1977) recommended that the number of participants per variable needs to be 14. Bentler and Chou (1987) insisted that the minimum number of five is needed for a variable in order to have a normal distribution. Recently, Hair et al. (1998) mentioned that 15 to 20 participants per independent variable are appropriate with regard to the generalizability of research results. This study was primarily designed with three independent variables (two main and one rival), and thus, it required at least 45 participants. Therefore, the number of participants of 141 in this study was considered to have met the above recommendation. Participants were recruited from the entire university non-native English-speaking population, and therefore, they represented a wide range of disciplines. A flier (see Appendix R) was developed and a personal contact with potential participants was made.
Participants of this study were admitted as either undergraduate or graduate students. Therefore, they were assumed to have sufficient English proficiency to complete the given tasks of the study as well as comprehend the purposes of the study. Participants completed a self-reporting questionnaire developed to gather demographic information about their English learning experiences and English listening behaviors and signed an informed consent form (see Appendix S) before participating in the present study. The participants took part in this study as volunteers and received a payment of $10 per hour during data collection.

3.5 Materials

In order to answer the research questions of the study, the following instruments and tasks were developed and administered.

3.5.1 Listening material

Finding suitable listening texts is a major issue in listening studies. Hughes (1989) stated that using samples of genuine speech is very important in developing listening tasks. Buck (2001) also mentioned that in preparing a listening text, researchers need to ensure that the listening text has the characteristics of target-language texts, and a one way to have these characteristics is to actually record target-language use situations where people are involved. Since this study intended to assess L2 learners’ college academic lecture listening comprehension, it was assumed that the ideal listening text was from recordings of actual college lecture classes.
Three lecturers from English, history, and business administration programs were contacted to obtain permission to record their classes, but it was found soon that recording live lectures was problematic due to a number of practical difficulties. Just leaving a portable tape recorder in the middle of the room did not record what was said clearly enough for the use in listening comprehension studies. Extraneous noise made by facilities such as an air-conditioner or a projector and by student coughing, shuffling books, and/or moving in their seats added difficulty for using recordings as listening texts for the study. As an alternative to recording live lecture classes, pre-recorded lecture video/audio files were searched through the university archives and the World Wide Web.

The department of astronomy at the university archived class lecture videos of astronomy 161 and 162 courses on the Internet, which were instructed by a professor at the research site for two quarters, winter 2005 and winter 2006. Because these courses were video simulcast to the various regional campuses during those quarters, for most of the lectures, the video and audio stream was captured on videotapes and converted into an Internet streaming video format to make it accessible on the World Wide Web. Since the main purpose of the video lecture was not to create a polished video of the lectures, the professor mentioned that all videos were developed live, unedited, and uncut.

Because the original videotapes of lectures were already reused for other purposes, the only option to obtain the lecture clips was to download them from the Internet. Although the lectures of both astronomy 161 and 162 were archived on the Internet and the professor gave permission to use his lectures as listening materials for this study, problems occurred to obtain the lecture videos from the Internet since these lectures were
formatted for students to listen to online and were not allowed to be saved in a personal computer through downloading. In order to record lectures from the Internet, Camtasia studio 3.0 published by TechSmith Inc. was used, which was developed to record real full-motion video of anything on the computer screen.

This study determined to use only audio stream of lectures as listening texts, although visual information was likely to improve situational authenticity. This was because visual information is considered less important in lecture situations where the emphasis is on the content (Buck, 2001), because the role and effect of visual information in listening studies remains largely unexplored (Gruba, 1997; Brindley, 1998; Buck, 2001; Read, 2002), and for the most, because the visual quality of the lectures was not good enough to provide contextual cues for the study. Audio streams of lectures were extracted by Zet-Audio 6.0.2 (basic version) published by Cowon Inc. and were saved as a wav file. In order to convert the wav file to an mp3 file that is suitable for both a computer and a CD-player, GOM recorder was used, which was published by IPOP Inc. The equalizer of CoolEdit 2.0 was used to reduce the hissing sound from the mp3 lecture files.

Among lectures of astronomy 161 and 162, the third lecture of astronomy 162 entitled “The Milky Way and Andromeda” was selected as the listening lecture text of the study. This 43-minute lecture was chosen for three reasons: (1) it was assumed that the general topic, the Milky Way and Andromeda, would be familiar to the participants, although some facets of the Milky Way and Andromeda that were explored by the lecturer might not be familiar to the participants who were not majoring in astronomy; (2)
this text showed a typical university lecture in terms of the use of technical/key terms, speech rate for native speakers of English (189 words per minute (wpm). Griffiths (1991) reported that the highest mean of listening comprehension test scores for the passage was obtained when the passage was delivered at 188 wpm), and discourse structure (information-driven and comparison-contrast); and (3) overall, not only for this third lecture in the 162 course, astronomy was not a core class for L2 learners, so the chance for students to be exposed to this class was predictably limited.

Regarding the length of a listening text, Bernhardt and James (1987) suggested that the length of the text be kept very short, no more than two-minute running time. However, Tauroza (2000) insisted that the length of the text in academic listening should be longer than 15 minutes in order to be coherent enough to understand. In the same vein, Buck (2001) also mentioned that the academic listening text should be long, insisting that “listening intently to understand a decontextualised and truncated sample of live speech is something that is very different from what happens in the target-language use situation” (p. 159). Carrell, Dunkel, and Mollaun (2002) insisted that the lecture text needs to be longer than 2.5 minutes to have at least face validity. Review of research on academic listening comprehension showed that the length of the listening texts was from 1.26 minutes (Schmidt-Rinehart, 1994) to 26.15 minutes (Flowerdew & Tauroza, 1995).

Because it included the purpose and introduction, the initial section (13.46 minutes) of the lecture was selected for this study. The first 50 seconds featured a review of topics from previous lectures, which would be the foundation for students to understand the current lecture. Next 3.24 minutes briefly covered key points of the whole
lecture. This initial 4.14 (50 seconds + 3.24 minutes) minutes of the lecture did not present the main content of the lecture. However, this initial 4.14 minutes was important because it served as a lead-in section during which the participants could get used to the lecturer’s voice and mannerisms without having to focus immediately on the information presented. For the remaining 9.32 minutes, the topic of the structure of the Milky Way and Andromeda was presented. This was one of the five main topics of the lecture and the college academic listening comprehension tasks of this study were conducted with this remaining 9.32 minutes of the lecture.

The average speech rate was 189 wpm and the passage was transcribed into written form afterwards for the purpose of analysis. The transcript of the lecture text can be found in Appendix A.

3.5.2 Self-reporting questionnaire for demographic information

A self-reporting questionnaire (see Appendix B) was developed to collect participants’ demographic information and information about their previous English learning. The questionnaire contained 26 question items. Nine initial items, question #1 to question #9, were formulated in order to obtain demographic information on participants. Information about academic background, length of residency in the USA, and duration of English study in their native countries was obtained. 17 items, question #10 to question #26, were developed to obtain information about how participants learned English. The experiences of participants’ extracurricular English learning and the materials used for developing English listening proficiency were surveyed.
3.5.3 Measurement

A total of nine measures were selected and administered with a quantitative approach. The first seven measures were selected to describe college academic listening comprehension by using two variables: content knowledge and L2 listening proficiency. And the other two measures related to the investigation of the L2 learners’ overall performance on college academic lecture listening comprehension tasks.

3.5.3.1 Self-assessment for L2 listening proficiency

Participants were asked to self-assess their L2 listening proficiency level. Self-assessment means judgments or beliefs that learners make about their learning ability and performance (Oscarson, 1980). Researchers reported that although there are arguments against using self-assessment as a measure of the degree of L2 proficiency because participants may be prone to overestimate how much they can do (e.g., Hilton, et al., 1985; Wesche, et al., 1990; Tauroza, 2000), self-assessment could also provide “robust concurrent validity” (Ross, 1998, p. 16) with other criteria (e.g., Heverly, 1994; Orsmond, Stephen, & Reilling, 1997; Malabonga, Kenyon, & Carpenter, 2005). For instance, Stefani (1994) and Sullivan and Hall (1997) found that self-assessment ratings had a high correlation with other criterion variables such as teacher ratings. Kenyon (1998) also reported that in performance-based tests of oral proficiency study, the correlation between the self-assessed ratings of examinees and the prepared proficiency ratings for oral interviews was .78. Complying with the use of the self-assessment studies, L2 learners’ listening proficiency was self-reported by participants using the listening proficiency guidelines of the ACTFL.
The ACTFL proficiency guidelines have been criticized by some researchers (e.g., Bachman & Clark, 1987; Bachman, 1988, 2002; Van Lier, 1989; Johnson, 2001). They contended that the ACTFL guidelines only list real-life language use situations while it intends to measure performance with performance as a vehicle of assessment of the ability being measured (Bachman, 2002). However, the ACTFL proficiency guidelines have also been widely considered by many L2 professionals to be a useful tool for assessing L2 learners’ overall ability of language use since the guidelines are proficiency-based and were developed to be used for global assessment (e.g., Clark & Clifford, 1988; Dandonoli & Henning, 1990; Kuo & Jiang, 1997). While they may not be perfect, the ACTFL guidelines are considered to be the professional standard L2 proficiency guidelines for the field of second language education.

The ACTFL guidelines for listening contain the descriptions of five different levels of listening proficiency: (1) novice, (2) intermediate, (3) advanced, (4) superior, and (5) distinguished. Each level also contains different numbers of sub-levels, which describe in detail the kinds of communication functions, degree of accuracy and flexibility, and range of vocabulary that learners of a language can control. A quantifying score for the level of listening proficiency was assigned by the researcher for each level of the ACTFL guidelines. The score range for listening proficiency was assigned from the lowest score of 1 to the highest score of 10. The lowest score of 1 indicates the level of novice-low that virtually implies no ability to comprehend even short utterances. The highest score of 10 indicates a distinguished level of proficiency that indicates an ability to understand all forms, styles, and genres of speech when presented in a listening mode.
Appendix C shows the rating scale of the ACTFL guidelines for L2 listening proficiency and the researcher’s assigned point levels.

3.5.3.2 A TOEFL listening test

Although self-assessment has been considered to provide valid information about L2 listeners’ proficiency levels as mentioned above, some researchers still feel that self-assessment is rarely as reliable or valid as standard test results or teachers’ estimates of the students’ L2 proficiency (e.g., Janssen-van Dieten, 1989; Blanche, 1990). As a supplementary tool, one practice material of the TOEFL listening comprehension published by Educational Testing Service (ETS) was used to identify the listening proficiency levels of the participants (i.e., Practice test A material and Listening CD of Practice Test A selected from the Test Preparation Kit Workbook, ETS, 2003). The practice material was a retired version of the listening comprehension section that was previously administered as a paper-based TOEFL test. The practice material of the TOEFL listening comprehension was one of six tests of preparation kits released by the TOEFL program of ETS in 2003. Since all materials published by ETS are subject to copyright protection, a prior permission for the use of the intended material was requested. The purpose of the research and the part of the TOEFL preparation kit that would be reproduced for the research were documented and submitted to the office of ETS General Council. The copyright permission of the intended TOEFL practice test material for the study was obtained three weeks after all relevant documents were submitted to the office of ETS general council for reviewing. See copyright permission letter of ETS in Appendix T.
Listening comprehension section of the TOEFL practice material contained 50 multiple-choice questions that took approximately 32 minutes to be completed. It consisted of three parts. Part A was composed of short conversations between two people. After each conversation, a third person asked a question about what was stated or implied in the conversation. The topics of the conversations were relevant to student life on campus such as asking about homework assignments or returning a book to the library. Part B and C had conversations and talks of up to two minutes in length. The conversations in Part B were about topics common to the everyday life of young adults enrolled in a university, for example, talking of completing a research paper or getting notes for a passed lecture. The talks in Part C were about a variety of topics, similar to what participants in the study might hear in a classroom lecture: astronauts on Mars or history of the Middle Ages. The score of 1 was assigned if the answer of an item was correct. Appendix D shows the TOEFL listening test material.

3.5.3.3 Self-assessment for content knowledge

Instead of classifying participants into either a group with content knowledge or a group without content knowledge (e.g., Long, 1990; Chiang & Dunkel, 1992; Hansen & Jensen, 1994; Schmidt-Rinehart, 1994), this study assessed participants’ content knowledge through a self-assessment of their familiarity with key terms of a listening text (see Appendix E) and a content knowledge checklist (see Appendix G), assuming that although participants share the same major, the knowledge about the topic of the listening text may be diverse since it is possible for them to obtain relevant knowledge outside their academic courses.
With regard to the self-assessing instrument, all noun phrases in the lecture passage were counted in order to select four key terms. Noun phrases of one hundred twenty-nine were observed (see Appendix F) and among them, four key terms were selected on the basis of the frequency of their use in the lecture passage: (1) Andromeda, (2) the Milky Way, (3) Hubble, and (4) spiral galaxy. Although the terms, ‘galaxy’ and ‘star’, appeared the most frequently, these two terms were not selected since the meanings of these terms are too broad in the context of astronomy. In contrast, the terms ‘disk’ and ‘spheroid’ were not chosen because the meanings of these two terms are too narrow to be useful, and because these two are sub-components of a term, ‘spiral galaxy’. The terms ‘content’, ‘dust’, ‘gas’, ‘population’, and ‘structure’ were also excluded because the meanings of these terms cannot be limited to astronomy-specified contexts. Participants were asked to rate their familiarity with each term on a scale of 1 (completely unfamiliar) to 5 (completely familiar). This method was used by McGinn (1991) and Hadwin, Kirby, and Woodhouse (1999) and was selected because, as mentioned by Hadwin, Kirby, and Woodhouse (1999), it relies on participants’ judgments about their familiarity with the material and prevents participants from being alerted to lecture content through prior assessment of content knowledge.

Additionally, two general questions were formulated to ask participants whether they had any previous opportunity to take any class offered by the department of astronomy and whether they had ever taken a class with the professor who gave the listening text lecture used in this study. These two questions were “yes” or “no” type of questions and no score was assigned. The ratings participants made for four key terms
were summed and averaged to create an overall score of content knowledge. Therefore, the maximum score of content knowledge on self-assessment was 5.

3.5.3.4. Content knowledge checklist

A checklist for the true or false task was developed as a supplementary tool for the self-assessment on participants’ content knowledge (see Appendix G). Ten statements were generated on the basis of the information that appeared in the lecture text and the instructor’s lecture notes as well as the information from the astronomy encyclopedia published by Oxford University Press (2002). Three statements were relevant to the appearance and location of the Milky Way. Another three statements were about the shape and structure of the Andromeda. The remaining four statements were about Hubble telescope and components and shapes of galaxy. The participants were instructed to read each statement and check whether or not its content was correct. Some of the statements purposefully included false ideas. This checklist was given to the participants followed by listening proficiency tests and was graded by the number of correct answers given by each participant. A score of 1 was assigned by the researcher if the answer of a statement was correct.

3.5.3.5 College academic lecture listening comprehension

In this study, college academic lecture listening comprehension is defined as constructing an interpretation that is reflected in accurate recall of what a lecturer said and accurate inferences about the lecture content and its meaning.
Construction-Integration model of comprehension, listening comprehension of academic lectures is considered to have two levels of understanding: (1) text-based and (2) situation model.

van Dijk and Kintsch (1983) made a distinction between text-based understanding and situation model understanding, insisting that text-based understanding is derived from creating a representation of the text itself while situation model understanding is derived from integrating the information in the text with one’s prior knowledge. Corresponding to this distinction, researchers have needed to demonstrate empirical measures that could assess one or the other level of understanding. However, because situation model understanding involves both the text-based understanding and prior knowledge from long-term memory, researchers seemed to consider it difficult to formulate tasks to measure this type of understanding separately.

Nevertheless, some measures seem to be more indicative of text-based understanding, whereas some measures seem to be more sensitive to situation model understanding. McNamara and Kintsch (1996) stated that “performance on a measure is assumed to depend primarily on the text-base when we are testing for information that is directly provided by the text” (p. 253-254), and that recognition tasks, text-based questions, and reproductive recall belong to the ways of measuring text-based understanding of the text. McNamara and Kintsch (1996) also reported that the measures of situation model understanding need to go beyond text recall reproduction, and that problem solving, keyword sorting, and bridging inference questions can be considered to tap primarily into situation model understanding.
Similarly, Goldman (1997) insisted that the assessment of situation model understanding involves “going beyond reproductive or recognitory measures of recall” (p. 366), and that the assessment of situation model understanding can be demonstrated in ways, such as “applying the information to a new situation, providing verbal explanations or drawings that illustrate how something works” (p. 366).

In this study, text-based understanding was reflected by the scores from either a written recall-protocol or a checklist, which indicated participants’ ability of identifying the information explicitly expressed in the academic listening lecture text. In order to measure participants’ situation model understanding of the academic listening lecture text, the bridging inference questions were administered, which indicated participants’ ability of integrating information from different parts of the text and inferring the relationships between parts of the text by using prior knowledge.

3.5.3.5.1 Checklist

A checklist for the true or false task was developed to assess participants’ text-based listening comprehension of a college academic lecture. To devise a way to design the statements in the checklist, each sentence of the transcribed text was coded for the information it contained (see Appendix H). Ten verbatim statements were generated from information explicitly stated in the lecture text (see Appendix I). The information was presented in a single sentence but occasionally an implied agent from the previous sentence was needed. The participants were instructed to read each statement and check whether or not its content included ideas specifically expressed in the listening text. Some
of the statements purposefully included false ideas that were nonetheless plausible from the context of the lecture text. This checklist was given to the participants followed by the written recall-protocol and was graded by the number of correct answers given by each participant. A score of 1 was assigned by the researcher if the answer of a statement was correct. The maximum score of the checklist was 10.

3.5.3.5.2 Immediate written recall-protocol

In order to assess participants’ text-based understanding, a written recall-protocol task was employed. The recall-protocol task was administered immediately after listening to the academic lecture. Bernhardt (1983) stated that the immediate recall-protocol “circumvents the pitfalls of traditional test design and, at the same time, focuses on the communication between text and reader” (p. 28). Janopoulos (1991) stated that a recall-protocol is a powerful tool in comprehension studies and effectively reveals the aspects of the processing of texts by ESL students at the university level. However, there has been both debate and discussion among researchers regarding the use of a recall-protocol in comprehension studies. Brown and Yule (1983) stated that since creating a metric for scoring recall-protocols is not transparent, the scoring rubric itself might represent an additional text. Urquhart and Weir (1998) summarized the discussion concerning the weakness of recall-protocols: (1) recall may not capture everything learners have understood; (2) there is a problem of confounding writing and reading skills; and (3) scoring recall-protocols is a subjective process. Still, although they are not without problems, recall-protocols have been employed in L2 listening comprehension.
studies and have successfully provided inferences about L2 listeners’ comprehension (e.g., Markham & Latham, 1987; Long, 1990; Lund, 1991; Schmidt-Rinehart, 1994; Chung, 1999).

Participants’ recall-protocols were analyzed and scored by pausal units of the lecture listening text. The method suggested by Johnson (1970) and applied in Schmidt-Rinehart (1994) was employed to obtain pausal units. “Pausal unit is a unit or entity that during normally paced oral reading has a pause on each end of it” (Brantmeier, 2006, p. 23). Johnson (1970) reported that verbal passages are objectively divided into linguistic sub-units (also referred to as pausal units) according to acceptable pausal locations where a person catches a breath, gives emphasis to the story, or enhances meaning, proving that “pauses are a locus for coding decisions” (p. 19) in three research experiments. Besides the fact that the pausal unit was successfully utilized in comprehension studies (e.g., Johnson, 1970; Schmidt-Rinehart, 1994; Brantmeier, 2006), the pausal unit was also employed for a practical purpose in the present study. Brown and Yule (1983) stated that the prepositional unit represents information content, but that it is difficult to analyze a text on the basis of propositions because identifying propositions is subjective. Alderson (2000) also referred to Bernhardt’s (1991) study in order to show the impracticality of utilizing propositional units for recall-protocol tasks: Bernhardts spent between 25 and 50 hours to develop one template for a 250 word text. The present study utilized a 2594 word text and thus it was considered that using prepositional units for the recall-protocol task was impractical. Consequently, the pausal unit protocol was employed.
The college academic lecture listening text of this study was divided into pausal units following the procedure of Johnson (1970)’s. This was done by two native English speakers who both have a background in foreign and second language education and was also done by the researcher independently (Inter-rater reliability was established at .89 through the pilot study). The obtained pausal units of the listening text were again hierarchically distinguished in terms of salience to the content (or message) of the text. Four levels of importance were used: (1) Macro-level, (2) Primary-level, (3) Secondary-level, and (4) Micro-level. The Macro-level pausal unit is a theme that runs through the text. The theme requires participants to generate connections between ideas presented explicitly in the text. The Primary-level pausal unit indicates the main ideas that are explicitly stated in the listening text and the topics of major segments of the listening text. The Secondary-level pausal unit specifies explicitly stated details that are crucial to support the Primary-level pausal unit. Finally, the Micro-level pausal unit provides further detail about the Secondary-level pausal units, which are not important for the Primary-level or Macro-level of the academic lecture.

The raters assigned the hierarchical levels to obtained pausal units by eliminating pausal units until only 60% (Secondary-level), 30% (Primary-level), or 10% (Macro-level) of the original number of words remained in the whole text without destroying the essential meaning of the text. Then, the raters compared their responses and identified any levels or details that any of them had missed, or had labeled differently. For the pausal units that had been labeled differently among the raters, the raters consulted with each other to reach an agreement. The final approved hierarchical levels of pausal units
were obtained through an agreement among the three raters (see Appendix J). The coring of pausal units was complied considering the weighted values below.

<table>
<thead>
<tr>
<th>Level</th>
<th>Type</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro-level</td>
<td>The theme that runs through all the text. It requires participants to generate connections between ideas presented explicitly in the text.</td>
<td>3</td>
</tr>
<tr>
<td>Primary-level</td>
<td>The main ideas that are explicitly stated in the listening text and the topics of major segments of the listening text</td>
<td>2</td>
</tr>
<tr>
<td>Secondary-level</td>
<td>Explicitly stated details that are crucial to support for the primary-level pausal unit</td>
<td>1</td>
</tr>
<tr>
<td>Micro-level</td>
<td>Further details to the secondary-level pausal units that are not important for the lecture</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 3.1:** The level, type, and score of pausal units of the lecture text

Table 3.1 shows the weighted values for each pausal unit of the lecture text. A score of 3 was assigned to the Macro-level pausal unit. A score of 2 was assigned by the researcher to the Primary-level pausal unit. A score of 1 was assigned to the Secondary-level pausal unit of the lecture text. No score was assigned to the Micro-level pausal unit.

With regard to collected recall-protocols, the total number of pausal units and the number of each level pausal unit were counted. The final approved number of pausal units for each level was obtained by comparing participants’ recall-protocols with the transcript of the academic lecture listening text that was previously analyzed by raters for obtaining the hierarchical structure of pausal units. The raters underlined the participants’
recall-protocols that contained either exactly matched pausal units or paraphrased pausal units of the text and assigned the scores to them on the basis of the weighted values seen at Table 3.1.

3.5.3.5.3 Bridging inference questions

McNamara and Kintsch (1996) developed bridging inference questions (as well as a vocabulary sorting task) to measure the situation model understanding of readers. According to them, although the bridging inference questions tap into learners’ text-based level of understanding, these types of questions can be considered to test aspects of understanding of the situation model because in order to answer those types of questions, “more than one segment of the text must be accessed and the relation between the separate segments must be understood” (p. 254). In the same vein, Goldman (1997) also stated that if learners do not have a deep understanding of a text, they do not connect ideas presented in the text, even though connections among the ideas are obvious to learners who have either some expertise or a deep level of understanding.

Following McNamara and Kintsch (1996), this study formulated two bridging inference questions to measure participants’ levels of situation model understanding after listening to the academic lecture. To formulate the questions, each sentence of the transcribed text was coded based on the information it contained (see Appendix H). Occasionally, a sentence was coded as “N/A” that indicated having no specific ideas or points of the text. The purpose of such coding was to formulate questions in a principled way so that the researcher could predict exactly which information was needed for
participants to infer the answer to the questions. In order to answer the bridging inference questions, participants needed to integrate information from two or more linear segments of the text or to integrate information from two or more nonconsecutive segments of the text. Although all the knowledge required to make the inferences was presented in the academic lecture text, it may not have been explicitly described in the text. Therefore, participants needed to find and build accessible and coherent knowledge structures as well as to listen to and evaluate the information presented in the text in order to make an inference when answering bridging inference questions. Table 3.2 shows an example of bridging inference questions and corresponding lines of the academic listening lecture text that were needed to answer it.

<table>
<thead>
<tr>
<th>Question 1</th>
<th>How did Hubble’s mistake affect the issue of the precision of the measurement of galaxy in the present time in relation to the distance of Andromeda?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence 14</td>
<td>They (Milky Way and Andromeda) have a stellar content each of about 200 billion star pieces.</td>
</tr>
<tr>
<td>Sentence 28</td>
<td>For Milky Way that’s pretty obvious, for Andromeda, it only recently becomes possible for fainter star, but going back to Hubble the very brightest stars are accessible.</td>
</tr>
<tr>
<td>Sentence 33</td>
<td>It (Andromeda)’s easily visible, you actually see this with naked eye on a very very dark night if you know exactly where to look.</td>
</tr>
<tr>
<td>Sentence 42</td>
<td>Hubble had vastly overestimated the distance to Andromeda largely because he thought that he was measuring bright Delta seffy stars.</td>
</tr>
<tr>
<td>Sentence 44</td>
<td>He thought that they were the brighter equivalent because they were mis-identified, he overestimated the luminosity and therefore overestimated the luminosity distance.</td>
</tr>
<tr>
<td>Sentence 47</td>
<td>-----because you now want to use objects that you can recognize in Andromeda as a stepping stone to look out to other galaxies</td>
</tr>
<tr>
<td>Sentence 49</td>
<td>The issue now is not the bulk distance but sort of refining the precision of that measurement</td>
</tr>
</tbody>
</table>

**Table 3.2:** An example of bridging inference questions and corresponding lines of the academic lecture listening text that were needed to answer it.
As shown in Table 3.2, question #1 asked about the relationship between Hubble and the issue of the precision of the measurement of galaxy at the present time. In order to answer this question, participants needed to make a connection at least among sentences #14, #28, #33, #42, #44, #47, and #49 because none of these sentences in the text explicitly mentioned the relationship. More in detail, first, participants needed to recognize that Andromeda has a stellar content (from #14), that the observation of Andromeda started from Hubble (from #28), that Andromeda is visible even to the naked eyes due to the brightness (from #33), that Hubble made a mistake in measuring the distance of Andromeda (from #44), that Hubble’s mistake was related to luminosity (from #44), that people still use objects in Andromeda as a stepping point to measure the distance of other galaxies (from #47), and that the distance of Andromeda is still uncertain (from #49). Second, participants had to connect the sentences #14 and #28 and infer that Hubble’s observation had a relationship with the distance of Andromeda. Participants also needed to connect the sentences #28, #33, #42, and #44 and infer that using the luminosity for units of measurement did not accurately compute the distance of Andromeda, and that despite this inaccuracy, stellar objects in Andromeda are still used for people to measure the distance of other galaxies. Two or more steps of integrating information from sentences and making an inference about the relationships between them as shown above were assumed to be required for participants to respond to question #1.
The bridging inference questions had an open-ended format but a limitation of response length (300 words) was given to participants for practical purposes. Appendix K shows the two bridging inference questions and the scoring rubric for these questions.

### 3.5.3.6 Self-assessing instrument of academic lecture listening comprehension

Brown and Yule (1983) mentioned that there are four factors affecting listening comprehension: (1) speaker factor, (2) listener factor, (3) content, and (4) support. The speaker factors indicate speech rates, accent, and the use of discourse markers (e.g., Chaudron & Richards, 1986; Flowerdew, 1994; Lynch, 1998). The listener factors include learners’ attentiveness, motivation, interest, strategy use, and topical knowledge (Watson & Smeltzer, 1984). Compared to the speaker and listener factors, the kinds of factors related to content and support were relatively small. The frequency of unfamiliar vocabulary has representatively been cited in the literature as one source of listening difficulty with regard to content (e.g., Rost, 1990; Dunkel, 1991; Thompson, 1995). The employment of visual items and the channel of question formats (e.g., aural, visual, or both) have been investigated as affective factors on listening comprehension in terms of support (e.g., Progosh, 1996; Brett, 1997; Gruba, 1997; Coniam, 2001; Ginther, 2001).

Research has also been conducted to explain listening comprehension with regard to essential skills L2 learners need to acquire for understanding academic lectures (e.g., Richards, 1983; Weir, 1993; Buck, et al., 1997; Buck & Tatsuoka, 1998; Flowerdew & Miller, 2005). These studies have described a series of skills, which are reported in the professional literature to be needed in order to process and comprehend oral speech, and
have reported that the lack of these skills brought difficulty in listening comprehension since listening is a multi-faceted process with a large number of sub-components. For instance, in one study of listening skills, Richards (1983) stated that learners’ listening problem could be diagnosed with respect to particular micro-skills since systematically comparing information in the micro-skill taxonomy with a learner’s listening profile makes it possible to identify which abilities of listening the learner lacks and needs to improve for better comprehension.

An instrument for self-assessing academic listening comprehension was developed to provide information about participants’ strengths and weaknesses in academic lecture listening (see Appendix L). It consisted of 22 items that were carefully formulated on the basis of reviewing the above research as well as considering three components (i.e., grammatical features, discourse features, and pragmatic features) that researchers and instructors have speculated the most in the procedure of material section for listening studies. Each item had a five-point rating scale that participants were asked to circle after reflecting about their listening performance. Scores from 1 to 5 indicate the levels of listening comprehension, i.e., minimal, limited, moderate, competent, and native-like, respectively. The ratings participants made for 22 items were summed and averaged to create an overall score of self-rating academic listening comprehension. Validity of each item was established by a panel of experts in the study. Cronbach alpha index of the internal consistency of this instrument was .69.
3.5.3.7 Strategy use questionnaire

A questionnaire for strategy use (see Appendix M) initially developed by Vandergrift (2005) but a little revised for this study was employed to assess participants’ strategy use while listening to the college academic lecture. Although Vandergrift used this questionnaire to assess mainly the meta-cognitive strategy use of his participants, some items of this questionnaire belonged to cognitive and socio-affective strategies classified by other researchers such as Flowerdew and Miller (2005). The questionnaire consisted of 18 items, which asked participants to self-assess their use of each listening strategy on a scale ranging from 1 to 5. The ratings participants made for 18 items were summed and averaged to create an overall score of strategy use. The Cronbach alpha index of the internal consistency of this questionnaire was a very acceptable .86.

3.5.4 Interview questions

A follow-up interview was conducted to collect additional information on L2 learners with regard to their academic lecture listening comprehension. Patton (1990) stated that interviews provide an opportunity to understand the complex behavior of participants. Denzin and Lincoln (2000) also mentioned that researchers can obtain deep and otherwise unobservable information about individuals’ performance and thinking by getting closer to them through interviews. Recently, Kachi (2004) emphasized the importance of using interviews by stating that the data inexpressible in numbers might offer rich information for understanding an incident at a deeper level. Therefore, this technique was included in the present study.
Ten questions (see Appendix N) were developed for the interview. Following Schwandt (1997) who mentioned that the open-ended format of questions during interviews has an advantage when the interviewer needs to get specific or focused information or when the time of the interview is limited, all these interview questions were designed using open-ended format and thus it was expected to gain in-depth and broad information about participants on listening comprehension of a college academic lecture. Three questions were formulated to investigate participants’ conceptual importance of content knowledge and L2 listening proficiency when listening to college academic lectures. Four other questions asked participants about what could make influence on their comprehension of college academic lecture listening. The three other questions were concerned with their strategy use and the factors affecting their selection of strategy when they listen to academic lectures.

For the interview, 13 participants (approximately 10% of a total number of participants) were selected on the basis of the data obtained in the quantitative aspect of the study in order to obtain diversity. The interview was conducted individually according to the availability of each individual. All interview questions were given in English to all participants answering in English because responding to interview questions in English was not assumed to give pressure to participants who had enough time to formulate answers to the questions. All of the interviews were audio-taped with the permission of the participants. Each interview lasted 45 minutes to one hour.
3.6 Data collection and procedure

With the approval from the Institutional Review Board (IRB) of the university (Protocol number-2006B0331, see Appendix U), participants were recruited between autumn quarter of 2006 and winter quarter of 2007 as volunteers for the study. Recruited participants signed a consent form and were given a six-digit alpha-numeric ID number (from AA0001 to PP0048) for the protection of their identity. Before the consent form and an ID were provided, the purposes of this study and the instruction about the procedure of the tasks they needed to follow were explained.

The tasks were conducted individually according to the availability of each participant. Before listening to the college academic lecture, the instruments for assessing L2 listening proficiency and content knowledge were provided to participants. After completing those instruments, participants took a 5-minute rest. Then, each participant was provided with a headset that was attached to the researcher’s computer and was asked to adjust the volume to his/her comfortable level. The academic lecture was played for 13.46 minutes. The initial 4.14 minutes of the lecture was played as a lead-in section for the participants to get used to the lecturer’s voice and mannerisms without having to focus immediately on the information presented. After participants were familiar with the lecturer’s voice, the main topic of the lecture, the structure of the Milky Way and Andromeda, was presented for 9.32 minutes. The main topic of the lecture was played after the participants informed the researcher that they were ready. While listening to the academic lecture, participants were allowed to take a note in relation to context authenticity. The written recall-protocol task was administered immediately after
listening to the academic lecture. Since the recall-protocol using participants’ L1 produced significantly more information than recall-protocol using participants’ L2 (Lee, 1986) and since participants should not have unnecessary limitations to what they can produce in their L2 in terms of grammar and lexicon (Meyer, 1984), participants of this study were allowed to use both their L1 and L2 for the recall-protocol task. After the recall-protocol, the checklist and the bridging inference questions were provided to participants. In order to reduce stress and to place more emphasis on comprehension as opposed to memory, participants were allowed to look back their notes to answer any questions during tasks.

Participants were recommended to take a 5-minute rest before the instruments of self-rating academic lecture listening comprehension and of strategy use were administered to them. After completing those two instruments, participants were asked to fill out the questionnaire that was designed to investigate their English learning experiences and demographic information. The participants who completed all tasks received a payment of $10 per hour.

Data collected from the written recall-protocol and bridging inference question tasks were translated by the help of bilinguals if the answers provided by participants were not in English. Also, in order to ensure that the translation contained what the participants recalled, back-translation was performed. Data from the recall-protocol were analyzed into pausal units following the Johnson (1970)’s system. The scoring processes of two tasks were done by two native English speakers who both have a background in foreign and second language education and were also done by the researcher independently.
The follow-up interview was conducted two weeks after all data for the quantitative aspect of the study were collected. For the interview, 13 participants were selected on the basis of the data obtained in the quantitative aspect of the study in order to obtain diversity. Personal contact with potential interviewees was attempted through email and telephone. The interview was conducted individually according to the availability of each participant. When participants were recruited, the consent forms were provided. After that, participants listened to the academic lecture again and were asked to rate the level of academic lecture listening comprehension. The participants were not allowed to see their previous rating for lecture listening comprehension. Then, the interview questions were given in English to all participants answering in English because responding interview questions in English was not assumed to give pressure to participants who had enough time to formulate answers to the questions. Since the interview encouraged the participants’ spontaneous responses, not all the interview questions were asked if the expected responses were already obtained. The entire interviews were audio-taped with the permission of the participants. Each interview lasted 45 minutes to one hour. The participants who responded to the interview further received a payment of $10 per hour.

3.7 Data analysis

The primary goal of this study was to investigate content knowledge and L2 listening proficiency as major predictors on college academic lecture listening comprehension within the Construction-Integration model when the predictive effect of
L2 learners’ strategy use was removed. The results from the recall-protocol task and the bridging inference question task were evaluated by three raters who have a background in foreign and second language education. Inter-rater correlation was analyzed to establish inter-rater reliability. Statistical Package for the Social Sciences (SPSS) 15.0 for Window was used to analyze the quantitative data. The descriptive statistics for all measures were presented to indicate the properties of each participant and to address the normality of the data from all measures.

Correlations were computed among and between each variable. The results of the multiple regression analysis were provided to explain the variance of the dependent variables explained through the linear relationships of the independent variables to each other and to the dependent variables (Gliem, 2003). The results of the principal component analysis were used to determine empirically how many underlying-listening constructs accounted for participants’ self-assessed academic lecture listening comprehension on the self-reporting comprehension questionnaire. In addition, the results of one-way ANOVA were used to compare the mean differences among three-level L2 listening groups on content knowledge scores and the mean differences among five L1 groups on strategy use scores when listening to college academic lectures.

Data from interviews were analyzed with the constant comparative approach. Comparisons within and between collected data were constantly made until “a general explanation that fits each of the individual cases although the cases will vary in their details” (Yin, 1994, as cited in Merriam, 1998, p. 112) was obtained. Close attention was paid to particular incidents, emergent patterns, and themes from the interviews. The
attempts to draw an overall picture of each participant’s L2 academic listening comprehension by scrutinizing the collected interview data with different perspectives were conducted.

3.8 Pilot study

A pilot study was conducted during summer quarter 2006. The pilot study aimed to clarify the procedures implemented for the study and to establish the reliabilities of the instruments developed for the study. Fifteen students who had the same representativeness with the target population of the study were recruited and the same procedures of data collection for the present study were implemented.

