

# The Interaction between Syntactic and Semantic Modules in Chinese Learners' English Spontaneous Speech

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## Abstract

According to modular theory, there are interactive effects between the central modules and language modules. The central cognition may deploy and redeploy resources from language modules. Moreover, the language modules can activate the cognitive ability. So this paper studies the spontaneous speech of students who learn English as a foreign language, to check whether activated syntactic module could speed up speech processing or not, and whether activated semantic module could also influence selection of syntactic structures. Therefore, this paper mainly conducts a qualitative study on English subjunctive mood based on the analysis on related syntactic and semantic factors in Chinese learners' spontaneous speeches, aiming at exploring the influence of syntactic and semantic modules on subjunctive mood learning. The result shows there are interactions between syntactic module and semantic module: the activation of either module will speed up speech processing of the other. Therefore in the teaching of Chinese learners' English spontaneous speech, the teachers should take measures to strengthen the input of the language modules in an applicable atmosphere, so that the two modules can reinforce each other, thus improving students' spontaneous speech ability effectively.

**Keywords:** central modules, language modules, syntactic module, semantic module, interaction

## 1. Introduction

Modular theory is very important in the field of cognition, psychological science and neural science. In recent years, this theory has showed its significance on visual imagination and language comprehension. Moreover, Kosslyn (1994) has exemplified modular activities in his research and showed the interactive effect between language modules and the central module in language production. As we know, for language production, the mind may process the information stored in the central cognition and then produce new utterances. Although these specific modules must work together with the central conceptual modules, syntax is usually considered as a major medium for modular research, for in making up a sentence, almost all language modules are involved. Since semantics and syntax are closely related, the paper will mainly explore the relationship between syntactic and semantic modules in the application of subjunctive mood in Chinese learners' spontaneous speeches, aiming at exploring the influence of syntactic and semantic modules on subjunctive mood learning, thus contributing to the improvement of oral English teaching for learners of EFL.

## 2. Literature Review on Modular Theory

According to Fodor (1983), the human mind can be clearly divided into two distinct parts: a set of peripheral input and output modules on one hand, and central cognition on the other. Fodor's input modules include specialized aspects of vision, audition, taste, smell, touch, and language; output modules include a variety of systemscontrolling different types of motor activity, and language. However, in Fodor's view, central cognition remains inherently mysterious for no clear modular cognitive processes are perceived. Apart from Fodor's (1983) peripheral modules, the central mind also contains a number of innately channeled conceptual modules, designed to process conceptual information concerning particular domains. Such modules might include a naïve physics system (dealing with the mechanical properties of middle-sized objects and substances), a naïve psychology or mind-reading system (dealing with the mental states), a folk-biology system (dealing with generic relationships amongst living things), an intuitive number system, a geometrical system for re-orienting and navigating in unusual environments and a system for processing and keeping track of social contracts (Carruthers, 2004). Here, the mind is also composed of modules because the processes which generate beliefs, desires and decisions are

modular in nature.

According to the views above, the notion of central-process modularity is a legitimate one and central modularity is powerful. Therefore, central modules should be accepted. All mental processes need to be computationally tractable, and therefore realized in encapsulated modular mechanisms (Carruthers, 2003b). Some of these modules will be domain-specific in their input conditions, no doubt, and some will be evolved adaptations. Many other writers have extended the notion of modularity to at least some central processes (Gallistel, 1990; Carey & Spelke, 1994; Botterill & Carruthers, 1999). They believe that there are modular central conceptual systems as well as modular input and output systems. That can be considered as a modification of the notion of a module somewhat. The specific claim is that the mind is massively modular in its organization (Carruthers, 2006).

Many researchers also believe that it is possible to study the structure and functioning of the central-process working-memory system, for example (Baddeley & Hitch, 1974; Baddeley, 1986; Gathercole & Baddeley, 1993); (working-memory system is one of the mental functions.) and Shallice and others have made testable proposals concerning the structure of the central executive (Norman & Shallice, 1986; Shallice, 1988, 1994; Shallice & Burgess, 1993). The structure of the central executive may illustrate that the mind is modularized as many modules or components. Karmiloff-Smith (1992) proposes that human cognition becomes modularized over the course of normal experience and learning. In this view, modular status can be gradually formed as the central system develops. Then, conceptual modules may be more or less strongly innately channeled, following a distinctive developmental sequence which is more or less reliably buffered against environmental variation and perturbation (Baron-Cohen, 1995, 1999; Botterill & Carruthers, 1999). It admits of innately channeled modules with developmental sequence. Furthermore, investigators intend to argue that central cognition itself may be quasi-modular in structure (Baron-Cohen, 1995; Smith & Tsimpli, 1995; Sperber, 1996). Quasi-modules are not real things that can be seen as an entity, but imagined reality that has independent functions. However, quasi-modules would differ from full modules in having conceptual inputs and outputs rather than in having perceptual inputs or motor outputs (Carruthers, 1998). In a word, quasi-modules can be an independent system, but it's also correlated with the rest of the system.

