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To Copy Verbatim, Paraphrase or Summarize - Listeners' Methods of Discourse Representation While Recalling Academic Lectures

Abstract

It is unanimously agreed that comprehension of academic lectures is cognitively demanding; however, few studies have focused on a listener's real-time discourse representation of a lecture. Based on the qualitative analysis of the verbal protocols, the present study investigated sixteen Chinese university students' verbal recall of an academic mini-lecture to explore how they made sense of the lecture and represented its discourse when they recalled it episode by episode, and to what extent they differed in discourse representation. The results show that listeners' discourse representation involved a range of cognitive processes such as paraphrasing, summarizing, and verbatim copying. Paraphrasing and summarizing were the main methods of discourse representation used by the participants when they verbally recalled the lecture. Those who correctly paraphrased more idea units recalled more content of the lecture. They were able to select and retain more idea units in their short-term memory, build more associations between the selected idea units, integrate them with the existing discourse structures and ensure contextual coherence in the construction of the local discourse structures. The findings of the study contributes to a better understanding of how listeners comprehend academic lectures and confirm that improving students' paraphrasing skills and hierarchical discourse construction in recall are conducive to better comprehension of academic lectures.

Key words: Discourse representation; Lecture comprehension; Recall; Paraphrase; Summarize

1. Introduction

Academic lectures as a principal genre of instructions in university settings (Lee, 2009) usually contain longer sentences and complex structures, and they are largely monologues. Comprehension of academic lectures poses a heavy cognitive load on second-language listeners (AUTHOR, 2018; Buck, 2001; Lynch, 2011). Recent studies prove that knowing how a discourse is structured and being aware of discourse organizers and genre patterns can facilitate students' comprehension and note-taking skills (Thompson, 2003; Zare & Keivanloo-Shahrestanaki, 2017; Zare et al. 2021). These studies echoed Dunkel and Davis's finding (1994) that it was the listeners' understanding of sentence connections and the overall discourse structure that could define the success of lecture comprehension. However, few studies have focused on how listeners construct their discourse representation of a lecture while listening to it. From the listeners' end, it is less clear how the lecture is "unpacked", i.e. how the lecture structure is cognitively represented in the listeners' mind." As Rost (1994) claimed that we could not simply assume the lecturer "packs" the lecture and the

listener “unpacks” it on the receiving end. How lecture content is converted to “memorable intake” remains unclear. If we investigate lecture comprehension solely from the perspectives of the speaker, it would be insufficient to understand how listeners comprehend academic lectures. A cognitive approach would be helpful to probe into the methods that listeners are likely to use in their discourse representations, while listening to a lecture, such as verbatim copying, paraphrasing, and summarization. In the current study, we aim to examine how listeners retain and reconstruct academic lectures.

Both concurrent and immediate retrospective verbal reports are considered a valid means to obtain individuals’ thinking processes (Faerch and Kasper 1987; Ericsson and Simon 1993; Brown & Rodgers 2002). Therefore, using recall of what has just been heard could be adopted as a valid means to access individuals’ thinking processes.

This paper reports the different methods of discourse representation employed by 16 Chinese learners of English as a foreign language when they verbally recalled an academic mini-lecture. The participants listened to the mini-lecture twice. At the first time, they listened to the whole mini-lecture without any pause. At the second time of listening, the mini-lecture was played episode by episode (about 50 words per episode). An episode is a sequence of propositions that form local coherence as semantic units in a discourse (van Dijk, 1981: 180). Between two episodes, the participants were given 20-30 seconds to recall what they just heard. Our study aims to explore how the participants re-constructed the discourse when they recalled the mini-lecture episode by episode, and to what extent they differed in their discourse representation.

2. Discourse representation of academic lectures

Alongside the studies on discourse comprehension pioneered by van Dijk (1975, 1980, 1981) and van Dijk & Kintsch (1977, 1983), the 1970s witnessed a significant growth of research into the discourse structure and discourse organizers of academic lectures (Flowerdew 1994; Zare et al, 2021). However, how the discourse of academic lectures is represented in listeners’ mind remains under-researched. An important assumption related to the effect of discourse representation on academic lecture comprehension is that if we can “characterize the formal schema of university lectures for our students, their processing of information will be greatly facilitated” (Young, 1994: 160).

Brown and Yule (1983) argued the reader/listener when receiving a discourse would try to build a representation of the state of affairs communicated by the speaker. What matters here is to what extent the listener’s representation shaped by his own experience of the world is similar to that of the speaker. Discourse representation is a crucial step that builds the semantic structure of the discourse in the listener’s mind. As pieces of information accrue during a speech event, they are progressively integrated into the listener’s existing discourse structure. Field (2008) pointed out that

in terms of the building of discourse structure, less successful listeners fail to build “a complex network of interrelated ideas but rely instead upon a linear string of small units of meaning” (p.254), however successful listeners tend to know how different discourses are organized, which can help them build complex hierarchical structures. Similarly, Goh (2000) reported that low-level learners were found to have noticeably more difficulties in the decoding process than more advanced ones, not to mention higher cognitive demands such as building a complex discourse representation. Nevertheless, more empirical evidence is required to validate Field’s argument.

2.1 Rules of structure construction

According to van Dijk and Kintsch (1983: 189), semantic structures of discourses are based on the meanings of the sentences of a discourse, i.e., on the propositions expressed by them. Semantic structures, also called macrostructures, are explicit, and their meaning is the unifying property of the respective meanings of a sequence of propositions of a discourse, which is defined by “macrorules” (ibid, 190) based on the meaning of the sentences of a discourse. Sentences consist of propositions which are the smallest units that can be judged as true or false (Anderson, 2014: 104). Other scholars call them “information units” (Sigel, 2018: 87). However, spoken language is sometimes messy, not as systematic as written language and it is usually produced in streams of “idea units” (IUs), i.e. “single intonation contours” as defined by Chafe (1979). Here we use the term “idea unit” because it forms part of the discourse representation a listener gradually builds up in the process of listening (Field, 2013: 121). Three rules are employed to process those propositions or idea units: deletion, generalization, and construction:

1. DELETION: For a sequence of propositions, delete the propositions that are not conditions (e.g., presuppositions) for interpreting another proposition in the sequence. As an example, the rule of deletion allows for the removal of “sunlight and swarms of flies” from the description of an environment, if it does not contribute to the rest of the story.
2. GENERALIZATION: For a sequence of propositions, replace the sequence by “a proposition that is entailed by each of the propositions of the sequence”. For example, the detailed piece of information with reference to France, South Korea, Brazil or Romania can simply be condensed to “several countries”.
3. CONSTRUCTION: For a sequence of propositions, substitute it by “a proposition that is entailed by the joint set of propositions of the sequence”. For example, the sequence (“X goes to the airport”, “X checks in”, “X waits for boarding”...) entails the macro-meaning “X is taking a plane”.