Clear understanding of the purposes of the study among the participants was observed and the amount of time assigned for each task proved to be sufficient. The establishment of reliabilities of instruments proved problem-free except one instrument: a self-assessing instrument of academic lecture listening comprehension. The reliability coefficient of the instrument of self-assessment for content knowledge was .76; the reliability coefficient of content knowledge checklist was .87; the reliability coefficient of a TOEFL listening practice material was .89; the reliability coefficient of the instrument of strategy use was established at .86. The raters had the opportunity to practice the scoring procedure and established inter-rater reliability at .89.

Two changes were made on the basis of the results of the pilot study. First, as mentioned above, the self-assessing instrument of academic lecture listening...
comprehension proved to have a problem. Initially, this instrument contained 26 items that asked participants to rate their lecture comprehension on a scale of 1 (minimal) to 5 (native-like). However, the results of the pilot study revealed that four items of this instrument caused a low coefficient value of reliability: item #9 (recognizing the stress patterns of words), #12 (processing speech containing pauses, errors, and corrections), #13 (distinguishing word boundaries) and #20 (guessing meaning from context). Instead of revising these four items, it was decided to drop the four items from the instrument after the consultation with two raters because the information that would be obtained from these four items could be obtained from the rest 22 items and because the revision of these items was too difficult due to the specificity of the items. Cronbach’s alpha index of internal consistency of the instrument with the exclusion of the four items was .69.

Second, the number of bridging inference questions for assessing participants’ situation model understanding was changed. Initially, three questions were designed for situation model understanding. However, the interview with participants revealed that taking three bridging inference questions was too demanding to participants and that question #2 was less clear for participants to understand what exactly the question intends to look for than the other two questions. In order to reduce the heavy burden from participants, it was determined to employ only two questions, dropping the question #2 from the set of questions.
CHAPTER 4

DATA AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and discussion of the data. First, the research questions of the study are re-stated. Second, the findings of the quantitative aspect of the study are reported, starting with a description of the study participants. Data analysis for the quantitative aspect of the study is then presented for each key aspect of the study; it is combined with discussion and interpretation of the data. Next, the findings of the follow-up interview, a qualitative aspect, of the study are presented. Finally, a combined summary from each aspect of the study is presented.

4.2 Research questions

This study was designed to investigate two variables, content knowledge and L2 listening proficiency, as major predictors of academic listening comprehension in an academic university setting. Academic listening in this study was defined as having two levels of understanding according to the Construction-Integration model: text-based and situation model understandings. In addition, this study investigated additional features of academic listening that might have an impact on L2 listening comprehension. For these
research purposes, this study used a quantitative design as the main research methodology in an ex post facto study and also employed a small, supplementary follow-up qualitative interview. The following research questions were addressed.

Primary research questions

1. What is the relationship between content knowledge and understanding of a college academic lecture?

   1.1 To what extent does content knowledge explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

   1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?

   2.1 To what extent does L2 listening proficiency explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

   2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?
3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?

3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?

Secondary research questions

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?

5. What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?

6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?

7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

4.3 Quantitative aspect of the study

This section reports the findings of the quantitative aspect of the study, starting with a description of the study participants. Data analyses on each independent and dependent variable in combination with discussion and interpretation are then presented. Next, data analyses for the primary research questions are reported, followed by data
analyses for the second research questions. Finally, a summary of the quantitative aspect of the study is presented. The findings of the small, supplementary follow-up qualitative interview of the study are presented in section 4.4.

4.3.1 Participants of the quantitative aspect of the study

From a total of 148 non-native English-speakers, the data from seven students were dropped from the study. Among the seven students, three students reported that they came to the USA when they were under four years old. Although they considered themselves to be non-native English-speakers due to their birthplace, they were considered to be native English-speakers in this study because they were perceived to be proficient in English and because of the number of years they had spoken English in the U.S. The data from four other students were also excluded since they were studying in the American Language Program (ALP) at the research site in preparation for study at the university during data collection. Thus, 141 non-native English-speakers (80 females and 61 males) who were enrolled as either undergraduate (N=45) or graduate students (N=96) in the university participated in the study. Participants in this study completed a self-reporting questionnaire about their demographic information and their experience in studying English. Table 4.1 shows the demographic information about research participants.
<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19 - 38</td>
<td>26.9</td>
<td>4.19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nationality</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentinean</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chilean</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Eritrean</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hindi</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Iranian</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Korean</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Malaysian</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Taiwanese</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Thai</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Turkish</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residency in the USA (months)</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 - 96</td>
<td>30</td>
<td>26.78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of English study in native country (years)</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 - 22</td>
<td>10.8</td>
<td>4.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational background</th>
<th>Master degree</th>
<th>41</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-year college</td>
<td>66</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>2-year college</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-year college</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High school diploma</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Junior high school diploma</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.1:** Demographic information of research participants
Table 4.1 shows that the age of participants ranged from 19 to 38, and the group average age was 26.9 years (4.19 of SD). Korean, Chinese, and Taiwanese were the most commonly reported nationalities of participants among the 13 nationalities identified in the questionnaire. Participants have resided in the USA, ranging from 3 months to 8 years, with an average of 30 months of US residence (26.78 of SD). Participants were also asked to describe the duration of English study in their own countries as well as any experiences in intensive language courses (e.g., ALP at the research site) in the USA. Although all participants provided a response to the question about the duration of English study in their country, which ranged from 2 years to 22 years, with an average of 10.8 years (4.10 of SD), the responses from four participants were excluded since these participants did not seem to have understood the question. These four participants reported six months to one year previous home country English study, despite their study at a 4-year college. Only seven of 141 participants reported having completed an intensive language program in the USA.

Table 4.1 also shows that 41 out of 141 have earned a master’s degree, 66 have earned a 4-year college degree, 11 have earned a 2-year college degree, one has earned a 1-year college degree, 20 have received only a high school diploma, and two have received a junior high school diploma. The students were recruited from the entire university population of non-native English-speakers at the research site and represented a range of academic disciplines. Thirty-six academic majors in nine different colleges at the research site were reported (see Appendix O for additional information).
In order to establish a profile of participants in the study, several questions regarding the participants’ English learning experiences and English listening behaviors were included in the questionnaire. Regarding the question of how they attempted to improve their English listening proficiency, watching TV or movies was reported as the most common way to improve English listening proficiency (N=58), followed by talking to native English-speaking friends (in study groups) (N=51), and listening to classroom lectures (N=13). Table 4.2 presents the lists of methods participants used to improve English listening proficiency.

<table>
<thead>
<tr>
<th>The list</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watching TV or movies</td>
<td>58 (41.1%)</td>
</tr>
<tr>
<td>Talking to native friends (in study groups)</td>
<td>51 (36.1%)</td>
</tr>
<tr>
<td>Listening to classroom lectures</td>
<td>13 (9.2%)</td>
</tr>
<tr>
<td>Listening to the radio</td>
<td>6 (4.2%)</td>
</tr>
<tr>
<td>Reading</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>Not specified</td>
<td>11 (7.8%)</td>
</tr>
</tbody>
</table>

Total N=141

**Table 4.2:** The most common ways participants in the study reported using to improve their English listening proficiency

Because both watching TV or movies and talking to native English-speaking friends (in study groups) were each selected by more than 50 participants as the most common way to improve English listening proficiency, participants’ responses to the questions about the amount time they spent watching TV or movies to improve their
English listening proficiency and to the questions about participation in study groups were further analyzed to provide additional information. First, with regard to watching TV or movies, seven of 141 participants reported that they spent no time watching TV or movies to improve their listening proficiency. Table 4.3 shows the amount of time (per day) that participants reported spending watching TV or movies to improve their listening proficiency.

<table>
<thead>
<tr>
<th></th>
<th>1 hour/day</th>
<th>2 hour/day</th>
<th>3 hour/day</th>
<th>4 hour/day</th>
<th>5 hour/day</th>
<th>6 hour/day</th>
<th>7 hour/day</th>
<th>NS</th>
<th>No T/M</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>27</td>
<td>13</td>
<td>14</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>61</td>
</tr>
<tr>
<td>F</td>
<td>25</td>
<td>27</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>U</td>
<td>18</td>
<td>11</td>
<td>11</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>G</td>
<td>34</td>
<td>29</td>
<td>19</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>96</td>
</tr>
<tr>
<td>T</td>
<td>52</td>
<td>40</td>
<td>30</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>141</td>
</tr>
</tbody>
</table>

M - male, F - female, U - undergraduates, G - graduates, T – total, NS- not specified

**Table 4.3**: The distribution of time participants reported spending watching TV or movies to improve English listening proficiency

Table 4.3 shows that on average, a majority of participants reported spending less than three hours watching TV or movies per day to improve their listening proficiency, irrespective of gender or academic level (under/graduate student status).

With regard to talking to native English-speaking friends (in study groups), approximately (over) half of the participants (71 students) reported that they had at some point been engaged in a study group with native English-speakers. These participants
were asked to assess their own understanding of native English-speaking friends’ speech during group study. Figure 4.1 graphically represents the amount of understanding of native English-speakers’ speech that participants self-reported while engaged in study groups.

Figure 4.1 shows that a majority of the participants in this study self-reported not having difficulty in understanding native English-speakers’ speech when they participated in study groups. Specifically, four participants reported that they understood less than 50% of native English-speakers’ speech when they participated in study groups. Eighteen participants reported that they understood between 50% and 75% of native English-speakers’ speech during group study. Twenty-three participants reported that they understood between 76% and 95% of native English-speakers’ speech when they...
participated in study groups. The rest of the twenty-six participants reported that they understood more than 95% of native English-speakers’ speech during group study. It might have been interesting from a research perspective to ask students about the ratio of native to non-native English speakers in the study groups. This topic can be a future research focus.

4.3.2 Data analyses for independent and dependent variables

4.3.2.1 Independent variables

This study investigated the effects of content knowledge and L2 listening proficiency on college academic lecture listening when the effect of strategy use of L2 listeners was removed. Therefore, the main independent variables for the study were: (a) levels of content knowledge, which were assessed by a self-assessment and a checklist, and (b) levels of L2 listening proficiency assessed by a self-assessment and a listening section of the TOEFL. The rival independent variable of the study was the strategy use. The descriptive statistics of each independent variable are presented below.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 Listening Proficiency</td>
<td>43.42</td>
<td>4.87</td>
<td>-1.29</td>
<td>141</td>
</tr>
<tr>
<td>Content Knowledge</td>
<td>6.10</td>
<td>1.57</td>
<td>-.19</td>
<td>141</td>
</tr>
<tr>
<td>Strategy Use</td>
<td>3.61</td>
<td>.41</td>
<td>-.18</td>
<td>141</td>
</tr>
</tbody>
</table>

Table 4.4: Descriptive statistics of L2 listening proficiency, content knowledge, and strategy use
Table 4.4 shows the descriptive statistics of the participants’ L2 listening proficiency, content knowledge, and strategy use. L2 listening proficiency in this study was reflected by the combined score from the self-assessment of L2 listening proficiency and a retired version of a TOEFL listening test previously administered. The descriptive statistics of L2 listening proficiency had a mean of 43.42 (SD of 4.87) with the scores ranging from 26 to 50. The participants’ scores on L2 listening proficiency showed a heavier skewness (-1.29), indicating that the listening tasks utilized in the study might have made it somewhat easy for the participants to generate score variances. In other words, a greater number of participants obtained higher scores on the listening proficiency tasks. However, the heavier skewness of L2 listening proficiency might not be problematic for the study since a value of skewness between +/- 2.0 is considered acceptable in social behavior research (George & Mallery, 2005).

The other independent variable, content knowledge, was also measured by two instruments, a content knowledge checklist and a self-assessment rating. As with L2 listening proficiency, the level of content knowledge was reflected by the combined score from the self-assessment and the content knowledge checklist. The descriptive statistics for content knowledge (Table 4.4) reveals a mean of 6.10 (SD of 1.57) with a range of scores from 2 to 9. It also shows a negative skewness, indicating that the median score of participants on content knowledge tasks was higher than the mean score for participants. This difference between mean and median scores on this variable is interpreted to mean that the content knowledge tasks utilized in the study might have made it easy for the participants to generate score variances. A greater number of participants obtained higher scores on the content knowledge tasks.
The rival independent variable, strategy use, was measured by the instrument initially developed by Vandergrift (2005). As shown in Table 4.4, it had a mean of 3.61 (SD of .41) with a range of scores from 2.33 to 4.78. Table 4.4 also shows a negative skewness, indicating that a greater number of participants obtained higher scores on the strategy use instrument. For the present study, this means that a greater number of participants reported higher use of strategy when they listened to an academic lecture.

4.3.2.2 Discussion of independent variables

Re-examination of the independent variables in the study raised concerns about a high value of negative skewness for L2 listening proficiency. Skewness is a measure of the asymmetry of the probability distribution of a variable and denotes the shape and direction of the distribution (i.e., whether deviations from the mean are going to be positive or negative). Unlike kurtosis, which indicates a measure of the peakedness of a distribution and reports the existence of extreme values that the normal distribution does not entail, an understanding of the skewness of the variable determines the appropriateness of the intended statistical tool for a variable. For instance, the use of a t-test relies on the normal distribution. If the variables tested are not normally distributed because they are too skewed, a t-test cannot be used.

Though the determination of acceptable values of skewness in this study relied on the recommendation of George and Mallery (2005) that a value of skewness between +/- 2.0 is acceptable, a high value of negative skewness may raise questions regarding implemented listening tasks (i.e., a TOEFL listening test and a self-assessment) and
research design, especially in relation to a statistical tool used for data analyses. A high value of negative skewness indicated that the implemented tasks did not distinguish an advanced level of L2 listeners from a low level of L2 listeners because overall, the low level of L2 listeners scored relatively well and the advanced level of L2 listeners did not seem to find the tasks demanding. Therefore, the usefulness of the implemented tasks for placing participants into appropriate L2 listening proficiency levels can reasonably be questioned. In the same vein, a high value of negative skewness is not desired in relation to a statistical tool if there is an attempt to investigate a significant difference on certain variables of groups classified according to levels of L2 listening proficiency (e.g., t-test or ANOVA). Because a high value of negative skewness indicated that a majority of participants were grouped in a narrow range of score variances, it might be difficult to establish cut-points to classify groups according to their correct L2 listening proficiency levels.

Questioning the usefulness of implemented tasks is related to two issues: familiarity of participants with TOEFL tests and the validity and reliability of self-assessments. Participants’ familiarity with the TOEFL test format and procedures is understandable given their previous preparation for admission to an American university. The demographic information for participants revealed an average of 2.5 months of intensive TOEFL test preparation. Therefore, the high L2 listening proficiency the participants demonstrated on their TOEFL listening test scores could be influenced by their familiarity with the TOEFL listening test and thus might not be their correct L2 listening proficiency level. However, relevant professional research showed many cases
of employing a TOEFL as a placement test for L2 learners’ listening (e.g., Gradman & Hanania, 1991; Hansen & Jensen, 1994; Sadighi & Zare, 2006). Considering that there are currently few other appropriate substitutes for assessing student’s L2 listening proficiency levels than TOEFL listening tests, it seems reasonable to rely on relevant professional research as that cited immediately above.

Concerning the validity and reliability issues of self-assessment to measure participants’ L2 listening proficiency, recent research has provided evidence of the use of self-assessment as an alternative to standardized tests by comparing two different measurements by means of correlation coefficients (e.g., LeBlanc & Painchaud, 1985; Simoes & Papanastasiou, 2002; Malabonga, Kenyon, & Carpenter, 2005). A similar result occurred in this study where the Pearson-Product Moment correlation between TOEFL listening test scores and self-assessed L2 listening proficiency was .630. Although the correlation coefficient between the TOEFL listening test scores and self-assessed L2 listening proficiency scores was not very high, it is reasonable to conclude that levels of L2 listening proficiency among the study participants were well established, reflecting that participants with higher TOEFL listening test scores rated themselves as high proficiency level listeners.

As mentioned above, the observed high value of negative skewness might be problematic with respect to the usefulness of the listening tasks and the research design of the study. When there are few defendable substitutes for the tasks used in this study to place participants in appropriate L2 listening proficiency levels, possible future solutions are needed to develop other valid approaches.
4.3.2.3 Dependent variables

The dependent variables of this study were assessed through three different listening tasks (i.e., a checklist, a written recall-protocol, and a set of bridging inference questions). The scores from the checklist and the written recall-protocol represented participants’ text-based understanding after listening to a college academic lecture. The scores from the bridging inference questions indicated the situation model understanding of participants. The checklist contained 10 true or false statements and one point was assigned for each correct answer, with a maximum score of 10. The written recall-protocol was scored using the Johnson system, a procedure in which the passage was divided into pausal units, and then each unit was assigned a value from 0 (being of least significance to the overall passage meaning) to 3 (being of most significance to the overall passage meaning). The participants’ recall-protocols were analyzed by the researcher and two raters, and the appropriate points for each unit recalled were assigned. Each bridging inference question was scored based on the pre-developed rubric, with a maximum of 10 points each. The final approved scores of the written recall-protocols and the bridging inference questions were obtained through an agreement among three raters. For the written recall-protocol and the bridging inference questions, lenient scoring criteria were applied, if a participant’s responses captured the meaning shown in the transcript of the listening lecture text. More discussion of the need for inter-rater reliability of these variables occurs in Chapter 5.
4.3.2.3.1 Data from the checklist.

As one indicator of participants’ text-based understanding of the college academic listening lecture, a checklist was administered with a maximum score of 10. Table 4.5 shows the study’s descriptive statistics for the checklist measure.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checklist</td>
<td>6.99</td>
<td>1.27</td>
<td>-.55</td>
<td>141</td>
</tr>
</tbody>
</table>

**Table 4.5: Descriptive statistics of the checklist**

Table 4.5 shows that participants’ scores on the checklist had a mean of 6.99 (SD of 1.27) with a total range from a low score of 3 to a high score of 9. Table 4.5 also shows a negative skewness, which indicated that a median score of participants on the checklist was higher than a mean score for participants. This difference between mean and median scores on the checklist indicated that the checklist utilized in this study might have made it somewhat easy for the participants to generate score variances. For this study, this indicated that a greater number of participants obtained higher scores on the checklist after listening to the college academic lecture.

4.3.2.3.2 Data from the written recall-protocol

Another indication of participants’ text-based understanding of a college academic listening lecture was revealed in the analysis of the written recall-protocol data. The recall-protocol was scored for the pausal units of the listening lecture text that
participants recalled. The total number of pausal units and the number of each level of pausal unit were counted. Table 4.6 displays the number of pausal units, as well as the maximum possible score of each pausal unit.

<table>
<thead>
<tr>
<th>Level of unit</th>
<th>Total number of unit</th>
<th>Weighted value of unit</th>
<th>Maximum score of unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro-level</td>
<td>17</td>
<td>3</td>
<td>51</td>
</tr>
<tr>
<td>Primary-level</td>
<td>31</td>
<td>2</td>
<td>62</td>
</tr>
<tr>
<td>Secondary-level</td>
<td>45</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>Micro-level</td>
<td>66</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>158</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.6: The number of each level of pausal unit and the maximum possible scores

Table 4.6 shows that the total number of pausal units for the listening lecture text was 159. Of the 184 pausal units that were counted in the initial stage of the study, 25 units were eliminated after consolidation among raters, since those units repeatedly appeared when the lecturer restated the key points in class. The 159 pausal units were later divided into four different hierarchical levels according to the meaning level in the listening lecture text (see Table 3.1 for the description of each level of pausal units. See Appendix J for pausal units of the listening lecture text). Participants’ recall-protocol data were scored by the raters based on the weighted values shown in Table 4.6. Table 4.7 shows the descriptive statistics for the recall-protocol.
Table 4.7: Descriptive statistics of the written recall-protocol

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written recall-protocol</td>
<td>32.01</td>
<td>13.85</td>
<td>.67</td>
<td>141</td>
</tr>
</tbody>
</table>

Table 4.7 shows that participants’ score on the written recall-protocol had a mean of 32.01 (SD of 13.85) with a total range from a low score of 6 to a high score of 79. Table 4.7 also shows a positive skewness, which indicated that a mean score of participants on the written recall-protocol was higher than a median score for participants. For this study, this difference between mean and median scores on the written recall-protocol indicated that a greater number of participants obtained lower scores on the written recall-protocol task.

In order to investigate a general tendency of the participants in relation to the recalled pausal units, as well as to investigate whether there were differences among each pausal unit in terms of the recalled amount, each level of pausal units the participants recalled after listening to the college academic lecture was counted. Table 4.8 shows a general tendency of the participants on each pausal unit in terms of the recalled amount. The descriptive statistics for the Micro-level of pausal unit were not provided since the weighted value for the Micro-level was ‘0’.
The number of total possible units in Table 4.8 indicates the summated number of pausal units all participants recalled. That is, for instance, the number of total possible units at the Macro-level was equal to the number of Macro-level pausal units of the listening lecture text multiplied by the total number of participants (i.e., Macro-level pausal units of the listening lecture text (17) × the number of research participants (141) = the number of total possible units at the Macro-level (2397)).

Table 4.8 shows that overall, the Macro-level of pausal unit (35%) was more frequently recalled than the Primary-level (20%) and the Secondary-level (4%), which indicated that participants recalled more of the themes and the main ideas of the lecture text presented explicitly than the stated details. Higher-level pausal units were more frequently recalled than lower-level pausal units. The performance of the participants in the written recall-protocol indicated an understanding of the hierarchical structure of the
text. However, regarding the question of which level of pausal unit contributed the most to explaining the recall-protocol variance, a regression analysis showed the following results.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>.883</td>
<td>.779</td>
<td>.779</td>
<td>13.258</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>1.513</td>
<td>.883</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (Constant)</td>
<td>.992</td>
<td>.984</td>
<td>.205</td>
<td>- .351</td>
<td>.883</td>
</tr>
<tr>
<td>Primary</td>
<td>1.078</td>
<td>.629</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macro</td>
<td>1.075</td>
<td>.519</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (Constant)</td>
<td>.998</td>
<td>.996</td>
<td>.012</td>
<td>.177</td>
<td>.501</td>
</tr>
<tr>
<td>Primary</td>
<td>1.012</td>
<td>.591</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macro</td>
<td>.993</td>
<td>.479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>.972</td>
<td>.129</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The recall-protocol scores

**Table 4.9: Summary of regression analyses for the recall-protocol scores with each level of pausal units.**

Tables 4.9 indicates that with the recall-protocol score as the dependent variable, 99.6% of the recall-protocol score was explained by the linear combination of the scores of Primary-, Macro-, and Secondary-level pausal units. Specifically, Table 4.9 reveals that when the effects of three levels of pausal units in the full model have been accounted for, the Primary-level accounted for 77.9% of the variance, the Macro-level accounted for 20.5% of the variance, and the Secondary-level accounted for 1.2% of the variance of the recall-protocol score. A review of regression coefficients (Table 4.9) shows that the Primary-level accounted for the highest relative contribution to the recall-protocol scores.
of participants ($\beta = .591$). The partial regression coefficient of the Primary-level unit was 1.012, which indicated that for a one-unit increase in Primary-level pausal unit recall, there was an expected increase in recall-protocol score of 1.012 when two other pausal units were held constant.

Simply stated, the analysis of each level of pausal units the participants recalled after listening to the college academic lecture suggested that the Macro-level of pausal unit was more frequently recalled than the Primary- and the Secondary-levels, whereas the Primary-level of pausal unit accounted for a higher relative contribution to the recall-protocol scores of participants than did the Macro- and the Secondary-levels.

4.3.2.3.3 Data from the bridging inference questions

As an indication of the situation model understanding of participants, a set of bridging inference questions was implemented in order to measure the participants’ ability to infer the relationships between different segments of the academic listening lecture text (see Appendix K for the set of bridging inference questions). Table 4.10 indicates the descriptive statistics for bridging inference question results.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging inference</td>
<td>6.20</td>
<td>2.63</td>
<td>.46</td>
<td>141</td>
</tr>
</tbody>
</table>

Table 4.10: Descriptive statistics for the bridging inference questions

155
The descriptive statistics for the bridging inference questions showed a mean of 6.20 (SD of 2.63) with a total range from a low score of 1 to a high score of 14. As shown in Table 4.10, participants’ scores on the bridging inference questions showed a positive skewness, which indicated that a mean score of participants on the bridging inference questions was higher than a median score for participants. This difference between mean and median scores on the bridging inference questions indicated that the bridging inference question task utilized in this study might have made it difficult for the participants to generate score variances. For this study, this indicated that a greater number of participants obtained lower scores on the bridging inference questions.

4.3.2.4 Discussion of dependent variables

Data analyses from the dependent variables suggested that participants obtained relatively higher scores on the checklist, whereas they obtained relatively lower scores on both the written-recall-protocol and the bridging inference questions. Re-examination of the written recall-protocol suggested that the data from the participants’ recall-protocol task might need additional evaluation before they can be used to interpret participants’ listening ability and enter a regression equation for the study. The data for the recall-protocol task showed that participants recalled super-ordinate pausal units more than subordinate ones according to the ratio of the number of each structural pausal unit that was recalled by participants. This finding was compatible with the results of studies by Dunn (1980), Roloff (1999), and Trites (2000). Since the academic listening lecture text was semantically organized to deliver information to students, it is not surprising to see
that participants recalled proportionately more super-ordinate units, rather than subordinate ones. However, contrary to expectation that the Macro-level unit contributes more to the recall-protocol score of participants than does the Primary-level unit since relevant professional research as well as this study found that participants recalled super-ordinate pausal units (e.g., the Macro-level unit) more frequently than subordinate ones (e.g., the Primary-level unit), the data of regression on the recall-protocol score indicated that the highest relative contribution to the recall-protocol scores of participants was made by the Primary-level unit, the second rank of the hierarchical structure of the text.

On the surface, this result can be explained by the relationship between the number of pausal units of each level and the assigned value for each pausal unit level. As shown in Table 4.8, the total number of recalled Primary-level units was 877, while the total possible number of Primary-level units was 4371, resulting in a 20% unit recollection. However, in the case of the Macro-level, Table 4.8 showed that the total number of recalled Macro-level units was 833, while the total possible number of Macro-level units was 2397, showing a 35% unit recollection. The assigned value for a correctly recalled unit was two for the Primary-level and three for the Macro-level. The relative contribution of each unit in explaining participants’ recall-protocol scores was obtained by calculating the comparative value of the variables in the same unit of measurements. Therefore, considering the relationship between the number of recalled units for each level and the assigned value of it, it was predicted that the value of one unit of the Primary-level was comparatively higher than that of the Macro-level; thus, pausal units of the Primary-level provided a higher contribution in explaining recall-protocol scores than did pausal units of the Macro-level.
Why was it more difficult to recall pausal units of the Primary-level than those of the Macro-level, despite the fact that the total possible number of Primary-level pausal units was almost twice that of Macro-level pausal units? One possible explanation for this tendency was found in the experiments of Connor (1984) and Roloff (1999). These researchers found that a low L2 proficiency level caused difficulty in recalling Primary-level pausal units in comparison to Macro-level pausal units. Connor found that native English-speaking learners tended to elaborate the themes of a text (e.g., Macro-level) with supportive ideas (e.g., Primary-level), since their proficiency of English enabled them to make connections between prepositions of the text, while L2 learners tended to mention the themes with less elaboration of supportive ideas. Roloff (1999) also came to a similar conclusion when comparing the difference between higher-level L2 learners and lower-level L2 learners recall of the pausal units of a text. Another possible explanation for this tendency may relate to the nature of academic listening lecture texts. Young (1994) stated that the theme (e.g., Macro-level) of a lecture is recursive, and provides a direction for a learner to take in listening to a lecture, perhaps resulting in a greater possibility for the learner to retain and recall it for a long time afterwards. Meanwhile, the subordinate (e.g., Primary-level) unit of a lecture text, although it is explicitly stated, is difficult for a learner to recall because its contribution to the meaning of the lecture seems to be less important than the theme and its connection to the theme is often not apparent. Future research is needed to investigate other factors that may influence the recall of structural units in an academic listening lecture text.
4.3.3 Data analyses for the primary research questions of the study

This study primarily investigated the contribution of content knowledge and L2 listening proficiency to an explanation of L2 learners’ academic lecture listening comprehension and explored the comparative importance between them in L2 academic lecture listening comprehension, which was defined as having two levels of understanding: text-based and situation model understandings. The primary research questions of this study were re-stated below to remind the primary research purposes of the present study.

1. What is the relationship between content knowledge and understanding of a college academic lecture?
   1.1 To what extent does content knowledge explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?
   1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?
   2.1 To what extent does L2 listening proficiency explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?
   2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?
   3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?
   3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?
As mentioned above, the primary purposes of this study were to investigate the contribution of content knowledge and L2 listening proficiency to an explanation of L2 learners’ academic lecture listening comprehension and to explore the comparative importance between them in L2 college academic listening comprehension as well. For these purposes, correlations and multiple regression analyses among variables were computed, using SPSS 15.0, a statistical software program commonly used for analyzing research data (Norusis, 2004). Before presenting answers to the primary research questions by using multiple regression analyses, the results of correlations among variables were presented first.

<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>Y1</th>
<th>Y2</th>
<th>Y2</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 Listening Proficiency</td>
<td>1.000</td>
<td>-.021</td>
<td>.249</td>
<td>.281</td>
<td>.463</td>
<td>.161</td>
</tr>
<tr>
<td>Content Knowledge</td>
<td>1.000</td>
<td>.147</td>
<td>.183</td>
<td>.049</td>
<td>.277</td>
<td></td>
</tr>
<tr>
<td>Strategy Use</td>
<td>1.000</td>
<td>.154</td>
<td>.195</td>
<td>.049</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Y1: Checklist, Y2: Written recall-protocol, Y3: Bridging inference questions

**Table 4.11:** Correlation matrix I

Table 4.11 summarizes the correlation coefficients among variables. The correlation matrix of variables was compiled to examine the magnitude of the relationships among variables. There are several measures of correlation to express the relationship between two or more variables. For instance, the Pearson-Product Moment
correlation coefficient measures the extent to which two variables are related. Canonical correlation is a procedure for assessing the relationship between two sets of variables. For example, an educational researcher may want to compute the simultaneous relationship between three measures of scholastic ability with five measures of success in school. A sociologist may want to investigate the relationship between two predictors of social mobility based on interviews, with actual subsequent social mobility as measured by four different indicators. In both of these cases, the researcher is interested in the relationship between two sets of variables, and Canonical correlation would be the appropriate method of analysis. This study did not intend to investigate the relationship between two sets of variables but investigated the extent to which two variables were related. Since all the variables were treated as metric data, the Pearson-Product Moment correlation coefficient was calculated. For the description of the checklist, Table 4.11 shows that a positive correlation between L2 listening proficiency and the checklist was .281 and the coefficient of determination ($r^2$) was .08. The coefficient of determination represents the proportion of the variability in $Y$ (e.g., the checklist score) accounted for by knowledge of $X$ (e.g., L2 listening proficiency) and indicates the goodness of prediction (Gliem, 2003). The coefficient of $r^2 = .08$ indicates that 8% of the variability in participants’ checklist score was explained by L2 listening proficiency, while 92% of the variability was not. This also indicates that participants who possessed higher levels of L2 listening proficiency tended to positively show higher scores of the checklist after they listened to a college academic lecture. Table 4.11 additionally shows that the intercorrelations
among independent variables were low on the basis of Bartz (1999), who describes the 
absolute value of the number between [.20 and lower] very low, [.20 to .40] low, [.40 
to .60] moderate, [.60 to .80] strong, and [.80 and higher] very high, and thus, 
multicollinearity was not concluded to be a concern in the regression analysis.

4.3.3.1 Relationship between the independent variables and text-based understanding

Among the primary research questions, three questions investigated the relative 
contribution of L2 listening proficiency and content knowledge to text-based 
understanding of L2 learners after listening to a college academic lecture. These 
questions included the question 1.1, 2.1, and 3.1 and were re-stated below.

1. What is the relationship between content knowledge and understanding of a college 
academic lecture?

1.1 To what extent does content knowledge explain text-based understanding as 
measured by a written recall-protocol and a checklist after college students listen 
to a college academic lecture?

2. What is the relationship between L2 listening proficiency and understanding of a 
college academic lecture?

2.1 To what extent does L2 listening proficiency explain text-based understanding as 
measured by a written recall-protocol and a checklist after college students listen 
to a college academic lecture?

3. When both content knowledge and L2 listening proficiency are variables, what is the 
relationship of these two variables to student understanding of a college academic 
lecture?

3.1 What is the relative importance of content knowledge and L2 listening proficiency 
with respect to understanding a college lecture when text-based and situation 
model are analyzed?

Regression of text-based understanding (represented by both checklist scores and 
written recall-protocol scores) on selected variables revealed that L2 listening proficiency
Table 4.12: Summary of regression analyses for the checklist scores on selected variables

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R² change</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B (b)</td>
<td>Beta (β)</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.281</td>
<td>.079</td>
<td>.079</td>
<td>3.802</td>
<td>.073</td>
</tr>
<tr>
<td></td>
<td>L2 listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (Constant)</td>
<td>.339</td>
<td>.115</td>
<td>.036</td>
<td>2.824</td>
<td>.075</td>
</tr>
<tr>
<td></td>
<td>L2 listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The checklist scores

All variables (i.e., L2 listening proficiency, content knowledge, and strategy use) were entered using the stepwise regression method in order to specify greater contributing predictors of the checklist score. Regression data (Table 4.12) indicate that the full model was appropriate for predicting participants’ text-based understanding of the college academic lecture with F = 8.933 and p < .05. The data also show that there were two statistically significant predictors (i.e., L2 listening proficiency and content knowledge) and that with the checklist score as the dependent variable, these two variables explained 11.5% of the variance. More specifically, the data indicated that L2 listening proficiency accounted for 7.9% of the variance of the checklist score and content knowledge explained 3.6% of the variance of the checklist score.
A review of the regression coefficient (Table 4.12) further indicates that L2 listening proficiency accounted for a higher relative contribution to the checklist score (Beta = .285) than did content knowledge (Beta = .188). The partial regression coefficient of L2 listening proficiency was .075, which means that the expected change of .075 in the checklist score was due to a one-point change of L2 listening proficiency when the other independent variables were held constant. Higher scores in L2 listening proficiency corresponded to higher scores in the checklist.

The examination of residuals indicated no violation of the assumptions for the linear regression (see Appendix P for details). The ‘Histogram of residuals’ and ‘Normal probability plot’ showed normal distribution. The value for the ‘Durbin-Watson statistic’ was 1.909 (Residuals are independent). The ‘Residuals statistics’ showed a mean of zero. The ‘Plot of residuals and predicted Y’ indicated no major concerns about the constant variance assumption.

Another indicator of text-based understanding was the written recall-protocol score that the participants obtained after listening to the college academic lecture. Table 4.13 shows the data of regression analyses.
<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B (b)</td>
<td>Beta (β)</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.473</td>
<td>.223</td>
<td>.223</td>
<td>-34.751</td>
<td>.445</td>
</tr>
<tr>
<td>L2 listening proficiency</td>
<td>1.265</td>
<td>.445</td>
<td></td>
<td>.410</td>
<td>.046</td>
</tr>
<tr>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy use</td>
<td>2.585</td>
<td>.077</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The written recall-protocol scores

**Table 4.13:** Summary of regression analyses for the recall-protocol scores on selected variables

All variables were entered into the regression equation in a single step (simultaneous model). Regression data (Tables 4.13) indicate that the full model was appropriate for predicting participants’ text-based understanding of the college academic lecture with F = 13.144 and p < .05. However, the data show that two variables (i.e., content knowledge and strategy use) were not important predictors of participants’ text-based understanding, demonstrating insignificant p-values (.543 for content knowledge and .328 for strategy use). In order to specify the contribution of L2 listening proficiency to the written recall-protocol accurately, another stepwise regression was conducted.
<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>.463</td>
<td>.215</td>
<td>.215</td>
<td>-25.154</td>
<td>1.316</td>
</tr>
<tr>
<td>L2 listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The written recall-protocol scores

**Table 4.14:** Summary of regression analyses for the recall-protocol scores on L2 listening proficiency

All three variables were entered with the stepwise method. Regression data (Table 4.14) indicate that the full model was appropriate for predicting participants’ text-based understanding of the college academic lecture with F = 37.990 and p < .05. The data also show that L2 listening proficiency was the only statistically significant predictor of participants’ text-based understanding (measured by a written recall-protocol) and that the regression of the recall-protocol scores on this variable resulted in 21.5% of the variance explained. Additionally, a review of the regression coefficient (Table 4.14) shows 1.316 of the partial regression coefficient of L2 listening proficiency, implying that for a one-point increase in L2 listening proficiency, there was an expected increase in the written recall-protocol of 1.316 points. Higher scores for L2 listening proficiency tended to correspond to higher scores in the written recall-protocol.

Regarding the assumption for linear regression, the examination of residuals showed no violation of the assumptions by showing normal distribution, having constant variance, indicating 1.982 as the value of Durbin-Watson, and showing a mean of zero in the table of residual statistics.
4.3.3.2 Discussion of the relationship between the independent variables and text-based understanding

Previous L2 listening studies have focused on determining whether there is an effect of content knowledge on L2 listeners’ comprehension and whether a relationship could be found between content knowledge and L2 listening proficiency on L2 listeners’ comprehension (e.g., Long, 1990). The present study assumed that there are indeed effects of both content knowledge and L2 listening proficiency and investigated the extent of the contribution for both content knowledge and L2 listening proficiency in explaining L2 learners’ college academic lecture listening within the Construction-Integration model. The Construction-Integration model suggests that comprehension has two different levels of understanding (i.e., text-based and situation model understandings) that both content knowledge and language proficiency have influence on but the effects of content knowledge and language proficiency differ according to the levels of understanding: Text-based understanding receives more influence from language proficiency than content knowledge, whereas situation model understanding receives more influence from content knowledge than language proficiency.

