An Empirical Study on the Correlation Between Teachers' Question Types of College English Class and IRF Conversation Structure

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Abstract. IRF is the basic unit of class conversation, which is usually initiated by teachers asking questions in class. This paper examines the relationship between the types of questions initiated by teachers, i.e., demonstrative questions and reference questions, and the conversational structure of IRF. UAM Corpustool3 was used to manually mark the data of the final contest of "The 10th SFLEP Foreign Language Teaching Contest" in 2019, calculate the number of ternary and non-ternary structures, and single IRF or multi-step IRF in ternary structures in the initiating conversation of teachers' demonstrative questions and reference questions. Pearson correlation analysis was conducted to find that there is no correlation between demonstrative problems and single IRF or multi-step IRF, and the generation of single IRF and multi-step IRF is related to whether the teacher can guide to generate new dialogues in the conversation, which shows obvious individual differences; there is 100% correlation between referential problem and the multi-step IRF conversation structure.

Keywords: referential questions · demonstrative questions · single IRF · multi-step IRF

1 Introduction

The study of class process is an important research field in the class study of SLA. Gaies [4] illustrates that class process research emphasizes direct observation of class and description of teaching events. Class discourse analysis is an aspect of class process research. Birmingham College, represented by Sinclair & Coulthard (1975), puts forward the famous theory of class discourse analysis, which divides the interaction between teachers and students into five stages: lesson, transaction, exchange, move and act. Among them, exchange is the basic unit of conversation between teachers and students. A typical exchange consists of three steps: teachers initiate - students response - teacher feeds back or follows up, or IRF for short. The three-step interaction mode is also known as the Ternary Conversation Structure. At the end of the 20th century, IRF theory has been further supplemented and developed. Effective dialogue analysis is not limited to the analysis of structure, but to the analysis of relevance and plot of dialogues.

Z. Zhan et al. (Eds.): EIMSS 2022, AHCS 7, pp. 358–366, 2023.
https://doi.org/10.2991/978-94-6463-024-4_38

1.1 Analysis of IRF Structure and the Types of Teachers' Questions

According to IRF theory, conversation structure can be divided into the Ternary Structure and Non-ternary Structure. Ternary structure consists of single IRF and multi-step IRF. A single IRF consists of only one question, one answer or one feedback; a multi-step IRF consists of multiple responses or multiple feedbacks. Non-ternary Structure contains Non-response Conversation Structure or Non-feedback Conversation Structure. In specific circumstances, it is understandable that students do not respond or teachers do not give feedbacks during the class, but teachers or students' non-response or non-feedback without reason can violate the cooperative principle of conversational principle in interpersonal communication, which will have a negative impact on the communication between teachers and students.

In class, communication between teachers and students is mainly carried out through questions, and teacher posing questions accounts for 20% to 40% of the class activities [1]. Long & Sato [6] propose two types of teacher's questions: demonstrative questions and referential questions. Demonstrative questions refer to the questions raised by teachers according to the course content, answers of which teachers know in advance; referential questions refer to the questions raised by teachers and teachers do not know the answers in advance and try to get information through them.

1.2 Relationship Between Teachers' Question Types and IRF Conversation Structure

In 2011, Wenfang Fan and Jingxiang Ma studied IRF structures of English class in primary schools, middle schools, high schools and universities in China, compared the different characteristics of class conversation in four different stages, and proposed two different communicative structures of English class teaching. In 2009, Gao Lijuan surveyed the characteristics of the aspects of the number, type, form and orientation of teachers' questions in the "student-centered" class. In 2015, Zhihua Wu and Xihuan Zhou employed IRF to analyze the effectiveness of classroom conversation and put forward strategies to improve the effectiveness of class conversation. According to the research of Wenfang Fan and Jingxiang Ma (2011), the proportion of the typical single IRF in the total conversations is gradually decreasing from the primary school to the university, which is 94%, 79.4%, 47.3% and 9.1%, respectively. The total number of single IRF conversation structures in College English class is 9.1%, which is based on a third-year English class. Is the number 9.1% universal? Is there correlation between single IRF and question types in class? Therefore, this paper studies whether there is correlation between teachers' question types and IRF conversation structure in College English classroom [3].