Van Dijk & Kintsch (1983: 190-210)

In a word, the afore-mentioned rules help generate the semantic structure of a discourse from local meanings which is constituted by semantic units covering a sequence of propositions. Meanwhile, listeners can use those rules to grasp the gist or

main ideas of academic lectures.

The rules proposed by van Dijk and Kintsch aim to “reduce the information in a text base to its gist” as the “theoretical macrostructure” (van Dijk & Kintsch, 1983: 363). Van Dijk and Kintsch analyzed readers’ recalls to generalize their reading comprehension processes. This research methodology supported the assumption that research on recall could contribute to understanding how readers retained information of what they had read and made sense of it. On the basis of Kintsch and van Dijk’s findings of reading comprehension processes, Field (2013:103) argued that structure building was the highest level of listening comprehension, emphasizing the construction of a “hierarchical pattern of what has been said, consisting of a set of major points with subordinate points attached to them”. In forming this hierarchical pattern, a listener needs to build relevance of the new information to the old and integrate it into a representation of a larger listening event. Inside the mind of academic listeners, discourse representation is an ongoing process of cumulative meaning construction, which differs from the meaning representation derived from a specific individual utterance.

2.2. Recall as discourse representation

Immediate recall tasks are widely used as an assessment tool of second language reading comprehension (Riley & Lee, 1996; Chang, 2006). Bernhardt (1991) believed a recall task was a “purer” method of testing reading competence that highlighted communication between text and reader. Alderson (2000) confirmed that if the recall task followed reading immediately, then the function of memory wouldn’t override that of comprehension. Moravcsik and Kintsch (1993) found that more skilled readers performed better in recall than less skilled readers.

Listening is more instantaneous; instant recall can help listeners retain and make sense of what they have just heard. Wilson (2003) found it an effective approach by asking students to reconstruct a small text (46 words) after hearing it in groups to prioritize their problems in listening comprehension, such as lack of contextual inferencing (i.e. difficulty in making connections of notions in the context). Recall tasks could assess a deeper understanding of what L2 learners had listened to, distinguished from the superficial understanding of texts (Bejar, et al, 2000; Rost, 2016). Rost (1994) believed that using online-summary (similar to immediate recall) of a lecture was an effective way to access listeners’ mental representation of it.

Field (2013: 102) emphasized that discourse representation is not a complete and clear-cut record of what has been said but the listener’s recall of what has occurred. He proposed the three-step discourse representation model of “selection, integration and self-monitoring” to illustrate how listeners dynamically construct their discourse representation. That is to say, recall itself is the authentic reflection of discourse representation in the listener’s mind. Even though participants may not recall all they remembered, what they recall must represent part of the content they remembered,

usually the most salient in memory (Brown, 2008).

The most salient information in the memory is stored in various ways. Verbatim copying is one of them. Rost (1994: 110) found a wide use of “juxtaposition strategy” by participants when they summarized lectures. Listeners tended to place two key words together with a vague association between them. The “juxtaposition strategy” is similar to “copy and delete” (Brown & Day, 1983). Kintsch and van Dijk (1978) used the term “verbatim” to refer to the same concept. Verbatim copying cannot be considered the same as listeners’ comprehension, as it sometimes leads to “creative anomalies” (Rost, 1994: 111). When it comes to assessment, “verbatim responses are not a successful strategy for answering global questions” (Hansen, 1994: 265). To put it simply, verbatim copying means to recall word for word, but this type of recall might not reflect comprehension.

Meanwhile, listeners tend to use paraphrasing or summarizing as a method to save cognitive resources, because the restraint of short-term memory can make attentional resources rather limited (Robinson, 1995) and furthermore, the number of propositions remains constant in memory (Simon, 1974). The time span of working memory where information processing occurs typically lasts 15 to 16 seconds (Baddeley, 1986). In terms of propositions, only two or four propositions can be the optimal unit to be contextualized as the new information in the working memory (Rickheit, Schnotz & Strohner, 1985: 16). During listening comprehension, listeners often rely on familiar content words to make inferences from the context (Goh, 2002: 194). In other words, a paraphrase or a summary of the same meaning is needed to grasp the points of a discourse. Paraphrasing of the text allows readers to recall more content and main ideas if they are fully engaged with it (e.g. Best, Rowe, Ozuru, & McNamara, 2005; Hagaman, Casey, & Reid, 2016). Whether paraphrasing is also an effective way of discourse representation is however under-researched. Paraphrasing is recasting the source text accurately (Shi, Fazel&Kowkabi, 2018: 32) to preserve meaning as “exactly logically equivalent” (Bhagat &Hovy, 2013: 471) while summarizing refers to reduction of propositions or idea units by means of macrorules which delete, generalize or construct local information into more general, or more abstract concepts (van Dijk,1983).

Summarizing is indispensable for learners to build semantic structures and obtain the gist of the discourse (AUTHOR 2005, 2013, 2021; Rost, 1994). For academic lectures, verbatim copying cannot help contextualize new information and hence comprehension might fail on occasions where discourse meaning is not successfully constructed. Lynch (1998) urged further investigation on listeners’ instant procedures for actively monitoring and remedying gaps in comprehension. Field (2011) argued that we can ask listeners to transcribe short sections of listening input to examine the extent to which listeners rely on compensatory strategies to supply missing words and phrases in decoding the listening input. However, what remains unknown is to what extent paraphrasing and summarizing can help build discourse representation in

listeners' mind to enhance their comprehension.

3. The study

The above literature review indicates that discourse representation involves verbatim copying/reporting, paraphrasing and summarizing (or Rost's notions (1994) as framing and embedding), which is an ongoing process of cumulative meaning construction essential to listeners' comprehension of complex discourses. The present study aims to answer the following research questions:

1. What methods do listeners employ to construct discourse representation of an academic lecture when they recall it episode by episode?
2. To what extent do successful listeners differ from less successful listeners in their discourse representation of the academic lecture?

3.1. Participants

There were 16 participants, aged from 20 to 22 with an average age of 21.38 at the EFL department of a foreign language university in Shanghai. Their English-learning time ranged from 9 to 15 years with 12.38 years on average. They were asked to recall a randomly chosen academic lecture, used in a past Test for English Majors-Band 8 (TEM-8) Listening Comprehension paper. TEM-8 is a national standardized high-stakes test developed and administered by the National Advisory Committee for Foreign Language Teaching (NACFLT, 2004) affiliated to the Higher Education Department, Ministry of Education, China. The test aims to evaluate the English language proficiency level of English majors in universities in the third and fourth years of their academic study (Jin & Fan, 2011). Overall, TEM-8 is approximately at CEFR C1 level (Peng, Liu & Cai, 2022).