As reported above, the data from the regression analyses revealed that both content knowledge and L2 listening proficiency were predictors of participants’ text-based understanding after listening to a college academic lecture: L2 listening proficiency explained 7.9% of the variance of the checklist score and content knowledge explained 3.6% of the variance of the checklist score; L2 listening proficiency explained 21.5% of the variance of the written recall-protocol. In addition, the data showed that L2 listening proficiency explained more about text-based understanding than did content knowledge:
The relative contribution of L2 listening proficiency to the checklist was .285 (Beta) and the relative contribution of content knowledge to the checklist was .188 (Beta); the relative contribution of L2 listening proficiency to the written recall-protocol was .463 (Beta). Since the implemented tasks (i.e., a checklist and a written recall-protocol) for text-based understanding were designed for assessing participants’ ability to comprehend the text without fully understanding the relationship between different segments of the text as explained in the Construction-Integration model, participants did not seem to utilize their content knowledge more than L2 listening proficiency to comprehend the text (McNamara & Kintsch, 1996; Roloff, 1999). Therefore, L2 listening proficiency explained the text-based understanding of participants, perhaps to a greater degree than did content knowledge.

It is important to note that caution must be taken when interpreting the data for the written recall-protocol task. The data showed that content knowledge was not a statistically significant predictor in explaining participants’ text-based understanding as measured by a written recall-protocol task. This result is different from that previous research (e.g., Schmidt-Rinehart, 1994; Hohzawa, 1998; Madden, 2004), which administered written recall-protocol tasks to investigate the effect of content knowledge on listening comprehension. As mentioned above, previous research sought to examine whether content knowledge influenced the comprehension of L2 listeners by comparing the mean difference between two groups (one with content knowledge and one without content knowledge) and whether a relationship could be found between content knowledge and L2 listening proficiency on L2 listeners’ comprehension. However, this
study assumed such an influence and aimed to investigate whether content knowledge was a statistically significant predictor in explaining L2 learners’ text-based understanding as measured by a written recall-protocol task, as well as to investigate the extent of both content knowledge and L2 listening proficiency contribute to explaining L2 learners’ written recall-protocol scores. The regression data showed a R² of .006 (F=.328 and p > .05) for content knowledge when it entered the regression equation of the recall-protocol alone. Although the regression data indicated no significance of content knowledge as a predictor and even a possibility of the negligence of it, there was still a small value of R² for content knowledge in explaining the recall-protocol variances of participants.

Why was there a difference in content knowledge contribution when explaining the variances of the checklist score and the written recall-protocol score, despite the fact that both the checklist and the written recall-protocol task were used to measure participants’ text-based understanding after listening to a college academic lecture? One possible explanation for this difference is that unlike the recall-protocol task, the checklist included items that could help L2 listeners activate relevant content knowledge that they already possessed. In the checklist, participants responded to a sample of statements by selecting one of two options. These statements tended to be problematic in assessing participants’ ability to differentiate between two choices but contained a concept which could build upon participants’ content knowledge, although there was no guarantee that participants would use content knowledge to select the correct answers. This area needs further research.
An unanticipated result of this study was that the strategy use did not seem to be a significant predictor of academic lecture listening comprehension. Since this unanticipated result was also observed in the study of the relationship between the independent variables and situation model understanding, possible explanations for this result are discussed in the next section of the chapter.

4.3.3.3 Relationship between the independent variables and situation model understanding

Among the primary research questions, three questions investigated the relative contribution of L2 listening proficiency and content knowledge to situation model understanding of L2 learners after listening to a college academic lecture. These questions included the question 1.2, 2.2, and 3.1 and were re-stated below.

1. What is the relationship between content knowledge and understanding of a college academic lecture?
   1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?
2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?
   2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?
3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?
   3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?
The regression of situation model understanding on selected variables revealed that content knowledge seemed to account for a higher relative contribution to the dependent variable (bridging inference questions) than did L2 listening proficiency. Table 4.15 shows the summary of regression analyses for the bridging inference question task.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
<th>Unstandardized Coefficients B (b)</th>
<th>Standardized Coefficient Beta (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>.277</td>
<td>.077</td>
<td>.077</td>
<td>3.370</td>
<td>.277</td>
</tr>
<tr>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td>.465</td>
<td>.277</td>
</tr>
<tr>
<td>2 (Constant)</td>
<td>.323</td>
<td>.104</td>
<td>.028</td>
<td>-.592</td>
<td>.280</td>
</tr>
<tr>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td>.471</td>
<td>.280</td>
</tr>
<tr>
<td>L2 Listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td>.090</td>
<td>.167</td>
</tr>
</tbody>
</table>

a. Dependent variable: The bridging inference question scores

**Table 4.15:** Summary of regression analyses for the inference question scores on selected variables

Table 4.15 shows that the full model was appropriate for predicting participants’ situation model understanding of the college academic lecture with $F = 8.047$ and $p < .05$, having two statistically significant predictors (i.e., content knowledge and L2 listening proficiency), which accounted for 10.4% of the variance of the bridging inference question score. Specifically, Table 4.15 shows that content knowledge accounted for 7.7% of the variance and L2 listening proficiency explained 2.8% of the variance of bridging inference question score. Table 4.15 also demonstrates that content knowledge
accounted for a higher relative contribution to the bridging inference question score (Beta=.280) than did L2 listening proficiency (Beta =.167).

The partial regression coefficient of content knowledge was .471, which demonstrated that the expected change of .471 in the bridging inference question score was due to a one-point change of content knowledge when L2 listening proficiency was held constant. The examination of residuals was carried out to check the violation of the assumption for linear regression and no violation of assumption was found since it showed normal distribution, constant variance, the value of 1.702 in Durbin-Watson, and a mean of zero in the table of residual statistics.

4.3.3.4 Discussion of the relationship between the independent variables and situation model understanding

As expected, the regression analysis data revealed that both content knowledge and L2 listening proficiency were statistically significant predictors of participants’ situation model understanding as measured by bridging inference questions: Content knowledge accounted for 7.7% of the variance of bridging inference questions and L2 listening proficiency explained 2.8 % of the variance of bridging inference questions. In addition, as expected, the data showed that content knowledge explained more about situation model understanding than did L2 listening proficiency: The relative contribution of content knowledge to the bridging inference question score was .280 (Beta) and the relative contribution of L2 listening proficiency to the bridging inference question score was .167 (Beta). Since the implemented task for situation model understanding was designed to assess participants’ ability to draw inferences about the text while
understanding the relationship between different segments of the text as explained in the Construction-Integration model, participants needed to utilize the relevant content knowledge they already possessed more than L2 listening proficiency (McNamara & Kintsch, 1996; Roloff, 1999). Therefore, it is reasonable to conclude that content knowledge explained more of the variance for the bridging inference question score than did L2 listening proficiency.

Relevant previous professional research has shown that L2 learners’ strategy use influenced their listening comprehension (e.g., Benson, 1989; Chamot & Kupper, 1989; Vandergrift, 1996; Lynch, 1997). Although it was unexpected, the present study found that strategy use was not a significant predictor in either text-based or situation model understanding. The design of this study did not allow the researcher to determine precisely why strategy use did not reveal itself to be a statistically significant predictor in academic lecture listening comprehension. However, it might be speculated that the negligible relationship of strategy use on both types of understanding might have occurred because the implemented measure of strategy use might not tap into the processes for academic lecture comprehension, such as selective attention, relevant resource seeking, and efficient use of note-taking.

The implemented instrument for measuring strategy use for the study was initially developed by Vandergrift (2005). Although the instrument was examined in terms of its validity and reliability (r = .86), the instrument might not be appropriate for the study since the listening context for which Vandergrift (2005) intended to use the instrument
might relate to the more general listening contexts that L2 learners may encounter, rather than academic lecture contexts specifically. Thus, further research is needed on this topic of instrumentation.

Although this experimental study may have shown an underestimation of the impact of strategy use on both text-based and situation model understandings, it should not be concluded that strategy use is not as important as other variables, especially considering the findings of the research on the effectiveness of strategy use on listening comprehension. There have been several efforts to create valid measures for strategy use of L2 listeners (e.g., Imhof, 1998; Flowerdew & Miller, 2005; Vandergrift, 2005), but there is still a need to construct effective measures of strategy use for L2 listeners. Future research to develop effective measures of strategy use for L2 listeners is needed and will be further described in Chapter 5.

4.3.3.5 Relationship between content knowledge and L2 listening proficiency

Besides the relative contribution of both content knowledge and L2 listening proficiency in explaining L2 academic lecture listening comprehension, this study also investigated the relationship between content knowledge and L2 listening proficiency by assuming that the effect of content knowledge varies according to the level of L2 listening proficiency, which was reflected in research question 3.2.

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?

3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?
A one-way ANOVA to compare the mean differences among three-level L2 listening proficiency groups on a content knowledge score was carried out in order to investigate whether different level L2 listening proficiency groups differ from each other on their performance on content knowledge tasks. First, participants were divided into three groups according to their scores on L2 listening proficiency: below 30%, 30%-70%, and above 70%. No students received scores of exactly 30% or 70%. Tables 4.16 shows the summary data and Analysis of Variance on the content knowledge score.

<table>
<thead>
<tr>
<th>Group 1 (Low group)</th>
<th>Group 2 (Intermediate group)</th>
<th>Group 3 (High group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>43</td>
<td>56</td>
</tr>
<tr>
<td>Mean</td>
<td>5.95</td>
<td>6.23</td>
</tr>
<tr>
<td>SD</td>
<td>1.63</td>
<td>1.62</td>
</tr>
<tr>
<td>Source</td>
<td>df</td>
<td>ss</td>
</tr>
<tr>
<td>Between groups</td>
<td>2</td>
<td>1.896</td>
</tr>
<tr>
<td>With groups</td>
<td>138</td>
<td>343.508</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>345.404</td>
</tr>
</tbody>
</table>

a. Dependent variable: The content knowledge scores

**Table 4.16:** Summary data and Analysis of Variance on the content knowledge scores

Table 4.16 reports the mean values of content knowledge score (i.e., an average score for the content knowledge checklist and the self-assessment) for three L2 listening groups. The low listening group showed a mean of 5.95 (SD of .1.63); the intermediate listening group showed a mean of 6.23 (SD of 1.62); and the high listening group showed a mean of 6.09 (SD of 1.44).
Table 4.16 also reveals that the intermediate listening group had a higher mean value than did the high listening group in content knowledge scores. Although there was difference among three listening groups in the mean values of content knowledge scores, Table 4.16 indicates that the difference was small and thus participants might possess similar levels of content knowledge, irrespective of L2 listening proficiency. In addition, Table 4.16 shows that the model may not be appropriate for this study due to the insignificant F-value ($F = .381, p > .05$), which indicates that different levels of listening proficiency groups did not differ from each other in their performance on content knowledge tasks.

Besides the one-way ANOVA, regression analysis was carried out in order to investigate whether the effect of content knowledge varies according to the learners’ level of L2 listening proficiency. Although one-way ANOVA whose results were stated above was already used to investigate whether the effect of content knowledge increases with greater L2 listening proficiency, the regression analysis was again carried out because the value of listening proficiency of participants was initially of a continuous nature and because regression analysis provides a more accurate p-value than does ANOVA (Graves, 2006): Regression analysis reports comparison insight relative to ‘what impacts the process’ (as ANOVA indicates) as well as ‘how much it will impact the process’ through data analysis. The low listening group and the high listening group were dummy-coded while the intermediate listening group was the base for dummy coding procedure due to its high frequency (n-1). Table 4.17 presents the results of regression analysis.
Table 4.17: Summary of regression analysis for content knowledge effect among different level L2 listening proficiency groups

Table 4.17 shows the summary of regression analysis for the content knowledge effect among different L2 listening proficiency groups. Two dummies of listening proficiency groups (i.e., the low listening group and the high listening group) were entered into the regression equation in a single step (simultaneous model). Table 4.17 shows that the full model for the different level L2 listening groups in the content knowledge scores was not appropriate ($F = .381$ and $p = .684$ ($p > .05$)), which indicates that the effect of content knowledge did not vary according to the learners’ level of L2 listening proficiency. Regression data did not provide evidence to support the development of a pattern of content knowledge effect with L2 proficiency increase.

4.3.3.6 Discussion of the relationship between content knowledge and L2 listening proficiency

Research on the threshold hypothesis has stated that there is a cut-off point at which the effect of L1 traits such as content knowledge changes markedly (e.g., Chapham, 1996; Krekeler, 2006). These studies also stated that L1 traits become more important in
comprehension tasks as L2 proficiency increases since L1 traits are not short-circuited when a reader/listener has an adequate level of L2 proficiency (e.g., Clarke, 1980; Feyten, 1991; Vandergrift, 2006). Relevant to the threshold hypothesis, Taillerfer (1996) also stated that if a language threshold exists, a developmental pattern of L1 traits would be observed with L2 proficiency increase. The notion of threshold did not appear to apply to this study when describing the relationship between content knowledge and L2 listening proficiency because this study provided no evidence of a developmental pattern of content knowledge effect when L2 listening proficiency increased.

A precise explanation of why the notion of threshold did not apply to this study cannot be established given the data available from this study. However, one possible explanation for this result was inferred from the data for the one-way ANOVA. The data for the one-way ANOVA showed that there was no difference in content knowledge task performance among the three different levels of L2 listening proficiency groups. As stated in the discussion section for the independent variables, this outcome might be caused by the lack of normal distribution of L2 listening scores in relation to skewness (-1.29). Because a high value of negative skewness of L2 listening proficiency indicated that a majority of the participants were grouping themselves in a narrow range of score variances, it would be difficult to establish defendable cut-points to classify groups according to L2 listening proficiency levels. As a result, it would also be difficult to predict a change in content knowledge effect on the basis of a change of L2 listening proficiency levels in this study. Further studies of similar issues are needed to establish clear cut-points among different L2 listening proficiency level groups.
4.3.4 Data analyses for the secondary research questions of the study

Besides the primary research questions that investigated content knowledge and L2 listening proficiency as major predictors of L2 academic lecture listening comprehension within the Construction-Integration model, this study addressed four secondary research questions that investigated L2 learners’ self-assessed comprehension in academic lecture listening, additional features of academic lecture listening that may have an impact on L2 listeners’ comprehension, listening strategy use of different L1 groups, and factors that may affect the strategy use of L2 listeners. The secondary research questions of this study were re-stated below to remind the secondary research purposes of the present study.

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?
5. What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?
6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?
7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

4.3.4.1 Self-assessed listening comprehension of college academic lectures

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?

Research question 4 was formulated to investigate L2 learners’ self-assessed comprehension after listening to a college academic lecture. Oscarson (1989) stated that L2 learners are able to diagnose strengths and weaknesses in language behavior if a self-
assessing instrument for language behavior is administered after language tasks. LeBlanc and Painchaud (1985) and Harris (1997) also reported that L2 learners were capable of assessing their own problems comparatively and reliably when comparing outcomes of L2 learners’ self-assessment in language behaviors to those of instructors. In order to investigate how L2 learners self-assess their comprehension in college academic lecture listening, a questionnaire was given to the participants after they listened to the college academic listening lecture. Table 4.18 presents the descriptive statistics for each item of the questionnaire.
<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Identifying the main idea</td>
<td>3.54</td>
<td>.96</td>
<td>141</td>
</tr>
<tr>
<td>2  Identifying details</td>
<td>2.74</td>
<td>.96</td>
<td>141</td>
</tr>
<tr>
<td>3  Identifying changes of topic and boundaries between topics</td>
<td>3.36</td>
<td>.92</td>
<td>141</td>
</tr>
<tr>
<td>4  Distinguishing facts from opinions</td>
<td>3.26</td>
<td>.99</td>
<td>141</td>
</tr>
<tr>
<td>5  Identifying relationships among units within discourse (major</td>
<td>3.15</td>
<td>.91</td>
<td>141</td>
</tr>
<tr>
<td>ideas, generalization, hypotheses, examples)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6  Recognizing irrelevant matters: jokes, digressions</td>
<td>3.15</td>
<td>1.15</td>
<td>141</td>
</tr>
<tr>
<td>7  Discriminating distinctive sounds of English</td>
<td>3.35</td>
<td>.82</td>
<td>141</td>
</tr>
<tr>
<td>8  Recognizing the functions of stress and intonation to signal the</td>
<td>3.49</td>
<td>.88</td>
<td>141</td>
</tr>
<tr>
<td>information structure of utterance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9  Identifying words in stressed and unstressed positions</td>
<td>3.56</td>
<td>.88</td>
<td>141</td>
</tr>
<tr>
<td>10 Processing speech at different rates</td>
<td>3.25</td>
<td>.92</td>
<td>141</td>
</tr>
<tr>
<td>11 Recognizing reduced forms of words</td>
<td>3.05</td>
<td>.92</td>
<td>141</td>
</tr>
<tr>
<td>12 Recognizing words and phrases of similar and opposing meaning</td>
<td>3.35</td>
<td>.86</td>
<td>141</td>
</tr>
<tr>
<td>13 Recognizing elliptical forms of grammatical units and sentences</td>
<td>3.07</td>
<td>.82</td>
<td>141</td>
</tr>
<tr>
<td>14 Recognizing typical word-order patterns</td>
<td>3.44</td>
<td>.87</td>
<td>141</td>
</tr>
<tr>
<td>15 Detecting sentence constituents such as subjects, verbs, objects,</td>
<td>3.60</td>
<td>.84</td>
<td>141</td>
</tr>
<tr>
<td>prepositions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Inferring links and connections between events</td>
<td>3.32</td>
<td>.84</td>
<td>141</td>
</tr>
<tr>
<td>17 Predicting the meaning of a message</td>
<td>3.33</td>
<td>.93</td>
<td>141</td>
</tr>
<tr>
<td>18 Detecting attitudes of speakers towards subject matter</td>
<td>3.60</td>
<td>.90</td>
<td>141</td>
</tr>
<tr>
<td>19 Detecting cultural underlying meaning</td>
<td>2.87</td>
<td>.90</td>
<td>141</td>
</tr>
<tr>
<td>20 Recognizing markers of cohesion</td>
<td>3.16</td>
<td>.98</td>
<td>141</td>
</tr>
<tr>
<td>21 Identifying key words and ignoring others while listening</td>
<td>3.40</td>
<td>.89</td>
<td>141</td>
</tr>
<tr>
<td>22 Using background knowledge to facilitate selective listening</td>
<td>3.24</td>
<td>1.01</td>
<td>141</td>
</tr>
</tbody>
</table>

* On the basis of the ACTFL guideline of listening proficiency, five comprehension levels for the questionnaire items were established: ‘Minimal’ indicates no ability to comprehend an academic listening text (The mean score for items is close to 1); ‘Limited’ indicates an ability to comprehend short learned utterances of an academic listening text (The mean score for items is close to 2); ‘Moderate’ indicates an ability to comprehend sentence-length utterances of an academic listening text (The mean score for items is close to 3); ‘Competent’ indicating an ability to comprehend main ideas and most details of connected discourse of an academic listening text on a variety of topics (The mean score for items is close to 4); ‘Native-like’ indicates an ability to comprehend all utterances of an academic listening text (The mean score for items is close to 5).

**Table 4.18: Self-assessed academic lecture listening comprehension**
As demonstrated in Table 4.18, participants self-reported a moderate to competent level of ability in comprehension when listening to a college academic lecture, given that means for most items in the questionnaire were close to 3.5 and standard deviations were small. Participants’ self-reported limited ability when comprehending the college academic lecture was shown only in items #2 and #19.

Since the questionnaire was unidimensional to measure participants’ self-assessed academic lecture listening comprehension and the internal consistency of the questionnaire items was already examined through the pilot study, the values of all items were summated to be used to identify the levels of each participant’s academic lecture listening comprehension. Table 4.19 presents the descriptive statistics for participants’ self-assessed academic lecture listening comprehension. It shows the mean of 3.29 (SD of .68) with the range of scores from 1.45 to 5.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-assessed academic lecture</td>
<td>3.29</td>
<td>.68</td>
<td>.12</td>
<td>141</td>
</tr>
<tr>
<td>listening comprehension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 4.19:* Descriptive statistics of self-assessed academic lecture listening comprehension

Similarly to the descriptive statistics of each item in the questionnaire, Table 4.19 shows that participants considered having a moderate to competent level of ability in comprehending a college academic lecture (see Table 4.18 for details).
As mentioned above, the questionnaire was unidimensional to measure participants’ self-assessed academic lecture listening comprehension. However, a re-examination of questionnaire items raised a possibility that the items in the questionnaire could be categorized into two or three sub-groups on the basis of an underlying listening construct in each item. Principal component analysis was carried out. Principal component analysis was used to determine empirically how many underlying-listening constructs accounted for participants’ self-assessed academic lecture listening comprehension on the questionnaire.

Data from principal component analysis, after transforming a set of correlated items into a smaller set of uncorrelated underlying listening constructs that retained most of the information in the original set of items (Gliem, 2004), revealed that 22 items on the questionnaire could be explained by three principal components (i.e., underlying-listening constructs), and that the total variance of participants’ self-assessed academic lecture listening comprehension explained by three components was 67.14% (see Appendix Q for the results of the principal component analysis). In order to have a simpler interpretation of the principal components, a varimax rotation that is the most frequently used orthogonal rotation (Gliem, 2004) was used. The amount of variance accounted for by each rotated component was 25%, 23%, and 19%.

Principal component analysis generated a rotated component matrix to identify items correlated with each component. Items loading under component one were items from # 7 to #15 and #18 (r = .934). Items loading under component two were items from #1 to #6 (r = .907). The rest of the items from # 16, #17 and #19 to #22 belonged to
component three \( (r = .889) \). Each component was named after extracting a common underlying-listening construct among related items. Component one was named ‘speech feature,’ component two was named ‘content feature,’ and component three was named ‘discourse feature.’

In order to investigate which component participants were more capable of identifying in comparison with the other components when they listened to the college academic lecture, descriptive statistics of each component were determined. Table 4.20 presents the descriptive statistics of each component associated with participants’ self-assessed academic lecture listening comprehension.

<table>
<thead>
<tr>
<th>Component</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech feature</td>
<td>3.36</td>
<td>.70</td>
<td>-.02</td>
<td>141</td>
</tr>
<tr>
<td>(Component one)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content feature</td>
<td>3.21</td>
<td>.82</td>
<td>.04</td>
<td>141</td>
</tr>
<tr>
<td>(Component two)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discourse feature</td>
<td>3.28</td>
<td>.73</td>
<td>.01</td>
<td>141</td>
</tr>
<tr>
<td>(Component three)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.20: Descriptive statistics of each component associated with participants’ self-assessed academic lecture listening comprehension

Table 4.20 shows participants’ moderate to competent level ability in all three components of academic lecture listening comprehension, given that the means of three components were close to 3.5 (see Table 4.18 for details). With regard to the speech feature (component one), Table 4.20 shows a mean of 3.36 (SD of .70) with a total range
from a low score of 1.44 to a high score of 5. With regard to the content feature (component two), it shows a mean of 3.21 (SD of .82) with a total range from a low score of 1.33 to a high score of 5. Table 4.20 also shows a mean of 3.28 (SD of .73) with a total range from a low score of 1.29 to a high score of 5 with respect to the discourse feature (component three).

The data in Table 4.20 suggest that participants self-reported that they were more capable of recognizing the speech feature when they listened to a college academic lecture than they were capable of identifying the two other features, because the mean of the speech feature was higher than those of two other analyzed features and the value of its SD was also smaller. Finally, Table 4.20 shows that participants were less capable of comprehending the content feature than the two other features when they listened to the college academic lecture.

4.3.4.2 Discussion of L2 learners’ self-assessed academic lecture listening comprehension

This study reported that participants seemed to have a moderate to competent level of listening comprehension ability in most items on self-reporting academic lecture listening comprehension questionnaire. In addition, this study revealed that among three components of academic lecture listening comprehension, participants were more capable of recognizing speech features than two other analyzed features. The finding that participants were more capable of recognizing the speech feature when they listened to a college academic lecture might be understandable given the EFL listening instructions that the participants had received before. For instance, in the study of EFL listening
course textbooks, Gabrielatos (1998) found that 70% of listening course textbooks for EFL learners were designed to identify familiar lexis by providing learners with systematic ear training to recognize individual sounds or clusters or to distinguish between sounds that may sound similar to learners. Vitanova and Miller (2002) also introduced a prevalent focus on the English speech feature in EFL listening instruction, arguing for the need of new tasks for EFL learners’ listening improvement. Therefore, the participants’ strength in recognizing the speech feature when they listened to a college academic lecture seems reasonable and corroborates other professional perspectives in the field.

Participants showed low performance in listening tasks of the study as shown in the positive values of skewness of the listening tasks (e.g., written recall-protocol, and bridging inference questions). However, as shown above, participants considered that their ability to comprehend a college academic lecture listening text was moderate to competent. A Pearson-Product Moment correlation coefficient was calculated to investigate the relationship between participants’ self-assessed academic lecture listening comprehension and the outcomes of the three listening tasks of the study.

<table>
<thead>
<tr>
<th></th>
<th>Checklist</th>
<th>Written recall-protocol</th>
<th>Bridging inference questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-assessed academic lecture listening comprehension</td>
<td>.264</td>
<td>.378</td>
<td>.206</td>
</tr>
</tbody>
</table>

**Table 4.21:** Correlation between participants’ self-assessed academic lecture listening comprehension and the three listening tasks of the study.
Table 4.21 shows that the correlations between participants’ self-assessed academic lecture listening comprehension and outcomes of the listening tasks of this study were low on the basis of Bartz (1999), who describes the absolute value of a number between [.20 to lower] very low, [.20 to.40] low, [.40 to.60] moderate, [.60 to.80] strong, and [.80 to higher] very high. It is reasonable to ask what could make these low correlations between participants’ self-assessed academic lecture listening comprehension and their scores on the three listening tasks.

One explanation for these low correlations might be that participants might have self-assessed each item of the questionnaire based on their previously measured L2 listening proficiency, rather than self-assessed after reflecting about their performance in the three listening tasks of the study. Studies such as Blanche (1990) and Blanche and Merino (1989) reported that a previous listening test result such as TOEFL or TOEIC had an influence on L2 learners’ self-assessed listening comprehension, although their listening comprehension may change according to the tasks administered to them.

The correlation between participants’ L2 listening proficiency (reflected by a combined score on a TOEFL listening test and a listening self-assessment) and their self-assessed academic lecture listening comprehension was carried out and a moderate correlation of .513 was found. Thus, the low correlations found between the three listening tasks and the study participants’ self-assessed academic lecture listening comprehension might be caused by participants rating each item of the questionnaire about academic lecture listening comprehension on the basis of their previously measured L2 listening proficiency.
Another explanation of the low correlations could be found through an examination of participants’ questionnaire responses. A research report on the survey responses of Asian students reported that Asian students tended to endorse the middle response on a Likert scale more than other ethnic group students, avoiding extreme responses (e.g., Crystal, Chen, & Fuligni, 1994; Grandy, 1996). A similar result occurred in the present study. Of 141 participants, 118 participants were from Asian countries. Eighty-three Asian participants showed no responses of either a low score of 1 or a high score of 5 to questionnaire items. Only 19 Asian participants showed responses of either a low score of 1 or a high score of 5 to more than four questionnaire items. Although the responses to the questionnaire items were supposed to reflect participants’ academic lecture listening comprehension accurately, it should not be ignored that participants’ responses to the questionnaire items might be affected by participants’ avoidance of certain responses, rather than representing an accurate individual response, resulting in an inaccurate measure for participants’ comprehension in academic lecture listening. The validity of self-assessment itself seems to be involved in this possible explanation of the low correlations between the study listening tasks and the participants’ self-assessed academic lecture listening comprehension. Additional solutions for this assessment need may require further research.
4.3.4.3 Other factors affecting academic lecture listening comprehension

5. *What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?*

Research question 5 was formulated to investigate other factors that might affect L2 learners’ comprehension after listening to a college academic lecture. An examination of the demographic questionnaire results raised the possibility that there might be other predictors to explain participants’ understanding of college academic listening lectures: time of residency in the USA (month), duration of English study in their native country (year), academic level (undergraduate or graduate), and gender. A correlation matrix was compiled to examine multicollinearity (Table 4.22) among the variables. Two independent variables, academic level and gender, are categorical variables and thus could not be treated in the same way as the other independent variables. These two variables were dummy-coded before being put into a regression analysis. Gender was coded as follows: female = 0 and male = 1. UGG was coded as follows: graduate = 0 and undergraduate = 1. Since all the variables could be treated as metric data, a Pearson-Product Moment correlation coefficient was calculated.
<table>
<thead>
<tr>
<th>Variable</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>X6</th>
<th>X7</th>
<th>Y1</th>
<th>Y2</th>
<th>Y3</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 listening proficiency (X1)</td>
<td>1.00</td>
<td>.021</td>
<td>.319</td>
<td>.108</td>
<td>.279</td>
<td>.249</td>
<td>.121</td>
<td>.281</td>
<td>.463</td>
<td>.161</td>
</tr>
<tr>
<td>Content knowledge (X2)</td>
<td>1.00</td>
<td>-.008</td>
<td>.107</td>
<td>.099</td>
<td>.147</td>
<td>.252</td>
<td>.183</td>
<td>.049</td>
<td>.277</td>
<td></td>
</tr>
<tr>
<td>Residency (X3)</td>
<td>1.00</td>
<td>-.244</td>
<td>.046</td>
<td>.199</td>
<td>-.016</td>
<td>.243</td>
<td>.164</td>
<td>.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of English study in native country (X4)</td>
<td>1.00</td>
<td>-.190</td>
<td>.022</td>
<td>-.096</td>
<td>.052</td>
<td>.243</td>
<td>.248</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic level (X5)</td>
<td>1.00</td>
<td>.068</td>
<td>.293</td>
<td>-.008</td>
<td>-.241</td>
<td>.073</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy use (X6)</td>
<td>1.00</td>
<td>.088</td>
<td>.154</td>
<td>.195</td>
<td>.049</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENDER (X7)</td>
<td>1.00</td>
<td>.084</td>
<td>-.077</td>
<td>.213</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Y1: Checklist, Y2: Written recall-protocol, Y3: Bridging inference questions

**Table 4.22**: Correlation matrix II
Table 4.22 summarizes the correlation coefficients among variables. For the description of the written recall-protocol, Table 4.22 shows that a positive correlation between L2 listening proficiency and the written recall-protocol was .463 and the coefficient of determination ($r^2$) was .21. The coefficient of $r^2 = .21$ indicates that 21% of the variability in participants’ written recall-protocol score was explained by L2 listening proficiency, while 79% of the variability was not. This also indicates that participants who possessed higher levels of L2 listening proficiency tended to positively show higher scores of the written recall-protocol after they listened to a college academic lecture.

Table 4.22 additionally shows that the intercorrelations among independent variables were low on the basis of Bartz (1999) and thus, multicollinearity was not concluded to be a concern in the regression analysis.

In order to predict text-based and situation model understandings by using the information from the seven independent variables, new multiple regression analyses were conducted. The following tables show the results of these analyses. First, the regression analysis for the checklist was completed.
Table 4.23: Summary of regression analyses for the checklist scores on seven selected variables

Table 4.23 shows that variables were entered using the stepwise regression method, indicating that the full model was appropriate for the study with F=7.483 and p < .05. Table 4.23 also shows that there were three statistically significant predictors (i.e., L2 listening proficiency, content knowledge, and residency), which explained 14.1% of the variance of the checklist score. More specifically, Table 4.23 indicates that L2 listening proficiency accounted for 7.9% of the variance, content knowledge explained 3.6% of the variance, and residency in the USA explained 2.6% of the variance of the checklist score. In addition, a review of the regression coefficient reveals that residency in the USA accounted for the smallest relative contribution to the score of the checklist (Beta = .171). The partial regression coefficient of residency in the USA was .008, which indicated that the expected change of .008 in the checklist score was related to a one-
month change of residency in the USA when the other independent variables were held constant. Hence, the relationship between residency in the USA and the checklist score of participants seemed to show that the longer L2 learners resided in the USA, the higher scores they obtained on the checklist. An examination for residuals showed no violation of the assumptions for linear regression.

A regression analysis was also conducted on the written recall-protocol task. Table 4.24 shows the outcomes of the regression.

Table 4.24: Summary of regression analyses for the recall-protocol scores on seven selected variables

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>.463</td>
<td>.215</td>
<td>.215</td>
<td>-25.154</td>
<td>1.316</td>
</tr>
<tr>
<td>L2 listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (Constant)</td>
<td>.503</td>
<td>.253</td>
<td>.038</td>
<td>-29.750</td>
<td>1.257</td>
</tr>
<tr>
<td>L2 listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of English study in native country</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.660</td>
</tr>
</tbody>
</table>
native country was another predictor for text-based understanding measured by the written recall-protocol, while the regression data on the checklist reported content knowledge and residency in the USA as additional predictors in explaining the text-based understanding of participants. Table 4.24 shows that two variables accounted for 25.3% of the variance of the recall-protocol score. L2 listening proficiency explained 21.5% and duration of English study in native country explained 3.8% in the variance of the recall-protocol score. A review of the regression coefficients (Table 4.24) shows that the partial regression coefficient of duration of English study in native country was .660, which implied that the expected change of .660 in the recall-protocol score was due to a one-year change of duration of English study in native country when the other independent variable was held constant. As with other regression analyses, the examination of residuals showed no violation of the assumptions for linear regression.

Last, the regression analysis for situation model understanding on selected variables revealed that content knowledge was found to be a statistically significant predictor in explaining the variance of the dependent variable.
<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B (b)</td>
<td>Beta (β)</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.277</td>
<td>.077</td>
<td>.077</td>
<td>3.370</td>
<td>.465</td>
</tr>
<tr>
<td></td>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (Constant)</td>
<td>.353</td>
<td>.125</td>
<td>.048</td>
<td>2.064</td>
<td>.425</td>
</tr>
<tr>
<td></td>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration of English study in native country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (Constant)</td>
<td>.396</td>
<td>.157</td>
<td>.032</td>
<td>1.980</td>
<td>.343</td>
</tr>
<tr>
<td></td>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration of English study in native country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (Constant)</td>
<td>.428</td>
<td>.183</td>
<td>.027</td>
<td>-1.845</td>
<td>.344</td>
</tr>
<tr>
<td></td>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration of English study in native country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L2 Listening proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The bridging inference question scores

Table 4.25: Summary of regression analyses for the bridging inference question scores on seven selected variables
As with the other analyses, variables were entered with a stepwise regression method. Table 4.25 indicates that the full model was appropriate for the study with $F = 7.634$ and $p < .05$ and had four predictors (i.e., content knowledge, duration of English study in native country, gender, and L2 listening proficiency), which demonstrated that the regression for bridging inference questions on these four variables explained 18.3% of the variance. With bridging inference questions as the dependent variable, content knowledge accounted for 7.7% of the variance; duration of English study in native country accounted for 4.8% of the variance; gender accounted for 3.2% of the variance; and L2 listening proficiency accounted for 2.7% of the variance.

A review of the regression coefficient (Table 4.25) further indicates that content knowledge accounted for a higher relative contribution to the bridging inference question score ($\text{Beta} = .205$) than did L2 listening proficiency and gender. The partial regression coefficient of content knowledge was .344, indicating that the expected change of .344 in score of the bridging inference questions was due to a one-point change of content knowledge when other independent variables were held constant. Hence, the relationship between content knowledge and bridging inference questions was that higher scores in content knowledge corresponded to higher scores on the bridging inference questions.

In order to check the violation of the linear regression assumption, the residuals were examined. Since it showed a normal distribution, constant variance, the value of 1.676 in Durbin-Watson, and a mean of zero in the table of residual statistics, no violation of assumption was found for the linear regression.

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4.3.4.4 Discussion of other factors affecting academic lecture listening comprehension

Besides examining the effects of content knowledge and L2 listening proficiency, this study also explored whether other variables such as gender, academic level, residency in the USA, and duration of English studying in native country contributed to the explanation of both text-based and situation model understandings of L2 listeners. As mentioned above, these additional variables were selected through a review of the participants’ demographic questionnaires. This study found that residency, duration of English study in native country, and gender might be statistically significant predictors in either text-based or situation model understanding. These findings were consistent with previous research, indicating that those variables had an influence on L2 listening comprehension (e.g., Gass & Varoniss, 1984; Robertson, 1984; Nuwash, 1997; Cargile, 2002). These previous studies, however, did not measure comprehension classified as two different levels of understanding as the present study did.

This study showed that gender was a significant predictor in the situation model understanding of participants, with females scoring higher on academic lecture listening comprehension tasks. This finding is consistent with those of Mau and Cheng (2000) and Cargile (2002), which reported that there was a gender difference on the measure of comprehension and that females scored higher than males on the analyzed measures of comprehension. The finding that residency was a significant predictor for text-based understanding was also consistent with previous research such as Gass and Varoniss (1984) and Matsuura, Chiba and Yamamoto (1992), which reported that L2 learners with a longer residency in the USA obtained higher comprehension scores than L2 learners.
with a shorter residency in the USA. As with the findings of Nuwash (1997), the present study showed that the duration of English study was a significant predictor in explaining the situation model understanding of L2 learners when they listened to a college academic lecture.