### **3. Syntactic and Semantic Modules in Language Processing: Taking the Application of Subjunctive Mood as an Example**

Based the the modular theory, we know that a module is roughly a dissociable functional component. According to Xiong (2005), a Chinese psychologist, the mind in nature plays interactive roles among functionally individual modules. The interactive roles may still exist between modules and also between small modules. Thus, a module may affect others and vice versa, while small modules may interact with each other. Thus, language knowledge can be organized and regulated by the central cognition, establishing appropriate components stored in the mind. These components are what we call modules. Since unreal conditional thinking (simple subjunctive mood) is usually involved in more inferences and reasoning, for several syntactic transformations in syntactic module and counterfactual propositions in semantic module are involved in the process. Therefore, the production of subjunctive mood can be an example of realizations of syntactic and semantic modules. In order to better judge the productions produced by different modules, syntactic and semantic modules of unreal conditionals must be separately analyzed from the output. There are unreal conditionals, present and past respectively, as compared with the first which is a real (present) conditional, for example:

- 1) If it rains, the sports meeting will be cancelled.
- 2) If it rained, the sports meeting would be cancelled.
- 3) If it had rained, the sports meeting would have been cancelled.

Starting with the real present conditional, one can transform it into the unreal present by a simple change of tense ( rain → rained, will → would); past unreal is generated by adding a further past tense marker with the help of HAVE (though in a different way in each of the two clauses: rained → had rained, would → would have). With CAN and with volitional WILL the forms, “could, could have, would and would have” can be used to refer to the conditional unreality of the ability or volition. So the special counterfactual meaning in the subjunctive mood is based on the special syntactic structures. Thus, syntactic rules and transformations, and semantic interpretations are the core features for the unreal conditionals because the two aspects need most of attention while thinking. Therefore, syntactic knowledge in syntactic module and semantic knowledge in semantic module can be checked and analyzed to explore their roles.

#### 4. A Case Study on the Interaction between Syntactic and Semantic Modules that Affects Chinese Learners' Spontaneous Speech

##### 4.1 Participants and Procedure

The participants in the study were 10 junior students from Inner Mongolian University for Nationalities, among which about 20% are male and 80% female. They have been English-majors for more than two years. The age range, the language proficiency, and the medium of learning for this group of students are representative of those of the student population in the same academic year. The topics are involved in suppositions and imaginations which are counterfactual conditionals, such as the topic 'if you were president, what would you do?' This kind of unreal thinking is usually involved in more inferences and reasoning, which is too hard for all Chinese who seldom use in daily life, or even in English corner. Thus, the unreal conditional thinking can't be automatic but involve natural and spontaneous reasoning.

All the participants will be required to be alone with three imaginative topics in a room and recorded with an MP3. After recording, he will be asked to finish a questionnaire (appendix 2), which will be complementary to recordings. From the information, the researcher can assure the informants' intention to better identify semantic clues. Every word in the recorded material, including repetitions, repairs, and pauses except pronunciations, will be transcribed. Comparing the oral and written transcriptions, differences can be checked again to assure the accuracy of the transcribing. Since the research is synthetic, there are two main types for analyzing spontaneous speech. First of all, we can look at the syntactic and semantic errors. Hopefully, breakdown of the normal patterns may give us vital information about the way we plan and produce what we say. According to (Aitchison, 2000), speech error of normal people and pauses in speech can be two approaches to postulate how people plan and process language in spontaneous speech. Second, we can examine pauses, repetitions and repairs in speeches. The objective of this is to try to detect patterns in the pausing which may give clues about when speech is planned and produced. The positions of pauses such as pauses before a verb and pauses before a noun may give us different evidence for language production. That is, the pauses representing the mind thinking and working. To be specific, If the informant hesitate at the verb part, that shows he is trying to process syntax and specifically done by the syntactic module; if he does at a noun and other similar nouns, that indicates he is involving in semantic process done by the semantic module. Based on this postulation, pauses will be selected as a standard to measure the syntactic and semantic processing. Repetitions involve processing much further information while on the contrary repairs intend to revise the previous part. Therefore, these two types of marking spontaneous speech will be introduced in data analysis.