3.2. Research instruments

Two academic lectures selected from TEM-8 past papers were used in this study in case that if a participant is familiar with one lecture, there could be an alternative. The two lectures have a similar length and structure. Academic lectures follow the similar pattern by introducing the topic (move 1 establishing a territory), raising questions or extending the previous knowledge (move 2 establishing a niche) and outlining purposes or indicating structures (move 3 occupying a niche) (Swales, 1990). Detailed moves of each lecture are presented in Table 1.

Table 1 Detailed Information of the Two TEM-8 Mini-lectures

	Lecture 1	Lecture 2
Topic	Paralinguistic features of language	What do active learners do?
Text type	Exposition	Exposition
Synopsis	The lecturer introduced paralinguistic features such as tone of voice, gesture and posture and their categories in the mini-lecture.	The lecturer introduced the differences between an active learner and a passive one and gave some useful strategies that could help students

		become active learners.
Moves	Introducing the topic (move 1)-Elaboration on categories (move 2)- Recurrence of main points (move 3)	Introducing the topic (move 1)-Contrast between two categories (move 2)-A brief summary (move 3)
Speech rate	119/min	134.7/min
Episodes	20	20
Idea units	80	83
Mean idea units per episode	4	4.15
Mean words per IU	11.9	11.4
Mean length per IU (secs)	6.06	5.06

The two lectures are similar in terms of difficulty, length and genre. The two recordings have similar readability level (Flesch Kincaid Reading Ease 58.2 for Lecture 1 and 57.2 for Lecture 2) and the length of script (952 words for Lecture 1 and 943 words for Lecture 2). Both lectures are expository with the purpose to inform listeners. Speech rate of both lectures is within 150 words/minute with some slight difference. Both lectures contain 20 episodes. Lecture 1 has 80 IUs while Lecture 2 has 83 IUs. Both lectures have similar mean IUs per episode (4 vs. 4.15), mean number of words per IU (11.9 vs. 11.4) and mean length per IU (6.06 seconds vs. 5.06 seconds). According to Chafe (1979), the mean number of words per idea unit in an academic lecture is 11 words while the mean number of words per idea unit in a conversation is 7 words.

3.3. Data collection

The participants listened to one of the two mini-lectures twice with eight of them listening to Lecture 1 and the rest listening to Lecture 2. At the first play, they were asked to complete a summary-cloze task in the TEM-8 test paper and the data of the first play were reported in AUTHOR (2021). At the second play, they were asked to recall the lecture. The participants were told at the beginning of the experiment that they were required to do both tasks one by one. Field (2013:127) argued that test takers would use the first play of recording to find the location of information in the recording and to make a preliminary match against the items in the paper, while on the second hearing test takers would be able to move on to construct a higher-level discourse representation. Therefore, we asked the participants to recall the lecture on the second hearing, with one episode (average text length around 50 words; average audio length between 15 and 30 seconds) played at a time. Then they were given 20-30 seconds to verbally recall the episode they just heard. The purpose of pausing recording during the verbal recall process is to reduce the memory effect and to ensure the immediacy of the verbal report (Field, 2011). We used a computer to record all the participants' recall data, then transcribed and coded them with Nvivo 11.0.

3.4. Data analysis

We coded the recall data iteratively as the themes emerged. Under the code of “summarization”, we categorized the data in three subordinate processes: deletion, generalization and construction which conform to van Dijk’s (1983: 189) “macrorules” discussed in the literature review. One episode could contain multiple codes. For example, compared with the original script of the lecture, the following recalled episode contains three codes: construction, paraphrase and generalization.

Example: “It is a contrast./¹(*construction*) Active learners think they learn for their own sake/(*paraphrase*) while passive learners, yes, they may seek for various excuses for their problems/(*generalization*).”

Original script: “The last characteristic, which I think is the most fundamental one, is to accept much of the responsibility for learning./Active learners understand that the responsibility for learning must come from within, /while passive learners often want to blame others for their lack of motivation, poor performance, time management problems, and other difficulties that they might experience./”

“Contrast” was not mentioned directly in the original script but could be inferred from the context of the lecture, so “It is a contrast” can be coded as construction (a proposition that can be constructed from related sentences). “Active learners think they learn for their own sake” is a paraphrase of the original “Active learners understand that the responsibility for learning must come from within”. In “Passive learners...may seek for various excuses for their problems”, “problems” is entailed by all the examples in the original lecture such as “lack of motivation” and “poor performance”, and hence it can be coded as “generalization”.

Participants’ recall protocols were coded twice via Nvivo 11.0 within two weeks. The intra-coder reliability is 0.846. At the second-time coding, a colleague coded 30% of the data and the inter-coder reliability was 0.753. Table 2 below presents the overall coding scheme. It includes the three main methods of discourse representation: verbatim copying, paraphrasing and summarizing, with examples of the recall protocols and the corresponding original scripts of the lectures.

Table 2 The Coding Scheme of Recall Protocols

The coding scheme of recall protocols of the TEM-8 Mini-lectures			
<i>Methods of discourse representation</i>	<i>Definition</i>	<i>Recall Protocols</i>	<i>Original episodes of the lectures</i>

¹“/” means the end of one idea unit of the recall.