2 Data Collection

This data is selected from the final teaching videos of the winners of the Special Award and the first prize in the 10th "SFLEP" National Foreign Language Teaching Contest in 2019. The winner of the special award is Mr. Xu, and the winners of the first prize are

Table 1. Quality and proportion of Conversational Structures

	Ternary	NON-Ternary	Total
Ms. Huang	13/81%	3/19%	16
Ms. Xiong	6/55%	5/45%	11
Ms. Fan	15/75%	5/25%	20
Ms. Xu	14/78%	4/22%	18
Total	48/74%	17/26%	65

Ms. Huang, Ms. Xiong and Ms. Fan. The final videos of the four teachers are used as the data being researched. The teaching contents of the four teachers' lectures are "unit 3 Breaking Stereotypes", from a Comprehensive Course of Intercultural College English 1. They are teaching the same group of students in the contest. All the teaching duration are about 20 min long. Their teaching videos have been transcribed to written texts to be dealt with.

UAM Corpustool3 was used to manually mark the ternary and non-ternary structures, and single IRF or multi-step IRF in ternary structures in the initiating conversation of teachers' demonstrative questions and reference questions. The result is shown in Table 1 Quality and proportion of Conversational Structures and Table 2 Quality and proportion of IRFs; among the Non-ternary Structure, we calculate the numbers and proportion of Non- Response and Non-feedback Conversations. Since there is no Non-feedback Conversation Structure in the data, the data of Non-ternary Conversation in Table 1 represents the numbers of Non-feedback Conversation Structures, so the number of Non-ternary Conversation Structure is omitted in Table 2.

On the basis of Tables 1 and 2, the number and proportion of different types of conversation structures initiated by demonstrative and referential questions are calculated in detail. It should be pointed out that data involved in the correlation between question types and Ternary Conversation Structure is collated, but not the Non-Ternary Conversation Structure. This paper focuses on the relationship between the types of teacher's questions and the ternary conversational structure, while the Non-ternary Conversational Structure occurs rarely in the studied classes. In the statistical process of the number of demonstrative and referential questions, it is found that the boundary between demonstrative and referential questions is not clear, and for some demonstrative questions, teachers have some answers beforehand, but their answers can be changed, so this kind of question also has the attribute of semi-openness. For some obviously open-ended questions, it cannot be ruled out that teachers have presupposed some answers to the questions in advance. Therefore, it is subjective to some degree to divide the types of questions according to whether teachers know the answers in advance. For this problem, the solution of this paper is that if the teacher has the answer in advance, whether it is comprehensive and accurate or not, it will be classified as a demonstrative question. If it is only a presupposed answer, it is taken as a reference question.

Table 2. Quality and proportion of IRFs

	IRFs		Total
	single IRFs	Multi-step IRFs	
Ms. Huang	6/46%	7/54%	13
Ms. Xiong	0/0%	6/100%	6
Ms. Fan	10/67%	5/33%	15
Mr. Xu	1/7%	13/93%	14
Total	17/35%	31/65%	48

3 Relationship Between IRFs and the Types of Teachers' Questions

As can be seen from Table 1, the total number of conversations in the four classes is 65, among them Ternary Conversation Structure 74% and Non-ternary Conversation Structure 26%. Specifically, Ms. Huang 81%, Ms. Xiong 55%, Ms. Fan 75%, Mr. Xu 78%. Wenfang Fan and Jingxiang Ma (2011) reported 0% of Non-ternary Conversation Structure based on observing a 20-min English class in the third year of the target university. It is speculated that the higher proportion of Non-ternary Conversational Structure in this study is due to the selection of the contest - a special teaching situation as the object surveyed. It is found that there is no Non-response Conversation Structure, and all Non-ternary Conversation Structures are NON-feedback Conversation Structures. This may be caused by that in the competition, teachers give students active feedbacks to mobilize students' enthusiasm to participate in the classroom, so Non-feedback Conversation does not appear; the number of Non-response Conversation accounts for 26%, which may be due to the time limit of the competition, and teachers try to speed up the pace of the class to achieve the predetermined teaching objectives, and for some obvious procedural questions, teachers choose their own strategies of saving time by answering questions themselves.

3.1 Single IRFs and Multi-step IRFs in the Classes

Table 2 shows the quality and proportion of single and multi-step IRFs in the classes.

The total number of IRFs is 48, 35% for single IRFs and 65% for multi-step IRFs. Specifically, the ratio of single IRFs of Ms. Huang is 46%, that of Ms. Xiong 0%, that of Ms. Fan 67%, and that of Mr. Xu 7%. In a word, the proportion of multi-step IRFs is higher, and the proportion of single IRFs has obvious individual differences. Wenfang Fan and Jingxiang Ma (2011) reported that the ratio of single IRFs is 9.1% and that of multi-step IRFs is 90.9%, based on the survey of a 20-min English classroom in the third year of the university, which is similar to the data of Ms. Xiong and Mr. Xu in this study.