In this research, two sets of data will be collected, and each will be analyzed separately. One set consists of the syntactic and semantic errors of the informants and the other, the pauses, repetitions and repairs occurred in the speech. Both sets of data will be analyzed synthetically by the researcher identifying, sorting, extracting and reorganizing the data and then grouping them according to individual items.

To subserve data analysis of syntactic and semantic errors, the questionnaires come to the stage. The informants were required to write down their main ideas occurred in their minds when recording. Three portions of their ideas were compared with the transcriptions accordingly to help the reader master their real intentions. Moreover, it is convenient for the researcher to judge and mark whether the sentences were completed or not in meaning interpretations.

Furthermore, the informants could give their information about their focus while processing those utterances. They might focus on the alternatives of syntax, meaning and the combination of meaning and syntax. This kind of data was analyzed with syntactic and semantic errors. Thus, the questionnaires can help to mark syntactic and semantic errors, which can guarantee accuracy of the results. Therefore, questionnaires can be attached to first part.

Since repetitions, repairs and pauses are regularly occurred throughout the transcriptions, repetitions before verbs, such as those of 'I could' 'I will' are thought to be syntactic repetitions. While those of 'I would + noun' or 'I would + verb' are concerned with meaning choices, that is semantic repetitions. 'I would' or the repetition of the subjects of the sentences may indicate that those repetitions are making efforts in processing both semantic and syntactic information.

With regard to repairs, they are easily to judge in that the previous part of the repairs can show the clues. To be specific, if the repairs concern auxiliary verbs, they are syntactic.

1) The auxiliary verbs were wrongly used.

e.g. And er I would make friends with many countries just like Chinese and European countries may can be very

helpful for ...um the construction of America.

2) The forms of verbs couldn't match the unreal conditional structure.

e.g. Even I could have wrote could have written all of the materials and all of the sayings in the paper, write them down, write down, wrote them down.

With regard to syntactic errors,

1) Past perfect tense was substituted by simple present tense.

e.g. We know the American president make a lot of unfriendly ... policies to other countries. Ah sometimes the president has the ... aggressive ... intention to other countries such as Iraq and ... Afghanistan.

2) Auxiliary verbs were about future tense through the whole sentence.

e.g. I will try to treat every country in the world equally.

e.g. I will be true self about me.

The above is the illustration for detecting syntactic structures. The specific analysis according to individual items is coming after figures and tables. Whether sentence meaning is right or not should depend on the informants' intention given in the questionnaire. Thus, the meaning of the sentences should be considered in specific context with the help of the questionnaire, which could come from discourse level rather than sentence level.

1) The sentences could quite well express the informants' intention without consideration of syntax (semantic completed item).

e.g. And er I would make friends with many countries just like Chinese and European countries may can be very helpful for ...um the construction of America.

e.g. I would have ...prepared all the details er even including the hellos and say goodbye saying goodbyes to my classmates.

2) The sentences could help to construct the whole meaning, however, they couldn't be understood at once but carry related meaning to the topic (semantic related).

e.g. I would help I would help them especially the weak countries so that make all the countries in the world would ... admire the president.

3) The sentences couldn't express the informants' main idea (semantic unrelated).

e.g. I would and I would have continued my emotion till class time. I would I would keep all the psychological balance before the class even I ...went to the stage... I would I could also balance myself and I also could I also could develop my thinking and feeling simultaneously.

In addition, introduction and conclusion are connected with the informants' reality so that this type of words can also be seen as meaning unrelated.

#### 4.2 Data Analysis

According to the method, two sets of data will be obtained in the study. The first set is about syntactic and semantic errors. Based on the scheme in the procedure, syntactic scheme could be divided into full correctness, partial correctness and error. The method of analysis on questionnaires can derive from two ways—one is meaning recall and the other is focus report. At last the specific analysis about repairs, repetitions and pauses have their own regularities.

For syntactic errors, there are three types. First is full correctness including two possibilities:

1) The sentence structure is wholly same to the ideal grammatical rules such as if clause+ main clause; or main clause + if clause; moreover, 'if clause' is 'if + subject + simple past verb', and main clause is structured as 'subject+ would + verb'.

e.g. If I were the American president, I would be ... trying to be a good ... trying to be a good president.

2) Since each recorded material has only one topic, the informants usually expressed once 'If I were ...' and the rest of them were omitted. Thus without 'if clause', the main clause can also be right.

e.g. Er I wouldn't bully the weak and small countries.

e.g. And I would do the things I would like the most.