Verbatim copying	Recall word for word, using the original propositional order for at least seven words.	<u>In other cultures placing your hand on your heart</u> (verbatim)indicates that you are telling the truth, <u>pointing your fingers to your nose means it's a secret,</u> (verbatim)that's how we see the gestures are culture-bound. (paraphrase)	“In other cultures placing your hand upon your heart is to indicate that you are telling the truth,/pointing your finger at your nose means it's a secret, /that's why we say that gestures are culture-bound.” (Lecture 1)
Paraphrasing	Recall all the main propositions, but use synonyms or one's own words instead of the original words.	Of course active learner do not question everything.(verbatim) They usually question those information <u>which is different from their existing knowledge.</u> Um, <u>the new information didn't fit in, doesn't fit in,</u> (paraphrase) they will <u>draw a new conclusion or different conclusion.</u> (paraphrase)	“Of course, active learners don't question everything, /but they do evaluate what they read and hear./When new information fails to fit in with what they already know,/they may differ in the conclusions they draw or the inferences they make.” (Lecture 2)
Summarizing Deletion	Delete propositions in the sequence.	Such as whispering, breathiness, whispering indicates needs for secrecy, (paraphrase) breathiness indicates deep emotion, (paraphrase) <u>the third one is huskiness...</u> (deletion) and then nasality, indicates anxiety (paraphrase).	“Let me give you some examples./ The first is whispering which indicates the need for secrecy./ The second is breathiness. This is to show deep emotion./ The third is huskiness which is to show unimportance./ The fourth is nasality this, um, is to indicate anxiety.” (Lecture 1)
Generalization	Replace the sequence by a proposition that is entailed by each of the propositions of the sequence.	The most fundamental characteristic is the active learners accept responsibilities (paraphrase) as they think responsibilities are from within, (paraphrase) but passive learners always blame others for their lack of motivation, poor performance, (verbatim) and <u>some other bad behaviors.</u> (generalization)	“The last characteristic, which I think is the most fundamental one, is to accept much of the responsibility for learning./ Active learners understand that the responsibility for learning must come from within,/ while passive learners often want to blame others for their lack of motivation, poor performance, time management problems,/ and other difficulties that they might experience.” (Lecture 2)
Construction	Replace a sequence of	So it talks about <u>what</u> they	“Good morning. Today I'll

propositions by a proposition that is entailed by the joint set of propositions of the sequence.	learn, <u>the active learners do</u> . First, the speaker divides the learner into <u>two categories</u> . (construction) The first is passive learner and the second active learners. And through six, the, the analysis of six features of passive learners in contrast to, (paraphrase) the six features of active learners in contrast to passive learners, we can, we can have a better understanding of the two categories. (paraphrase)	discuss: what is active learning, and, uh... what do active learners do?/ In order to define active learning, I'll look at the differences between active learning and passive learning by examining six characteristics of active learners/ and contrasting them with those of passive learners. Ok, let's start." (Lecture 2)
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In order to get an overall picture of the participants' recall data, we also calculated all the participants' correct recall IUs. The grading rubrics are quite simple: only successfully recalled complete IUs would be calculated; the missed IUs and IUs of wrong content would not be calculated; if only half of the content of one IU was recalled, it would be calculated as 0.5 IU.

4. Results and discussion

In this section, we will first report the general findings of the participants' methods of discourse representation with quantitative data to address the first research question and then the individual differences in terms of discourse representation with qualitative data to address the second research question.

4.1. An overview of discourse representation

To answer Research Question 1, Table 3 shows the general methods of discourse representation. We can see that all the 16 participants used paraphrasing in recalling the mini-lectures with very high frequency (altogether 569 references, 59.29% average coverage). The low frequency of verbatim recalling (only 4 sources, 9 references, 1% average coverage) demonstrates that information stored in memory can hardly take the original form. On the other hand, all 16 participants resorted to summarizing when recalling the lecture (16 sources, 206 references, 22.14% average coverage). Under summarizing, all 16 participants used deletion (16 sources, 125 references), deleting some of the propositions while recalling the lectures. As discussed in the literature review, because of the limited space of working memory, the time span of it is typically 15-16 seconds for information processing (Baddeley, 1986). In this study, the average text length of episodes for participants to recall was restricted to 50 words. The text length of 50 words is cognitively demanding for recalling verbatim; therefore, paraphrasing and summarizing would be necessary discourse representation methods to help the participants recall the lecture content more successfully. Among all the recall protocols, only one student (participant No.

13) deleted very few IUs; she recalled some IUs verbatim and paraphrased most of the rest IUs. Due to the considerable capacity of working memory, her case was rather exceptional. In terms of overall frequency, paraphrasing tops the other methods of discourse representation, summarizing goes next, and verbatim copying comes the last. It is also interesting to note that 14 participants monitored their recall simultaneously in order to either confirm their recall or clarify the semantic structure (14 sources, 91 references, 5.01% average coverage), which reflects Field’s argument that self-monitoring is one of the three steps of discourse representation because part of integration entails comparing a new piece of information with what has gone before to ensure that it is consistent (Field, 2013).

Table 3 Codes of Methods of Discourse Representation

Codes	Participants	Occurrences	Average Coverage
Verbatim copying	4	9	1%
Paraphrasing	16	569	59.29%
Summarizing	16	206	22.14%
Deletion	16	125	
Generalization	8	14	
Construction	15	67	
Monitoring ^①	14	91	5.01%
Miscellaneous ^②	3	7	1.07%
Researcher’s prompts ^③	12	37	11.49%
Total	16	882	100%

Note:

^①Monitoring refers to participants’ awareness of the features of their recalled episodes, such as “That’s the main idea of this part” and “She says about posture and echoing and exemplified specific reasons...”

^②Miscellaneous covers the occurrences that cannot be classified into other categories, such as “I forgot it”; and “I cannot remember the rest”, or participants’ fillers that do not contain any meaning, such as “ah”, “well”, “um”, and “oh”.

^③Researcher’s prompts were given by the researcher when 12 participants paused for more than 5 seconds, such as “What’s next?”, and “Can you go on?”.

We can infer from the findings that paraphrasing facilitates discourse representation. Copying verbatim is only applicable under the condition of relatively short propositions and simple syntactic structures. We have discussed in literature review that idea units are not always kept in the form of original words in listeners’ mind, because meaning is represented in mind with the purpose of facilitating information retention and retrieval. As a result, for the sake of cognitive convenience, meanings of input are stored in the form of propositions or idea units familiar to the listeners. It is worth noticing that one of the participants even came up with it after his recall of one episode: “...*this is not the original words. The original is ‘the concepts that are new to...’When I listen to the passage and I just translate some parts and remember it in my mind...I just reorganize it in my own words...*” Without paraphrasing the original words, the participant cannot even remember what has been heard from the lecture.

Therefore, receptive skills and productive skills are interactive and inter-dependent on each other in the recall task.

The frequency distribution of different methods of discourse representations in recalls (see Table 4) of the 16 participants show how they represented the episodes of the academic mini-lectures. Under “summarizing”, generalization and construction were not frequently used. Since the task was a real-time recalling of the lecture episode by episode instead of recalling the whole lecture, summarizing was much less frequently used than paraphrasing. On the other hand, since the participants were required to do real-time recalling immediately after they had heard an episode of the lecture and it was also the second time they heard the lecture, they must have tried their best to recall as much information as possible.