However, unlike the findings of research such as Robertson (1984), Johnson (1988), and Kobayash (2006), this study showed that academic level (i.e., undergraduate or graduate) was not a statistically significant predictor in explaining L2 listeners’ comprehension for an academic lecture, either text-based or situation model understanding. One possible explanation for this outcome might be that there were not enough undergraduate participants in the present study. As reported above, the number of graduate students was almost twice that of undergraduate students, and thus it might be difficult to make viable comparison for the contribution of academic level on the measures for both types of understanding. Another possible explanation for the relationship between academic level and both types of understanding might be that undergraduate and graduate participants in the study were not different in some important aspects. For instance, the mean differences between undergraduate and graduate students may not have been significant in content knowledge (t= -1.176, p >.05), residency (t= - .548, p >.05), and strategy use (t= -.804, p >.05). Further research is needed to identify other variables that might influence L2 listeners’ comprehension of college academic lectures.
4.3.4.5 Factors affecting L2 learners’ listening strategy use

6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?

Research question 6 was formulated to investigate factors that might affect L2 learners’ strategy use when listening to college academic lectures. The contributions of the factors that had been used to investigate L2 learners’ academic lecture listening comprehension were re-examined, including age. Therefore, selected variables included age, L2 listening proficiency, content knowledge, residency, academic level, gender, and duration of English studying in native country. Regression of L2 listeners’ strategy use on selected variables revealed that L2 listening proficiency provided a statistically significant contribution to the explanation of L2 learners’ strategy use in academic lecture listening comprehension. Table 4.26 shows the regression analysis data.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>R² change</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>.249</td>
<td>.062</td>
<td>.062</td>
<td>2.698</td>
<td></td>
</tr>
<tr>
<td>L2 listening proficiency</td>
<td>.021</td>
<td>.249</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- a. Dependent variable: The strategy use scores

Table 4.26: Summary of regression analyses for the strategy use scores on selected variables
All variables were analyzed using the stepwise regression method in order to specify greater contributing predictors of participants’ strategy use score. Table 4.26 indicates that the full model was appropriate for the study with $F = 9.192$ and $p < .05$. The data also show that L2 listening proficiency was the only statistically significant predictor and that the regression of strategy use for this variable explained 6.2% of the variance. Additionally, a review of the regression coefficient (Table 4.26) shows .021 of the partial regression coefficient of L2 listening proficiency, indicating that for a one-point increase in L2 listening proficiency, there was an expected increase in the strategy use of .021 points.

Regarding the assumption for linear regression, the examination of residuals showed no violation of the assumptions by showing normal distribution, having constant variance, indicating 1.878 as the value of Durbin-Watson, and showing a mean of zero in the table of residual statistics.

4.3.4.6 Discussion of the relationship between selected factors and L2 learners’ listening strategy use

The findings about the relationship between selected variables and strategy use suggested that the strategy use for academic lecture listening comprehension relied on L2 learners’ listening proficiency. This finding was compatible with previous research (e.g., Oxford & Burry-Stock, 1995; Vandergrift, 1996), in that the strategy use of L2 learners increases according to L2 listening proficiency. These previous studies also reported that L2 learners with a high level of listening proficiency used more strategies than did learners with a low level of listening proficiency. However, the design of this study did
not allow the researcher to determine precisely how L2 learners’ different levels of listening proficiency interact with strategy use in academic lecture listening. As mentioned above, the observed high value of negative skewness of L2 listening proficiency in this study might be problematic when there is an attempt to investigate a mean difference of a certain variable of groups classified according to levels of L2 listening proficiency. Therefore, further investigation on the interaction between strategy use and L2 listening proficiency levels is needed.

The finding that gender difference did not explain the strategy use of L2 learners when they listened to a college academic lecture seemed to contradict previous research (e.g., Bacon, 1992; Sheorey, 1999; Macaro, 2002). These previous studies found that female L2 learners used more strategies than did male L2 learners. With regard to the finding that gender difference did not seem to contribute to explaining the strategy use of L2 learners, one possible explanation for this outcome might be that female and male participants in this study were not different in some important aspects. For instance, the mean differences between male and female participants were not significant in residency in the USA (t = .190, p >.05), duration in English study in participants’ native country (t = 1.140, p >.05), age (t = 1.458, p >.05), and listening proficiency (t = 1.434, p >.05). It is also possible that the numbers in this study sample size did not reveal gender differences in the strategy use.

With regard to the effect of gender difference on strategy use, previous research has shown that female L2 learners preferred cognitive strategies while male L2 learners used more meta-cognitive than cognitive strategies (e.g., Bacon, 1992; Bugel & Bunnk,
In order to elicit different strategy use between females and males, these studies used verbal reports such as think-aloud techniques or task-based retrospective interviews. However, the present study employed a questionnaire instrument that was designed to provide a broad picture of L2 learners’ listening strategies. Thus, this study did not yield evidence to support the different strategy use by male and female L2 learners when they listen to a college academic lecture. Different research methodologies may be needed to accurately describe L2 learners’ listening strategy use with respect to gender differences.

Listening strategy studies have identified factors that may affect L2 learners’ strategy use in academic lecture listening such as motivation and types of language tasks. The present study found that factors such as academic level, residency, and content knowledge did not contribute to the explanation for the strategy use of L2 listeners. Additional research is needed to generalize the effects of the above factors on L2 listeners’ strategy use for college academic lecture listening.

4.3.4.7 Comparing strategy use among participants with different L1 backgrounds

7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

Although participants in this study were from 13 different countries, only six nationalities whose number of participants was over eight were arbitrarily selected to compare strategy use in academic lecture listening comprehension. For purposes of this
study, participants from China and Taiwan were put into one group since the L1 of both nationalities is Chinese. The five L1 groups included Chinese, Hindi, Japanese, Korean, and Malaysian.

Table 4.27 presents the descriptive statistics for each item of the strategy use questionnaire to which each L1 group of participants responded.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Before starting to listen, I think of what I might know about the story.</td>
<td>3.60 .91</td>
<td>3.75 1.14</td>
<td>3.89 .93</td>
<td>3.34 1.20</td>
<td>4.00 .76</td>
</tr>
<tr>
<td>2 I used sound effects and tone of the speaker’s voice to help me guess</td>
<td>3.56 .79</td>
<td>3.33 1.15</td>
<td>3.11 .78</td>
<td>3.55 .90</td>
<td>3.75 .71</td>
</tr>
<tr>
<td>the meaning of words.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 As I am listening, I predict what will happen.</td>
<td>3.35 .95</td>
<td>3.17 1.03</td>
<td>3.67 .71</td>
<td>3.52 1.00</td>
<td>3.38 .74</td>
</tr>
<tr>
<td>4 As I am listening, I use words that I recognize to help me guess the</td>
<td>4.09 .78</td>
<td>3.67 1.07</td>
<td>4.00 .50</td>
<td>3.55 .90</td>
<td>4.13 .64</td>
</tr>
<tr>
<td>meaning of other words.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 When I do not understand, I listen for words that sound the same as</td>
<td>3.07 .88</td>
<td>3.00 1.28</td>
<td>3.11 1.36</td>
<td>3.30 .95</td>
<td>3.00 1.31</td>
</tr>
<tr>
<td>English.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 When I have difficulty understanding, I give up listening.</td>
<td>2.11 .88</td>
<td>1.50 .90</td>
<td>2.11 .78</td>
<td>2.25 .97</td>
<td>2.38 1.30</td>
</tr>
<tr>
<td>7 I listen for overall meaning.</td>
<td>3.95 .73</td>
<td>4.25 .45</td>
<td>3.67 .87</td>
<td>3.50 .90</td>
<td>4.25 .71</td>
</tr>
<tr>
<td>8 When I am having trouble understanding, I tell myself that I’ll</td>
<td>3.71 .76</td>
<td>3.58 1.24</td>
<td>3.44 .88</td>
<td>3.41 .82</td>
<td>4.13 .99</td>
</tr>
<tr>
<td>manage and do fine.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 As I listen, I relate what I am hearing with what I understood earlier.</td>
<td>4.00 .79</td>
<td>4.08 .79</td>
<td>4.22 .44</td>
<td>3.77 .74</td>
<td>4.50 .53</td>
</tr>
<tr>
<td>10 I use the comprehension questions in front of me to help me predict what</td>
<td>3.67 .88</td>
<td>3.50 1.31</td>
<td>3.33 1.22</td>
<td>3.16 .78</td>
<td>4.13 .83</td>
</tr>
<tr>
<td>I cannot understand.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 As I listen, I focus on the main words.</td>
<td>3.87 .58</td>
<td>3.83 .58</td>
<td>4.11 .60</td>
<td>4.00 .72</td>
<td>4.25 .71</td>
</tr>
<tr>
<td>12 When I have trouble understanding, I pay more attention and focus</td>
<td>4.07 .84</td>
<td>4.25 .75</td>
<td>4.33 .87</td>
<td>3.84 1.06</td>
<td>4.00 .76</td>
</tr>
<tr>
<td>harder.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 When I have trouble understanding, I keep on listening because I</td>
<td>4.10 .85</td>
<td>4.17 1.11</td>
<td>4.00 1.00</td>
<td>3.82 .84</td>
<td>4.25 .71</td>
</tr>
<tr>
<td>expect to understand more later.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 I often correctly figure out the meaning of words I do not understand.</td>
<td>3.18 .72</td>
<td>4.00 .74</td>
<td>3.33 1.00</td>
<td>3.32 .71</td>
<td>3.75 .87</td>
</tr>
<tr>
<td>15 When my mind wanders, I usually recover my concentration right away.</td>
<td>3.29 .85</td>
<td>3.42 .79</td>
<td>3.00 .71</td>
<td>3.11 .87</td>
<td>3.50 .53</td>
</tr>
<tr>
<td>16 When I have the chance to listen a second or third time, I usually know</td>
<td>4.30 .66</td>
<td>4.50 .52</td>
<td>4.22 .83</td>
<td>4.05 .71</td>
<td>4.38 .52</td>
</tr>
<tr>
<td>where I need to pay more attention.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 I understand without translating in my head.</td>
<td>3.85 .70</td>
<td>4.50 .67</td>
<td>4.00 1.12</td>
<td>3.07 1.04</td>
<td>3.88 .99</td>
</tr>
<tr>
<td>18 When I listen, I know when I understand and when I don’t.</td>
<td>4.00 .72</td>
<td>4.33 .78</td>
<td>3.78 .97</td>
<td>3.39 .81</td>
<td>4.38 .74</td>
</tr>
<tr>
<td>Total N=128</td>
<td>3.66 .32</td>
<td>3.71 .47</td>
<td>3.63 .34</td>
<td>3.44 .47</td>
<td>3.89 .23</td>
</tr>
</tbody>
</table>

Table 4.27: Descriptive statistics for each item of the strategy use questionnaire
Table 4.27 shows that overall, Malaysian participants showed the highest mean value of strategy use when they listened to a college academic lecture, while the Korean participants showed the lowest mean value of strategy use. Malaysian participants reported the highest mean values of strategy use in the 13 items on the questionnaire. Hindi participants showed the highest mean values of strategy use in four questionnaire items. Chinese participants did not have the highest mean values of strategy use in any of the questionnaire items.

A one-way ANOVA analysis to compare the mean differences among five L1 groups on strategy use scores was conducted. Table 4.28 presents summary data and Analysis of Variance on the strategy use scores.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>ss</th>
<th>ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>4</td>
<td>2.116</td>
<td>.529</td>
<td>3.448</td>
</tr>
<tr>
<td>Within groups</td>
<td>123</td>
<td>18.868</td>
<td>.153</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>20.984</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent variable: The strategy use scores

Table 4.28: Summary data and Analysis of Variance on the strategy use scores
Table 4.28 indicates that the model may be appropriate for this study with F=3.448 and p < .05, implying that a difference existed within comparisons of strategy use scores among the five different L1 groups. In order to investigate whether one group scores significantly higher than another, Post Hoc Multiple comparisons were conducted. All possible pairs of factors were compared.

<table>
<thead>
<tr>
<th>L1 (I) vs. L1 (J)</th>
<th>Mean difference (I - J)</th>
<th>Sig.</th>
<th>95% confidence interval lower</th>
<th>upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>Hindi</td>
<td>-.06</td>
<td>.646</td>
<td>-.30</td>
</tr>
<tr>
<td></td>
<td>Japanese</td>
<td>.03</td>
<td>.854</td>
<td>-.25</td>
</tr>
<tr>
<td></td>
<td>Korean</td>
<td>.22*</td>
<td>.008</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>Malaysian</td>
<td>-.23</td>
<td>.118</td>
<td>-.53</td>
</tr>
<tr>
<td>Hindi</td>
<td>Japanese</td>
<td>.08</td>
<td>.630</td>
<td>-.26</td>
</tr>
<tr>
<td></td>
<td>Korean</td>
<td>.27*</td>
<td>.035</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Malaysian</td>
<td>-.18</td>
<td>.327</td>
<td>-.53</td>
</tr>
<tr>
<td>Japanese</td>
<td>Korean</td>
<td>.19</td>
<td>.190</td>
<td>-.09</td>
</tr>
<tr>
<td></td>
<td>Malaysian</td>
<td>-.26</td>
<td>.176</td>
<td>-.64</td>
</tr>
<tr>
<td>Korean</td>
<td>Malaysian</td>
<td>-.45*</td>
<td>.004</td>
<td>-.75</td>
</tr>
</tbody>
</table>

a. Dependent variable: Strategy use scores

Table 4.29: Post Hoc Multiple Comparisons

In Table 4.29, the asterisks (*) indicate that there were three pairs of groups whose means differed significantly (p < .05) from each other. The three pairs of groups included ‘Chinese vs. Korean’, ‘Hindi vs. Korean’, and ‘Korean vs. Malaysian’.

According to Table 4.29, the Chinese (M=3.66), Hindi (M=3.71), and Malaysian (M=3.89) groups scored significantly higher on the items of strategy use questionnaire.
than did the Korean group (M=3.44). No other pairs of means differed significantly. The overall ANOVA data showed a significance (p =.010) and the pairwise comparisons yielded three differences that were statistically significant (p = .008, p = .035, and p = .004). This is because the overall ANOVA compared all values simultaneously, while the Least Significant Difference (LSD) procedure is just a series of independent t-tests (George & Mallery, 2005).

4.3.4.8 Discussion about strategy use of different L1 groups in academic lecture listening

The reason for why the Korean participants showed a statistically significant lower mean value in strategy use when they listened to a college academic lecture than did other L1 groups was not discovered by this study. Asian students’ avoidance of certain scores might not explain the difference in the Korean participants’ strategy use since three other L1 groups also had Asian backgrounds. Some characteristics of the Korean participants were compared with those of other L1 group participants to identify the possible causes of the significant mean difference between them in listening strategy use. The mean differences between the Korean participants and other L1 group participants in self-assessed academic listening comprehension, residency in the USA, and duration of English study in native country were not significant: self-assessed academic listening comprehension (Korean group vs. Chinese group: t= 3.845, p >.05; Korean group vs. Hindi group: t= 5.887, p >.05; Korean group vs. Malaysian group: t= 3.132, p >.05), residency in the USA (Korean group vs. Chinese group: t=.791, p >.05; Korean group vs. Hindi group: t=.000, p >.05; Korean group vs. Malaysian group: .
t= .684, p >.05), and duration of English study in their native country (Korean group vs.
Chinese group: t= 1.660, p >.05; Korean group vs. Hindi group: t= 5.296, p >.05; Korean
group vs. Malaysian group: t= 3.625, p >.05). However, the comparison between Korean
participants and Chinese participants showed a mean difference in L2 listening
proficiency (t= 5.428, p <.05, F=10.471). Further research is needed to identify factors
that might cause the difference between Korean participants and other L1 groups in
strategy use for academic lecture listening.

Summary of the data analysis in the quantitative aspect of the study

This study primarily investigated the contribution of content knowledge and L2
listening proficiency to an explanation of academic lecture listening comprehension.
Academic lecture listening comprehension in this study was defined as having two levels
of understanding: text-based and situation model understandings. The data of the
quantitative aspect of the study showed that both content knowledge and L2 listening
proficiency significantly contributed to both text-based and situation model
understandings of L2 learners when they listened to a college academic lecture. In
addition, the data for the regression analyses showed that content knowledge accounted
for a higher contribution to the situation model understanding of L2 listeners than did L2
listening proficiency, whereas L2 listening proficiency accounted for a higher
contribution to the text-based understanding of L2 listeners than did content knowledge.
The findings that the contributions of content knowledge and L2 listening proficiency
differed according to the level of understanding might be evidence to support the application of the Construction-Integration model to explain the listening comprehension of a college academic lecture.

Besides the contributions of content knowledge and L2 listening proficiency to explaining academic lecture listening, this study also investigated the relationship of content knowledge and L2 listening proficiency when L2 learners listened to a college academic lecture. The one-way ANOVA results indicated that different levels of L2 listening groups did not differ from each other in their scores on content knowledge tasks. Also, the regression data provided no evidence of a developmental pattern of content knowledge effect when L2 listening proficiency increased.

With respect to the secondary research questions, overall, this study reported that participants considered themselves to have a moderate to competent ability level in comprehending a college academic listening lecture and that participants were more capable of recognizing the speech feature than identifying either the content feature or the discourse feature when they listened to a college academic lecture. Also, this study identified residency in the USA, duration of English study in native country, and gender as additional variables that might contribute to an explanation of L2 learners’ academic lecture listening comprehension. In addition, although this study found no evidence to support the effect of strategy use on L2 learners’ academic lecture listening comprehension, given the findings of previous professional research on strategy use effect, this study examined the factors affecting L2 learners’ strategy use when L2
learners listen to a college academic lecture. The regression of L2 learners’ strategy use on selected variables revealed that L2 listening proficiency provided a significant contribution to the explanation of strategy use of L2 learners in college academic lecture listening. Regarding the strategy use of different L1 group participants in college academic lecture listening, the Korean participants showed a statistically significant lower mean value in strategy use than any other L1 groups.

4.4 Follow-up interview aspect of the study

The second aspect of this study was a follow-up interview. This second section was conducted in order to provide additional explanations to the findings of the quantitative aspect of the study, according to the recommendation of Tashakkori and Teddlie (1998). The quantitative aspect of the study revealed that content knowledge and L2 listening proficiency were statistically significant predictors in explaining both types of L2 learners’ understanding when they listened to a college academic lecture. Therefore, the conceptual importance of L2 listening proficiency and content knowledge when L2 learners listen to a college academic lecture was the focus of the interviews with selected participants in the follow-up interview of the study. In addition, the quantitative aspect of this study identified residency, duration of English study in native country, and gender as variables explaining L2 learners’ college academic lecture listening comprehension, in addition to content knowledge and L2 listening proficiency. The interview aspect of this study reported additional variables affecting L2 learners’ college academic lecture listening comprehension, which were not identified in the quantitative aspect of the study.
Finally, with regard to the strategy use of different L1 groups for college academic lecture listening, the quantitative aspect of this study reported a statistically significant mean difference between the Korean group and the other L1 groups in strategy use for college academic lecture listening. The interview aspect of this study described the different uses of the listening strategies of different L1 groups in more detail.

This section reports the findings of the follow-up interview aspect of the study, starting with a description of the selected interview participants. Then, interview data on the conceptual importance of content knowledge and L2 listening proficiency in college academic lecture listening are presented. Next, variables affecting L2 college academic lecture listening comprehension are reported. Finally, the different strategy uses of L1 groups are summarized. It is important to note that participants’ English usage often contained errors and no editing was done by the researcher to describe the participants’ responses.

4.4.1 Interview participants

Thirteen interview participants were recruited from those who participated in the quantitative aspect of the study. In the initial stage of recruitment, all of the participants in the quantitative aspect of the study were grouped according to their nationality. Then, 20 potential interview participants were randomly selected with regard to the proportional rate of each nationality in the total number of participants. Although it was decided in the design stage of the study that 10% of the total participants would be
recruited for the interview aspect of the study, it was determined that 20 students should be contacted at first, given the possibility of non-responses from contacted students that might make it difficult to achieve the 10% participant goal. Twenty potential interview participants were contacted via telephone and email but only 16 students responded to the request for an interview. However, three of these 16 respondents were not available during the proposed interview period. Therefore, 13 students participated in the interview aspect of the study. The brief demographics of the final 13 interview participants are reported in Table 4.30.
English learning from private language academies in participants’ native countries was excluded in the study.

Table 4.30: Demographics of interview participants

<table>
<thead>
<tr>
<th>Name</th>
<th>L1</th>
<th>Native country</th>
<th>Sex</th>
<th>Age</th>
<th>Residency (month)</th>
<th>Major</th>
<th>Previous English learning before attending the University *</th>
<th>Education in native countries</th>
<th>UG</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Chinese</td>
<td>China</td>
<td>F</td>
<td>29</td>
<td>24</td>
<td>Mathematics</td>
<td>Regular school English instruction</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td>C2</td>
<td>Chinese</td>
<td>China</td>
<td>M</td>
<td>22</td>
<td>21</td>
<td>Industrial Engineering</td>
<td>Regular school English instruction</td>
<td>2-year college</td>
<td>U</td>
</tr>
<tr>
<td>C3</td>
<td>Chinese</td>
<td>China</td>
<td>F</td>
<td>25</td>
<td>16</td>
<td>Business</td>
<td>Regular school English instruction/</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Business</td>
<td>American Language Program (One quarter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>Hindi</td>
<td>India</td>
<td>M</td>
<td>25</td>
<td>15</td>
<td>Business</td>
<td>Regular school English instruction</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td>H2</td>
<td>Hindi</td>
<td>India</td>
<td>F</td>
<td>27</td>
<td>15</td>
<td>Communication</td>
<td>Regular school English instruction</td>
<td>High school</td>
<td>U</td>
</tr>
<tr>
<td>K1</td>
<td>Korean</td>
<td>Korea</td>
<td>M</td>
<td>25</td>
<td>6</td>
<td>Computer Engineering</td>
<td>Regular school English instruction/</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Computer Engineering</td>
<td>American Language Program (One quarter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>Korean</td>
<td>Korea</td>
<td>M</td>
<td>24</td>
<td>10</td>
<td>Business</td>
<td>Regular school English instruction/</td>
<td>2-year college</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Business</td>
<td>American Language Program (Two quarters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>Korean</td>
<td>Korea</td>
<td>M</td>
<td>25</td>
<td>10</td>
<td>Industrial Engineering</td>
<td>Regular school English instruction</td>
<td>4-year college</td>
<td>U</td>
</tr>
<tr>
<td>K4</td>
<td>Korean</td>
<td>Korea</td>
<td>M</td>
<td>31</td>
<td>11</td>
<td>Economics</td>
<td>Regular school English instruction/</td>
<td>4-year college</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Economics</td>
<td>American Language Program (Two quarters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Chinese</td>
<td>Taiwan</td>
<td>F</td>
<td>27</td>
<td>14</td>
<td>Industrial Engineering</td>
<td>Regular school English instruction/</td>
<td>Master’s degree</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Industrial Engineering</td>
<td>American Language Program (Two quarters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Chinese</td>
<td>Taiwan</td>
<td>F</td>
<td>24</td>
<td>15</td>
<td>Economics</td>
<td>Regular school English instruction</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td>T3</td>
<td>Chinese</td>
<td>Taiwan</td>
<td>F</td>
<td>30</td>
<td>15</td>
<td>TESOL</td>
<td>Regular school English instruction</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td>T4</td>
<td>Chinese</td>
<td>Taiwan</td>
<td>F</td>
<td>27</td>
<td>16</td>
<td>Sport and Exercise Science</td>
<td>Regular school English instruction/</td>
<td>4-year college</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sport and Exercise Science</td>
<td>American Language Program (One year)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* English learning from private language academies in participants’ native countries was excluded in the study.
Table 4.30 shows the brief demographics of the final 13 interview participants. The 13 interview participants (6 undergraduate and 7 graduate students) were seven Chinese, two Hindi, and four Korean. The age of interview participants ranged from 22 to 31, and the group average age was 26.2 years. Eight academic majors in five different colleges at the research site were reported. When asked how long they have resided in the USA, interview participants provided answers ranging from 6 months to 2 years, with an average of 14.5 months of US residence. Regarding their educational background, one interview participant reported having earned a master’s degree, nine reported having earned a 4-year college degree, two reported having earned a 2-year college degree, and one reported having received a diploma from high school. Regarding the question about previous English study before attending an American university, a majority of interview participants reported regular school English instruction. Four of 13 interview participants reported having completed an intensive language program in the USA (e.g., ALP at the research site).

Before each interview, the participant listened to the academic lecture that was used in the first phase of the study as a simulation of genuine lecture content. Overall, the majority of the participants self-reported their comprehension of the lecture as middle-low and referred to the need for a certain level of content knowledge and L2 listening proficiency as well as the upgrading of certain traits of the lecturer, such as the rate of speech, for better understanding of the lecture.
4.4.2 The conceptual importance of content knowledge and L2 listening proficiency in academic listening comprehension

The quantitative aspect of the study reported that content knowledge and L2 listening proficiency might play a different role in college academic lecture listening comprehension: L2 listening proficiency was more closely related to remembering (e.g., text-based understanding), whereas content knowledge seemed to have played a role in inferring and integrating (e.g., situation model understanding). Since a majority of the interview participants seemed to acknowledge the role of both variables for college academic lecture listening comprehension by reporting that a lack of either variable may affect listening comprehension, this section summarizes participants’ interviews about listening comprehension in relation to content knowledge and L2 listening proficiency.

4.4.2.1 Listening problems caused by insufficient content knowledge and L2 listening proficiency

A majority of participants reported that a low level of knowledge about the lecture content may affect the level of comprehension when they listened to college academic lectures. Possessing content knowledge means knowing specific terms frequently used in a particular academic discipline. Also, as T1 commented, possessing content knowledge is like having a tool for distinguishing what is important from what can be ignored when L2 learners listen to a college academic lecture. The participants reported that a low level of knowledge about the lecture content resulted in a lack of concentration when listening to a college academic lecture. For example, T3 said, “I think the most difficult part for me is I don’t know the terms. So I can’t concentrate for a long time because I lost for a while.”
I can’t go back quickly.” It is important to note here again that participants’ English usage often contained language errors, and no editing was done by the researcher to present the participants’ meanings accurately. K1 also mentioned, “I was not familiar with what he was talking, so at first, I felt really somewhat curious, but as time goes on, my mind wandered around.” Similar comments were repeated by K3, T1, and T2.

Content knowledge is related to perceiving content clarity and helps L2 learners to deal with content difficulties as well as to scaffold logical flows of their thinking. Therefore, a low level of content knowledge was also considered to possibly cause L2 listeners’ inability to come to a coherent understanding of the lecture. Because, as C3 pointed out, a low level of content knowledge could not “help to recapture what I (L2 learners) already know and to connect it with new information smoothly,” I2 and T1 said, “I didn’t have problem understanding each word. But overall, I couldn’t quite get what I heard,” and “I can’t understand what he wants to tell us, he reminds us what he talks this time... but when he starts to talks, I hear one thing, I hear something else. They probably have some links. But to me, they seemed to say different studies.”

While most participants faulted themselves for having a low level of content knowledge for listening comprehension, K4 reported the negative effect of having content knowledge when he listened to college academic lectures. He stated that pre-stored content knowledge could be overextended to a new set of information and could make him abandon the information obtained by the help of L2 listening proficiency in favor of the pre-stored content knowledge. More specifically, he remarked, “In my case, if I have great content knowledge, I might jump to the conclusion before I listen all of the
information and think carefully. For example, if I heard about ‘Hubble’, and if a lecturer is talking about A, B, C, I might make a conclusion that only B is relevant to Hubble because I already know B is related to Hubble through previous studying, before I even think carefully about A and C and actually even a lecturer says all A, B, C are related to Hubble.”

Besides a low level of content knowledge, a low level of L2 listening proficiency was also considered to possibly cause problems in college academic lecture listening comprehension for a majority of the participants. It is important to note that L2 listening proficiency in the participants’ comments concerned overall problems of comprehension, which seemed to relate to word or utterance recognition as well as meaning. K2 said, “Without enough listening skill, how do you know he is saying ‘full’ or ‘pull’?” K3 also said that a low level of L2 listening proficiency was serious “because sometimes we can find something important from a lecturer’s explanation, not from the textbook.” In the same vein, K4 added, “If my listening is not good, I can’t catch what he is talking about.”

While a majority of the participants provided comments on the impact of their low level of L2 listening proficiency in relation to word or utterance recognition and meaning, some participants said that their low level of L2 listening proficiency also related to utterance formulation to help their understanding. For instance, C1 said, “Even though I don’t understand exactly what is about, I listen, so I can ask, so there is no problem.” Similarly T2 said, “If I can’t listen, I can’t, how to say, extract my idea. I can’t extract my idea about what I don’t know indeed.” In light of the fact that speaking and listening are linked and speaking is an essential tool for listeners to demonstrate
comprehension, the comments of these participants were believed to indicate that a low level of L2 listening proficiency hindered their comprehension of college academic lectures which is achieved by incorporating speaking and listening. This area needs further research to be more fully explored.

4.4.2.2 Relative significance of content knowledge and L2 listening proficiency to college academic lecture listening

Seven out of 13 participants reported that content knowledge was more significant than L2 listening proficiency in college academic lecture listening comprehension. These participants included C3, H2, K1, K3, T2, T3, and T4. They argued that academic lecture was not a one-time event but a constant event with a ten-week duration, which indicates a long knowledge continuum. They said that obtained knowledge through lectures was connected as a sequence, and thus provided necessary resources for them to fill in the conceptual gaps when new information was presented through a lecture. For instance, H2 and K3 gave the following comments to emphasize the role of content knowledge in college academic lecture listening comprehension.

H2: “If you have had background of topic before going into the class, it might help to give you a course-base knowledge, for like my 604 course. I did some background work before going to media ethics to get some background, I looked at what ethics is, what moral, morality is, you know kind of, that could be used in the course, professor might use, so I did some background check kind of, it helps kind of made it even easy, when she talked about ethic, I kinda figure out what she was talking right or wrong, what she was missing like moral change, or what she was gonna to say kind of.”
“I guess content knowledge is more important. Just being fluent in English is not all for a lecture understanding. Because in lecture classes, most lecturers take care of international students, so they don’t speak fast. So, even you don’t have great fluency in listening, it is ok. But, if you don’t have content knowledge, you will be lost. Because the content of lecture are all connected through a quarter or even several quarters like Physics 101 and 102, so if you don’t connect all you know, you can’t exactly know what a lecturer really emphasizes, I mean, what a lecturer really wants us to know, not like a simple point, like why this is important and what makes it important, such like that, even you think you know.”

While the above-mentioned seven participants seemed to believe that content knowledge played a significant role in academic lecture listening comprehension, six participants reported that college academic lecture listening required more L2 listening proficiency than content knowledge. These participants included C1, C2, H1, K2, K4, and T1. They stated that the role of L2 listening proficiency not only related to remembering information but also to monitoring the information. It is interesting to note that the participants who emphasized the role of remembering information for college academic lecture listening seemed to report testing situations to support their opinion that L2 listening proficiency contributed more to explaining academic lecture listening comprehension than did content knowledge, as observed in C2’s and K2’s interviews.

“I think listening proficiency is 70% and content knowledge is 30%. Even you don’t know the content, you are still allowed to catch something. …...What I realized is that if, for American students, even though they never study that, they can ditch around and remember and answer to that and they can get partial credits for that.”

“I think listening proficiency is more important because if somebody has good listening proficiency, they can understand immediately because they can easily catch what a lecturer is talking about. They will not miss key points and …...For a test, we need to listen to a lecturer’s explanation carefully because in a test, we often found what a teacher said be in the exam, which you can’t find in the textbook.”
The participants (C1, H1, and T1) indicated that L2 listening proficiency played a role in monitoring L2 learners’ comprehension during college academic lecture listening. They mentioned that L2 learners with a high level of L2 listening proficiency were able to evaluate their levels of comprehension, which led to communication with a lecturer to verify acquired information or to fill in the gaps of knowledge that they missed. For instance, C1 said, “If somebody has a good listening proficiency and he doesn’t understand, he can ask to a lecturer to explain it again.” T1 made a similar comment, “If somebody has a good listening skill, because he will have a communication with the professor about what he doesn’t know if he knows he missed something important or doesn’t know.”

4.4.3 Summary of the interviews about the conceptual importance of content knowledge and L2 listening proficiency

The interview participants seemed to acknowledge the importance of both content knowledge and L2 listening proficiency in college academic lecture listening comprehension by reporting that the lack of either variable affected comprehension when they listened to college academic lectures. Although they expressed different opinions on which variable was more significant in college academic lecture listening comprehension, the interview participants seemed to recognize different roles of both variables in college academic lecture listening. Regarding the role of content knowledge in college academic lecture listening comprehension, the interview participants indicated that knowledge obtained through lectures was connected with content knowledge and that content knowledge provided necessary resources for L2 listeners to fill in the conceptual gaps
when new information was presented through lectures. Concerning the role of L2 listening proficiency, the interview participants reported that the role of listening proficiency related to remembering and monitoring the information when L2 learners listened.

As mentioned above, the quantitative aspect of this study reported that both content knowledge and L2 listening proficiency were statistically significant predictors in explaining L2 learners’ comprehension when they listened to a college academic lecture, and that L2 listening proficiency was more closely related to remembering (e.g., text-based understanding), whereas content knowledge played an important role in inferring and integrating (e.g., situation model understanding). The findings of the quantitative aspect of this study in relation to the role and contribution of content knowledge and L2 listening proficiency to academic lecture listening seemed to be confirmed in the interviews.

4.4.4 Factors explaining college academic lecture listening comprehension

The quantitative aspect of this study identified residency in the USA, duration of English study in native country, and gender as factors in explaining L2 listeners’ comprehension of a college academic lecture, in addition to content knowledge and L2 listening proficiency. Interviews with the selected participants also reported that content knowledge, L2 listening proficiency, residency in the USA, and gender were factors that accounted for L2 listeners’ comprehension of a college academic lecture. However, the interviews with the selected participants also revealed that there were other factors that
might also account for L2 learners’ academic lecture listening comprehension but were not identified in the quantitative aspect of this study. These other factors included visual aids, a lecturer’s speech rate and pronunciation, interest, listening habits, teaching skills, anxiety, American humor, satire, or slang, motivation, and self-confidence. This section summarizes the factors reported during the interviews, excluding content knowledge and L2 listening proficiency since the impacts of content knowledge and L2 listening proficiency on L2 learners’ college academic lecture listening comprehension were already described above.

**Visual aids**

Seven participants (C3, H1, K2, T1, T2, T3, and T4) reported that their academic listening comprehension was affected by the use of the visual aids that a lecturer employed during a lecture. Visual aids include Power-Point slides, handouts, and other pictures or illustrations. The participants reported that visual aids helped them to make relations between information in the lecture and also helped them to pay attention during the lecture. T1 also reported that visual aids compensated for her lack of L2 vocabulary, saying that, “If I don’t know the word, but I have pictures, I can memorize the picture, so I don’t know the word, it is ok, because I can see what the lecturer is talking about, so I can understand. But if I just listen, and when I listen to the difficult word, I don’t know.” K2 also mentioned the importance of using visual aids in compensating for his lack of L2 vocabulary, saying that, “Sometimes, I hear some words I don’t know. So, I miss some
parts. But if I can have handouts or see Power-Point slides, I will know right away what that word means and won’t have problems.”

Lecturer’s speech rate

The lecturer’s speech rate was also reported by the participants as a factor that affects their academic lecture listening comprehension. Seven participants (C2, C3, H2, K1, K2, T3, and T4) reported that, as is commonly expected, a fast speech rate influenced the accuracy of word recognition and content comprehension of a lecture: “He spoke too fast. I didn’t understand at all. I felt he just mumbled something,” said K2. Besides the impact of fast speech, the problems caused by slow speech were also reported. K1 stated that slow speech hampered his concentration and made him irritated when he listened to the lecture, presenting his class experience in the art history program. Similarly, C3 also reported a problem with concentration, saying that, “I had hard time grasping the whole picture about what a lecturer really wanted to say because she spoke really slow. My mind just wandered.”

Lecturer’s pronunciation

While lecturers’ speech rates, especially fast speech, were mostly applied to native English-speaking lecturers, concerns were also raised about pronunciation related to non-native English-speaking lecturers. Eight participants (C2, C3, H2, K1, K2, K4, T1, and T4) reported the difficulty of word recognition caused by incorrectly articulated
sounds in non-native English-speaking lecturers’ speeches. For instance, H2 said, “it was just the way she sounded it. It made me hard to follow her,” referring to one art class led by a Brazilian lecturer. K1 also made a similar comment about a Japanese lecturer’s peculiar pronunciation while he was pronouncing voiced sounds such as “plays [z].” These participants also remarked that they were irritated by a lecturer’s strange pronunciation. Although these participants said that the strange pronunciation of non-native English-speaking lecturers increased the difficulty of their academic lecture listening, a majority of these participants (C2, K2, K4, T1, and T4) did not make a clear distinction between accent problems and pronunciation problems, making comments such as K4’s, “I can’t explain very well, but I know when I listen to something.”