Concerning partial correctness, there are also two possible interpretations are about word choosing such as verb selection and noun selection, they are considered as semantic repairs; while if the repairs are under consideration

of syntax and semantics, for example, 'I would' is to repair 'I want', they are both semantic and syntactic repairs. As for pauses, there are three kinds in the recorded materials. The symbols are 'er', 'um', 'ah', and '...'. If pauses fall before a sentence or an auxiliary verb, the pauses may involve both thinking syntax and semantics, while before a noun, focusing the attention on choices of meaning and before a verb for the choices of syntax.

## 5. Results

### 5.1 Results for Syntactic and Semantic Errors

Among 101 sentences, 62 sentences can be thought to be semantic completed ones. Twenty-two sentences are partially related to the topics. And the rest are 17 unrelated ones. The specific number can be seen in the table.

Table 1. Speech errors

Syntax/semantics	Completed meaning Related	Related meaning	Unrelated meaning	Total number	Percentage %
Full syntax	26	6	4	36	35.64
Partial syntax	11	8	7	26	25.74
Wrong syntax	25	8	6	39	38.62
Total number	62	22	17	101	100
Percentage %	61.39	21.78	16.83	100	

Thirty-six sentences are fully correct according to syntactic rules of subjunctive mood, 26 are partially right, and 39 are syntax-violated. Completed meaning item takes up 61.39%.

That means most Chinese learners may pay more attention to meaning than to syntax which is only near to 36%, when processing subjunctive mood. In complete meaning, full syntax is doubly more than partial syntax. And in full syntax, complete meaning quadruples related meaning.

The number of repetitions and repairs and positions of pauses may give us the clues during speech production. In Table 2, repairs were judged by the researcher according to syntax and semantics. Thus, repairs can be syntactic, semantic, and the combination of the two. For repetition item, the repeated parts were accounted as above. The left of the column is the repetitive part and the right is the number. For pause item, 'verb' means the pauses occur before verbs, 'noun'—pauses before nouns, 'initial'—those before a whole sentence, 'Preposition'—pauses before prepositions and prepositional phrases. However, 'clauses' indicates that pauses happen between clauses. The following is the specific analysis of the table.

Table 2. Numbers of repair, repetition and pause

Repair	22	Repetition	38	Pause	94
Syntactic	12	I	8	Verb	22
		I would	1	Clauses	12
		I could	1	Others	2
		I have	1		
		I will	1		
			2		
Semantic	7	I have+	1	Noun	27
		noun	5	Others	3
		I would+	4		
		verb			
		Others			
Syntax & semantics	3	I would	11	Preposition	7
		Others	3	Initial	15
				Others	6

There are 22 repairs which are thought to revise the previous part. The number of revising syntax is 12. 'I would be happy' is to repair 'I would happy' in Sentence 94; 'that's' is for 'that was' in Sentence 87; 'in china' for

'Chinese' in Sentence 79; others are 'taught' for 'teach', 'to myself' for 'to me', 'I would' for 'I will', 'they are very' for 'they were very', 'to the class' for 'on class', 'I could give' for 'I can good', 'could have written' for 'could have wrote', 'write them down, write down, wrote them down' for 'written', 'saying goodbyes' for 'say goodbye'.

The other seven repairs are about word choices. 'I would play' is to revise 'I would be' because the choice of verb 'play' can facilitate the following semantic production. 'I could' for 'I would', 'that could make' for 'that could help' and 'would try' for 'would give' are verb choices for further meaning establishment. The other three are noun repairs for the accurate propositions. The rest of the three pairs are under considerations of syntax and semantics. 'I would be' for 'I can' and 'I would' for 'I have' in Sentence 78; 'I would' for 'I want'. Such kind of repairs share not only syntactic correction but also semantic thinking.

According to the above analysis, twelve are syntactic repairs, seven are semantic and three are both syntactic and semantic. Therefore, most of the informants intend to repair syntax and then spare little time for semantic repairs. The repairs of combination of syntax and semantics are less than semantic repairs. The total number of repetitions is 38. The specific distributions are eight "I"; twelve "I would"; one "I also could"; two "I have"; one "I will"; five "I would +verb"; and the rest nine others—"for", "that is", "if I were a famous star", "who", "trying to be a good", "some", "in America", "during the" and "when I". Repetitions involve thinking about later information. The highest repetitive frequency falls to "I would" because "I would" is a fixed pattern for subjunctive mood. Seeing the 12 'I would' from the sentence level, only one sentence with a repetitive 'I would' is semantic unrelated and other eleven repetitions are meaningfully completed among which only two are partial syntactic correctness. Obviously these eleven repetitions may involve both syntactic construction and semantic development.