Table 4 Individual Participant’s Discourse Representation in Recalls

<i>Discourse Representation</i>	<i>Participants</i>															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total recall IUs	42	39	55.5	28	31	47	54	62.5	47	54	56.5	54	74	59	36	56
Paraphrasing	28	25	23	16	22	32	45	46	27	52	49	43	52	48	26	35
Percentage	51.12	34.9	64.1	39.7	46.2	60.4	81.6	69.7	44.5	76.5	55.2	81.1	78.24	60.9	51.1	52.91
	%	6%	5%	0%	4%	1%	1%	0%	9%	4%	9%	0%	%	8%	1%	%
Summarizing	22	18	16	18	14	10	9	12	17	8	13	8	6	17	9	9
Percentage	38.08	31.5	26.0	53.1	23.7	23.2	9.98	16.6	32.5	12.0	18.4	12.4	6.98	15.6	19.9	13.63
	%	4%	4%	8%	2%	5%	%	9%	7%	4%	5%	0%	%	9%	2%	%
Deletion	17	10	10	13	7	3	6	6	12	7	7	5	4	10	3	5
Generalization	4	1	0	0	0	0	0	1	3	0	1	0	2	1	0	1
Construction	1	7	6	5	7	7	3	5	2	1	5	3	0	6	6	3
Monitoring	1	0	1	1	7	0	1	2	1	3	1	3	1	2	4	1
Percentage	1.28	0	3.77	1.92	20.6	0	1.97	2.05	4.12	4.52	3.52	3.98	0.45	1.76	16.1	3.98
	%		%	%	5%		%	%	%	%	%	%	%	%	2%	%
Verbatim	0	0	1	0	0	0	0	4	0	0	0	0	9	0	0	2
Miscellaneous	1	0	0	0	0	1	0	1	0	0	1	0	0	0	0	3

According to Table 4, we can see paraphrasing was most frequently used (ranging from 34.96% to 81.61%). Participants No. 7, No. 10, No. 12 and No. 13, recalled the lecture by mostly paraphrasing it, which could mean they managed to construct the semantic structure of the lecture in their own way and retain most of the information of the lecture this way. Based on the frequencies listed in the tables (see Tables 3&4), participants depended on either the method of paraphrasing or deletion to recall episodes of the lecture. Participants No. 1, No. 4 and No. 9 used deletion most frequently, which could mean they were more inclined to delete IUs to build semantic structures of the lecture.

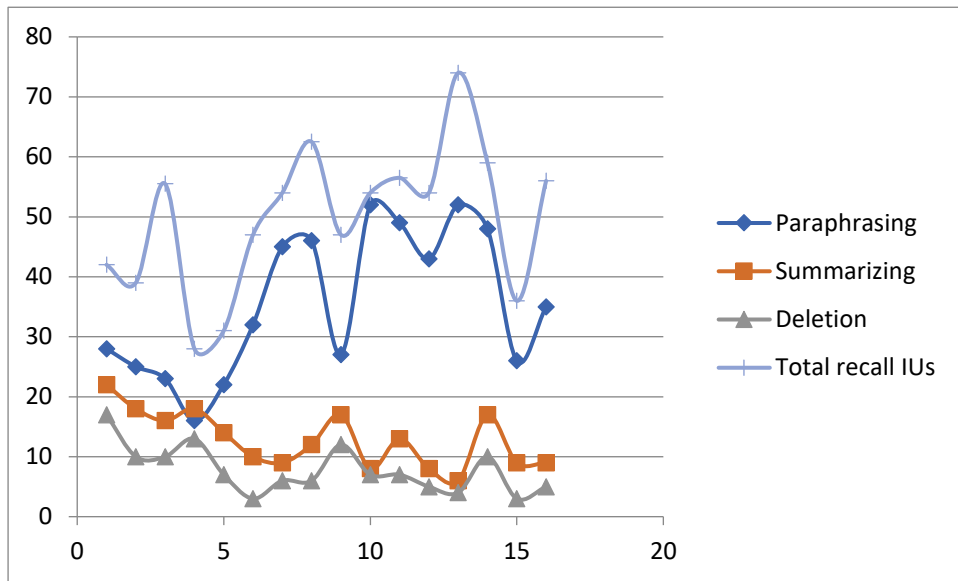


Figure 1 Scatter Diagram of Total Recall IUs, Paraphrasing, Summarizing and Deletion of the 16 Participants

The diagram (Figure 1) presents the visual frequency distribution of the four continuous variables of the 16 participants' recall data. We can observe similar frequency distribution patterns between total recall IUs and paraphrasing, and between paraphrasing and summarizing. This implies that the participants who could correctly paraphrase the content of the lecture were more likely to obtain correct recall IUs. The similar frequency distribution pattern between deletion and summarizing might suggest that the participants need to summarize the discourse by deleting those that cannot be retained in memory when they listen to a lecture because deletion is the simplest rule of structure construction. Meanwhile those retained IUs are not in the form of original wording but take on a paraphrased form. Though paraphrasing and summarizing are the participants' most commonly used methods of discourse representation, paraphrasing is much more frequently used if the effect of memory is minimized (recall by episodes instead of the whole lecture), and construction and generalization are the least used because they are more cognitively demanding in an immediate and instant recall.

4.2. Differences in individuals' discourse representation

To answer Research Question 2—to what extent do listeners differ in terms of their discourse representation of the academic lecture, a qualitative comparison between episodes of individuals' recall protocols is presented below?

4.2.1. Selecting IUs

Example 1 Selecting IUs

Source	Participant 11 (Total recall IUs: 56.5)	Participant 3 (Total recall IUs: 55.5)	Participant 9 (Total recall IUs: 47)
“Active readers, on the other hand, <u>set</u>	Active readers <u>set goals</u>	Active learners at the beginning will,	Active learners will
before reading and	<u>before reading</u> and	beginning will, at the	<u>set goals before they</u>

<u>goals before they read./ and check their understanding as they read./When they finish, they can explain the main points./and know that they have understood what they have read.”</u> (4 IUs)	<u>while reading, they check their understanding, and after reading, they can make out the main idea of the passage...</u> (3 IUs)	beginning will...Ok, during the reading, they will <u>check their understanding, and after they finish reading, they will, they can, they are able to explain the meaning of their reading.</u> Then at the beginning of reading...I forget it. (2 IUs)	<u>read and checking their, eh, and checking their understanding while reading and I just forget it...I think it’s understanding.</u> Um...(2 IUs)
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Comment Participant 11 recalled more IUs than Participants 3 and 9. Participant 11 exhibits his active engagement in meaning-building of the input by paraphrasing it.