Interest in the topic

Six participants (C1, C2, C3, K1, T2, and T3) reported interest as a factor that affects their academic lecture listening comprehension. K1 mentioned that a lack of interest might result in losing concentration during college academic lecture listening. T3 also said, “no matter how easy the lecture is, if I am not interested in topic, I just, my mind will wander, I can’t, can’t concentrate.” Lack of interest was also reported by C3 as decreasing the retention of subject-matter content after the lecture: “I can’t remember what I heard, probably, because I wasn’t interested in that subject.”
Listening habits

One of the salient points that emerged from the interviews was that participants’ listening habits seemed to play a role in their comprehension of college academic lecture listening. K1 said that without knowing all the information he had just been listening to, he could not go on listening. Participants’ listening habits seemed to have a close relationship with their academic majors and their previous learning experiences in test preparation. C2 said that his academic major (Industrial Engineering) did not allow students to move on to other topics without a break-session for the topics from the previous lecture, during which the instructor let students recall what they learned about the topic and make a summary note about it, and thus he felt uncomfortable in continuous listening. K3, who is also an Industrial Engineering major, said, “I will be very nervous if a lecturer speaks without a term because in my major classes we have several break terms.” Academic lecture listening comprehension also seemed to be associated with listening habits obtained through previous learning experiences, specifically experiences in preparing for tests. T1 said, “To obtain a good score, I needed to catch all words. So, when I miss a word, I think back what the word meaning is during the whole class.” C3 also described the difficulty caused by her listening habits obtained through previous test preparation experiences.

Teaching skills

Four participants (C2, C3, H2, and T4) reported the teaching skills of the lecturer as a factor affecting their academic lecture listening comprehension. Teaching skills
Anxiety during a lecture class was reported by five participants (C3, K2, T1, T2, and T3) as another factor that may influence L2 learners’ college academic lecture listening comprehension. Anxiety might relate to a fear of interacting with native English-speakers. T1 said, “I am nervous whenever native speakers are nearby in the class, and I missed something important.” T3 also reported that she felt uncomfortable in classes with no international students, stating that, “I was nervous and tense in that class
(an English literature class) whenever a lecturer asked us to do a group discussion.” C3, K2 and T2 mentioned feeling inferior in listening comprehension where most classmates were native English-speaking students. For instance, T2 said, “Everybody seems to know the lecturer’s saying except me.” K2 also said, “One lecturer, I think he is very nice, he always asks me I understood his lectures after class. I think he did because I am the only international student in his class. Probably he thinks I am having a hard time because I don’t understand quite well what he is saying, though it is true.” The impact of possible anxiety in college academic lecture listening comprehension was indirectly expressed by words such as “nervous” and “tense” in the comments of participants: “Although it is better now, in the beginning, I was nervous in a lecture class because I felt I was the only student who didn’t understand, and I think because of that, I lost more about what the lecturer said,” said C3.

American humor, satire, or slang

American humor, satire, or slang in a lecturer’s speech also seemed to affect the participants’ comprehension when they listened to college academic lectures. K1 reported that since American humor and slang could not be immediately understood by him, they hampered the natural flow of his understanding of the lecturer’s speech. H1 also stated that, “The humor and satire which make American laugh, that is the thing difficult for me to understand. I need to ask my friend what it means.” A similar comment was made by T3, who pointed out that deficiency in understanding American humor and slang was not
compensated for by L2 listening proficiency: “Nobody explained that to me. I tried to write it down. I went back to my room and looked it up on my dictionary. But sometimes it wasn’t there.”

Residency

Another factor that participants reported was residency in English-speaking countries. K2 and T3 reported that a longer residency in the USA provided ample opportunity to develop L2 listening proficiency, and they blamed short residency in the USA for their low ability in academic lecture listening: “I don’t know, maybe because I have been here just for one year,” said K2, and “I was here only one or two months at that time. It was nature for me not to understand,” said T3. They related residency to a chance for L2 learners to have natural exposure to lecturers’ speech and emphasized the significance of a repetitive exercise for listening in lecture contexts: “If I take many lecture classes, I might be much better,” K2 said.

Motivation

Motivation as a factor affecting academic lecture listening comprehension was reported by only one participant, C3. C3 said that her motivation to obtain good grades in midterms and finals might influence her listening comprehension in class. She mentioned that, “Honestly speaking, whenever midterms or finals are coming, I feel like I need to pay more attention to the lecturer’s saying...maybe because of that, my listening was much better than any other times.” Her motivation seemed to be manifested through a
focus on achieving some kind of instrumental end (e.g., good grades in midterms and finals) and it resulted in an improvement in academic lecture listening.

**Self-confidence**

Self-confidence was reported by K2 only, as a factor that might affect his listening comprehension to college academic lectures. He also reported that self-confidence might relate to the level of L2 listening proficiency and familiarity with lecturers’ speech: “*Sometimes my English native friends told me that my English was improved a lot….I understand his saying much better now. But that is because I am familiar with his speech. In the classroom, I am often not sure what I heard was correct or not….because I am not familiar with the lecturer’s speech…because I know my listening is not good…I lost much information, I know.*”

**Gender difference**

K1 reported that an instructor’s gender affected his comprehension when he listened to academic lectures. K1 was the only participant who reported gender difference as a factor affecting academic lecture listening comprehension. He said, “*I understood better when the lecturer is female. Female lecturer’s speeches are much clear and gentle.*” Since he was a computer engineering major and most classmates and lecturers in his program were males, according to the background information obtained during the interview, this raised a question about the reason behind his comments about how gender impacted his academic lecture listening comprehension. However, he did not provide any
explanation, simply stating that, “I just feel in that way. Not only classroom lectures. I understand much better when female classmates speak something to me.”

4.4.5 Summary of the interviews about the factors influencing L2 learners’ college academic lecture listening comprehension

As mentioned above, the quantitative aspect of this study indicated that residency in the USA, duration of English study in native country, and gender were factors explaining L2 listeners’ comprehension of an academic lecture, in addition to content knowledge and L2 listening proficiency. Interviews with the selected participants revealed additional factors accounting for L2 listeners’ college academic lecture comprehension, which included visual aids, a lecturer’s speech rate and pronunciation, interest, listening habits, teaching skills, anxiety, American humor, satire, or slang, motivation, and self-confidence.

4.4.6 Differences in listening strategy use among L1 groups

The quantitative aspect of this study found no evidence to support the effect of strategy use on L2 learners’ academic lecture listening comprehension. However, given the findings of previous research that an L2 learner’s ability to use listening strategies is an important cognitive skill and may have an impact on comprehension in academic listening lecture, the quantitative aspect of this study further compared strategy use of different L1 groups when they listened to a college academic lecture. This study showed that the Korean group had a statistically significant lower mean value in strategy use than
did other L1 groups and also that L2 listening proficiency might play a significant role in explaining L2 learners’ strategy use in academic lecture listening.

In the interview aspect of this study, the listening strategy use of L2 learners was further investigated in order to provide additional explanations to the findings of the quantitative aspect of this study. Specifically, listening strategy use of different L1 groups was compared and factors that might affect L2 listeners’ strategy use in academic lecture listening were then summarized. The interview participants were grouped according to their L1s. The participants from China and Taiwan were put into one group as in the quantitative aspect of the study, since the L1 of both of these participants is Chinese.

As mentioned above, it is important to note that participants’ English usage often contained language errors, but no editing was done by the researcher in presenting participants’ meanings. It is also important to note that the strategies reported by the interview participants were classified according to the strategy classification presented by Flowerdew and Miller (2005).

4.4.6.1 Strategy use of the Chinese interview participants

To respond to academic lecture listening difficulty, the seven Chinese participants reported five types of cognitive strategy, two types of socio-affective strategy, and three types of meta-cognitive strategy. The five types of cognitive strategy included resourcing, note-taking, translation, imagery elaboration, and repetition. Among these five types, resourcing indicates that learners use any available resources to aid them in their understanding. Eight behaviors indicating the resourcing strategy were reported and
among these eight behaviors, getting help from other students who were also taking the
course together was the one most frequently reported by the Chinese interview
participants. Other behaviors belonging to the resourcing strategy are presented in Table
4.31. Resourcing relates to concept clarification and information cohesion as pointed out
by C3, who said, “The lecturer’s explanation wasn’t clear. So I need to see, that is why I
have to see others.” The benefits of using note-taking and translation were not uniform
among the Chinese interview participants. C2, T2, T3, and T4 stated that taking notes
while listening to college academic lectures seemed to have hampered their concentration
on lecture listening and may have caused them to miss information. C2 said, “I can’t
concentrate on listening if I take notes,” and T4 said, “It is hard for me because I need to
write down materials and I also need to listen, so it is very hard.” T2, T3, and T4
mentioned that they preferred to receive a handout or a lecturer’s notes, although they
took notes when listening to lectures: “Of course, some instructors give us handouts, so
we don’t have to take notes, it is much better,” said T4. Besides hampering concentration,
T2 also pointed out the difficulty of following the fast speech of a lecturer while taking
notes and introduced her fast writing practice to improve her note-taking skills: “Because
it is very important, I did train myself....because it is very important, because if I can’t
catch up with my professor’s speech, I lost everything...Yes, I trained myself. I practiced
a fast writing. But I still can’t write as quick as what a professor speaks.” Regarding
translation, according to C1, English to Chinese translation might cause problems with
lexical mismatches and with ambiguity of delivered information. C1 said, “Sometimes, I
can’t find a right Chinese word for that” and “I know I wrote that, but sometimes, I can’t
understand what it meant to be.”
The imagery elaboration type of cognitive strategy was reported by T2. The imagery elaboration implies that learners use mental imagery for comprehension. T2 said that she needed to draw a mental graphic with arrows, flowcharts, and diagrams for better retention and for recalling obtained information in lectures. She also pointed out the influence of her academic major on the use of imagery elaboration, saying that, “For economics, it (imagery elaboration) helps a lot.” Concerning repetition, T4 reported that one way to increase her comprehension of an academic lecture was to memorize what she heard by repeating it. She also commented that repeating what she heard increased her chances of remembering it later.

Besides cognitive strategy, the seven Chinese participants reported two types of socio-affective strategy and three types of meta-cognitive strategy. Regarding socio-affective strategies, the Chinese interview participants reported the use of questioning for clarification and taking an emotional temperature. Questioning for clarification indicates that learners find out more about the text by asking questions. This type of strategy is used to solve problems of confusion and lack of coherence about lecture information, as C1 said that, “Normally, I asked a question about something I am not sure after the class.” Questioning for clarification was reported by five Chinese participants (C1, C2, C3, T1, and T4). An interesting fact was that five of the Chinese participants reported that they asked questions of the lecture after class. Comments from C2, C3, and T1 showed that the strategy of questioning after class might relate to the concern of ‘losing face’ caused by demonstrating a low level of English proficiency. For instance, C2 said, “During the lecture, I don’t really ask unless it is a small class because I don’t want to
Similarly C3 stated that, “I can't elaborate more of the question when a lecturer said she didn’t understand my question in the class.” The strategy of questioning after class also seemed to relate to a lack of ‘self-centeredness.’: “I am not comfortable to ask a question during the class. There are other classmates. I don’t want to interrupt them,” said C3. Another type of socio-affective strategy reported by the Chinese participants (C1, T3, and T4) was taking an emotional temperature, which refers to the action that learners utilize when they realize that they are not comfortable in listening in a second language. Ignoring and giving up were reported as types of responses to the irritation caused by the English speech rate and the pronunciation of a lecturer: “I tried not to care about that because I can’t do anything,” said T3.

As meta-cognitive strategies, the Chinese participants reported the use of evaluation, monitoring, and planning. Concerning evaluation, C1, C2, T1, and T4 reported the use of problem identification by putting a question mark in their textbooks or notes when listening to academic lectures. Problem identification indicates that learners decide what problems still exist and are preventing them from achieving success in listening comprehension. C1 and T4 mentioned that putting a question mark identified for themselves where they had problems as well as signaled to them that they should visit a professor for content clarification. Monitoring was reported by C2, who used auditory monitoring, which refers to learners making decisions as to whether certain sounds appear or not. Since earning a good grade in class is a primary purpose of academic lecture listening, C2 reported monitoring two words, ‘examination (midterms or finals)’ and ‘grade’ during class, stating that, “Unless she says something very striking like this
will appear in the midterm, all right, I don't wake up from my reading and don't care whatever she says.” T1 reported the use of planning, specifically selective attention, when she listened to college academic lectures. She stated that she made a plan to focus on certain parts of the lecture before going to class. She said that when she read an assigned textbook, she found the parts she experienced difficulty with and thus reminded herself to listen to those parts carefully before the next class. The types of strategy the seven Chinese participants reported are presented in Table 4.31.
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<th>Behavior/Action</th>
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<td></td>
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<td>Referring to relevant books or notes in the library</td>
<td>C1, C2, C3, T1</td>
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<tr>
<td>Repetition</td>
<td>Memorizing or Repeatedly writing</td>
<td></td>
<td>T4</td>
</tr>
<tr>
<td>Questioning for clarification</td>
<td>Asking a question to a professor after a class</td>
<td>C1, C2, C3, T1, T4</td>
<td></td>
</tr>
<tr>
<td>Socio-affective</td>
<td>Taking an emotional temperature</td>
<td>Ignoring and giving up</td>
<td>C1, T3, T4</td>
</tr>
</tbody>
</table>

**Table 4.31:** The strategy types reported by the seven Chinese participants
Table 4.31 summarizes the types of listening strategy the seven Chinese interview participants reported when they listen to college academic lectures. It shows that 17 strategic behaviors could be classified into 10 distinct types of strategies and these 10 types of strategy encompassed the three main areas of strategy use (i.e., meta-cognitive, cognitive, and socio-affective).

4.4.6.2 Strategy use of the Hindi interview participants

Two Hindi participants reported the use of three types of cognitive strategy, one type of socio-affective strategy, and no use of meta-cognitive strategies. The three types of cognitive strategies included resourcing, note-taking, and imagery elaboration. While the Chinese participants reported performing eight behaviors of the resourcing type of cognitive strategy, the two Hindi participants reported employing only pre-reading as a resource before listening to academic lectures: “When there are assigned reading before the class, of course, I do. I do read and go. I go through chapters and stuff,” said H1. Concerning note-taking, both Hindi participants supported note-taking as a resource for learning. For instance, H2 demonstrated her effort to take notes, mentioning an assistant to help her take notes who were hired with the help of her academic advisor. H1 also reported employing note-taking when preparing for examinations as well as for assisting his comprehension of an academic lecture. However, to him, note-taking seemed to have another function. H1 reported that he could easily be distracted by his own thoughts while listening to academic lectures and thus reported that he used note-taking to keep his concentration on academic lecture listening: “I am even increasing of my thoughts, when
I am increasing my own thought, not to do that anymore, I keep taking notes….You know, when the time I am thinking something else, I do to do that. Otherwise, when I pay attention to the class, it is not required to me to take notes, though I do. I do understand whatever I think he says, instructor.”

Besides resourcing and note-taking, the imagery elaboration type of cognitive strategy was reported by H1. Imagery elaboration indicates that learners use mental imagery to create a picture of what is happening. H1 said that he made frames for entire subjects of a lecture in the form of schematics. He reported that he mentally drew diagrams, flowcharts, and pictures to help him recollect what he learned in the class:

“When the instructor is talking about the shape of the Milky Way and what’s the composition of the center and what is the, how does it look like….I did draw a diagram of Milky Way while I was listening and I did point out some arrows mentioning this is tail and this is bottom, this composes with gas and dust particle…..I framed the whole thing in the form of schematics and I drew few diagrams and flowcharts and pictures which later on help me answer to the questions and also recollect whatever stuff he mentioned in the lecture.”

As with the Chinese participants, both Hindi participants reported employing questioning for clarification as a socio-affective strategy. However, in contrast to the Chinese participants who asked a question after class, both Hindi participants stated that they preferred to ask questions during class. Considering that English proficiency, in part, prevented the Chinese participants from asking questions during class, the English proficiency of the Hindi participants seemed to enable them to interact with an academic
lecturer during class, as H2 commented, “I can understand whatever he is saying. So if something is, if I don’t understand what he is saying, I am asking right away like Mr. so and so, would you say....”

Concerning meta-cognitive strategy use, both Hindi participants reported no use of planning, monitoring, or evaluation when they were listening to academic lectures. The types of strategy the two Hindi participants reported employing are presented in Table 4.32.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Types</th>
<th>Action/ behavior</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>Imagery elaboration</td>
<td>Mapping-framing the whole discussion in the form of schematics – drawing diagrams, flowcharts, etc.</td>
<td>H1</td>
</tr>
<tr>
<td></td>
<td>Resourcing</td>
<td>Reading beforehand</td>
<td>H1, H2</td>
</tr>
<tr>
<td></td>
<td>Note-taking</td>
<td>Note-taking</td>
<td>H1, H2</td>
</tr>
<tr>
<td>Socio-affective</td>
<td>Questioning for clarification</td>
<td>Asking the lecturer a question during class</td>
<td>H1, H2</td>
</tr>
</tbody>
</table>

Table 4.32: The strategy types reported by the two Hindi participants

Table 4.32 summarizes the types of listening strategy the two Hindi interview participants reported when they listen to college academic lectures. It shows that four strategic behaviors could be classified into four distinct types of strategies and these four types of strategy encompassed the two main areas of strategy use (i.e., cognitive, and socio-affective).
4.4.6.3 Strategy use of the Korean interview participants

The four Korean participants reported the use of six types of cognitive strategy, two types of socio-affective strategy, and two types of meta-cognitive strategy when they listened to college academic lectures. The six types of cognitive strategy included resourcing, repetition, note-taking, translation, imagery elaboration, and linguistic inference. Among these six types of cognitive strategy, linguistic inference was not reported by either the Chinese participants or the Hindi participants. Since the other five types of cognitive strategy were already described in the sections on the Chinese and Hindi interview participants, only the linguistic inference type is described in this section. Detailed behaviors of the five types of cognitive strategy are presented in Table 4.33. K3 reported the use of linguistic inference, which refers to guessing the meanings of unknown words by linking them to known words. He mentioned that his understanding was limited due to a low level of English proficiency, and thus if he caught new words in a lecturer’s speech, or if he did not understand some utterances of a lecturer, he tried to guess the meaning from his understanding of the whole context, instead of looking in the dictionary or asking a classmate.

R: “If there are some words you don’t know, what do you do? Do you try to get some help from classmates sitting next to you?”
K3: “No, no, I don’t ask. I just ... I just think a little more and try to guess what he is talking about. And if I can have a rough idea and go.”
R: “How can you have a rough idea? You said you don’t know some words.”
K3: “For example, when he talked about Andromeda, he said some words I don’t know. Something like lumi... or illu... I can’t say exact words but he said them several times. And he also said something like bright, dark...... and said we used it to calculate the distance of stars. So, I thought it (i.e., luminosity) might be related to brightness such like that.”

* R: Researcher

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Concerning the socio-affective strategy, as with the Chinese participants, the four Korean participants reported the use of questioning for clarification and taking an emotional temperature. However, while the Chinese participants showed a lecturer-dependence only on questioning for clarification, the Korean participants reported their reliance on both the lecturers (K1, K2, K3, and K4) and their native English-speaking classmates (K2 and K3). As in the case of the Chinese participants, the issue of ‘losing face’ caused by demonstrating a low level of English proficiency and the issue of lacking ‘self-centeredness’ might explain the Korean participants’ preference for asking a question to a lecturer after class, as shown in comments such as, “I can’t respond quickly and I don’t want to make a mistake in a class” by K3 and, “I can’t ask. It hurts others” by K4. Regarding the reliance on native English-speaking classmates during class, K2 did not elaborate on the idea. He only repeated that, “I just asked to a classmate because I didn’t understand.” Hence, it was not clear what could be the basis of his reliance on his native English-speaking classmates. However, K3 reported that familiarity with native English-speaking classmates enabled him to rely on them during class, overcoming the issue of ‘losing face’. He stated that he had a seat next to native English-speaking classmates who had taken classes with him before and thus they knew his difficulty in listening to academic lectures. He also reported his reluctance to talk to unfamiliar English-speaking classmates, saying that, “Can you ask to them? I don’t think I can. If they ask to me, I might respond…. I will just wait and ask to a lecturer after the class.” Another type of socio-affective strategy employed by the Korean participants was taking an emotional temperature, as the Chinese participants did. Ignoring and giving up were
reported as a response to the irritation caused by the English speech rate and also the pronunciation of lecturers.

As a meta-cognitive strategy, the Korean participants reported the use of evaluation and planning. Concerning evaluation, K1, K3, and K4 reported employing problem identification by putting question marks in their textbooks or notes when listening to academic lectures. Similar to C1 and T4, they stated that a question mark identified for themselves where they had problems as well as signaled to them to look for references or to visit a professor for content clarification. Planning was reported by K1, K2 and K4. K1 and K4 reported employing selective attention, which indicates that learners pay attention to specific types of information while listening to an academic lecture. K1 and K4 stated that they made a plan to focus on certain parts of the lecture before going to class. For instance, K1 said that when he read assigned textbooks in an engineering class, he had difficulty understanding the design of efficient algorithms of CPU and thus before going to class, he reminded himself to listen to those parts carefully. A similar comment was reported by K4. K2 remarked that he planned to sit near the lecturer to especially listen for minor points of the lecture, which he found often appeared in the examinations. According to him, if he did not sit near the lecturer, he might miss those points because he would be distracted by other classmates. The types of strategy four Korean participants reported are presented in Table 4.33.
<table>
<thead>
<tr>
<th>Strategy</th>
<th>Types</th>
<th>Action/ behavior</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-cognitive</td>
<td>Planning - Selective attention</td>
<td>Planning for listening carefully</td>
<td>K1, K4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sitting near a lecturer to listen for details</td>
<td>K2</td>
</tr>
<tr>
<td></td>
<td>Evaluation-problem identification</td>
<td>Writing question marks</td>
<td>K1, K3, K4</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Resourcing</td>
<td>Checking the meaning in a dictionary</td>
<td>K2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referring to relevant books or notes in the library</td>
<td>K2, K3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reviewing the summary</td>
<td>K3, K4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reading beforehand</td>
<td>K1, K2, K3</td>
</tr>
<tr>
<td>Repetition</td>
<td></td>
<td>Memorizing</td>
<td>K1, K4</td>
</tr>
<tr>
<td>Note-taking</td>
<td></td>
<td>Note-taking</td>
<td>K1, K2, K4</td>
</tr>
<tr>
<td>Translation</td>
<td></td>
<td>Translation</td>
<td>K3</td>
</tr>
<tr>
<td>Imagery</td>
<td></td>
<td>Mapping-framing the whole topic in the form of schematics – drawing diagrams, flowcharts, etc</td>
<td>K2, K4</td>
</tr>
<tr>
<td>elaboration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linguistic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-affective</td>
<td>Questioning for clarification</td>
<td>Asking a professor a question after class</td>
<td>K1, K2, K3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asking a native English speaking classmate a question during class</td>
<td>K2, K3</td>
</tr>
<tr>
<td></td>
<td>Taking an emotional temperature</td>
<td>Ignoring and giving up</td>
<td>K3, K4</td>
</tr>
</tbody>
</table>

Table 4.33: The strategy types reported by the four Korean participants
Table 4.33 summarizes the types of listening strategy the four Korean interview participants reported when they listen to college academic lectures. It shows that 15 strategic behaviors could be classified into 10 distinct types of strategies and these 10 types of strategy encompassed the three main areas of strategy use (i.e., meta-cognitive, cognitive, and socio-affective).

4.4.6.4 Comparison of listening strategy use of different L1 groups

As mentioned above, the quantitative aspect of this study compared the strategy use of different L1 group participants in college academic lecture listening comprehension and showed that the Korean group had a statistically significant lower mean value in strategy use than did some other L1 groups (i.e., Chinese, Hindi, and Malaysian). In order to add information to future research on the difference in strategy use among different L1 groups, the interview aspect of this study compared strategy use between the Chinese participants and the Korean participants and between the Hindi participants and the Korean participants when they listened to a college academic lecture. The researcher chose to analyze data for these groups because, as shown in Table 4.30, interview participants could be classified into these groups according to their L1.

The Chinese participants reported twice as many behaviors of the resourcing type of cognitive strategy than did the Korean participants. For instance, the Chinese participants reported eight such behaviors, while the Korean participants reported four. Both the Chinese and the Korean participants reported the use of two types of socio-affective strategy, questioning for clarification and taking an emotional temperature.
They described their preference for using a questioning for clarification strategy after class, which they reported was in part caused by a fear of ‘losing face’ and a lack of ‘self-centeredness.’ However, the Korean participants reported that familiarity with native English-speakers might help L2 learners overcome the limited use of questioning as clarification strategy (i.e., using questioning for clarification after class, not during class) caused by the issue of ‘losing face.’ Concerning meta-cognitive strategies, the Chinese participants reported the use of three different strategies (i.e., monitoring, evaluation, and planning). Among these three types of meta-cognitive strategies, monitoring was not reported by the Korean participants. Overall, however, the strategies both the Chinese and the Korean participants reported showed similarities in terms of both type and behavior.

A comparison of listening strategy use between the Hindi and Korean participants showed that, overall, the Korean participants reported approximately four times as many strategy types as the Hindi participants. In addition, the Hindi participants showed three behaviors of cognitive strategy and the Korean participants showed nine such behaviors. Concerning socio-affective strategy, the Hindi participants reported their preference for using questioning for clarification during class, whereas the Korean participants reported their preference for using questioning for classification after class. As mentioned above, the Korean participants’ preference for questioning after class was reported in part, as a fear of ‘losing face’ in cases of low levels of English proficiency. The interviews with the Hindi participants revealed that the English proficiency of the Hindi participants enabled them to interact with lecturers during class. Therefore, English proficiency level seemed
to have had an impact on the selection of strategy use by participants of these two L1 groups when they listened to an academic lecture. Regarding the use of meta-cognitive strategy, the Hindi participants reported no use of meta-cognitive strategy, while the Korean participants reported the use of two types of meta-cognitive strategy. However, the interviews with the Hindi participants did not provide an explanation for why they did not use any of the meta-cognitive strategies.

The interview data suggested that, overall, the strategies that participants of three L1 groups reported were similar in terms of both type and behavior. The interview data also suggested that a popular strategy type for the three L1 groups was the resourcing type of cognitive strategy, since several behaviors seeking additional information for the comprehension of academic listening were reported.

4.4.6.5 Factors affecting strategy use

The quantitative aspect of this study showed that L2 listening proficiency might play a significant role in explaining L2 learners’ strategy use in academic lecture listening. Interviews with selected participants also reported that L2 listening proficiency was a factor that might affect L2 listeners’ strategy use when they listened to a college academic lecture. However, the interviews revealed that there was another factor that was not identified in the quantitative aspect of this study, academic major. The following section summarizes the factors identified during the interviews.
Academic major

One factor identified during the interview was the academic major of the participants. All participants majoring in either Economics or Business (H1, K2, K4, and T2) reported the use of an imagery elaboration strategy. T2 said that in her academic major, mental imagery strategy was very helpful to connect concepts and their applications to practice. Sharing a similar major with T2, H1 also said that, “There is a logical and sequential flow in markets. So it is all possible for me to write down the process in schematic diagrams to elucidate better.” The effect of the academic major also seemed to relate to the academic listening problems that were related to the participants’ listening habits. C2 stated that his engineering major did not allow students to move on to other topics without a break-session for the topics from the previous lecture, during which the instructor let students recall what they learned about the topic in previous lectures and briefly make a summary note about what they recall, and thus he reported that he felt uncomfortable with continuous listening. K3, who also majored in engineering, said that, “I will be very nervous if a lecturer speaks without a term because in my major classes we have several break terms.” Similar comments about the association between listening habits and academic major were also observed in K1’s interview. Both participants (C2 and K3) seemed to report that their academic impacted their listening behaviors during academic lecture listening.
L2 listening proficiency

L2 listening proficiency also seemed to affect participants’ strategy use. As noted above, a majority of the participants reported a preference to ask professors questions after class. C2 and K3 related their strategy of asking questions after class to the issue of ‘losing face’ caused by demonstrating a low level of L2 listening proficiency, saying that, “During the lecture, I don’t really ask unless it is a small class because I don’t want to embarrass myself” and, “I can’t respond quickly and I don’t want to make a mistake in a class.” T1 also noted a low level of listening proficiency as a possible explanation for her strategy selection, commenting that, “I seldom asked to a question to a professor because I am not sure I can make him understand my question.” Although a lack of ‘self-centeredness’ also seemed to relate to this strategy, as shown in C3’s comment, “I am not comfortable to ask a question during the class. There are other classmates. I don’t want to interrupt them,” a majority of the participants more emphasized the relationship between the strategy (e.g., asking the professor a question after class) and L2 listening proficiency rather than the lack of ‘self-centeredness,’ as shown in K1’s comment that, “I will ask to him immediately if I am, I can make him understand what I am asking.”

4.4.7 Summary of the interviews about difference in listening strategy use among L1 groups

The interview data suggested that, overall, the strategies all three L1 group participants (i.e., Chinese, Hindi, and Korean) employed were similar in terms of both type and behavior. The interview data also suggested that a popular strategy type among these three L1 groups was the resourcing type of cognitive strategy, since several
behaviors seeking additional information for the comprehension of academic lecture
listening were identified. However, the interview data showed that there were differences
in strategy use among the three L1 groups, specifically in terms of the number of reported
strategy behaviors. Finally, the interview data identified academic major and L2 listening
proficiency as factors that might affect the strategy use of participants of the three L1
groups when they listened to a college academic lecture.

Summary of the interview aspect of the study

The interview aspect of this study showed that the selected 13 participants
acknowledged the importance of both content knowledge and L2 listening proficiency in
college academic lecture listening by reporting that the lack of either variable might
affect their comprehension when they listened to a college academic lecture. These
participants also showed the recognition of the different roles of content knowledge and
L2 listening proficiency in academic lecture listening, indicating that content knowledge
provided necessary resources for L2 listeners to fill in the conceptual gaps when new
information was presented through a lecture and L2 listening proficiency related to
remembering and monitoring the information when L2 learners listened.

Besides content knowledge, L2 listening proficiency, residency in the USA,
duration of English study in native country, and gender that were identified in the
quantitative aspect of this study, the interview aspect of this study identified additional
factors that might affect L2 listeners’ academic lecture comprehension. Interviews with
the selected participants suggested some additional factors such as visual aids, a
lecturer’s speech rate and pronunciation, interest in the topic, listening habits, teaching skills, anxiety, American humor, satire, or slang, motivation, and self-confidence.

Finally, the interview aspect of this study further compared the listening strategy use of several L1 groups and investigated factors influencing L2 listeners’ strategy use during an academic lecture in order to provide additional explanations to the findings of the quantitative aspect of this study. Although there were differences in strategy use in terms of the number of strategy behaviors reported, overall, the strategies of the three L1 group participants showed similarities in terms of both type and behavior.

Summary of Chapter 4

Since the current study adopted a mixed method, the findings from the interview aspect of the study were used to explain the findings of the quantitative aspect of the study, according to the recommendation of Tashakkori and Teddlie (1998). The quantitative aspect of the study revealed that content knowledge and L2 listening proficiency were statistically significant predictors in explaining both text-based and situation model understandings of L2 learners when listening to a college academic lecture. The quantitative aspect of the study also revealed that the significance of both variables differed according to the levels of understanding. Text-based understanding is primarily related to L2 listening proficiency, whereas situation model understanding is primarily related to content knowledge. The findings of the quantitative aspect of the study were consistent with findings of other research.
The findings of the quantitative aspect of the study were confirmed in the interviews with selected participants. The interview participants acknowledged the importance of both content knowledge and L2 listening proficiency in college academic lecture listening by reporting that the lack of either variable resulted in comprehension difficulty when they listened to a college academic lecture.

Besides the contributions of content knowledge and L2 listening proficiency to explaining college academic lecture listening, this study also investigated the relationship of content knowledge and L2 listening proficiency when L2 learners listened to a college academic lecture. The one-way ANOVA results indicated that different levels of L2 listening groups did not differ from each other in their performance on content knowledge tasks. Also, the regression data provided no evidence of a developmental pattern of content knowledge effect when L2 listening proficiency increased.

With regard to the factors affecting L2 learners’ college academic lecture listening comprehension, interviews with the selected participants suggested additional 10 factors such as visual aids, a lecturer’s speech rate and pronunciation, besides residency in the USA, duration of English study in native country, and gender that were identified in the quantitative aspect of this study. The finding that L2 listening proficiency might affect L2 learners’ strategy use in college academic listening was confirmed in the interviews with selected participants. An examination of the interview data suggested that academic major might also influence L2 learners’ strategy use in listening to college academic lectures.
CHAPTER 5

FINDINGS, DISCUSSION, IMPLICATIONS, LIMITATIONS, RECOMMENDATIONS, AND CONCLUSION

5.1 Introduction

This chapter describes the findings of this study and discusses these findings in the context of relevant research. In addition, this chapter presents pedagogical implications for ESL and EFL programs and states the limitations that were raised based on the type of study conducted as well as the methodology of the study conducted. Finally, this chapter presents recommendations for further research and conclusion.

5.2 Findings of the study

This study was comprised of two aspects, a quantitative aspect and a follow-up qualitative interview aspect, both of which investigated the academic lecture comprehension of L2 listeners at the college level. In the quantitative aspect, the study primarily investigated the extent of the relative contribution of content knowledge and L2 listening proficiency to college academic lecture listening, which was operationally defined as having two levels of comprehension. Through the primary research questions, this study intended to find evidence to support the application of the Construction-Integration model to investigate the effect of content knowledge on L2 listeners’
academic lecture comprehension: Content knowledge would be a strong predictor in situation model understanding than L2 listening proficiency, while L2 listening proficiency would be a stronger predictor for text-based understanding than content knowledge. The quantitative aspect of this study also sought to investigate additional features of L2 learners’ academic lecture listening in order to add new information to the existing knowledge in the field of L2 academic listening. The follow-up interview aspect of the study was conducted, according to the recommendation of Tashakkori and Teddlie (1998), to provide additional information to the findings of the quantitative aspect of the study, especially in relation to the conceptual importance of content knowledge and L2 listening proficiency in college academic lecture listening, the factors affecting L2 academic lecture listening, and the strategy use of different L1 groups. Specific answers to the research questions are presented below.

5.2.1 Primary research questions

1. What is the relationship between content knowledge and understanding of a college academic lecture?

1.1 To what extent does content knowledge explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

1.2 To what extent does content knowledge explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

The results of the regression analyses in the quantitative aspect of this study indicated that content knowledge was one of the statistically significant predictors in explaining the variance of both text-based and situation model understandings. Participants’ text-based understanding of a college academic lecture was measured by
either a checklist or a written recall-protocol task. In the case of the checklist, regression results reported that content knowledge explained 3.6% of the variance of the checklist score. In the case of the recall-protocol task, however, regression results revealed that content knowledge was an insignificant predictor in explaining the variance of the recall-protocol score. For participants’ situation model understanding of the college academic listening lecture, regression results showed that content knowledge accounted for a larger contribution to the variance of the bridging inference questions than did L2 listening proficiency, with content knowledge accounting for 7.7% of the variance of the bridging inference question score.

Interviews with selected participants revealed that a majority of interview participants seemed to acknowledge a significant role of content knowledge in college academic lecture listening comprehension, reporting that content knowledge is related to perceiving content clarity and helps L2 learners to deal with content difficulties as well as to scaffold logical flows of their thinking. Interview participants also reported that a low level of content knowledge possibly causes L2 listeners’ inability to come to a coherent understanding of the lecture.

In conclusion, with respect to the relationship between content knowledge and L2 college academic listening comprehension, content knowledge was one of the significant predictors in explaining L2 learners’ college academic listening comprehension, which was operationally defined as having two levels of understanding. Specifically, content knowledge provided more of a contribution in explaining the situation model understanding of L2 listeners than it did in explaining the text-based understanding when
L2 learners listened to a college academic lecture. In other words, content knowledge was more necessary when L2 listeners reconstructed the information (from nonconsecutive segments) of the lecture text than when L2 listeners reproduced the information of the lecture text accurately.

2. What is the relationship between L2 listening proficiency and understanding of a college academic lecture?

2.1 To what extent does L2 listening proficiency explain text-based understanding as measured by a written recall-protocol and a checklist after college students listen to a college academic lecture?

2.2 To what extent does L2 listening proficiency explain situation model understanding as measured by a set of bridging inference questions after college students listen to a college academic lecture?

The regression results in the quantitative aspect of this study showed that L2 listening proficiency was one of the statistically significant predictors in explaining the variance of both text-based and situation model understandings. For participants’ text-based understanding of the college academic listening lecture, L2 listening proficiency explained 7.9% of the variance of the checklist score and 21.5% of the variance of the recall-protocol score. For participants’ situation model understanding of the college academic listening lecture, regression results showed that L2 listening proficiency accounted for a smaller contribution to the bridging inference questions than did content knowledge, reporting that L2 listening proficiency accounted for 2.8% of the variance of the bridging inference question score.

Interviews with selected participants revealed that a majority of interview participants seemed to acknowledge a significant role of L2 listening proficiency in college academic lecture listening comprehension, reporting that L2 listening proficiency
is related to word or utterance recognition and that a low level of L2 listening proficiency possibly causes L2 listeners’ inability to remember information of the lecture.

In conclusion, with respect to the relationship between L2 listening proficiency and L2 college academic listening comprehension, L2 listening proficiency was one of the significant predictors in explaining L2 learners’ college academic listening comprehension, which was operationally defined as having two levels of understanding. Specifically, L2 listening proficiency provided more of a contribution in explaining the text-based understanding of L2 listeners than the situation model understanding when they listened to a college academic lecture. In other words, L2 listening proficiency was more necessary when L2 listeners reproduced the information (from nonconsecutive segments) of the lecture text accurately than when L2 listeners reconstructed the information of the lecture text.

3. When both content knowledge and L2 listening proficiency are variables, what is the relationship of these two variables to student understanding of a college academic lecture?

3.1 What is the relative importance of content knowledge and L2 listening proficiency with respect to understanding a college lecture when text-based and situation model are analyzed?

3.2 Does the effect of content knowledge vary according to the learner’s level of L2 listening proficiency? Do different level L2 student listening groups differ from each other on their performance on content knowledge tasks?