In the nine others, repetition of 'if I were...', 'in America', and 'that is' can help for whole sentence productions. Thus, these three repetitions can be named as syntactic-semantic repetitions. However, the 'I would' with full syntax and unrelated meaning is a syntactic repetition. The repetition of 'I also could' is convenient for the informant to construct the syntax of subjunctive mood but violate meaning interpretation. Probably, the informant was not familiar with 'subject + could' so that he could make the words confused. This is an example of syntactic repetition. The repetitions of 'I have' and 'I will' followed by verbs are considered as syntactic ones. And so are 'I', 'when I' and 'who'. However, repetitions of 'I would + verb' such as 'I would help' and 'I would change' show that the informants try to process the following meanings after 'I would + verb'. Therefore, such kind of repetition is mainly contributed for semantic processing. A repetition of 'I have' followed by a noun is a semantic repetition. While the repetitions of 'trying to be a good', 'some', 'during the' and 'for' can be inferred as choosing words. These four are also semantic repetitions. As the above, syntactic repetition item is 14, which is the same as syntactic and semantic item.

There are 94 pauses altogether. Twenty-two stops are just before the verb, among which 16 exist between auxiliary and the verbs. (100) And then I will ..began to work and have my own money. (66) and so if I were an American, I want I would ..be an English teacher. Twelve pauses happen between clauses rather than sentences. They are involved in choosing syntactic structure. Another two posit before the verb repetitions and repairs, for example, 'er I have I have I would knew the culture.' Thus, these two are also for syntax processing. Twenty-seven pauses stop before nouns, adjectives and pronouns. Other three pauses, like a pause between two repetitive 'trying to be', concern semantic thinking.

Fifteen pauses occur in the initial of the sentences. Seven pauses are before prepositional phrases. Six pauses like 'I would ...I would buy' and 'I would ...I would help' are processing both syntax and semantics. Therefore, they are expected to process both syntactic and semantic information together. Thus, thirty-six pauses are syntactic, 30 are semantic and 28 are both syntactic and semantic. Therefore, it is clear that syntactic pauses are more than the other two. Concluding the whole table, repair is syntax-biased; as for the item of repetition, the sum of syntax-oriented is same with that of semantics and syntax; pause is syntax-biased.

## 6. Discussion

Since there are two sets of data in this study, the data may contradict or conform to each other. If there is contradiction, the study will be meaningless; if there is conformity, the result will be effective and significant. Then, the researcher will discuss the data one by one, leading to the final conclusion.

### 6.1 Discussion for Syntactic and Semantic Errors

The most obvious feature in Table 1 and the six figures is, no matter syntax is full or wrong, meaning-completed item takes up the highest percentage. This indicates that the informants focus their attention mainly on semantic

processing. They try to make the meaning logic and coherent at the loss of syntactic errors. When the informants recorded their monologues, they may first think what they are going to say. Thus, meaning would come out before syntax in their minds when they saw the topics. This is the role of semantic module which facilitates meaning processing with the help of central modules.

Another feature in this part is partial syntax. No matter meaning is completed or not, partial syntax has the rising tendency, full syntax has the reducing tendency with wrong syntax. The proportion of partial syntactic sentences is rising from the completed meaning to the unrelated meaning. That means more irrelevant meaning the informants have in their minds, more partial syntactic sentences they would produce. *Vise versa*, more partial syntactic sentences they have, more irrelevant information they process. Thus, there is an interactive role between syntactic module and semantic module. But the premise is that semantic module must be activated first. If semantic module is partially activated, meaning must be inadequate in the mind. Hence, with the inadequate activation of semantic module, syntactic module may try to help the central mind to transform the limited propositions into sentences. When the central cognition intends to modify the existing propositions, it will pay more attention to semantic module again and will overlook syntactic selections to some extent, which cause partial syntactic sentences. That's why more irrelevant meaning results in more partial syntax. Certainly, it is normal phenomenon that less well-grammatical sentences occur in related and unrelated meaningful sentences. However, it is abnormal that the proportion of wrong syntax in completed meaningful sentences is greater than that in related meaningful sentences which is greater than that in unrelated meaningful sentences. Here, wrong syntactic sentences can express very appropriate meaning because any syntax except subjunctive mood is considered as wrong syntax. For example, present tense and future tense can express a complete meaning but they are believed wrong. Thus, wrong syntax is possible to be similar with full syntax in completed meaningful figure. Similarly, when only related meaning is activated in their minds, the central cognition and semantic module would not be so active as when a completed meaning is activated in their minds, leading to less wrong meaningful sentences. Therefore, wrong syntax is decreasing with full syntax when meaning becomes unrelated.