3.2 Relationship Between Demonstrative Questions and IRFs

In Table 3, we can see that the total number of demonstrative questions is 37, and that of referential questions 11; the multi-step IRFs is 20, accounting for 54%. Specifically, Ms.

Table 3. Quality and proportion of IRFs by teachers' question type

	Demonstrative questions/IRFs		Referential questions/IRFs	
Ms. Huang	9	Single 6/67%	4	multi-step 4/100%
		multi-step 3/33%		
Ms. Xiong	5	Single 0/0%	1	multi-step 1/100%
		multi-step 5/100%		
Ms. Fan	14	single 10/71%	1	multi-step 1/100%
		multi-step 4/29%		
Mr. Xu	9	single 1/11%	5	multi-step 5/100%
		multi-step 8/89%		
Total	37	single 17/46%	1	multi-step 11/100%

Huang's multi-step IRFs accounts for 33%, Ms. Xiong's 100%, Ms. Fan's 29% and Mr. Xu's 89%. For Ms. Xiong and Mr. Xu, IRFs they produced are nearly all multi-step IRFs, while for Ms. Fan and Ms. Huang, multi-step IRFs accounts for about 30%. The proportion of multi-step IRFs initiated by demonstrative questions differs from person to person. Pearson correlation analysis was used to calculate the correlation between demonstrative questions and single IRFs and multi-step IRFs. The results shows that there was no correlation between demonstrative questions and single IRFs ($P > 0.05$); there was no correlation between demonstrative questions and multi-step IRFs ($P > 0.05$), indicating that demonstrative questions have no correlation with the conversation structures they initiated. The production of single IRFs and multi-step IRFs may be closely related to teachers' conversational habits. Look at the following two conversations:

Case 1 (Ms. Huang):

T: Do you know the meaning? Have any idea about the words of submissive? Yes okay. How about you, this girl? Okay. Do you have any idea about the meaning of submissive?

S: I think it's synonymous with obedient.

T: Obedient, right? Very good.

Case 2 (Mr. Xu):

T: Could you please briefly interpret these words? Submissive, for example, submissive in this obedience, right?

S: Yes.

T: How about accommodating.

S: Accommodating is like you help, helping other people.

T: Helpful right?

S: Yes.

T: And maybe warm-hearted. Okay, very good.

The two conversations are both discussing the meaning of words. Case 1 is a single IRF, a typical IRF conversation structure; Case 2 is a multi-step IRF. From Case 2, we

can see that the students are actively participating in the conversation, even if they answer "yes". The teacher constantly asks the students' opinions, which makes the students feel the teacher's focus on them, and the students' initiative to participate in the conversation has been improved comparatively. From the perspective of the generation of IRFs, Wu Zhihua and Zhou Xihuan (2015) divided IRFs into two types: generative (GD) IRF and authoritative (AD) IRF. All conversation units that get authoritative feedbacks from teachers are regarded as authoritative. Generative conversation units mainly focus on the generation of information or ideas. Teachers construct conversation framework through open-ended guidance and feedbacks, and urge students to respond or create new ideas.

Case 3 (Mr. Xu):

T: What she does, she she reaches out and pats me on my back, right? Really, when we pat somebody on the back, we are trying to convey what kind of emotions?

S: Sympathy,

T: very good (AD). What else? Just like the last word we're trying to co- (GD),

S: Comfort.

T: Comfort the other one, right? (AD) However, this friendly gesture is not appreciated by the writer. Instead, she thinks it is. Does she appreciate this kindness? No, she doesn't. She thinks it is. Look at the brick late. She think (GD).

S: Ridiculous.

T: She thinks it is ridiculous. Right? (AD).

There are three ADs and two GDs in this conversation. The reason why the conversation continues is that the teacher guides the students to form a new dialogue while giving feedbacks. In most cases, generative IRFs can easily lead to more complex multi-step conversation structures [8]. According to the research of Fan Wenfang and Ma Jingxiang (2011), the proportion of typical single IRFs in the total number of conversational structures gradually decreases, from primary schools to universities, from 94%, 79.4%, 47.3% to 9.1% respectively. On the whole, the higher the level of knowledge is, the more complex the content is, the less number of single IRFs is. In this study, four teachers are teaching the same text, and the same group of students. Among the four teachers' demonstrative questions, the proportion of multi-step IRFs by Ms. Huang was 33%, Ms. Xiong 100%, Ms. Fan 29%, and Mr. Xu 89%. Does it mean that the four teachers show different knowledge difficulty and complexity in class? In view of the difficulty and complexity of knowledge in the classes is not the focus of this study, but as a researcher, the intuitive feeling of the classes are as follows: Mr. Xu's knowledge level, teaching logic and the depth of content discussion are better than the rest three teachers; Ms. Fan's class communication contents is relatively simple, in which the reading task accounts for a certain proportion; feelings for Ms. Huang and Ms. Xiong's classes have no obvious differences.