Regarding which variable contributed more to comprehension when L2 learners listened to a college academic lecture, a review of the regression coefficient of the checklist (i.e., text-based understanding) showed that L2 listening proficiency accounted for a larger relative contribution to the checklist (Beta=.285) than did content knowledge (Beta=.188), having .075 of the partial regression coefficient, which indicated that the
expected change of .075 in the checklist score was due to a one-point change of L2 listening proficiency when content knowledge variance was held constant. A review of the regression coefficient of the recall-protocol task (i.e., text-based understanding) showed that the relative contribution of L2 listening proficiency to the recall-protocol was .463 (Beta), and that for a one-point increase in L2 listening proficiency, there was an expected increase in the recall-protocol of 1.316 points (partial regression coefficient).

Regarding the bridging inference questions (i.e., situation model understanding), a review of the regression coefficient indicated that content knowledge accounted for a larger relative contribution to the bridging inference question score (Beta=.280) than did L2 listening proficiency (Beta=.167), with .471 of the partial regression coefficient: The expected change of .471 in the bridging inference question score was due to a one-point change of content knowledge when L2 listening variance was held constant.

Analyzing the relationship between content knowledge and L2 listening proficiency, the result of ANOVA indicated that different levels of L2 listening proficiency groups did not differ from each other on their performance on content knowledge tasks. Besides the one-way ANOVA, regression analyses were conducted to investigate whether there was a development pattern whereby the role of content knowledge increased with greater L2 listening proficiency. However, regression data revealed no developmental patterns of content knowledge effect with an L2 listening proficiency increase.

Although they expressed different opinions on which variable (between content knowledge and L2 listening proficiency) was more significant in L2 college academic
lecture listening comprehension, the interview participants seemed to recognize different roles of both variables in college academic lecture listening comprehension. Regarding the role of content knowledge in college academic lecture listening comprehension, the interview participants indicated that knowledge obtained through lectures was connected with content knowledge and that content knowledge provided necessary resources for L2 listeners to fill in the conceptual gaps when new information was presented through lectures. Concerning the role of L2 listening proficiency, the interview participants reported that the role of listening proficiency related to remembering and monitoring the information when L2 learners listened.

In conclusion, with respect to the comparative importance between content knowledge and L2 listening proficiency to L2 listeners’ understanding of a college academic lecture, L2 listening proficiency appeared to have a stronger effect on the text-based understanding of L2 listeners than did content knowledge, while content knowledge appeared to have a stronger effect on the situation model understanding of L2 listeners than did L2 listening proficiency. In other words, L2 listening proficiency was more closely related to remembering (i.e., text-based understanding), whereas content knowledge seems to have played a role in inferring and integrating (i.e., situation model understanding).
5.2.2 Secondary research questions

4. Are L2 listeners aware of their academic lecture listening proficiency? How do L2 learners self-assess their listening comprehension when they listen to a college academic lecture?

The quantitative data of participants’ self-assessed college academic listening comprehension indicated that participants self-reported having a moderate to competent level of comprehension when they listened to college academic lectures. In addition, the data revealed that among three components of academic lecture listening comprehension (i.e., speech, content, and discourse features), participants were more capable of identifying speech features than about the other two features when they listened to college academic lectures. Further, the data showed that participants were less capable of identifying content features than the other two features when they listened to college academic lectures.

The improvement of content knowledge level for the understanding of the lecture was also pointed out by interview participants. A majority of the interview participants self-reported their comprehension level of the lecture as middle-low and referred to the need for a certain level of content knowledge and L2 listening proficiency as well as the upgrading of certain traits of the lecturer, such as the rate of speech, for better understanding of the lecture.

5. What other unanticipated factors affecting college academic lecture listening comprehension are revealed in the study?

Besides content knowledge and L2 listening proficiency, the quantitative aspect of this study found that residency, duration of English study in participants’ native
country, and gender were statistically significant predictors in explaining the college academic lecture listening comprehension of L2 learners. The interview aspect of this study identified additional factors such as visual aids, a lecturer’s speech rate and pronunciation, interest, listening habits, teaching skills, anxiety, American humor or slang, motivation, and self-confidence.

6. What are the main factors that affect L2 learners’ use of strategies when they listen to a college academic lecture?

   Regression analyses on selected variables (i.e., content knowledge, L2 listening proficiency, residency, gender, age, duration of English study in participants’ native country, and academic level) of L2 listeners’ strategy use revealed that L2 listening proficiency played a significant role in explaining L2 learners’ strategy use in college academic lecture listening. Interviews with the selected participants also reported that L2 listening proficiency was a factor that might affect L2 listeners’ strategy use when listening to college academic lectures. In addition, the interviews reported an additional factor affecting L2 learners’ strategy use, which was L2 learners’ academic major.

7. Do L2 learners from different L1 backgrounds cope differently with the problems of college academic lecture listening with regard to their self-report strategy use?

   The responses of the strategy use questionnaire among the five different L1 groups (i.e., Chinese, Hindi, Japanese, Korean, and Malaysian) were compared in the quantitative aspect of the study. The ANOVA data showed that there were three pairs of L1 groups whose means differed significantly (p < .05) from each other: Chinese vs. Korean, Hindi vs. Korean, and Korean vs. Malaysian. The Korean participants showed a
significantly lower mean value in strategy use when they listened to college academic lectures than did other L1 groups. The interview aspect of the study further compared the listening strategy use of different L1 groups (i.e., Chinese, Hindi, and Korean) in terms of the number of strategy behaviors and types reported during interviews. The interview aspect of the study reported that overall, all three L1 groups’ participants showed similarities in strategy use in relation to both type and behavior when they listened to college academic lectures.

5.2.3 Combining the findings of the quantitative aspect and the follow-up interview of the study

The quantitative aspect of this study revealed that both content knowledge and L2 listening proficiency were statistically significant predictors in explaining L2 learners’ college academic lecture listening comprehension, which was operationally defined as having two levels of understanding: text-based and situation model understandings. The quantitative aspect of the study further showed that the contribution of content knowledge and L2 listening proficiency differed according to the levels of understanding: L2 listening proficiency provided more of a contribution in explaining the text-based understanding of L2 listeners than did content knowledge, while content knowledge provided more of a contribution in explaining the situation model understanding of L2 listeners than did L2 listening proficiency.

The significance of both content knowledge and L2 listening proficiency in college academic listening comprehension and their different contributions to college academic listening comprehension were also reported in the interview aspect of the study.
with selected participants. Although questions about the recognition of different levels of understanding in college academic lecture listening and the contribution of content knowledge and L2 listening proficiency according to the levels of understanding were not directly given to the interview participants, the participants revealed that the lack of either variable resulted in comprehension difficulty when listening to college academic lectures and that they utilized content knowledge for inferring and integrating and L2 listening proficiency for remembering lecture content, which might be interpreted to indicate their recognition of the different contributions of both variables in college academic listening comprehension.

The quantitative aspect of this study demonstrated that strategy use was not a significant predictor in explaining the academic lecture understanding of L2 listeners. This finding seemed to contradict previous studies that reported a significant influence of L2 learner’s strategy use on listening comprehension (e.g., Chamot & Kupper, 1989; Vandergrift, 1996; Lynch, 1997; Smidt & Hegelheimer, 2004; Macaro, 2006). In the interview section of the study, questions about strategy use were again given to the participants in relation to college academic lecture listening comprehension. Participants reported twenty-one different listening strategies. Among them, 13 were types of cognitive strategy, four were types of meta-cognitive strategy, and four were types of socio-affective strategy.

The quantitative aspect of this study further compared the strategy use of different L1 groups in college academic lecture listening and reported a statistically significant mean difference between the Korean group and some other L1 groups (e.g., Chinese,
Hindi, and Malaysian). The interview aspect of this study also compared the listening strategy use between the Korean groups and the other two L1 groups (e.g., Chinese and Hindi) in order to provide an additional explanation to the findings of the quantitative aspect of the study. Although there was a difference in strategy use in terms of the number of strategy behaviors (e.g., the Chinese participants reported twice as many behaviors of the resourcing type of cognitive strategy as did the Korean participants), the interview data showed that the strategies all three L1 groups reported had similarities in terms of both type and behavior. Both the quantitative aspect and the interview aspects of the study revealed that L2 listening proficiency might affect L2 learners’ strategy use in listening to college academic lectures.

Besides content knowledge and L2 listening proficiency, the quantitative aspect of this study found that residency in the USA, duration of English study in participants’ native country, and gender might be other factors influencing the college academic lecture understanding of L2 listeners. Specifically, the quantitative aspect of the study revealed that residency in the USA contributed to L2 listeners’ text-based understanding, whereas gender contributed to L2 listeners’ situation model understanding. Only duration of English study in participants’ native country was identified as a factor that influenced both text-based and situation model understandings of L2 learners when they listened to college academic lectures. Since academic lecture listening is a complex performance that may be affected by individual learner difference as well as other external factors (Flowerdew & Miller, 2005), additional questions about factors influencing academic lecture listening were given to the participants during the interview aspect of this study.
The influence of residency in the USA and gender on college academic lecture listening was reported in the interview aspect of the study. Additional factors, which were not identified in the quantitative aspect of this study, were also reported in the interviews. These factors included visual aids, a lecturer’s speech rate and pronunciation, interest, listening habits, teaching skills, anxiety, American humor or slang, motivation, and self-confidence.

5.3 Discussion of research findings

Discussion related to the interpretation of data analyses was presented in Chapter 4. This section further discusses the research findings of the effects of content knowledge and L2 listening proficiency on L2 college academic lecture listening, the application of the Construction-Integration model to L2 listening studies, and the effect of strategy use on L2 college academic lecture listening in the context of relevant research.

This study reported the significance of content knowledge in college academic lecture listening and supported the findings of Long (1990), Schmidt-Rinehart (1994), and Hohzawa (1998), which reported that content knowledge facilitates L2 listening comprehension by retrieving reserved knowledge to infer its relationship with incoming information as well as by integrating knowledge already obtained with incoming information. However, some listening research has shown contrasting findings to this study, indicating that content knowledge did not play a significant role in L2 listening comprehension. For instance, Chiang and Dunkel (1992) reported that content knowledge did not support comprehension when listening to monologue texts such as a lecture.
Hansen and Jensen (1994) and Jensen and Hansen (1995) found only a trivial effect of content knowledge on L2 listening comprehension. Recently, Madden (2004) wrote that content knowledge was not a significant predictor of success in L2 listening comprehension. Therefore, findings of L2 listening studies have shown inconsistent results about the effect of content knowledge on L2 listening comprehension.

What is the reason for the inconsistent findings about the effect of content knowledge among L2 listening comprehension research, including this study? One possible explanation is the specificity of listening texts. Akbulut (2007) stated that the text specificity influenced the use of L2 learners’ prior knowledge of topics when reading (or listening to) a passage. Research has shown that texts employed in the study of content knowledge effect ranged from general texts that were equally understandable by students in any discipline, to highly specific texts that could generally only be understood by learners with not only knowledge of a particular subject area but also a detailed knowledge of some specific process within it (Long, 1989; Clapham, 1996). An examination of the listening texts in the studies reporting no significant effect of content knowledge, such as Hansen and Jensen (1994) or Madden (2004), showed that the content of the listening texts was somewhat general, since the participants in those studies did not need to have some knowledge of the content to understand the texts. For instance, the listening text in Madden (2004) was about gender difference in conversation, which was equally understandable by participants in any discipline. Similarly, the history text in Hansen and Jensen (1994) was somewhat general because most participants from different academic disciplines commented upon a greater familiarity on that topic in the
questionnaire. On the contrary, the studies reporting a significant effect of content knowledge on L2 listening comprehension showed that the content of the listening texts was somewhat specific. For instance, the text in Schmidt-Rinehart (1994) was derived from a Spanish program course book and were only understood by participants who had previous exposure to that course. In the present study, the topic of the listening text was known to students of various learning experiences, but some facets of the text were specific, which was difficult to the participants who were not majoring in astronomy. Some participants reported little familiarity with the subject of the listening text during the interview, and the various levels of content knowledge reported in this study indicated that the listening text was not equally understandable by participants across the disciplines. Therefore, a variation in text specificity might cause inconsistent findings among research into the effect of content knowledge on L2 listening comprehension.

Another possible explanation about the inconsistent findings among L2 listening comprehension studies might relate to the issue of assessing participants’ content knowledge. Research regarding content knowledge effect has shown three different methods to distinguish the level of participants’ content knowledge: Some studies classified participants into either a group with content knowledge or a group without content knowledge, assuming that if participants belong to one group, they have the similar level of content knowledge on listening texts (e.g., Markham & Latham, 1987; Long, 1990; Chiang & Dunkel, 1992; Schmidt-Rinehart, 1994); some studies classified participants into either an experimental group (e.g., a content-knowledge group) or a control group (e.g., a no-content-knowledge group), providing a brief preview about the
content of the listening text to the experimental group before the research was conducted (e.g., Hohzawa, 1998; Madden, 2004); and some research, including this study, determined the level of participants’ content knowledge after assessing the participants’ familiarity or knowledge about the topic of the listening text through a questionnaire or a checklist, assuming that although participants share the same major, the knowledge about the topic of the listening text may be diverse since it is possible for them to obtain relevant knowledge outside their academic courses (e.g., Hansen & Jensen, 1994). The significance of assessing participants’ content knowledge cannot be overemphasized because different measurements may result in different outcomes for the same phenomenon (McGinn, 1991; Hadwin, Kirby, & Woodhouse, 1999) and thus, a variation in assessing content knowledge may cause inconsistent findings among research into the effect of content knowledge on L2 listening comprehension.

Although this study showed that both content knowledge and L2 listening proficiency were significant contributors in college academic lecture listening comprehension, there has been disagreement in the professional literature about the relationship between content knowledge and L2 listening proficiency in L2 listening comprehension. Some previous research has claimed that content knowledge compensates for L2 proficiency for comprehension and thus, L2 proficiency plays a significant role in comprehension when appropriate content knowledge is not available to L2 listeners (e.g., Long, 1990; Schmidt-Rinehart, 1994; Hohzawa, 1998). On the contrary, some studies have reported that the comprehension of L2 listeners was mainly affected by the level of L2 proficiency (e.g., Chiang & Dunkel, 1992; Jensen & Hansen, 1995; Madden, 2004).
In addition to the text specificity and the diversity of assessing content knowledge as mentioned above, the relationship between L2 proficiency and content knowledge in L2 listening comprehension studies might relate to the measurement of L2 learners’ comprehension of listening texts. Clapham (1996) reported that the comparative importance of L2 proficiency and content knowledge depends on the specificity of the tests, which includes task types. Studies insisting upon a greater influence of content knowledge on L2 listening comprehension than L2 proficiency administered tests that had test items only related to the listening texts of the studies. For instance, the studies of Long (1990) and Schmidt-Rinehart (1994) employed listening texts derived from a Spanish program course that participants were enrolled in (or had previously enrolled in), and administered a written recall-protocol task and a checklist to measure participants’ comprehension of the listening text. Hohzawa (1998) also collected scores from a written recall-protocol task and a checklist after 58 participants listened to three news stories. In contrast, studies emphasizing the effect of L2 proficiency in L2 listening comprehension studies employed multiple-choice tests that contained not only listening text-related test items but also listening text-non-related test items. For instance, Chiang and Dunkel (1992) administered a multiple-choice comprehension test that contained both passage-dependent and passage-independent items. Jensen and Hansen (1995) also used 11 lecture sub-tests of T-LAP (a multiple-choice test) as a measure for listening comprehension while using the rest of the sub-tests of the T-LAP to measuring L2 listening proficiency. That is, when L2 listeners’ scores on comprehension were based on the tests that contained items only related to the listening texts of the studies, content knowledge
seemed to be more important than L2 proficiency, whereas L2 proficiency seemed to be more important than content knowledge when L2 listeners’ scores on comprehension were based on the tests that contained both listening text-related test items and non-related test items. Additional research on this topic is necessary.

Discussion about the comparative importance between content knowledge and L2 listening proficiency has drawn attention to the applicability of the threshold hypothesis in L2 listening studies, since the finding of some studies that L2 listening proficiency appeared to have a much stronger effect on L2 listeners’ comprehension than did content knowledge seemed to accord with the threshold hypothesis. Jensen and Hansen (1995) hypothesized that the accessibility of content knowledge on specific topics in lectures is determined by the level of L2 listening proficiency. However, the examination of the interaction between L2 listening proficiency and content knowledge indicated no support for the hypothesis, reporting that L2 listening proficiency did not moderate the effect of content knowledge. The present study also did not find developmental patterns of content knowledge effect with an L2 listening proficiency increase: Participants’ levels of L2 listening proficiency did not affect their use of content knowledge. On the contrary, most L2 reading studies have accepted that readers’ level of L2 proficiency affects their use of prior knowledge (e.g., Hock, 1990; Hammadou, 1991; Clapham, 1996; Krekeler, 2006). Taking a step forward, some studies have investigated the possibility of the existence of two thresholds in L2 reading, although the findings have been inconsistent (e.g., Clapham, 1998, 2000; Krekeler, 2006).
The basis of the difference between the present study and L2 reading studies in relation to the applicability of the threshold hypothesis was not clear. It might be due to the difference in cognitive process between listening and reading; it might also be due to the specificity of tests or texts, or because of different methods of measuring the content knowledge of research participants as mentioned above. Or, as discussed in Chapter 4, a possible reason for the difference might be the limitations of the instruments used to measure L2 listening proficiency: One possible explanation for why the notion of threshold did not apply to this study might relate to the instruments for measuring participants’ L2 listening proficiency, which resulted in difficulty establishing defendable cut-points to classify groups according to L2 listening proficiency levels. Given that finding evidence to support the threshold hypothesis in L2 listening studies might bring a plausible explanation for L2 listeners’ comprehension processes as it did for L2 reading (Vandergrift, 2006), further research needs to be conducted with special attention to research design.

Previous L2 listening studies have focused on determining whether there is an effect of content knowledge on L2 listeners’ comprehension and whether a relationship could be found between content knowledge and L2 listening proficiency on L2 listeners’ comprehension. The present study assumed that there are indeed effects of both content knowledge and L2 listening proficiency and stepped forward to investigate the extent of the contribution for both content knowledge and L2 listening proficiency in explaining L2 listeners’ college academic lecture comprehension within the Construction-Integration model.
The Construction-Integration model suggests that comprehension has two different levels of understanding (i.e., text-based and situation model understandings) that both content knowledge and language proficiency have influence on but the effects of content knowledge and language proficiency differ according to the levels of understanding. In addition, research supporting the Construct-Integration model has successfully measured the different levels of understanding, insisting that some measures represent a strong indicator of text-based understanding by heavily relying on text information or memory (e.g. recognition, text-based question, reproductive recall, etc.), whereas some measures stand for determining a level of situation model understanding by integrating information in the text with prior knowledge in the long-term memory (e.g., recall elaborations, bridging inference questions, problem-solving tasks, keyword-sorting tasks, etc.).

Accepting the two levels of understanding proposed by the Construction-Integration model, this study investigated whether there were indeed effects of both content knowledge and L2 listening proficiency on L2 listeners’ college academic lecture comprehension and whether the contribution of content knowledge and L2 listening proficiency differed according to the levels of understanding, expecting that the text-based understanding of a L2 listener receives more influence from L2 listening proficiency than content knowledge, whereas situation model understanding receives more influence from content knowledge than L2 listening proficiency, as did other studies of reading comprehension (e.g., McNamara & Kintsch, 1996; Roloff, 1999).
The findings of this study reported that both content knowledge and L2 listening proficiency played a significant role in L2 listeners’ comprehension, and that L2 listening proficiency provided more of a contribution in explaining the text-based understanding of L2 listeners than did content knowledge, while content knowledge provided more of a contribution in explaining the situation model understanding of L2 listeners than did L2 listening proficiency. These findings were consistent with findings of other research that has supported the application of the Construction-Integration model to comprehension studies (e.g., Swaffar & Bacon, 1993; McNamara & Kintsch, 1996; Voss & Silfies, 1996; Roloff, 1999; Zwanna, et al, 2000).

The findings of this study suggested that the application of the Construction-Integration model to L2 college academic listening study may provide a more plausible explanation for the comprehension process of L2 listeners, in relation to the content knowledge effect. Introducing the Construction-Integration model as a framework for collecting data to examine the content knowledge effect on L2 college academic listening study has significance in relation to the interpretation of the role of content knowledge on academic listening because it can answer not only the question of whether or not content knowledge affects L2 academic listening but also provide a plausible explanation of the effect of content knowledge on L2 academic listening, by separately examining the extent of the effect of content knowledge on text-based and situation model understandings, which represent separate aspects of the same comprehension created by a listener [e.g., content knowledge contributes to explaining the integration among information (i.e., situation model understanding) more than the retention of information (i.e., text-based understanding)].
This study might be one of the first few listening studies employing the
Construction-Integration model. Additional research is necessary.

The present study found that strategy use was not a statistically significant
predictor in either text-based or situation model understanding. This seemed to contradict
the findings of other studies, which insist that a listener’s strategy use influences L2
listening comprehension (e.g., Chamot & Kupper, 1989; Vandergrift, 1996, 2005; Lynch,
1997; Smidt & Hegelheimer, 2004; Macaro, 2006). One possible explanation for this
seeming contradiction was found in the interviews, although the findings of the
interviews may not be generalized to all of this study’s participants. Interview
participants reported 21 listening strategies. Most of these were types of cognitive
strategy; there were only four types of meta-cognitive strategy and four types of socio-
affective strategy. Relevant studies insisted that a combination of cognitive and meta-
cognitive strategies enhances L2 learners’ comprehension (e.g., Brown & Palinscar,
1982; O’Malley, 1987; Wenden, 1987; Purpura, 1997). According to these studies,
although a repertoire of cognitive strategies is important, cognitive strategy functions in
concert with meta-cognitive strategy, which functions in an executive capacity. In other
words, without the use of meta-cognitive strategy, cognitive strategy alone does not seem
to work to affect comprehension. The interviews with selected participants revealed a low
level of meta-cognitive strategy use when they listened to college academic lectures, and
this might lead to participants’ poor performance on the questionnaire items about meta-
cognitive strategy use. The questionnaire on strategy use contained nine items relating to
meta-cognitive strategy, seven items relating to cognitive strategy, and two items relating
to socio-affective strategy for college academic listening comprehension. Although the report from the interview participants may not be generalized to all of this study’s participants, the contradiction between the findings of this study and relevant literature about the effect of strategy use on L2 listening comprehension might be caused by the low level of participants’ meta-cognitive strategy use in academic lecture listening.

Another possible explanation might relate to the implemented instrument (questionnaire) for strategy use itself. Although the questionnaire for strategy use was analyzed in terms of its validity and reliability, the questionnaire might not be appropriate for the study in terms of the wording of questionnaire items. Research has found that the wording of questionnaire items could affect students’ performance on the outcomes of questionnaires (e.g., Oscarson, 1978; LeBlanc & Painchaud, 1985; Bachman & Palmer, 1989). The questionnaire on strategy use contained 18 items with a relatively short description of strategy use for academic lecture listening (e.g., item # 17 is ‘I understand without translating in my head’). Since L2 learners are vulnerable to item wording effects (Heileman, 1990), if the items on the strategy use questionnaire had more detailed descriptions, such as ‘When I listen to college academic lectures, I can understand the topics of lectures without thinking in my native language’ for item #17, the results of this study might be different. The instrument for strategy use needs to utilize more descriptive items for L2 learners to indicate what they think they can do in academic lecture listening.

In addition, the implemented questionnaire for strategy use in academic lecture listening might not tap into the process of academic lecture listening for some aspects, as briefly discussed in Chapter 4. As mentioned above, the questionnaire contained 18 items
related to academic lecture listening. Researchers have provided inventories of necessary skills for academic listening, ranging from seven to 54. Aitken (1978) proposed seven skills; Buck and Tatsuoka (1998) found 15 essential skills after analyzing academic listening tasks; Richards (1983) provided 18 skills; Powers (1986) listed 21 skills; and extensively, Munby (1978) presented 54 skills for receptive learning overall. Although 18 items for strategy use in academic lecture listening might not be considered a small number, 18 items in the present study’s questionnaire could not be enough to explore the knowledge and skills that essentially relate to academic lecture listening comprehension. Further research on the strategy use effect in L2 academic lecture listening should be conducted using a larger inventory of strategy items than was used in this study.

5.4 Implications for ESL and EFL programs

The findings of this study confirmed that L2 listening proficiency and content knowledge can have a significant influence on L2 listening comprehension in college academic lectures. As a result, instructors should take advantage of these findings. With regard to facilitating content knowledge, instructors should attempt to provide scaffolding for their students by choosing texts that contain familiar topics. Carrell (1987) reported that the familiar content has an influence on how well the class is remembered and understood, as well as how content is learned. Schmidt-Rinehart (1994) also reported that utilizing a familiar text for a class facilitates ESL/EFL listeners’ comprehension by “helping students make connections to their previous knowledge to build a mental framework with which to link the new information” (p. 185).
Besides using texts with familiar topics, instructors should attempt to develop techniques to increase the content knowledge of L2 listeners for college academic lecture comprehension. Researchers have proposed various techniques encouraged in the field. For example, some researchers advocated the use of pre-listening exercises. Hohzawa (1998) and Madden (2004) insisted upon activating students’ content knowledge through discussion before L2 learners are engaged in listening. Lingzhu (2003) stated the benefits of utilizing pre-passage questions before L2 learners listen to a target text. He reported that asking pre-passage questions helps L2 learners build up their own expectations about the coming information and that by trying to find answers to these questions, their prior knowledge on the topic can be activated. Making lists for the words and phrases L2 learners already know about and looking at pictures before listening are well-known examples of pre-listening activities to facilitate ESL/EFL learners’ content knowledge and to help them focus their attention on the topic when they listen to college academic lectures.

Explicit training in listening strategies could help ESL/EFL learners activate their content knowledge to achieve comprehension, although the present study did not provide evidence to support the effect of strategy use on college academic listening comprehension. Rost (2002) said that training learners to clarify what they know can help them understand a variety of L2 texts. Goh (2002) also mentioned that strategy training can improve listeners’ comprehension indirectly by employing strategy-raising tasks such as content predication with known vocabularies. Although the value of strategy training is inconclusive (Chamot, 1995; Goh, 2002), ESL/EFL instructors should not ignore
previous work that found the benefits of listening strategy training on comprehension. Through strategy training programs, instructors should attempt to show learners what kinds of strategies and tactics might be useful to facilitate content knowledge and how listening tactics interact with listening strategies in sequences of content knowledge processing to achieve comprehension.

Developing L2 listening proficiency should be a focus of instructors’ efforts based on the findings of the present study. Therefore, ESL/EFL instructors should attempt to develop activities to increase the listening skills of their students. As one way to achieve high-level listening skills, some researchers supported using natural speech in listening tasks. Ur. (1984) reported that real-life speech contains redundancy, noise, colloquial language, false starts, and overlapping. As pointed out by Madden (2004), listening proficiency is more than the ability to comprehend the fairly even pace, volume, and pitch found in listening textbooks used in ESL/EFL programs. Therefore, ESL/EFL instructors should design classroom listening comprehension practice to incorporate such characteristics of real-life listening as Ur described above.

Besides providing tasks containing real-life speech characteristics, instructors also need to develop listening tasks that contain different speech rates for L2 learners. Research has shown inconclusive data about the effect of speech rate on comprehension. Some studies showed that students benefited from hearing a reduced-rate speech (e.g., Dunkel et al., 1996; Lim & Smalzer, 1996), whereas other studies showed contradictory results and insisted that L2 learners need to learn to process speech more rapidly (e.g., Griffiths, 1991; Ferree & Sanabria, 2004). Instructors should consider the merits and
demerits for students that tasks with different speech rates bring about first, and then attempt to design tasks that include speech rates appropriate for their students. In addition, instructors should determine the speech rates of listening tasks according to their teaching goals. For instance, if an instructor for low-level listening proficiency learners sets detecting missing words as a teaching goal, the instructor might use simplified language with a low speech rate and longer pauses between the words, and control for other factors. Because of the availability of digital audio editing computer programs, controlling speech rates for listening tasks is not difficult. Instructors should design tasks for learners to hear speech presented at the actual rate as well as at a slower or more rapid rate with pitch control through audio editing programs, so the speech still remains authentic.

Instructors should use various listening materials to increase L2 learners’ listening proficiency. Inventories of listening materials were provided by listening researchers and Internet sites. Rost (2002) in *Teaching and researching listening* described available listening materials designed explicitly for language instructors, language schools, and Internet providers, as well as established language education publishers. The inventory included commercial audio tapes and CDs, television and video, and Internet sources. Flowerdew and Millers (2005) also provided a list of materials that instructors can access to develop L2 learners’ listening skills. With the ever-increasing accessibility of technology, instructors can also find listening materials on the Internet. For instance, the Internet sites of Public Broadcasting Service (PBS) online and Englishlistening.com contain a variety of short authentic extracts and tasks for L2 listeners. Instructors should find appropriate materials and modify these materials to make them more accessible to learners when needed.
Identifying the factors affecting L2 listeners’ academic lecture comprehension is a first step for instructors to understand the diverse characteristics of L2 listeners’ comprehension of college academic lectures. Therefore, findings from the interviews with selected participants can provide instructors not only with useful guidelines in designing strategy training exercises that L2 learners can perform to overcome listening difficulty but also with opportunities to develop their own teaching skills. For instance, this study reported that L2 listeners’ comprehension might be affected by teaching skills, specifically the skill of logically presenting topics in class. Acknowledging that L2 listeners’ comprehension is related to teaching skills might bring about the opportunity for instructors to realize a need for continuous effort in teaching skill development.

Instructors might want to develop a series of strategy training activities that take into consideration their L2 learners’ listening comprehension. One example of strategy training in class might be to facilitate post-listening discussions in which learners may talk about their strategy use and beliefs relevant to a particular lecture listening task. For instance, after completing a listening task, an instructor encourages learners to discuss with their partners or in a group the strategies they used for the task and to talk about the appropriateness of the strategies. In this way, the instructor allows learners to have opportunities to discover different strategies to improve their listening comprehension and to evaluate employed strategies with respect to their usefulness. Similarly, instructors should encourage learners to reflect on their own successes and failures in lecture listening comprehension and to brainstorm their own solutions to listening difficulties.
Finally, the finding that the contributions of content knowledge and L2 listening proficiency to comprehension differ according to the levels of understanding (as suggested by the Construction-Integration model) indicates the need for developing new comprehension tasks for ESL and EFL programs. According to the Construction-Integration model, a listener may be able to reproduce what he/she has heard accurately (i.e., text-based understanding) but be unable to use acquired information for other purposes (i.e., situation model understanding) if his/her pre-stored content knowledge is not fully activated during the comprehension process for incoming information. As McNamara and Kintsch (1996) and Trites and McGroarty (2005) pointed out, traditional tasks that ESL and EFL programs have employed to assess L2 listeners’ comprehension tend to be less demanding and require only a basic grasp of content meaning from L2 listeners by heavily relying on L2 proficiency (i.e., text-based understanding). However, comprehension is more than reproducing and remembering what a L2 listener hears. A L2 listener can have a deeper understanding of what he/she has heard by integrating information from the text (i.e., what he/she has heard) with related information drawn from his/her pre-stored content knowledge. As a result, instead of employing tasks which heavily emphasized L2 listening proficiency or which were developed without consideration of the different contributions of content knowledge and L2 listening proficiency to comprehension of L2 listeners, ESL and EFL instructors should select and design tasks with a consideration for the different roles and contributions of both variables in L2 listeners’ comprehension in college academic contexts. Instructors should
develop new listening tasks for assessing different levels of comprehension of L2 listeners based on the empirical research within the Construction-Integration model.

5.5 Limitations of the study

As with any study, this study also had limitations. The findings of this study should not be generalized beyond the participants in the present study. Also, the findings and implications of this study should be interpreted with consideration of the limitations stated below.

First, although this study employed a mixed-method research approach, this study emphasized a quantitative, rather than a qualitative approach to investigate the college academic lecture listening comprehension of L2 learners. Regarding the quantitative approach, this was an ex post factor study and thus had inherent design limitations. As stated in Gliem (2003), an ex post factor study starts with the observation of dependent variables. It then studies the independent variables in retrospect for their possible relation to, and effect on, the dependent variables. Therefore, as an ex post factor study, this study did not seek to provide a cause-effect relationship between independent and dependent variables. In addition, this study used regression data analysis to explain the variance of the dependent variables through the linear relationships of the independent variables. Therefore, this study did not investigate the interaction among independent variables in explaining dependent variables.

Second, participants in this study were ESL learners who were enrolled as either undergraduate or graduate students at the research site. Therefore, the findings of this
study may not be generalized to either non-native college ESL learners from other contexts or English learners in EFL contexts. In addition, most participants of the study had an East Asian cultural background (108 participants out of 141), although students from 13 nationalities participated in the study. With the restrictions of budget and time, additional recruitment from other nationalities was not done, but it might have influenced the findings of this study.

Third, participants in this study performed listening tasks for 80 minutes in addition to completing three questionnaires related to English-learning and demographic information. With similar research purposes, some studies assigned less than 60 minutes for listening tasks (e.g., Markham & Latham, 1987; Long, 1990; Schmidt-Rinehart, 1994), and some studies assigned more than 90 minutes for listening tasks (e.g., Madden, 2004). An examination of academic lecture listening in different time allocations might result in different outcomes.

Fourth, participants of this study listened to an audio-recorded lecture. The original lecture obtained for this study contained visual-motion pictures. However, this study used only the audio component of the lecture as a listening text, although visual-motion pictures might have improved the situational authenticity. Therefore, this study might yield different findings if participants listened to the lecture while seeing the visual component. In addition, the audio component of the lecture was extracted from the original lecture and was saved as an MP3 file by a computer sound-editing program. As a result, there might be either differential improvement or an occasional deterioration in the voice quality of the audio-recorded lecture, which might also have impacted the results of this study.
Fifth, the level of L2 listening proficiency of participants was determined by the combined scores from a self-assessment of listening proficiency and a listening section of a TOEFL test. However, the descriptive statistics of L2 listening proficiency showed a heavier skewness (-1.29), indicating that a majority of the participants were grouping themselves in a narrow range of score variances. As a result, the researcher encountered difficulty when trying to establish defendable cut-points to classify groups according to L2 listening proficiency levels. The lack of a normal distribution of L2 listening proficiency was considered a possible reason for why the notion of threshold did not seem to apply to this study. Different tasks for measuring participants’ L2 listening proficiency might bring about different results from those of the present study, specifically in relation to the threshold hypothesis.

Sixth, this study selected one lecture topic known to students of various learning experiences. However, the chosen topic was not necessarily familiar to all participants and thus the researcher observed different levels of content knowledge from the participants. Although the selected topic for assessing content knowledge of participants was accessible to any participants recruited regardless of their familiarity with it, if this study was based on a different topic, it might have produced different results. The specific topic of the present study dealt with the galaxies of the Milky Way and Andromeda. If this study was based on a topic from history, politics, or psychology, different results might have been found.

The seventh limitation related to tasks of the written recall-protocol process and the bridging inference questions of the study. Participants might be unfamiliar with the
procedures of these tasks and thus their performance may have been impacted. Additionally, the lecture text was in English and the participants’ recall-protocol and answers to bridging inference questions were either in English or in their first language. Hence, the impact of translation from the participants’ L1s to English may have come into play when the answers were provided in the participants’ L1s. Although data analyses were carried out with help from bilingual raters in order to correctly interpret the meanings of the participants on their recall-protocol and bridging inference questions, allowing participants to use both L1 and L2 to perform the tasks of the recall-protocol and bridging inference questions might have yielded different results from those of the case when participants had only been allowed to use L1 or L2 to perform both tasks.

Eighth, three raters, including the researcher, were involved in the scoring procedures of the written recall-protocol and bridging inference questions. In order to obtain reliable results, inter-rater reliability needed to be established: The inter-rater reliability among the three raters was established at .89 through the pilot study. Although this gave an idea of how much agreement existed in the scoring procedure of the written recall-protocol and bridging inference questions, it may be a crude measure. In addition, the data analysis of this study took place almost two quarters after the pilot study. If inter-rater reliability was re-established from time to time during the data analysis to assure that the raters were not changing, the reliability of the data might possibly be higher than that of the present study. However, an inter-rater reliability coefficient of .89 is generally acceptable in research for studies of this type.
Finally, the ninth limitation relates to the procedure of conducting the interview aspect of the study. The interview of this study was a one-time event and thus, the findings were limited. Repeated interviews with the same participants might yield additional findings and reveal particular incidents and emergent patterns about the college academic lecture listening comprehension of the study participants. In addition, the participants of the interview study were chosen with regard to the proportional rate of each nationality to the total number of participants. Interviews with participants selected without considering the proportional rate of each nationality participant in the study might have revealed different findings.

Given these limitations, the findings and implications of this study should be cautiously interpreted. The following section presents recommendations for further research.