The three recall protocols clearly show the difference between participants as Participant 11 has selected most IUs except the final one that is a further elaboration of the third IU thus making it harder to be retained in the memory. Participant 3 missed the first and fourth IUs. At the end of the episode, she did make efforts to recollect the first point but failed again by saying: “Then at the beginning of reading...I forget it.” Participant 9 forgot the last two IUs and she confirmed the loss by saying “I just forget it”. Nevertheless, she could recall there was another “point” that she failed to remember. In other words, participants might have a general idea on how many IUs being heard, but the detailed information of the IUs could elude them. This finding echoes similar findings in several previous studies (e.g., Anderson, 1976; Field, 2008; Kintsch, 1974; Olsen and Huckin, 1990)), confirming that information can be kept in memory as “points” or “chunks” rather than individual words and phonemes.

4.2.2. Building associations

Example 2 Building associations

Source script(Lecture1)	Participant13 (Total recall IUs:74)	Participant4 (Total recall IUs: 28)	Participant7 (Total recall IUs: 54)
“When <u>two people are keen to agree with each other/ they would likely, though unconsciously, adopt the same posture as if in imitation of each other./They sit or stand in the same manner./</u> When used in this way <u>echoing appears to complement the</u>	When <u>two people is keen to each other, they may adopt the same manner as if they are imitating each other.</u> They sit or stand in the <u>same manner.</u> When it use in this way, it is a <u>complement to verbal communication.</u> Of	Imi, imi, imitation, <u>imitation of the same manner, adopt the same manner.</u> Agree, <u>when someone agrees,</u> he will have the same manners...(pause) I heard ‘verbal communication’. After that, there’s mocking	When <u>two people are keen to agree with each other, they will unconsciously do the same manner, such as sit in the same place or do the same thing,</u> which shows an intimacy, an imitation and...(pause) nothing

<u>verbal communication./ Of course when such imitation is carried out consciously/ it often indicates that someone is mocking at another speaker.” (6 IUs)</u>	course if <u>someone do this consciously</u> , it means <u>someone is mocking at the speaker.</u> (6 IUs)	at others. <u>Conscious imitation</u> means <u>mocking at others.</u> (4 IUs)	else. It also says when they are <u>doing it not unconsciously</u> , it means <u>mocking, what, each other.</u> (5 IUs)
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Comment Participant 13 managed to recall all the IUs of the recording. Participant 4 encountered the difficulty in building association between the new IU “verbal communication” with previous IUs and then it became an independent and incomplete IU. Participant 7 recalled most of the IUs but failed to recall the fourth one.

Building associations between IUs is the second step of discourse representation and it facilitates listeners’ cognitive processing of categorizing new IUs. For Participant 4, although he recalled the key phrase “verbal communication”, he failed to make out the relationship between “verbal communication” and previous propositions that center upon “unconscious imitation” as “echoing” (one of the paralinguistic features). False association could end up in mis-categorization. It means if the association-building breaks down, the listener might not be able to categorize new IUs and then fail to attach them to the corresponding existing semantic structure, and thus his/her discourse representation of the lecture would be blocked. For example, Participant 7 failed to process the fourth IU with a pause and a self-reflection of “nothing else”. Immediate categorization of IUs is substantially evidenced by all the recall protocols of Participants 13, 4 and 7, since all of them clearly noticed the contrast between unconscious and conscious imitation and none of them misinterpreted “conscious imitation” (Participant 13: someone do this consciously; Participant 4: conscious imitation; Participant 7: doing it not unconsciously) in the last IU. Making associations to categorize input resembles the “framing” step in Rost’s discourse representation model (1994) as “Logical grouping for ideas”.

4.2.3. *Constructing integration*

Example 3 Constructing integration

Source script(Lecture 2)	Participant11 (Total recall IUs: 56.5)	Participant3 (Total recall IUs: 55.5)	Participant9 (Total recall IUs: 47)
<u>“Although passive learners may seek help at some point,/it is often too little, too late./In addition, because passive learners do not reflect and think critically,/they often don’t even realize that they need</u>	<u>Passive learners also seek help, but because they but they do not reflect very much, so...So they often don’t know they have questions. They even don’t have questions.</u>	<u>Passive learners do ask questions. But they are too little and too late and because they don’t reflect with their ideas, with ideas in the course, so they...(pause) (3 IUs)</u>	<u>Passive learners will ask little questions, they nearly don’t ask questions because they even don’t know they have questions.</u> (2 IUs)

<u>help.</u> ” (4 IUs)	And there’s another point before the sentence...(pause) <u>They just seek too little.</u> (4 IUs)
Comment	Participant 11 showed his active engagement in integrating the previous IU “too little” into the related semantic structure of “passive learners’ seeking help” and finally recalled all the four IUs while Participants 3 and 9 failed to attach one or two IUs to the same semantic structure.

In Example 3, we can see that Participant 11 failed at first to attach “seek too little” to the heading of “passive learners” but eventually managed to integrate this IU into the semantic structure of “passive learners’ seeking help”. “And there’s another point before the sentence...” clearly indicates his effort to construct integration of all the four IUs. On the other hand, Participants 3 and 9 missed one or two IUs so that the construction of integration remained incomplete.

Participants fail to construct complex semantic structures because they cannot integrate the new information into the existing structure. Since the integration of information helps the building of semantic structures, participants tend to monitor their recall to ensure integration, such as “That’s the main idea of this part”; “Um, this is the characteristic of passive learner”; “And they are parallel to each other...”. This might also explain why the method of monitoring takes around 5% of the total occurrences (Table 3).

When participants came across a longer sequence of parallel propositions such as “their lack of motivation, poor performance, time management problems...” they will use a hypernym such as “bad behaviors” or “difficulties” to entail the long sequence. These findings echo Goh’s argument that rephrasing or summarizing of the same idea is an effective strategy to facilitate understanding of important content, thus making listening less stressful (Goh, 2002: 198).

4.2.4. Building local coherence

Example 4 Building local coherence

Source script (Lecture 1)	Participant13 (Total recall IUs: 74)	Participant7 (Total recall IUs: 54)	Participant15 (Total recall IUs: 36)
“ <u>So what may seem normal to a speaker from one culture may appear unnecessarily close or distant to a speaker from another/ and standing close to someone may be quite appropriate in some</u>	<u>So what may seem common, seem normal in one culture maybe unappropriate in another and closeness may be appropriate in some situations, such as informal party, but</u>	<u>I also heard two examples. The first one is if standing close, it just in some situation, it is ok, for example, in informal party, but in others, it is not suggested, like</u>	<u>Later she said if you stand closeness to someone and the...It just means to emphasize specific... It says if you stand closeness to someone, and the meaning the</u>

<u>situations such as an informal party/ but completely out of place in other situations such as a meeting with a superior.”</u> (3IUs)	<u>completely out of place at another, at other situations.</u> (3 IUs)	<u>in meeting, when you are meeting with a superior.</u> (2 IUs)	<u>conversation of talk is different and specific</u> and I cannot recall anything more. (2 IUs, either incomplete or incorrect)
Comment	Participant 13 recalled all the 3 IUs of the input and successfully constructed the local semantic structure. Participant 7 missed the first IU. Participant 15 recalled 2 IUs, but the first IU is incomplete and the second is incorrect. There is no sign of successful local coherence-building in the recall protocol of Participant 15.		