Demonstrative questions have no correlation with IRF types. They are related to whether teachers guide to generate new dialogues, or may be also related to the complexity of class knowledge and depth of thinking. Teachers should pay attention to their conversational habits, consciously increase the proportion of multi-step IRFs, and improve the quality of class conversations. Compared with single IRFs, multi-step IRFs

can promote the full exchange of knowledge and the depth of thinking, which is closer to the real communication scene.

3.3 Relationship Between Referential Questions and IRF Structures

The total number of referential questions in Table 3 is 11, accounting for 23%. Referential questions produce 100% multi-step IRF structures. The proportions of the four teachers' referential questions in the total conversations are 30%, 16%, 7% and 36%, respectively. This is similar to the research of other scholars. Gall [5] illustrated that 60% of teachers' questions require students to recall facts, only 20% require students to think, and the other 20% are classroom language; Pica & Long [7] also reported that there are more demonstrative questions and less referential questions in Teachers' discourse. However, Xing Zhou and Yun Zhou [9] put forward more referential questions than demonstrative questions, referential questions accounting for 73%–82% of the total.

Case 4 (Ms. Huang):
T: Yes, think about it…. Would you like to have a try?
S1: by communication,
T: Yes, communication?
S2: if you want to know more about her foreign culture, you can travel to their culture.

In Case 4, S2 answers the questions voluntarily. From the above conversations, we can feel that students actively participate in referential questions, the quantity of students' vocabulary output is significantly increased, and the output quality is also improved. It may be partly due to that there is no standard answer for reference questions, so students will not be restrained by the standard answers, and they are more relaxed to speak freely. We have counted the quantity and proportion of students' output vocabulary in conversations by demonstrative questions and referential questions in four sessions, and find that the total output of reference questions is 424, accounting for 41%. In general, the output of students in the conversations by referential questions is less than that of students in demonstrative questions. Although there are less outputs of students in conversations by reference questions, the number of referential questions is also less, so the outputs of students in the conversations by single reference question is further counted, the average output of students in conversations by single demonstrative question is 16, and that of students in conversations by single referential question is 60, specifically, Ms. Huang 15 and 40; Ms. Xiong 12 and 47; Ms. Fan 21 and 136; Mr. Xu 15 and 60. Generally speaking, the outputs of students in conversations by single referential question is much larger than that of students with single demonstrative question. From the content point of view, most of the demonstrative questions are related to the text structure, the general idea of the text, the meaning of words and the transmission of text knowledge; the referential questions are related to the topic introduction and topic discussion or expansion. In terms of time, the demonstrative questions appear in the middle of the course, and the referential questions appear at the beginning or end of the class. Wenfang Fan and Yacheng Fan [2] divided class communication into class teaching communication and real situation communication according to the different roles of referential and demonstrative questions in class. The real situation communication caused by referential questions

can significantly improve the quantity and quality of class vocabulary outputs. They can create real communication scenes in the classroom, and promote the development of students' communicative competence. Although referential questions have a strong potential to stimulate students' interest, they cannot substitute demonstrative questions in class. Demonstrative and referential questions do complete different teaching tasks in class, and the necessary demonstrative questions are needed to transmit and practice basic knowledge.

4 Conclusion

There is no correlation between demonstrative questions and single IRF structure in the researched College English class. Although a single IRF produced shows greater teachers' individual differences, which is related to whether the teacher can guide to generate new dialogues in the conversation, and may also be related to the complexity of class knowledge and thinking. Referential questions are 100% related to the multi-step IRF structure. Referential questions can stimulate students' interest in conversation and improve the quantity of students' discourse output. Demonstrative and referential questions play different roles in class. Adjusting the proportion of them reasonably and increasing the number of reference questions as much as possible can better activate the class and improve the quality of teaching.

Acknowledgement. It is a research of project "GKY-2020KYyBW-37" of Guangdong University of Science and Technology, titled Research on Class management Domain of College English Course Based on Corpus.

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