5.6 Recommendations for further research

The findings of this study suggest several areas of further research. First, given that the finding of the present study supported the application of the Construction-Integration model in explaining the effect of content knowledge on L2 college academic listening comprehension, specifically in relation to the notion of text-based and situation model understandings, similar research should be conducted. Quantitative studies with college students from other ESL contexts or college students in EFL contexts are recommended. These studies are needed to make a solid foundation for the use of the Construction-Integration model as a theoretical framework for academic listening comprehension research.
Second, although the findings of the present study did not provide any evidence to support the threshold hypothesis in L2 learners’ academic listening with regard to content knowledge (content knowledge can be regarded as an L1 trait) and L2 listening proficiency, continuous quantitative approach studies that are similar to the present study are recommended to allow for an examination of the theoretically interesting question of a threshold for listening (Vandergrift, 2006). Quantitative instruments other than the TOEFL test should be used to measure L2 learners’ English listening proficiency. These instruments should be able to establish defendable cut-points to classify participant groups according to L2 proficiency levels. Participants’ content knowledge also needs to be measured by quantitative instruments that may have higher reliability coefficients than those of the present study. Students enrolled in undergraduate-level programs should participate in these quantitative studies, whose numbers are increasing throughout US. Continuous quantitative studies are needed to investigate evidence supporting the threshold hypothesis in L2 listening studies, which might provide plausible explanations for L2 listeners’ comprehension processes of academic lectures as well as explanations for the interaction between content knowledge and L2 listening proficiency in L2 academic listening comprehension.

This study used only audio input because visual information is less important in lecture situations where the emphasis is on content (Buck, 2001). Comparative studies that explore the differences in L2 listeners’ comprehension with and without visual input should be conducted. Quantitative instruments should be used to measure L2 listeners’ comprehension in both situations. A follow-up qualitative interview should be used to
investigate the depth of the role of visual input for L2 listeners’ comprehension of academic lectures. These studies need to be conducted with not only L2 learners at the college level but also L2 learners at the secondary school level, whose numbers are increasing throughout US. Through these comparative studies, instructors may determine whether they should include or exclude visual information to their listening practice instruction for L2 learners.

Further studies that investigate the effects of content knowledge and L2 listening proficiency on L2 listening comprehension need to be conducted with different types of academic lectures. Although studies on the effects of content knowledge and L2 listening proficiency on L2 listening comprehension have provided information about the effects of these variables, the majority of the findings were produced with the ‘talk and chalk’ lecture style. Only Madden (2004) investigated the effect of content knowledge on the ‘give and take’ style of academic lectures. Quantitative studies that involve college-level L2 learners and utilize a recorded ‘give and take’ style of academic lecture are recommended. These studies are needed to investigate whether both content knowledge and L2 proficiency affect L2 learners’ academic lecture listening comprehension irrespectively of the type of lecture or whether the type of lecture has an influence on L2 listeners’ use of content knowledge and L2 listening proficiency in lecture comprehension.

Although this study did not support the effect of strategy use on L2 academic listening comprehension, relevant studies have insisted that strategy use helps L2 learners in comprehending academic lectures (e.g., O’Malley & Chamot, 1990; Lynch, 1997).
Correlation studies investigating the relationship between strategy use and L2 academic listening comprehension are necessary. A quantitative instrument for strategy use needs to utilize more descriptive items for L2 learners to indicate what they think they can do in academic lecture listening, considering that L2 learners are vulnerable to the item wording of the questionnaire (Heileman, 1990). In addition, the quantitative instrument for strategy use should have a larger inventory of strategy items than that of the present study and should explore the knowledge and skills that essentially relate to academic lecture listening comprehension. Correlation studies need to be conducted with a larger number of participants than that of this study, at different academic levels (e.g., college levels, secondary school levels, etc.), and different contexts (e.g., ESL or EFL). These correlation studies are needed to add information to existing data about the effect of strategy use on L2 academic lecture listening comprehension.

Finally, further studies need to identify other variables that may account for L2 learners’ college academic listening comprehension but were not detected through the present study. Motivation and text characteristics may be potential variables. Qualitative studies with L2 learners at the college level or L2 learners at the secondary school level are recommended. Interviews or class observation may be appropriate approaches for these qualitative studies. Finding these variables may provide information for instructors to understand the diverse characteristics of L2 listeners’ comprehension of academic lectures and provide a guideline for researchers when designing future studies in L2 academic listening area.
5.7 Conclusion

This study examined L2 listeners’ comprehension in a college academic lecture setting in terms of content knowledge, L2 listening proficiency, and strategy use. This study also investigated additional variables affecting L2 learners’ academic listening comprehension.

Content knowledge and L2 listening proficiency were found to be significant predictors of successful listening comprehension on the study tasks, whereas strategy use was not. Therefore, instructors should acknowledge the significance of content knowledge in L2 listeners’ comprehension and find ways to activate L2 learners’ existing prior content knowledge through pre-listening exercises. In the same vein, instructors and L2 learners should work to increase L2 listening proficiency through the use of instructional listening activities and materials. Although this study did not provide evidence to support the effect of strategy use in listening comprehension tasks, other relevant research has shown the importance of strategy use in L2 academic listening. Consequently, instructors need to design a program for the strategy training of L2 listeners.

Most of all, instructors should recognize the different contributions of content knowledge and L2 listening proficiency to the academic lecture comprehension of L2 listeners: Text-based understanding seems to be primarily related to L2 listening proficiency, whereas situation model understanding seems to be primarily related to content knowledge. As a result, instructors should select and design tasks with
consideration for the different roles and contributions of both variables in L2 listeners’
comprehension in college academic lecture contexts.

Identifying variables affecting L2 learners’ listening comprehension may help
instructors make their lectures more understandable to L2 learners and identify solutions
to L2 learners’ lecture listening comprehension problems. However, it is also important
to remember that the findings of this study need to be interpreted cautiously in
consideration of the study limitations.

Finally, this study suggested continuous research to examine the roles of content
knowledge, L2 listening proficiency, and strategy use in L2 listeners’ academic lecture
comprehension. This study also emphasized the importance of identifying variables that
might affect L2 listeners’ college academic lecture comprehension. Further research is
necessary.


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Watson, K., & Smeltzer, L. (1984). Barriers to listening: Comparison between students and practitioners. *Communicative Research Report, 1*, 82-87.


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APPENDICES
APPENDIX A

TRANSCRIPT OF THE ACADEMIC LISTENING TEXT

All right, so, the last two lectures have been historical in nature to illustrate just how difficult it was to figure out just what the Milky Way was and what these other spiral nebula were. The understanding was gained in 1925-1926 with Edward Hubble’s observations with the distance to Andromeda. Really establish the universe was very much bigger place than anyone had previously expected. Some people would make the philosophical claim that it was infinite. It’s one thing to make a claim based on philosophy and another to actually demonstrate the immense size of the universe. Today we are going to step back a little from the historical bit, historical moment, historical pop-in, how you learn things about, actually we’re living, and talk about two galaxies, the Milky Way and Andromeda. It turns out by happen by happen stance, Milky Way and Andromeda are very similar in their properties. So we can actually by studying our own galaxy which we see up close and personal cause we are riding alone inside it. And Andromeda which we can actually see laid out before us. So the Milky Way in the upper left hand side here, a view from the inside in infra red and Andromeda in the lower right a beautiful photograph by and amateur astronomer. Give us insights in to what the Milky Way might look like if we were to step out side of it. What the structure of what the Milky Way and some of it constituencies. We are going to use this to stepping out to point to talking about physics of galaxies. This kind of pack key ideas, I am gonna go through a lot of materials today. We are first going to introduce the basic structure of the Milky Way and Andromeda which is a disc spheroid structure. We are going to describe graphically and verbally what that means in a just moment here. We are going to find in a series of observations made by Walter Bada in the 1940, that we can actually divide the stellar content of Milky Way and Andromeda into 2 broad populations, two broad classes of stars, that are distinguished by where they are in the galaxy and their metal properties and their kinematics or orbits. What kinds of orbits we find them on. We are going to divide them into population one star which represent the young metal rich discs stars and open cluster stars. These are going to turn out to have very very ordered motions. In fact, they are going to appear to be orbiting in circular orbits around the center of the galaxy. Our sun in a population One Star and it orbits with the rest of the population one stars around the center of Milky Way. Population 2 on the other had are going to turn out to be old very metal poor metal spheroid and globular cluster stars. And there are going to turn out to be to also distinguish to be very disordered and elliptical motions they don’t all lye in the plane of the Milky Way they lay out of it. We see a little bit of how that give us
some clue to the structure and history of the Milky Way and Andromeda in a just moment. We are going to then bring together the fact that we have 2 different population of stars and among other things distinguished by their differences in metal content to say something about what we call the chemical evolution of galaxies. Where do the heavy elements the metal as we call come from. Through the process of nuclear synthesis we talked about the origin of those metals inside of supernova. Inside of fusion and massive star cores. But how do we actually see the signs of the chemical evolution that spring of that material out into the galaxy and again giving us clue to the way galaxies where assembled and formed. And finally I want to zoom into the center of these galaxies and bring something that is relatively new. Long suspected but only recently established due to observations. That lacking in the heart of these galaxies are very unusual objects super massive black holes with masses in excess of a million times of masses of the sun. I will show you some of the evidences for the presence of rather exotic beast. We will see this thing come up again next week. We’ll talk about how these are very common in all spirals, perhaps elliptic galaxies. We have a lot of territories to cover today. Let’s put it together today (4.14 minutes).

Transcript of the lecture text – Main

What are galaxies, we’ve done all of the historical review in the last few days. The basic bottom line is this. Galaxies are large assemblies of gas stars and dust all held together by their mutual gravity. So if you look out and you see, for example the Milky Way and Andromeda is examples of galaxies which contain a larger number of stars, a lot of gas and dust. We’re also going to see in subsequent lectures, beginning next week, galaxies that contain all stars and virtually no gas, galaxies that extremely gaseous and have very little stellar content, so it runs the whole gamut. The sizes of galaxies have a very wide range. The very largest galaxies that we’ve found have a size up to trillion stars or more. These are extremely large objects often found sitting in the center of large rich clusters of galaxies. The smallest thing that we recognize as galaxies has no more than 10 million stars inside of them. So it is a very wide range phenomenon. A 10 million star galaxies appears a little tiny faint smudge in the sky that you really have to almost squint at to see is an actually, actual structure held together by gravity. Milky Way and Andromeda turn out to be examples of bright spiral galaxies. They have a stellar content each of about 200 billion star pieces. A lot of those stars are actually low mass stars, stars with the mass of the sun or even smaller. The most light that we see come from the giants, and the really really bright stars. So it’s a little bit hard to tell the stellar content just by looking. We have to look at galaxies in much more detail. And to kind of put a scale on what does it mean to be 200 billion, 200 billion is actually very close to the Milky Way and Andromeda, combined at 400 billion stars. Nabisco Company has baked 400 billion Oreo cookies since the first one rolled off the factory line in 1913, so it can, it got a scale here, basically, there is one Oreo cookie from every star in the Milky way and Andromeda, so even though there is a very larger number, its not an unimaginably large number. What gets larger is when you start thinking about how many galaxies that there probably are in the universe. And that runs up into the 10s of 100s of billions. At which point better get cracking to catch up. Let look now as a focus today on the nearest bi-examples of galaxies the Milky Way and Andromeda. The reason we’re going to do this
is because unlike most galaxies that we are able to study, we can actually see the stellar content by measuring individual stars in both of these places. For Milky Way that’s pretty obvious for Andromeda is only recently become possible for fainter star but going back to Hubble the very brightest stars are accessible. But by contrasting and comparing the properties of Milky Way and Andromeda, we can learn something about both these systems. So let’s start by first by defining what we mean by Andromeda, now we use to call it the Andromeda nebula, let’s drop that word, it’s really the Andromeda galaxy or Andromeda for short. It has a designation of M31, that means in 31st entry of Charles Masseso Catalog of non-stellar objects. So we’ll often refer to it as M31. It’s easily visible, you can actually see this with naked eye on a very very dark night if you know exactly where to look and it looks just barley visible to the naked eye. It does look like a whole lot, it look mostly like a faint smudge of light. Mostly what you see with your eye is the bright central concentration of stars in the center the nucleus. If you look at this through a telescope, like for example if the decided to point during the right time of year which would be the fall and early winter. It you pointed to 12 inch telescope on top of Smith lab at Andromeda, what you would see is a kinda of faint smudge of light almost disappointing in appearance actually of just this inner bright region here in the center. These beautiful pictures that I am showing you come from are the result from long time exposures. You really can't see details in galaxies like spiral arms and dust lines, except in very few rare cases with very very large telescopes. The earl of Ross, 72 inch telescope being on of them. That makes galaxies kind of disappointing target except if you are a photographer. Andromeda is about 700 kilo per sec away. Hubble had vastly overestimated the distance to Andromeda largely because he though that he was measuring bright Delta seffi stars. It turns out that he had mistakenly measured some W vergenus stars which are intrinsically fainter he thought that they were the brighter equivalent because they were misidentified he overestimated the luminosity and there for over estimated the luminosity distance. When that was correct later by Boternuther and oh, yes, of course the modern day this distance estimate has been refined to about 700 kilo per sec. It turns out that the distance to Andromeda is still an issue. It’s still something that people are trying to measure, because you want to try to measure it with very high precision because you now want to use objects that you can recognize in Andromeda as a stepping stone to look out to other galaxies. And so there’s still a challenge even almost a century later trying to find the distance of this object. The issue now is not the bulk distance but sort of refining the precision of that measurement. There are a lot of similarities, between Andromeda and Milky Way that are the reason we going to spend a lot of time with it today. Both of these are very large spiral galaxies, they both contain about 200 billion stars similar content in gas and dust. So if you look at the stat of evolution the mix of young and old stars, high menalcity, low menalcity stars, the mixture of gas dust, young stars old stars, it’s all pretty similar between Milky Way and Andromeda. There are differences. We are going to see but because it was average close though. It gives us the way of looking both galaxies. Andromeda is in a way the twin sister to the Milky Way so as a consequence we get an unpresent ability to view as if what are galaxy should look like more or less for the outside. There are differences, our galaxy is probably more actively star forming and wider spiral arms, but the bulk properties, the basic real important qualities to get to the heart of what it means to be a
spiral galaxy we can view it in both. And it can give us clues as to actually how to do our 
survey from the inside by looking at this very good example of what the Milky Way 
might look like from the outside. Now what have we learned, the first thing we found out 
is, spiral galaxies have very distinctive to part structure, the disk and the spheroid. The 
disk is what really gives the appearance if the galaxy in photographs and spiral arms and 
all of those little characteristics shape of the galaxy. Largely come from the brightest part 
of the galaxy, which is called the disk. This is a thin disk of stars and gases and dust, it’s 
very extended. In case Milky Way and Andromeda between 30-50 kilo per sec across. 
And it’s crossed by spiral arms which are outlined by a combination of bright blue stars 
which is an interesting hint to where star formation occurs in these disk and gas and dust, 
the raw material for star formation. We will see little more about that in more detail 
tomorrow. The disk in the bright part surrounding embedded this disk itself is actually 
embedded in a much larger fainter structure, called the spheroid. You can think of the 
spheroid not as much as a spire, it is a kind thick puff spheroid, it kinda flattened on the 
pole and larger on the equator. And the disk is embedded deep inside of this. It’s centrally 
concentrated and that if you somehow could remove the disk from spheroid, you would 
find that the number of star rather dramatically increased as you moved to the center of 
spheroid and begin to fall off very rapidly as you move to the outside of the spheroid. So 
it’s not a uniform distribution, it’s concentrated, most of it is mass, most of it is stars are 
in the center but it spreads out over a very large extent. The other thing that you would 
notice if you remove the disk on the Milky Way and Andromeda is that the spheroid 
really is got virtually no gas or dust, little gas or dust that is actually, there doesn’t belong 
to it dynamically has probably just fallen in from the outside of the and just going thru 
the spheroid. So the spheroid already has distinguished itself from the disk in a number of 
ways. Instead of being felt it puff, instead of being spread out, it’s very strongly centrally 
concentrated and it’s lacking in stars and dust, it’s lacking in the raw material to from 
stars. If I won’t that material, I’m kinda looking in the disk. Here is a picture of the 
Rubay galaxy, not Andromeda or Milky Way, but one kind of umbrella galaxy less little 
04. I chose this because it has unusually bright spheroid component. So you can see very 
clearly the disk here outline in the case by dust and the, a little bit of blue stars, but you 
can sort of see a really, the appearance of the disk embedded inside this larger spheroid of 
stars. You can see how that spheroid get very very bright and centrally concentrated in 
the middle, and falls off slowly fading out to the outside. In fact there are still spheroid 
stars way out but they are now getting so spread out their beginning to fade into the 
background of light which sort of makes up the general background of light of the night 
time sky. Any of these bright stars, most parts, that you see here are in our own Milky 
Way and you have to look out thru them we are riding inside the disk of the Milky Way 
we have to look out thru the screen of foreground stars so when ever you see these 
photographs of the galaxies bear in mind that all of these stars that you are seeing for the 
most part really are from our Milky Way.
APPENDIX B

QUESTIONNAIRE – DEMOGRAPHIC INFORMATION AND INFORMATION OF ENGLISH LISTENING

Directions: The following are questions asking about you. Please take a moment and circle the item that best fits you or write a short answer in each item.

ID # ____________  Email-address: _________________  Major: ______________

1. Gender: ____________________
2. Age: ____________________
3. Nationality: ____________________
4. Undergraduate: ________________  Graduate: ________________
5. Total length of staying in the USA to the present: _________months/years
6. Total length of studying English in your country (both formal and informal instruction): ________________months/years
7. What was your last education in your country?
   a. High school    b. 2-year college    c. 4-year college    d. Other ___________
8. Do you watch TV programs produced in your L1?
   a. Yes  b. No
9. How often do you watch TV programs in your L1?
   a. Regularly (almost everyday)        b. Less than 3 times a week
   c. More than 3 times a week             d. Other ________________
10. Have you ever received any English instruction besides formal English instruction from schools in your country such as TOEFL preparation academy?
    a. Yes  b. No
11. If you answer “Yes” to question #10, please describe the type and duration of English instruction you received.
    Example: Private lessons of English grammar for 2 years during high school.
    TOEFL preparation intensive course for 3 months

12. Have you ever attended an English-intensive course (American English courses at OSU) prior to attending your programs?
   a. Yes  b. No
13. If you answer “Yes” to question #12, how long did you take that course? If you attended more than one school, combine the duration at each school.
    ____________________quarter(s)/semester(s)/month(s)/year(s) (Circle one)
14. Which way do you think will be best for improving your listening proficiency?
   a. Watching TV or movies (not for entertainment)
   b. Listening to the radio (not for entertainment)
   c. Listening to classroom lectures   d. Listening to native friends
   e. ______________________________________
15. Do you watch English TV programs (including movies)?
   a. Yes                                                      b. No
16. How much time do you spend watching English TV programs to improve listening proficiency?
   a. Less than 1 hour a day       b. Less than 2 hours a day
   c. Less than 3 hours a day       d. Other ______________________
17. How much do you understand when you watch English TV programs?
   a. Less than 50%   b. More than 50%   c. More than 75%
   d. More than 95%   e. Other ______________________
18. Do you listen to English radio?
   a. Yes                                             b. No
19. If you answer “Yes” to question #18, how much time do you spend listening to the radio to improve listening proficiency?
   a. Less than 1 hour a day       b. Less than 2 hours a day
   c. Less than 3 hours a day       d. Other ______________________
20. How much do you understand when you listen to the radio?
   a. Less than 50%    b. More than 50%    c. More than 75%
   d. More than 95%    e. Other ______________________
21. Have you ever had (attended) a study group with native speakers?
   a. Yes                                                 b. No
22. If you answer “Yes” to question #21, how much do you understand when you listen to discussions?
   a. Less than 50%  b. More than 50 %  c. More than 75%
   d. More than 95%  e. Other ______________________
23. Is lecture a common method of knowledge acquisition in the schools of your country?
   a. Yes                                                  b. No
24. How much do you understand when you listen to lectures?
   a. Less than 50%    b. More than 50%    c. More than 75%
   d. More than 95%    e. Other ______________________
25. Have you ever purchased any materials (e.g., cassette tapes or video tapes) to improve your listening?
   a. Yes                                                         b. No
26. If you answer “Yes” to question #25, please describe the type of materials and the time you purchased them.
   Example: TOEFL listening cassette tapes in 2004
* There will be a second session for this study later (Interview – 20$ incentive). Are you willing to participate in the second session? Yes _________ No ________
**APPENDIX C**

**SELF-ASSESSING LISTENING PROFICIENCY – ACTFL LISTENING GUIDELINE**

ID # __________________________

**Direction:** Below shows the scale regarding how much you can do overall in English listening comprehension in both general and academic areas. Please circle the number that best describes your performance in listening comprehension (Circle one number only).

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>1 Novice-Low</td>
</tr>
<tr>
<td>2 Novice-Middle</td>
</tr>
<tr>
<td>3 Novice-High</td>
</tr>
<tr>
<td>4 Inter-Mediate-Low</td>
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<table>
<thead>
<tr>
<th>Level</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<td></td>
<td>Inter-Mediate-Middle</td>
<td>Inter-Mediate-High</td>
<td>Advanced</td>
<td>Advanced-Plus</td>
<td>Superior</td>
</tr>
<tr>
<td></td>
<td>Able to understand sentence-length utterances which consist of re-combinations of learned utterances on a variety of topics. Content continues to refer primarily to basic personal background and needs, social conventions and somewhat more complex tasks, such as lodging, transportation, and shopping. Additional content areas include some personal interests and activities, and a greater diversity of instructions and directions. Listening tasks not only pertain to spontaneous face-to-face conversations but also to short-routine telephone conversations and some deliberate speech, such as simple announcements and reports over the media. Understanding continues to be uneven.</td>
<td>Able to sustain understanding over longer stretches of connected discourse on a number of topics pertaining to different times and places; however, understanding is inconsistent due to failure to grasp main ideas and/or details. Thus, while topics do not differ significantly from those of an Advanced level listener, comprehension is less in quantity and poorer in quality.</td>
<td>Able to understand main ideas and most details of connected discourse on a variety of topics beyond the immediacy of the situation. Comprehension may be uneven due to a variety of linguistic and extra-linguistic factors, among which topic familiarity is very prominent. These texts frequently involve description and narration in different time frames or aspects, such as present, nonpast, habitual, or imperfective. Texts may include interviews, short lectures on familiar topics, and news items and reports primarily dealing with factual information. Listener is aware of cohesive devices but may not be able to use them to follow the sequence of thought in an oral text.</td>
<td>Able to understand the main ideas of most speech in a standard dialect; however, the listener may not be able to sustain comprehension in extended discourse which is propositionally and linguistically complex. Listener shows an emerging awareness of culturally implied meanings beyond the surface meanings of the text but may fail to grasp socio-cultural nuances of the message.</td>
<td>Able to understand the main ideas of all speech in a standard dialect, including technical discussion in a field of specialization. Can follow the essentials of extended discourse which is propositionally and linguistically complex, as in academic/professional settings, in lectures, speeches, and reports. Listener shows some appreciation of aesthetic norms of target language, of idioms, colloquialisms, and register shifting. Able to make inferences within the cultural framework of the target language. Understanding is aided by an awareness of the underlying organizational structure of the oral text and includes sensitivity for its social and cultural references and its affective overtones. Rarely misunderstands but may not understand excessively rapid, highly colloquial speech or speech that has strong cultural references.</td>
</tr>
<tr>
<td>10</td>
<td>Distinguished</td>
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<tr>
<td></td>
<td>Able to understand all forms and styles of speech pertinent to personal, social, and professional needs tailored to different audiences. Shows strong sensitivity to social and cultural references and aesthetic norms by processing language from within the cultural framework. Texts include theater plays, screen productions, editorials, symposia, academic debates, public policy statements, literacy readings, and most jokes and puns. May have difficulty with some dialects and slang.</td>
<td></td>
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</tr>
</tbody>
</table>
APPENDIX D


- The test materials must not be made available to University Microfilm, Inc.
APPENDIX E

SELF-ASSESSMENT OF THE FAMILIARITY WITH KEY TERMS

ID# ___________________________

Directions: Responses to below items will be used to measure your content knowledge on the topic of the lecture. On a scale of 1 (Completely unfamiliar) to 5 (Completely familiar), please rate your familiarity of the key terms of the lecture. Circle one number only.

- Completely Unfamiliar (CU): 1
- Unfamiliar (U): 2
- Average (A): 3
- Familiar (F): 4
- Completely Familiar (CF): 5

CU U A F CF

Example: Galaxy 1 2 3 4 5

1. Andromeda 1 2 3 4 5
2. The Milky Way 1 2 3 4 5
3. Hubble 1 2 3 4 5
4. Spiral Galaxy 1 2 3 4 5

Directions: Please answer the following questions.

1. Have you ever taken any class offered by the Department of astronomy?
   Yes ____________ No ____________

2. Have you ever taken a class with Dr. Poggie before?
   Yes ____________ No ____________
### APPENDIX F

#### WORD FREQUENCY

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<th>Word</th>
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</tr>
<tr>
<td>Star</td>
<td>32</td>
</tr>
<tr>
<td>Milky Way</td>
<td>28</td>
</tr>
<tr>
<td>Andromeda</td>
<td>25</td>
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<td>Structure</td>
<td>6</td>
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<td>5</td>
</tr>
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<td>Hubble</td>
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<td>Object</td>
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<td>Photograph</td>
<td>4</td>
</tr>
<tr>
<td>Property</td>
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</tr>
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<td>Thing</td>
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<td>Distance</td>
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<tr>
<td>Example</td>
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</tr>
<tr>
<td>Observation</td>
<td>3</td>
</tr>
<tr>
<td>Orbit</td>
<td>3</td>
</tr>
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<td>Smudge</td>
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<td>Something</td>
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</tr>
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APPENDIX G

CONTENT KNOWLEDGE CHECKLIST

ID# _____________________

**Directions**: Please put ‘X’ next to TRUE if the statement is true. If the statement is false, put an ‘X’ next to FALSE.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
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</thead>
<tbody>
<tr>
<td>1. Galaxy is a huge gravitational system of stars, gas, dust, and unseen dark matter.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>2. The Milky Way is the galaxy which is far away from our solar system with billions of other stars.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>3. The Milky Way has not been thought to look like the Andromeda.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>4. The term ‘Milky’ originates from the hazy band of White light appearing across the Milky Way galaxy visible from the earth.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>5. The Andromeda Galaxy is invisible to the naked eye in a moderately dark sky.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>6. The Andromeda Galaxy is one of the red shifted galaxies.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>7. The Andromeda Galaxy is a spiral galaxy.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
<tr>
<td>8. Hubble telescope is a telescope in orbit around the Earth.</td>
<td>TURE</td>
<td>FALSE</td>
</tr>
</tbody>
</table>
9. Spiral galaxy has a dark surrounded by spheroid (a geometrical figure similar in shape to a sphere).

10. The following picture indicates a spiral galaxy.

TRUE _____ FALSE_____
APPENDIX H

SENTENCE CODING

1. What are galaxies? (Definition of galaxy)
2. We’ve done all of the historical review in the last few days. (N/A)
3. The basic bottom line is this. (N/A)
4. Galaxies are large assemblies of gas, stars and dust, all held together by their mutual gravity. (Definition of galaxy)
5. So if you look out and you see, for example, the Milky Way and Andromeda is examples of galaxies which contain a larger number of stars, a lot of gas and dust. (Example of galaxy/Content of galaxy)
6. We’re also going to see in subsequent lectures, beginning next week, galaxies that contain all stars and virtually no gas, galaxies that are extremely gaseous and have very little stellar content, so it runs the whole gamut (Types of galaxy)
7. The sizes of galaxies have a very wide range. (Size of galaxy)
8. The very largest galaxies that we’ve found have a size up to trillion stars or more. (Size of Galaxy)
9. These are extremely large objects, often found sitting in the center of large rich clusters of galaxies. (N/A)
10. The smallest thing that we recognize as galaxies has no more than 10 million stars inside of them. (Size of galaxy)
11. So it is a very wide range phenomenon. (N/A)
12. A 10 million star galaxies appears a little tiny faint smudge in the sky that you really have to almost squint at to see is an actually, actual structure held together by gravity (Size/Brightness of galaxy)
13. Milky way and Andromeda turn out to be examples of bright spiral galaxies. (Shape of galaxy)
14. They have a stellar content each of about 200 billion star pieces. (Size of galaxy)
15. A lot of those stars are actually low mass stars, stars with the mass of the sun or even smaller. (Size of star)
16. The most light that we see come from the giants, and the really really bright stars. (Size/Brightness of the star)
17. So it’s a little bit hard to tell the stellar content just by looking. (Size/Brightness of the star)
18. We have to look at galaxies in much more detail. (N/A)
19. And to kind of put a scale on what does it mean to be 200 billion, (Size of galaxy)
20. 200 billion is actually very close to the Milky way and Andromeda, combined at 400 billion stars. (Size of galaxy)
21. Nabisco Company has baked 400 billion Oreo cookies since the first one rolled off the factory line in 1913, (Size of galaxy)
22. So it can, it got a scale here, basically there is one Oreo cookie from every star in the Milky way and Andromeda. (Size of galaxy)
23. So even though there is a very larger number, it’s not an unimaginably large Number (Size of galaxy)
24. What gets larger is when you start thinking about how many galaxies that there probably are in the universe and that runs up into the 10s of 100s of billions. (Size of galaxy)
25. At which point better get cracking to catch up. (N/A)
26. Let’s look now as a focus today on the nearest bi-examples of galaxies the Milky Way and Andromeda. (N/A)
27. The reason we’re going to do this is because unlike most galaxies that we are unable to study, we can actually see the stellar content by measuring individual stars in both of these places.(Andromeda- outside view of the Milky Way galaxy)
28. For Milky Way that’s pretty obvious, for Andromeda, it only recently become possible for fainter star but going back to Hubble the very brightest stars are accessible. (Andromeda- outside view of our own galaxy)
29. But by contrasting and comparing the properties of Milky Way and Andromeda, we can learn something about both these systems. (N/A)
30. So lets start by first by defining what we mean by Andromeda, now we use to call it the Andromeda nebula, let’s drop that word, it’s really the Andromeda galaxy or Andromeda for short. (Names of Andromeda)
31. It has a designation of M31, that means in 31st entry of Charles Masses Catalog of non-stellar objects. (Names of Andromeda)
32. So we’ll often refer to it as M31. (Names of Andromeda)
33. It’s easily visible, you can actually see this with naked eye on a very very dark night if you know exactly where to look and it looks just barely visible to the naked eye (Brightness of Andromeda)
34. It does look like a whole lot, it looks mostly like a faint smudge of light (Brightness of Andromeda).
35. Mostly what you see with your eye is the bright central concentration of stars in the center the nucleus (Brightness of Andromeda)
36. If you look at this through a telescope, like for example if the decided to point during the right time of year which would be the fall and early winter. (N/A)
37. It you pointed to 12 inch telescope on top of Smith lab at Andromeda, what you would see is a kinda of faint smudge of light almost disappointing in appearance actually of just this inner bright region here in the center. (Brightness of Andromeda)
38. These beautiful pictures that I am showing you come from are the result from long
time exposures. *(Brightness of Andromeda)*
39. You really can't see details in galaxies like spiral arms and dust lines, except in very
few rare cases with very very large telescope, the earl of Ross, 72 inch telescope
being on of them. *(N/A)*
40. That makes galaxies kind of disappointing target except if you are a photographer.
*(N/A)*
41. Andromeda is about 700 kilo per sec away *(Distance to Andromeda)*
42. Hubble had vastly overestimated the distance to Andromeda largely because he
though that he was measuring bright Delta seffi stars. *(Hubble-Brightness- Distance
to Andromeda)*
43. It turns out that he had mistakenly measured some W vergenus stars which are
intrinsically fainter *(Hubble-mistake-the distance to Andromeda)*
44. He thought that they were the brighter equivalent because they were misidentified he
overestimated the luminosity and there for over estimated the luminosity distance.
*(Hubble-Mistake-the distance to Andromeda-brightness)*
45. When that was correct later by Boternuther and oh, yes, of course the modern day this
distance estimate has been refined to about 700 kilo per sec.(The distance to
Andromeda)
46. It turns out that the distance to Andromeda is still an issue *(Distance-Measurement)*
47. It’s still something that people are trying to measure, because you want to try to
measure it with very high precision because you now want to use objects that you can
recognize in Andromeda as a stepping stone to look out to other galaxies *(Distance-
Measurement)*
48. And so there’s still a challenge even almost a century later trying to find the distance
of this object *(Distance-Measurement)*
49. The issue now is not the bulk distance but sort of refining the precision of that
measurement. *(Distance - Measurement)*
50. There are a lot of similarities, between Andromeda and Milky Way that are the reason
we going to spend a lot of time with it today *(N/A)*
51. Both of these are very large spiral galaxies. *(Similarity- Shape)*
52. They both contain about 200 billion stars similar content in gas and dust.(Similarity-
Content)
53. So if you look at the stat of evolution the mix of young and old stars, high menalicity,
low Menalicity stars, the mixture of gas dust, young stars old stars, it’s all pretty
similar between Milky Way and Andromeda. *(Similarity- Content)*
54. There are differences. *(N/A)*
55. We are going to see but because it was average close though *(N/A).*
56. It gives us the way of looking because both galaxies, Andromeda is in a way the twin
sister to the Milky way so as a consequence we get an un Fnished ability to view
as if what are galaxy should look like more or less for the outside. *(Andromeda-
outside view of our own galaxy)*
57. There are differences. *(N/A)*
58. Our galaxy is probably more actively star forming and wider spiral arms, but the bulk
properties, the basic real important qualities to get to the heart of what it means to be a spiral galaxy (Andromeda -Outside view of our galaxy)

59. We can view it in both (Andromeda -Outside view of our galaxy)
60. And it can give us clues as to actually how to do our survey from the inside by looking at this very good example of what the Milky Way might look like from the outside (Andromeda- outside view of our own galaxy)
61. Now what have we learned. (N/A)
62. The first thing we found out is, spiral galaxies have very distinctive to part structure, the disk and the spheroid (The shape of spiral galaxy)
63. The disk is what really gives the appearance if the galaxy in photographs and spiral arms and all of those little characteristics shape of the galaxy. (The feature of Disk)
64. Largely come from the brightest part of the galaxy, which is called the disk. (The feature of Disk)
65. This is a thin disk of stars and gases and dust, it’s very extended. (The feature of Disk)
66. In case Milky Way and Andromeda between 30-50 kilo par secs across and it’s crossed by spiral arms which are outlined by a combination of bright blue stars which is an interesting hint to where star formation occurs in these disk and gas and dust, the raw material for star formation. (The feature of Disk)
67. We will see little more about that in more detail tomorrow. (N.A)
68. The disk in the bright part surrounding embedden this disk itself is actually embedded in a much larger fainter structure, called the spheroid. (The feature of Spheroid)
69. You can think of the spheroid not as much as a spire (The feature of Spheroid)
70. It is a kind thick puff spheroid (The feature of Spheroid)
71. It’s kinda flattened on the pole and larger on the equator. (The feature of Spheroid)
72. And the disk is embedded deep inside of this (The feature of Spheroid)
73. It’s centrally concentrated (The feature of Spheroid)
74. And that if you somehow could remove the disk from spheroid, you would find that the number of star rather dramatically increased (Disk, Spheroid, the distribution of stars)
75. As you moved to the center of spheroid and begin to fall off very rapidly as you move to the outside of the spheroid. (Spheroid, the distribution of stars)
76. So it’s not a uniform distribution, it’s concentrated, most of it is mass, most of it is stars are in the center but it spreads out over a very large extent. (the feature of spiral galaxy)
77. The other thing that you would notice if you remove the disk on the Milky Way and Andromeda is that the spheroid really is got virtually no gas or dust, little gas or dust that is actually, there doesn’t belong to it dynamically has probably just fallen in from the outside of the and just going thru the spheroid. (The feature of Spheroid)
78. So the spheroid already has distinguished itself from the disk in a number of ways. (N/A)
79. Instead of being felt it puff, instead of being spread out, it’s very strongly centrally concentrated and it’s lacking in stars and dust, it’s lacking in the raw material to from stars. (The feature of Spheroid)
80. If I won’t that material, I’m kinda looking in the disk.(N/A)
81. Here is a picture of the Rubay galaxy, not Andromeda or Milky Way, but one kind of umbrella galaxy less little 04. (N/A)
82. I chose this because it has unusually bright spheroid component (N/A).

83. So you can see very clearly the disk here outline in the case by dust and the, a little bit of blue stars, but you can sort of see a really, the appearance of the disk embedded inside this larger spheroid of stars. (Comparison of features: disk- Spheroid)
84. You can see how that spheroid get very very bright and centrally concentrated in the middle, and falls off slowly fading out to the outside. (The feature of Spheroid)
85. In fact there are still spheroid stars way out but they are now getting so spread out their beginning to fade into the background of light which sort of makes up the general background of light of the night time sky. (The feature of Spheroid)
86. Any of these bright stars, most parts, that you see here are in our own Milky Way and you have to look out thru them we are riding inside the disk of the Milky Way we have to look out thru the screen of foreground stars (N/A)
87. so when ever you see these photographs of the galaxies bear in mind that all of these stars that you are seeing for the most part really are from our Milky Way (N/A)
APPENDIX I

CHECKLIST

ID# ___________________

Directions: Please, put an ‘X’ next to TRUE if the statement is true. If the statement is false, put an ‘X’ next to FALSE. You may refer back to your notes.