Building local coherence is a temporarily conclusive step of listeners’ dynamic discourse representation of an episode of the lecture. In order to understand the lecture content, the listener must build the semantic structure of what s/he hears and make clear about the hierarchical relationship between different IUs. In example 4, we changed Participant 4 into Participant 15 with the similar level of total IU score to highlight the differences between individuals in the last step of discourse representation. For example, Participant 13 has already built a key point of the episode that (proximity) is culture-bound and situation-specific by recalling that “what may seem common...in one culture...maybe inappropriate (inappropriate) in another” and “closeness may be appropriate in some situations...but out of place at ... other situations”. The recall is highly parallel in structure, similar to the original recording. However, Participant 7 missed the first IU that constitutes the key point of the episode. Another example of less successful recall is Participant 15 who failed to grasp the structure of this episode, especially the logical relationship between “closeness” and different “situations” such as an “informal party” and “meeting with a superior”. Participant 15’s failure to build the local coherence of the semantic structure finally resulted in the missing of the whole point and incomplete discourse representation of the episode. These results are consistent with Wilson’s (2003) prioritization of listening problems derived from a lack of contextual inferencing and the final step of “embedding” in Rost’s discourse representation model (1994), which involves presenting facts or ideas in a logical order of importance.

4.2.5 Further discussion on discourse representation of academic lectures

Field’s (2013) three-step discourse representation model of “selection, integration and self-monitoring” can be applied to academic lecture comprehension. Supported by the examples above, we can depict listeners’ four steps of discourse representation of academic lectures—selection, association, integration and coherence.

1. Selection. Listeners either use verbatim copying or paraphrasing (but mostly paraphrasing) to select the relevant IUs for information processing;
2. Association. After selecting relevant IUs for processing, listeners need to associate, categorize and build logical relationships between those IUs and assign them to the corresponding structures;

3. Integration. After listeners have associated IUs, they need to integrate them with their corresponding structures via deleting, generalizing or constructing relevant IUs, integrating new IUs to the existing discourse representation;

4. Coherence. During recalling, listeners are automatically, though not without difficulty, comparing new IUs with the existing semantic structure to ensure contextual coherence. Building contextual coherence to construct semantic structures of key points takes a significant role in completing dynamic discourse representation of the lecture.

Therefore, steps 2 to 4 largely rest upon meaning-building of the input to construct semantic structures and represent the discourse along the way. Self-monitoring occurs during the whole meaning-building process. Based on the development of Field's model, we have arrived at the following implications of the different performances between those who could recall more correct IUs and those who couldn't in terms of their discourse representation evidenced by their immediate recalls.

1. Those who could recall more correct IUs (evidenced by Participants 11 and 13 in the previous examples) could select and retain more IUs in their memory by either restoring information verbatim or in a paraphrased form (mostly a paraphrased form) while those who couldn't usually select and retain fewer IUs for processing.

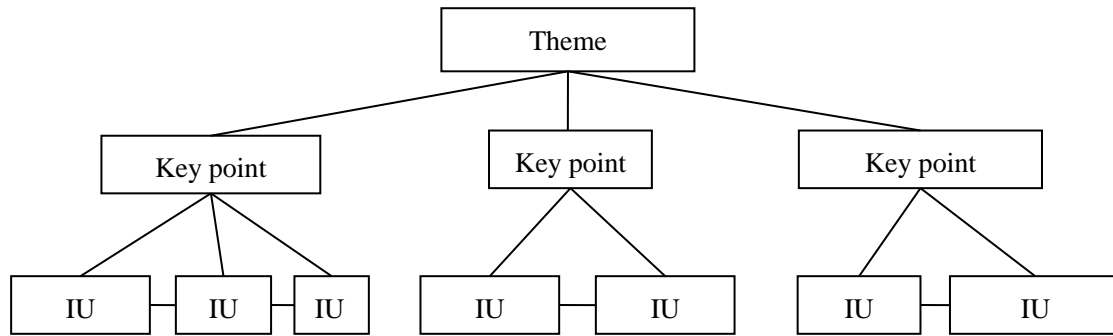
2. Those who could recall more correct IUs could build logical associations between selected IUs and categorize them simultaneously while those who couldn't might encounter difficulty in building associations and thus leaving isolated IUs unattached to the corresponding semantic structures or failing to select relevant IUs.

3. Those who could recall more correct IUs could more actively integrate new IUs into their corresponding structures or summarize streams of highly related IUs to form semantic structures while those who couldn't might fail to do so and thus the corresponding semantic structures remain incomplete.

4. Those who could recall more correct IUs can compare new IUs with the existing semantic structure to ensure contextual coherence and then successfully construct local semantic structures that finally constitute the hierarchy of the discourse while those who couldn't might fail to build the semantic structure and then leave a gap in the discourse representation of the lecture.

We thus adapted the figure of successful and unsuccessful discourse structure building (Field, 2008: 254) to visualize the afore-mentioned different performances between those who could recall more correct IUs and those who couldn't:

Successful Discourse Representation



Less Successful Discourse Representation

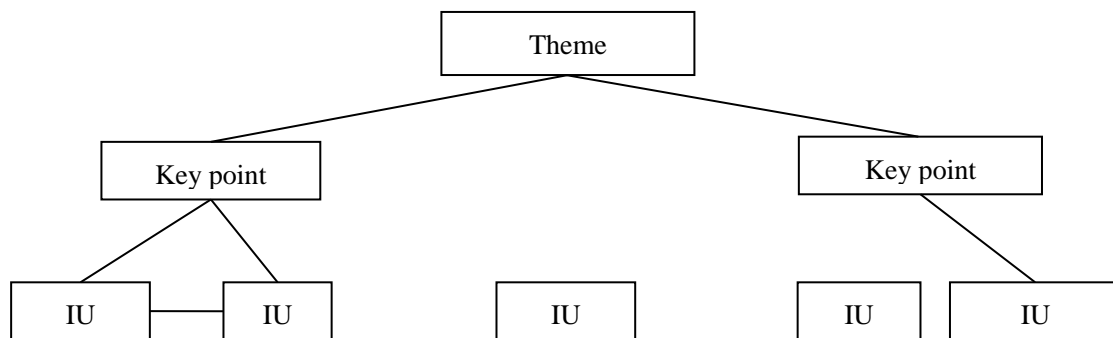


Figure 2 Successful and Less Successful Discourse Representation

From Figure 2, we can see that the most noticeable difference between those who could recall more correct IUs and those who couldn't does not merely lie in the hierarchy of the structure but association-building between IUs and integration of IUs. Those who miss more IUs are also aware of the hierarchy of the discourse, i.e. different levels of information and the theme of the lecture, but they are not able to select enough IUs for processing (indicated by fewer IUs in the figure of less successful discourse representation), build associations between IUs, and integrate new IUs into existing structures (indicated by fewer lines between IUs or between IUs and Key points in the figure of less successful discourse representation). Eventually, they encounter difficulties in building local coherence of semantic structures and result in fuzzy discourse representation from time to time that hinders their lecture comprehension.

5. Conclusion

5.1 Pedagogical implications

We agree that an academic lecture is not recalled “episode by episode” or heard twice in an authentic lecture setting. Nevertheless, focusing on short units or “episodes” under a quasi-experimental condition can help us learn more about listeners’ discourse representation methods such as verbatim copying, paraphrasing or summarization when they recalled the lecture through microscopic lenses, which may

shed some light on how to teach academic listening.

The low use of verbatim copying confirms the cognitive difficulty to recall word for word exactly as in the original script, due to the constraints of memory. There are mainly two reasons: first, recall word for word of the original script is challenging; second, it is unnatural as well. We are naturally inclined to paraphrase or summarize the input even if it is a short episode. The most frequent use of paraphrasing by the participants to represent the corresponding discourse of the mini-lecture indicates that meaning is stored and represented in a way that must ease information retention and facilitate subsequent information retrieval. Meaning stored in our mind takes the form of our familiar propositions instead of the original ones (Goh, 2002; Sachs, 1967). And their size increases as we become more familiar with the information remembered, thus storing and recalling more information (DeCarrico & Nattinger, 1988). Paraphrasing is a skill practiced a lot in reading classes. However, based upon the findings, we argue that paraphrasing is a very practical compensatory strategy that listeners can employ. Paraphrasing can help listeners to integrate new information to the existing discourse structure. In other words, paraphrasing should lead to better recall than verbatim copying because the transformation of input is realized in a more elaborate manner in more complex tasks (Lambert, 1988). Moreover, successful listeners' information processing will be relatively smoother while they are able to fill in the gaps in comprehension with their own words of interpretation while a less successful listener's listening process will break down from time to time if they fail to fill in those comprehension gaps in their own words. Successful paraphrasing requires learners to have access to a range of their linguistic resources such as vocabulary, phrases, formulaic chunks and syntactic structures. In teaching lecture comprehension, ask students to recall small streams of idea units is important especially when they encounter complex sentences or sentences that require more cognitive processing. Improving students' paraphrase skills in recall is essential for effective comprehension of academic lectures. A practical way is to pause a lecture recording from time to time, to ask for listeners' feedback on what they have just heard and to relate it to what has gone before (Field, 2011: 110). It is a repeated process where listeners need to learn to familiarize themselves with paraphrasing the lecture content episode by episode, and learn to be more aware of the logical connections between episodes.

Discourse organization patterns affect listeners' lecture comprehension (Allison & Tauroza, 1995). However, Rost (1994: 94) argued that the analysis of the organization of lectures might not tell us how listeners constructed an "internal organization" of the lecture content. The recall protocols revealed three ways or procedures of summarization: deletion, generalization and construction. Deletion of propositions is a widely used strategy while selecting and retaining useful information. Though sometimes listeners might delete important information, it is also very likely that automatically deleting propositions is an indispensable process when people summarize an academic discourse. Brown (2008) examined the distribution of

notional words such as nouns, verbs, and adjectives/adverbs in the recall protocols in contrast to the original texts and found that nouns are more privileged in memory than other types of words. In academic listening classes, instructors might encourage students to focus on nouns and verbs of the listening input and build the discourse representation based on those “key words”. Selecting notional words is practically important, but we would argue that the academic listening instructors shall remind the students not to simply select notional words in “linear structures” in case they might miss the “planks of an argument” (Field, 2011: 110). Instructors also need to encourage students to generalize extensive propositions and construct complex semantic structures to make sense of academic lectures. As illustrated in 3.4 and 4.2.3, if listeners fail to generalize detailed propositions and construct relevant semantic structures, they might not notice the dynamic shift of topics and fail to build a hierarchical discourse representation (See Figure 2).

The present study has highlighted the importance of paraphrasing and summarizing in successful discourse representation of academic lectures. This finding aligns with similar findings on students’ note-taking during lectures. For example, Muller & Oppenheimer (2014), Siegel (2019) and Song (2011) found that word-for-word note-taking of lecture content cannot really reflect listeners’ understanding of the organizational connections among ideas. If listeners are only recalling or taking notes of the lecture content in a linear way, they might not be able to make sense of what they have heard or written. It is advisable that listeners are encouraged to draw mind maps or write down hierarchical structure of headings and subheadings to reflect their discourse representation through paraphrasing and summarizing the content of lectures so that the learning outcomes can be improved.

5.2 Limitation and future direction

The current study aims to better understand how listeners represent the discourse of academic lectures, as shown in their recalls of academic lectures episode by episode. The recall protocols revealed that paraphrasing and summarizing are the main methods of discourse representation. The study also highlights the different levels of discourse representation. These findings can have implications for EAP instruction. For example, it may be an effective method to ask students to paraphrase and summarize academic lectures to activate and facilitate their meaning and discourse construction of academic lectures.

Although the findings of the study can have implications for teaching and assessing academic listening, especially in the realm of lecture comprehension, several limitations of the current study should be noted. Firstly, there is room for improvement in the coding scheme and the coding process. During the coding process, sometimes it was particularly challenging to distinguish some sub-codes in the scheme. Secondly, due to the small sample of participants, any comparison in their recall protocols is naturally qualitative and tentative as the sample size is not big enough for a robust statistical analysis. More empirical studies of larger sample sizes are much needed.

For larger-scale research, it would be useful to investigate the correlations between the methods that participants use in their discourse representation (e.g. in a recall task) and their overall performance in the listening comprehension tasks. Equally it would be useful to compare recalling of academic lectures as an assessment tool with other assessment methods.

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