1. Both the Milky Way and Andromeda are spiral galaxies. TRUE____FALSE____

2. The gravity is necessary to compose galaxies. TRUE____FALSE____

3. The very largest galaxies that we’ve found have a size up to 10 billion stars or more. TRUE____FALSE____

4. It is impossible to tell the stellar content by looking at it with our naked eyes. TRUE____FALSE____

5. If you use a 12-inch telescope, Andromeda looks like a faint smudge of light in which you can see dust lines and spiral arms. TRUE____FALSE____

6. The disk is the brightest part of the galaxies. TRUE____FALSE____

7. Finding the way to measure the distance to Andromeda accurately is one of the challenges that researchers have still encountered when investigating Andromeda. TRUE____FALSE____

8. If you remove the disk from the galaxy, the spheroid has virtually no gas or dust. TRUE____FALSE____

9. Gas and dust are the raw materials for star formation. TRUE____FALSE____

10. Spheroid is flattened on the pole and larger on the equator. TRUE____FALSE____
APPENDIX J

THE PAUSAL UNITS OF THE ACADEMIC LISTENING LECTURE TEXT

4 - Macro, 3 – Primary, 2 - Secondary, 1-Micro , RT – Redundancy

<table>
<thead>
<tr>
<th>Unit #</th>
<th>Content</th>
<th>Level</th>
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<td>1</td>
<td>What a galaxies?</td>
<td>4</td>
</tr>
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<td>2</td>
<td>We have done all of the historical view in the last few days.</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>The basic bottom line is this.</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Galaxies are large assemblies of gas, stars, and dust,</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>All held together by their mutual gravity.</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>So if you look out and you see,</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>For example,</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>The milky way and Andromeda is examples of galaxies,</td>
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</tr>
<tr>
<td>9</td>
<td>Which contain a larger number of stars, a lot of gas and dust.</td>
<td>R/T</td>
</tr>
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<td>10</td>
<td>We’re also going to see in subsequent lectures,</td>
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</tr>
<tr>
<td>11</td>
<td>Beginning next week,</td>
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<tr>
<td>12</td>
<td>Galaxies that contain all stars and virtually no gas,</td>
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</tr>
<tr>
<td>13</td>
<td>Galaxies that extremely gaseous and have very little stellar content.</td>
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</tr>
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<td>So it runs the whole gamut.</td>
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<td>The sizes of galaxies have a very wide range.</td>
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</tr>
<tr>
<td>16</td>
<td>The very largest galaxies that we’ve found have a size up to trillion</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>stars or more.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>These are extremely large objects often found sitting in the cent of</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>large rich clusters of galaxies.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>The smallest thing that we recognize as galaxies has no more than</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>10 million stars inside of them</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>So it is a very wide range phenomenon.</td>
<td>R/T</td>
</tr>
<tr>
<td>20</td>
<td>A 10 million star galaxies appears a little tiny faint smudge in the</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>sky,</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>That you really have to almost squint at to see is,</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>An actually actual structure held together by gravity.</td>
<td>R/T</td>
</tr>
<tr>
<td>23</td>
<td>Milky way and Andromeda turn out to be examples of bright spiral</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>galaxies.</td>
<td></td>
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<td></td>
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<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>They have a stellar content,</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Each of about 200 billion star piece.</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>A lot of those stars are actually low mass stars,</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Stars with the mass of the sun or even smaller.</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>The most light that we see come from the giants, and the really really bright stars.</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>So it’s a little bit hard to tell the stellar content just by looking.</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>We have to look at galaxies in much more detail.</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>And to kind of put a scale on what does it mean to be 200 billion,</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>200 billion is actually very close to the Milky way and Andromeda,</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Combined at 400 billion stars,</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Nabisco company has baked 400 billion Oreo cookies,</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Since the first one rolled off the factor line in 1913,</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>So it can, it got a scale here,</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Basically, there is one Oreo cookie from every star in the Milky way and Andromeda.</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>So even though there is a very large number,</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>It’s not an unimaginably large number.</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>What gets larger is when you start thinking about how many galaxies,</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>That there probably are in the universe.</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>And that runs up into the 10s of 100s of billions,</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>At which point better get cracking to catch up.</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Let look now as a focus today on the nearest bi-examples of galaxies the Milky way and Andromeda.</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>The reason we’re going to do this is,</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Because unlike most galaxies that we are able to study,</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>We can actually see the stellar content by measuring individual stars in both of these places.</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>For Milky way that’s pretty obvious.</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>For Andromeda it only recently become possible for fainter star.</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>But going back to Hubble, the very brightest stars are accessible.</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>But by contrasting and comparing the properties of Milky way and Andromeda, we can learn something about both these systems.</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>So let’s start by first by defining what we mean by Andromeda.</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Now we use to call it the Andromeda nebula,</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Let’s drop that word,</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>It’s really the Andromeda galaxy or Andromeda for short.</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>It has a designation of M31,</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>That means in 31st entry of Charles Massea’s Catalog of non-stellar objects,</td>
<td></td>
</tr>
<tr>
<td>Page</td>
<td>Text</td>
<td>Location</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>58</td>
<td>So we’ll often refer to it as M31.</td>
<td>R/T</td>
</tr>
<tr>
<td>59</td>
<td>It’s easily visible,</td>
<td>3</td>
</tr>
<tr>
<td>60</td>
<td>You can actually see this with naked eye on a very very dark night.</td>
<td>3</td>
</tr>
<tr>
<td>61</td>
<td>If you know exactly where to look,</td>
<td>2</td>
</tr>
<tr>
<td>62</td>
<td>And it looks just barely visible to the naked eye.</td>
<td>2</td>
</tr>
<tr>
<td>63</td>
<td>It does look like a whole lot,</td>
<td>1</td>
</tr>
<tr>
<td>64</td>
<td>It looks mostly like a faint smudge of light.</td>
<td>3</td>
</tr>
<tr>
<td>65</td>
<td>Mostly what you see with your eye is,</td>
<td>2</td>
</tr>
<tr>
<td>66</td>
<td>The bright central concentration of stars in the center the nucleus.</td>
<td>3</td>
</tr>
<tr>
<td>67</td>
<td>If you look at this through a telescope,</td>
<td>2</td>
</tr>
<tr>
<td>68</td>
<td>Like for example</td>
<td>1</td>
</tr>
<tr>
<td>69</td>
<td>If the decided to point during the right time of year,</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td>Which would be the fall and early winter.</td>
<td>3</td>
</tr>
<tr>
<td>71</td>
<td>If you pointed to 12 inch telescope on top of Smith Lab at Andromeda,</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>What you would see is a kinda of faint smudge of light,</td>
<td>2</td>
</tr>
<tr>
<td>73</td>
<td>Almost disappointing in appearance,</td>
<td>1</td>
</tr>
<tr>
<td>74</td>
<td>Actually of just this inner bright region here in the center.</td>
<td>2</td>
</tr>
<tr>
<td>75</td>
<td>These beautiful pictures that I am showing you,</td>
<td>1</td>
</tr>
<tr>
<td>76</td>
<td>Come from are the result from long time exposure.</td>
<td>1</td>
</tr>
<tr>
<td>77</td>
<td>You really can’t see details in galaxies like spiral arms and dust lines,</td>
<td>2</td>
</tr>
<tr>
<td>78</td>
<td>Except in very few rare cases with very very large telescopes.</td>
<td>2</td>
</tr>
<tr>
<td>79</td>
<td>The earl of Ross, 72 inch telescope being one of them.</td>
<td>2</td>
</tr>
<tr>
<td>80</td>
<td>That makes galaxies kind of disappointing target,</td>
<td>1</td>
</tr>
<tr>
<td>81</td>
<td>Except if you are a photographer.</td>
<td>1</td>
</tr>
<tr>
<td>82</td>
<td>Andromeda is about 700 kilo per sec away.</td>
<td>3</td>
</tr>
<tr>
<td>83</td>
<td>Hubble had vastly overestimated the distance to Andromeda,</td>
<td>4</td>
</tr>
<tr>
<td>84</td>
<td>Largely because he thought that he was measuring bright Delta seffi stars,</td>
<td>2</td>
</tr>
<tr>
<td>85</td>
<td>It turn out that he had mistakenly measured some W vergenus stars,</td>
<td>2</td>
</tr>
<tr>
<td>86</td>
<td>Which are intrinsically fainter.</td>
<td>1</td>
</tr>
<tr>
<td>87</td>
<td>He thought that they were the brighter equivalent because they were misidentified,</td>
<td>2</td>
</tr>
<tr>
<td>88</td>
<td>He overestimated the luminosity,</td>
<td>4</td>
</tr>
<tr>
<td>89</td>
<td>And therefore over-estimated the luminosity distance.</td>
<td>R/T</td>
</tr>
<tr>
<td>90</td>
<td>When that was correct later by Botemuther,</td>
<td>2</td>
</tr>
<tr>
<td>91</td>
<td>And oh, yes, of course the modern day,</td>
<td>1</td>
</tr>
<tr>
<td>92</td>
<td>This distance estimate has been refined to about 700 kilo per sec.</td>
<td>R/T</td>
</tr>
<tr>
<td>93</td>
<td>It turns out that the distance to Andromeda is still an issue.</td>
<td>4</td>
</tr>
<tr>
<td>94</td>
<td>It is still something that people are trying to measure,</td>
<td>2</td>
</tr>
<tr>
<td>95</td>
<td>Because you want to try to measure it with very high precision,</td>
<td>2</td>
</tr>
<tr>
<td>96</td>
<td>Because you not want to use objects that you can recognize in Andromeda as a stepping stone,</td>
<td>3</td>
</tr>
<tr>
<td>Line</td>
<td>Text</td>
<td>Speaker</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>97</td>
<td>To look out to other galaxies.</td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>And so there’s still a challenge even almost a center later.</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Trying to find the distance of this object.</td>
<td>R/T</td>
</tr>
<tr>
<td>100</td>
<td>The issue now is not the bulk distance but sort of refining the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>precision of that measurement.</td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>There are a lot of similarities between Andromeda and the Milky</td>
<td></td>
</tr>
<tr>
<td></td>
<td>way.</td>
<td>4</td>
</tr>
<tr>
<td>102</td>
<td>That are the reason we are going to spend a lot of time with it today.</td>
<td>1</td>
</tr>
<tr>
<td>103</td>
<td>Both of these are very large spiral galaxies,</td>
<td>R/T</td>
</tr>
<tr>
<td>104</td>
<td>They both contain about 200 billion stars similar content in gas and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dust.</td>
<td>R/T</td>
</tr>
<tr>
<td>105</td>
<td>So if you look at the state of evolution,</td>
<td>1</td>
</tr>
<tr>
<td>106</td>
<td>The mix of you and old stars</td>
<td>1</td>
</tr>
<tr>
<td>107</td>
<td>High menalicity, low menalicity stars,</td>
<td>1</td>
</tr>
<tr>
<td>108</td>
<td>The mixture of gas, dust, young stars old stars.</td>
<td>1</td>
</tr>
<tr>
<td>109</td>
<td>It’s all pretty similar between the Milky way and Andromeda.</td>
<td>R/T</td>
</tr>
<tr>
<td>110</td>
<td>There are differences.</td>
<td>4</td>
</tr>
<tr>
<td>111</td>
<td>We are going to see bu,</td>
<td>1</td>
</tr>
<tr>
<td>112</td>
<td>Because it was average close though.</td>
<td>1</td>
</tr>
<tr>
<td>113</td>
<td>It gives us the way of looking both galaxies.</td>
<td>1</td>
</tr>
<tr>
<td>114</td>
<td>Andromeda is in a way the twin sister to the Milky way.</td>
<td>4</td>
</tr>
<tr>
<td>115</td>
<td>So as a consequence,</td>
<td>1</td>
</tr>
<tr>
<td>116</td>
<td>We get an unpresent ability to view,</td>
<td>1</td>
</tr>
<tr>
<td>117</td>
<td>As if what are galaxy should look like more or less for the outside.</td>
<td>1</td>
</tr>
<tr>
<td>118</td>
<td>There are differences.</td>
<td>R/T</td>
</tr>
<tr>
<td>119</td>
<td>Our galaxy is probably more actively star forming wider spiral arms,</td>
<td>4</td>
</tr>
<tr>
<td>120</td>
<td>But the bulk properties,</td>
<td>1</td>
</tr>
<tr>
<td>121</td>
<td>The basic real important qualities to get to the heart of what it</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>means to be a spiral galaxy,</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>We can view it in both.</td>
<td>1</td>
</tr>
<tr>
<td>123</td>
<td>And it can give us clues as to actually how to do our survey from</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>the inside,</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>By looking at this very good example of what the Milky way might</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>look like from the outside.</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>Now what have we learned,</td>
<td>1</td>
</tr>
<tr>
<td>126</td>
<td>The first thing we found out is,</td>
<td>1</td>
</tr>
<tr>
<td>127</td>
<td>Spiral galaxies have very distinctive part structure, the disk and</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>the spheroid.</td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>The disk is what really gives the appearance in the galaxy in</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>photographs,</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>And spiral arms and all of those little characteristics shape of the</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>galaxy.</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Largely come from the brightest part of the galaxy,</td>
<td>3</td>
</tr>
</tbody>
</table>
131  Which is called the disk. | R/T
132  This is a thin disk of stars and gases and dust, | 3
133  It’s very extended. | 2
134  In case the Milky way and Andromeda between 30-50 kilo per sec across. | 3
135  And it’s crossed by spiral arms, | 2
136  Which are outlined by a combination of bright blue stars, | 3
137  Which is an interesting hint to where star formation occurs in these disks, | 3
138  And gas and dust, the raw material for star formation. | 2
139  We will see little more about that in more detail tomorrow. | 1
140  The disk in the bright part surrounding embedded this disk itself | 1
141  Is actually embedded in a much larger fainter structure, called the spheroid. | 3
142  You can think of the spheroid not as much as a sphere, | 2
143  It is a kind thick puff spheroid, | 3
144  It’s kinds flattened on the pole and larger on the equator. | 3
145  And the disk is embedded deep inside of this. | R/T
146  It’s centrally concentrated and | 3
147  That if you somehow could remove the disk from spheroid, | 2
148  You would find that the number of star rather dramatically increased as you moved to the center of spheroid, | 2
149  And begin to fall off very rapidly as you move to the outside of the spheroid. | 2
150  So it’s not a uniform distribution, | 3
151  It’s concentrated, | R/T
152  Most of it is mass, | R/T
153  Most of its stars are in the center, | 2
154  But it spreads out over a very large extent. | 2
155  The other thing that you would notice if you remove the disk on the Milky way and Andromeda is, | R/T
156  That the spheroid really is got virtually no gas or dust, | 3
157  Little gas or dust that is actually, | 2
158  There doesn’t belong to it dynamically has probably just fallen in from the outside of the and just going thru the spheroid. | 2
159  So the spheroid already has distinguished itself from the disk in a number of ways. | R/T
160  Instead of being felt it puff, | R/T
161  Instead of being spread out, | R/T
162  It’s very strongly centrally concentrated, | R/T
163  And it’s lacking in stars and dust, | R/T
164  It’s lacking in the raw material to form stars. | 3
165  If I won’t that material,
I'm kinda looking in the disk.

Here is a picture of the Rubay galaxy,

Not Andromeda or the Milky way, but one kind of umbrella galaxy less little 04.

I chose this because it has unusually bright spheroid component.

So you can see very clearly the disk here outline tin the case by dust and the, a little bit of blue stars.

But you can sort of see a really, the appearance of the disk embedded inside this larger spheroid of stars.

You can see how that spheroid get very very bright and centrally concentrated in the middle,

And falls off slowly fading out to the outside.

In fact there are still spheroid stars way out,

But they are not getting so spread out

Their beginning to fade into the background of light

Which sort of makes up the general background of light of the night time sky.

Any of these bright stars, most parts, that you see here are in our own Milky way,

And you have to look out thru them,

We are riding inside the disk of the Milky way

We have to look out thru the screen of foreground stars,

So whenever you see these photograph of the galaxies,

Bear in mind that

All of the stars that you are seeing for the most part really are from our Milky way.
BRIDGING INFERENCE QUESTIONS

Question #1: How did Hubble’s mistake affect the issue of the precision of the measurement of galaxy in the present time in relation to the distance of Andromeda?

Key points
1. Andromeda has a stellar content (1 credit)
2. Hubble made it possible to access all stars in Andromeda galaxy (1 credit)
3. The distance of Andromeda is still a challenge (1 credit).
4. Hubble overestimated the distance to Andromeda (2 credits)
5. Andromeda has a designation of M31 which indicates non-stellar objects (2 credits)
6. Hubble’s mistake is because he used the luminosity as the precision of the measurement of the distance (3 credits)

In order to receive full credits for question #1 (10 credits), the answer should contain all six key points stated above. If any of key points is missing in the answer, the points awarded will be computed by excluding the credits of the missing key points.

Question #2: How could you describe the appearance of the Milky Way?

Key Points
1. The Milky Way is a bright spiral galaxy (2 credits)
2. The Milky Way has a distinctive structure, the disk and the spheroid (2 credits).
3. Spheroid is a thick puff (1 credit)
4. Spheroid is flattened on the pole and larger on the equator (1 credit)
5. Disk is embedded deep inside of Spheroid (1 credit).
6. Disk contains a little bit of blue stars (Disk looks blue) (1 credit),
8. Spheroid is centrally concentrated in the middle (1 credit)
9. Spheroid falls off slowly fading out to the outside (1 credit).

In order to receive full credits for question #2 (10 credits), the answer should contain all nine key points stated above. If any of key points is missing in the answer, the points awarded will be computed by excluding the credits of the missing key points.

Inference involves some interpretation. If the answer of participants are paraphrased but capture the same meanings of key points, a full credit of each key point will be awarded.
APPENDIX L

SELF-ASSESSING INSTRUMENT OF ACADEMIC LECTURE LISTENING COMPREHENSION

ID# ___________________________

**Directions:** Please circle the number that best describes your performance. Circle one number only.

- Minimal (MI) : 1
- Limited (LI): 2
- Moderate (MO): 3
- Competent (CO): 4
- Native-like (NA): 5

<table>
<thead>
<tr>
<th>MI</th>
<th>LI</th>
<th>MO</th>
<th>CO</th>
<th>NA</th>
</tr>
</thead>
</table>

Example:
- Identifying differences between what you hear and a printed version of the text.

<table>
<thead>
<tr>
<th>MI</th>
<th>LI</th>
<th>MO</th>
<th>CO</th>
<th>NA</th>
</tr>
</thead>
</table>

1. Identifying main ideas
   1 2 3 4 5

2. Identifying details
   1 2 3 4 5

3. Identifying changes of topic and boundaries between topics
   1 2 3 4 5

4. Distinguishing facts from opinions
   1 2 3 4 5

5. Identifying relationships among units within discourse (major ideas, generalization, hypotheses, supporting ideas, examples)
   1 2 3 4 5

   1 2 3 4 5
<p>| | | | | | |</p>
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>7. Discriminating distinctive sounds of English</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Recognizing the functions of stress and intonation to signal the information structure of utterance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Identifying words in stressed and unstressed position</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Processing speech at different rates</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Recognizing reduced forms of words</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. Recognizing words and phrases of similar and opposing meaning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. Recognizing elliptical forms of grammatical units and sentences</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. Recognizing typical word-order patterns</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. Detecting sentence constituents such as subjects, verbs, objects, prepositions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. Inferring links and connections between events</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>17. Predicting the meaning of a message</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>18. Detecting attitudes of speakers toward subject matter</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>19. Detecting cultural underlying meaning</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>20. Recognizing markers of cohesion</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. Identifying key words and ignoring others while listening</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. Using background knowledge to facilitate selective listening</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</tbody>
</table>

*Please turn into the researcher. Thank you for your participation.*
APPENDIX M

STRATEGY USE QUESTIONNAIRE

ID# ______________________

Directions: Please circle the number that best describes your performance while listening to lectures (Circle on number only).

- Strongly Disagree (SD): 1
- Disagree (DI): 2
- Average (AV): 3
- Agree (AG): 4
- Strongly Agree (SA): 5

Example:

- I check if I have understood what was said in a lecture.  
  1 2 3 4 5

1. Before starting to listen, I think of what I might know about the story.  
   1 2 3 4 5

2. I use sound effects and tone of the speaker’s voice to help me guess the meaning of words.  
   1 2 3 4 5

3. As I am listening, I predict what will happen.  
   1 2 3 4 5

4. As I am listening, I use words that I recognize to help me guess the meaning of other words.  
   1 2 3 4 5

5. When I do not understand, I listen for words that sound the same as English.  
   1 2 3 4 5

6. When I have difficulty understanding, I gave up listening.  
   1 2 3 4 5
7. I listen for overall meaning.  

8. When I am having trouble understanding, I tell myself that I’ll manage and do fine.  

9. As I listen, I relate what I am hearing with what I understood earlier.  

10. I use the comprehension questions in front of me to help me predict what I cannot understand.  

11. As I listen, I focus on the main words.  

12. When I have trouble understanding, I pay more attention and focus harder.  

13. When I have trouble understanding, I keep on listening because I expect to understand more later.  

14. I often correctly figure out the meaning of words I do not understand.  

15. When my mind wanders, I usually recover my concentration right away.  

16. When I have the chance to listen a second or third time, I usually know where I need to pay more attention.  

17. I understand without translating in my head.  

18. When I am listening, I have a good idea when I understand something and when I do not.  

Please turn into the researcher. Thank you for your participation.

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APPENDIX N

INTERVIEW QUESTIONS

1. How do you describe your understanding of the lecture? Was it difficult? Or easy?
2. What characteristics of the lecture made you describe your understanding in that way?
3. What do you think has influence on your comprehension while listening to the lecture?
4. Why do you think those factors have influence on your comprehension while listening to the lecture?
5. Between content knowledge and L2 listening proficiency, which one do you think more important to understand the lecture?
6. Why do you think content knowledge (or L2 listening proficiency) is more important?
7. Would you mind telling me how (you think) content knowledge and L2 proficiency help you understand academic lectures?
8. Would you mind telling me what procedure or strategies you use to help your understanding while listening to academic lectures?
9. Why do you think you use those procedures or strategies to help your understanding while listening to academic lectures?
10. Would you mind telling me what you usually do to understand lectures before, during, and after listening to academic lectures?
# APPENDIX O

## ACADEMIC DISCIPLINES OF RESEARCH PARTICIPANTS

<table>
<thead>
<tr>
<th>College</th>
<th>Major</th>
<th>Student number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 College of Arts</td>
<td>History of Arts</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Much Performance</td>
<td>2</td>
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<td>2 College of Biological Science</td>
<td>Biochemistry</td>
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<td></td>
<td>Biology</td>
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<tr>
<td></td>
<td>Molecular Biology</td>
<td>2</td>
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<tr>
<td></td>
<td>Horticulture crop science</td>
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<td>3 College of Humanities</td>
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<td></td>
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<td>Physics</td>
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<td></td>
<td>Mathematics</td>
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<td></td>
<td>Statistics &amp; Accounting</td>
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<td></td>
<td>Earth Science</td>
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<td>Communication</td>
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<td>Social Work</td>
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APPENDIX P

EXAMINATION OF RESIDUALS - CHECKLIST

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<tr>
<th>Residuals Statistics a</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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<td>Std. Residual</td>
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a. Dependent Variable: c

Histogram

Dependent Variable: c

Mean = 1.62E-16
Std. Dev. = 0.993
N = 141
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: c

Scatterplot

Dependent Variable: c
Partial Regression Plot

Dependent Variable: c

Partial Regression Plot

Dependent Variable: c
## APPENDIX Q

### PRINCIPAL COMPONENT ANALYSIS RESULTS

#### Total Variance Explained

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<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Cumulative %</th>
<th>Total Variance</th>
<th>Cumulative %</th>
<th>Total Variance</th>
<th>Cumulative %</th>
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Extraction Method: Principal Component Analysis.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 10 iterations.
Non-Native Speakers of English Student Volunteers Needed

Undergraduate and Graduate students

You are invited to participate in a study that examines the roles that content knowledge and English listening ability play in English lecture comprehension. We have several tasks directed at this question, and will need some volunteers to help us in this study. There will be 2 sessions for this study. Session one will take no more than 2 and half hours. Session two will take no more than 2 hours but it will be for only selected participants. Participants will get an incentive, 10 dollars an hour for each session. If you participate in only session one, you will receive an incentive, 25 dollars (maximum). But if you participate in session one and two, you will receive maximum 45 dollars as an incentive.

Contact period: MM/DD/YEAR – MM/ DD/ YEAR
Research period: MM/ DD/ YEAR – MM/ DD/ YEAR

Contact immediately before you miss this opportunity. Give us your telephone number and email information so that we can inform you of what this study is about in detail.

Email: jeon.24@osu.edu
TEL: 688-0563
APPENDIX S

CONSENT FORM

The Ohio State University Consent to Participate in Research

Study Title: A Study of Listening Comprehension of Academic Lectures within the Construction-Integration Model

Researcher: Charles R. Hancock (Principal Investigator) and Jihyun Jeon (Co-investigator)

Sponsor: N/A

This is a consent form for research participation. It contains important information about this study and what to expect if you decide to participate.

Your participation is voluntary.

Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate. If you decide to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose:
This study investigates the role of background knowledge in one’s comprehension of an academic lecture given in English.

Procedures/Tasks:
For Session One (For all participants):
You will receive a six-digit alpha-numeric ID number (ex: AA0001) for protection of your privacy before you perform the listening tasks. Before listening to the academic lecture, you will be given two instruments by which to gauge your English-listening ability and your background knowledge of the lecture. Upon completing these two instruments, you will be given a 5-minute break after which you will receive a headset for listening to an audio-recorded academic lecture. After you inform the researcher that you are ready, the lecture will be played for 13 and a half minutes. While listening to the recorded lecture, you are allowed to take notes. After listening to the lecture, you will take two listening comprehension tests. While taking the listening comprehension tests, you will be allowed to refer to your notes to help answer the questions. A 5-minute rest will be included before you are given two instruments for self-rating your listening comprehension of the lecture and to rate your listening strategy use. After completing these instruments, you will be asked to fill out a questionnaire about your English-learning experiences and background information. You will receive a payment of $10 per hour after completing all tasks for Session One.

For Session Two (For a 10% follow-up of the total number of participants in Session One): Participants will be interviewed two weeks after Session One has been completed. If you participate in the interview, you will listen to the academic lecture again and will be asked to rate the level of listening difficulty of the lecture. You will not be allowed to view your self-assessment on listening difficulty from Session One. Ten interview questions will be given to you in English, and you will have time to formulate answers to the questions. Since the interview encourages spontaneous responses, not all the interview questions will be asked, if
the expected responses have already been obtained. With your permission, the entire interview will be audio-taped. Each interview will last no more than one hour. You will receive a payment of $10 per hour after the interview.

Duration:
This study is comprised of two sessions, each lasting no longer than 2 1/2 hours. You may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University. Detailed information about the procedures and duration for each session in the study follows.

Session One (For all participants):
1. Brief overview of study
2. Complete the instruments for assessing background knowledge of a given lecture topic and English-listening ability
3. 5-minute break
4. Listen to the lecture
5. Listening tests-Checklist/ Written recall protocols/Inference questions
6. 5-minute break
7. Complete the instruments for self-rating listening difficulty of the lecture and to rate your listening strategy use
8. Complete a background information questionnaire

Session Two (Two weeks after Session One has been completed – For a 10% follow-up of the total number of participants in Session One):
1. Listen to the lecture from Session One
2. Complete the self-rating instrument
3. Interview (lasting no longer than one hour)

Risks and Benefits:
One of the risks you might feel is some psychological stress due to taking several listening tests measuring your listening ability or that your responses will be audio-taped when you are interviewed. You might also feel uncomfortable with my presence as the researcher while you are taking the listening tests. In order to ease your stress, I will keep all information obtained from the listening tests and the interview confidential in a locked file drawer in a private place during this research and will destroy all information obtained immediately after the completion of this study. Also, your personal comments or opinions will not be judged for correctness and will not be disclosed to other people. When I report your response in the dissertation, conference, or journal articles, I will not use your name in order to protect your privacy and identity.

Some of the benefits you will gain include knowledge about the topic covered in the lecture of the listening component and gaining experience in taking listening tests without any penalty or having to pay to take these tests. You will also gain knowledge about listening strategies which may be helpful to your understanding of academic lectures in English and which you
may use in transferring knowledge learned in your native language to performing academic
tasks in English. In addition, it is hoped that through this research, you will become more
familiar and successful with listening comprehension. Finally, you will contribute a research
in language education.

Confidentiality:
Efforts will be made to keep your study-related information confidential. However, there
may be circumstances where this information must be released. For example, personal
information regarding your participation in this study may be disclosed if required by state
law. Also, your records may be reviewed by the following groups (as applicable to the
research):
- Office for Human Research Protections or other federal, state, or international
  regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible
  Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-
  regulated research) supporting the study.

Incentives:
In appreciation for your valuable time and contributions to this study, you will receive 10
dollars per hour at the end of each session. However, if you decide to withdraw from
participation in the study before completing a session, the cash payment will be paid on a pro-
rated basis depending on how long you stay.

There will be two sessions for this study. Session One will take no longer than 2 1/2 hours,
and Session Two will take no longer than 2 hours. If you participate in Session One, you will
receive a maximum of 25 dollars. If you are asked to participate further in Session Two, you
will receive an additional 20 dollars (maximum). Therefore, if you fully participate in all
sessions of this study, you will receive a maximum of 45 dollars as an incentive.

By law, payments to subjects are considered taxable income. If you are an OSU employee,
you compensation you receive as a result of participating in the study will be made through
the payroll system and applicable taxes will be deducted.

Participant Rights:
You may refuse to participate in this study without penalty or loss of benefits to which you
are otherwise entitled. If you are a student or employee at Ohio State, your decision will not
affect your grades or employment status.

If you choose to participate in the study, you may discontinue participation at any time
without penalty or loss of benefits. By signing this form, you do not give up any personal
legal rights you may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State
University reviewed this research project and found it to be acceptable, according to
applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:
For questions, concerns, or complaints about the study you may contact Jihyun Jeon either at 614-688-0563 or at jeon.24@osu.edu or Dr. Charles R. Hancock at hancock.1@osu.edu

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If you are injured as a result of participating in this study or for questions about a study-related injury, you may contact Jihyun Jeon either at 614-688-0563 or at jeon.24@osu.edu

Signing the consent form
I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to participate in this study.

I am not giving up any legal rights by signing this form.

Printed name of subject

Signature

Date and time

Printed name of person authorized to consent for subject (when applicable)

Signature of person authorized to consent for subject (when applicable)

Relationship to the subject

Date and time

Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Jihyun Jeon

Signature of person obtaining consent

Date and time

Page 4 of 4

Form date: 12/15/05
November 10, 2006

Jihyun Jeon
Ohio State University
335 Jones Graduate Tower
101 Coral Drive
Columbus, OH 43210

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3. The test materials must be placed in an appendix to the research publication, and the appendix must not be made available to University Microfilms, Inc.

4. You will assume responsibility for the analyses and conclusions of your study and, other than acknowledgment of the source of the questions, you will not use ETS's name in such a way as to imply participation in or responsibility for your research.

5. Please send a copy of your research results to Lorraine Carmosino, Educational Testing Service, Office of General Counsel, Rosedale Road, Mail Stop 04-C, Princeton, NJ 08541 when available.

6. If you are referencing ETS's TOEFL® trademark in your publication, specific guidelines for the informational use of the TOEFL trademark must be followed. Please review the Guidelines for the Proper Informational Use of ETS Trademarks in the attached Appendix B.
7. This Agreement shall be considered null and void if not signed and returned within 30 days of the date of this letter.

If the above arrangements are satisfactory, please sign both copies of this letter, and return one to me at the above listed address.

Sincerely,

Lorraine Carmosino
Permissions Administrator

cc: S. Wagg

ACCEPTED AND AGREED TO:

BY: Jihyun Jeon

TITLE: Ph.D. Candidate at CUNY City University of New York

DATE: 1/19/2006
APPENDIX U

IRB APPROVAL LETTER

December 12, 2006

Protocol Number: 2006H0331
Protocol Title: A STUDY OF LISTENING COMPREHENSION OF ACADEMIC LECTURES WITHIN THE CONSTRUCTION-INTRODUCTION MODEL, Charles R. Hancock, Jihyun Jeon, Teaching & Learning

Type of Review: Initial
IRB Staff Contact: Kelli Cyrus
Phone: 614-292-6826
Email: cyrus.17@ohio-state.edu

Dear Dr. Hancock,

The Behavioral and Social Sciences IRB APPROVED the above referenced protocol.

Date of IRB Approval: December 11, 2006
Date of IRB Approval Expiration: November 17, 2007

If applicable, informed consent (and HIPAA research authorization) must be obtained from subjects or their legally authorized representatives and documented prior to research involvement. The IRB-approved consent form and process must be used. Changes in the research (e.g., recruitment procedures, advertisements, enrollment numbers, etc.) or informed consent process must be approved by the IRB before they are implemented (except where necessary to eliminate apparent immediate hazards to subjects).

This approval is valid for one year from the date of IRB review when approval is granted or modifications are required. The approval will no longer be in effect on the date listed above as the IRB expiration date. A Continuing Review application must be approved within this interval to avoid expiration of IRB approval and cessation of all research activities. A final report must be provided to the IRB and all records relating to the research (including signed consent forms) must be retained and available for audit for at least 3 years after the research has ended.

It is the responsibility of the investigator to promptly report to the IRB any serious, unexpected and related adverse events or potential unanticipated problems involving risks to subjects or others.

This approval is issued under The Ohio State University IRBIR Federalwide Assurance #00006378.

All forms and procedures can be found on the IRB website [www.orirb.osu.edu]. Please feel free to contact the IRB staff contact listed above with any questions or concerns.

Thomas Nygren, PhD, Chair
Behavioral and Social Sciences Institutional Review Board

Behavioral Approval #1200
Version 11/12/06

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APPENDIX V

SCORING RUBRIC FOR RECALL-PROTOCOL

Dear colleague/Rater:
Thank you very much for agreeing to help out in evaluating student responses to the listening in my dissertation study.

Here’s what to do.
You have some responses written by students who participated in my study. They listened to a lecture; then the students in the study wrote recalls of what they understood. What we want to know is if what the students wrote matches what was said in the lecture, in terms of themes, main ideas, and details.

To make your evaluation,
1. First read over the transcript of the lecture.
2. Write the student’s ID number on the evaluation form.
3. Read each student response.
4. Read down the evaluation form (Transcript coded by different levels. Generally, the transcript uses the pausal units as the major units, and thus follow natural pauses or stress patterns in speech followed by Johnson (1970)).
5. Compare the student response to the transcript. If, in your judgment, the content of what the student wrote matches the transcript, underline that part of the student response and write the number of that pausal code of the transcript.
6. Count up the number of pausal units and write that at the bottom of the response.

Remember that memory is not a tape recorder; comprehension and recall involve some interpretation. For this reason, other studies that use recalls have advised raters to use “lenient” criteria in judging. So, in this case, do try to be accurate, but feel free to give students the benefit of the doubt. Try to be as consistent as you can.

In the lecture, the speaker repeats himself. If a student recall captures the meaning, go ahead and check any instance where you think the student has captured the meaning shown in the transcript. Transcript coded by four different pausal units is enclosed.

Jihyun Jeon
Ph.D. Candidate, School of Teaching and Learning
Jeon.24@osu.edu
APPENDIX W

SAMPLE OF RECALL-PROTOCOL ANSWER

The speaker talks about galaxies; specifically about Andromeda and Milky Way because Milky Way is the galaxy we are in and Andromeda is very similar to Milky Way and its study may provide insights and understanding of our Milky Way too.

First, the speaker provided a definition of a ‘galaxy’ as a body of gas, stars, and dust held together by gravity. Then he elaborated that the constitution of galaxies vary might vary. Some may have high star content and low dust and gas content and others may have different proportions of these constituents.

Then he talks about large and small galaxies; large galaxies might have millions of stars (Andromeda and Milky Way are large galaxies with about 200 billion stars each) whereas the smaller galaxies have no more than 10 million stars. He also talks about luminosity of galaxies and the source of it, specified low-mass stars.

After that, the speaker focuses the discussion on Andromeda and Milky Way galaxies. He addresses the issue of measurement stellar content and reflects that though we are more aware about the nature of stellar content in Milky Way, we still don’t have sufficient information about the stellar content of Andromeda.

He talks about Andromeda and why it is also known as M31. Andromeda looks like in fall and early winter, Andromeda can be seen as a smudge in the night sky with naked eyes.
APPENDIX X

SAMPLE OF BRIDGING INference QUESTION ANSWER

Bridging inference questions

ID# 00032

Directions: Complete the following questions. You may write in English or in your native language. You may refer back to your notes. Do not use single words for your responses; form your responses in phrases or in complete sentences. You will be provided with two blank sheets of paper. There is time limitation to answer questions (20 minutes). Maximum length of your answer for each question is 300 words.

Question #1: How did Hubble’s mistake affect the issue of the precision of the measurement of the galaxy in the present time in relation to the distance of Andromeda?

Question #2: How could you describe the characteristics (shape, appearance, distance, structure, etc.) of the Milky Way?
Question #1: How did Hubble’s mistake affect the issue of the precision of the measurement of the galaxy in the present time in relation to the distance of Andromeda?

Because the galaxy and Andromeda are difficult to look with human being’s naked eyes, people need to use telescope. Even though people use telescope might not see clearly the Milky Way and Andromeda.

Hence, long distant from the earth to the galaxy is the challenges that reason to investigate Andromeda.

Hubble assumes the galaxy is spiral. If you remove the disk from the galaxy, the sphere has still gas and dust due to other related factors, the galaxy is hard to observe. Therefore, Hubble’s mistake affects the precision of the measurement of the galaxy.
Question #2: How could you describe the characteristics (shape, appearance, distance, structure, etc.) of the Milky Way?

The Milky Way's shape is like a disk and composed of hundreds of stars. Because of long distance from the earth to the Milky Way, it is difficult to look with naked eyes. People need to utilize telescope to see stars. The brightest galaxy is about 10 billion stars. The brightest inside of the disk is the brightest and outside of the disk is dark and faint.

Both of the Milky Way and Andromeda are similar, consisting of dust, and gas.