#### *6.2 Discussion for Questionnaire*

According to the informant's questionnaire, he mainly thought about subjunctive mood structure so that he had no time and no consciousness to consider more meaning. Thus the semantic information is interfered by the syntactic attention. In other words, the semantic module is suppressed by activated syntactic module. However, when the informant looked at the topic given by the researcher, his semantic module must work first for comprehension in order to understand the topic. After believing the topic as subjunctive mood, his semantic module plays a less important role when his syntactic module comes up and occupies most attention. Hence, only little space can be spared for semantic module, leading to less meaning in the mind. Thus, when syntactic module is partially activated, the central mind may pay more attention to syntax so that it may hinder semantic processing. Therefore, although his syntactic structure is partial or even completed, the meaning he wanted to express is less. Since half of the informants admit, in the questionnaire, that they mainly process syntax at the recording time, there may have obvious feature about both syntax and meanings. The result for the nine syntax-based recordings is the similarity of the number of syntactic correctness with that of semantic completion. That indicates that if syntactic module is entirely motivated and activated, semantic module can work with it in tandem. Thus, when the informants process syntactic module, they don't give up semantic thinking.

For meaning-focused recordings, there is similarity between meaning completion and wrong syntax. The semantic processing may neglect the choices of correct syntax. Therefore, when semantic module is activated during the processes of imaginations, there is little room or even no room for the speaker to think about syntax. As for the three materials of syntax and semantics, there are 12 sentences in which nine are meaning completed, one is related and two are unrelated. While, two are syntactically correct, six are partial and four are wrong syntax. Here, the semantic module can produce nine meaningful sentences. However, syntactic module can produce only two full syntactic sentences but six partial syntactic ones. These partial syntactic sentences can evidence the syntactic module's processing. Actually, the effort of striving to process correct syntax may result in partial syntax. Thus, the informant can process syntactic module and semantic module at the same time. When he used his syntactic knowledge of subjunctive mood, the informant processed syntactic module while semantic module must work. However, the central cognition only attends to the semantic part and part of syntactic module. He only focus on part of syntactic module because the central cognition believes that he can proceduralize syntactic structure of subjunctive mood after attending to the auxiliary verb 'would'. Unfortunately, the so-called familiarized syntactic module can't work very well without attention of the central cognition. Thus, only attention on part of syntactic module results in partial syntax. That's why there are errors on verb forms leading to partial syntax. Therefore, activated semantic modules can produce more completed meaning and less

fullsyntactic ones but more partial syntactic ones. Well, the activated syntactic module can produce not only well-grammatical but also completed meaningful sentences. In a word, syntactic module can facilitate syntactic production and semantic module can facilitate meaning establishment. Nevertheless, according to the above result, the role of syntactic module is greater than that of semantic module.

### *6.3 Discussion for Repairs, Repetitions and Pauses*

Repair is mainly syntax-biased; repetition is both syntax-oriented and the combination of semantics and syntax; pause is syntax-based. Among the three results, syntactic module plays more important role than semantic module in subjunctive mood productions. According to the result of repair, most of the informants intend to repair syntax and then spare little time for semantic repairs. This proves that most of the informants focus their consciousness on syntax, leading to syntactic repairs. In other words, syntactic module is working and repairing the previous part under the guidance of the central modules. When the central module is aware of the inaccuracy, the attention will go on searching in stored data and matching the inaccurate structure with right unreal conditional structures until it finds out the best selection. Therefore, repairs are mainly syntactic.

Repetition is also syntax-biased because the words are repeated for the following syntax. Repetition is also involved in thinking combination of semantics and syntax. This part means that the central cognition consciously activates syntactic module after a repetition, to search appropriate syntactic patterns, and drives both modules together after a repetition to construct a both well-formed and logic utterance. Probably, the activation of both modules may run in tandem but syntactic module may take up more reasoning effort.

Pauses before or between some words can give us clues. To be specific, pauses before verbs mean for syntactic processing while before nouns for semantic production. The largest number of pause is syntax. Namely, syntactic pauses indicate that the central mind focus on syntactic structures in syntactic module. Since subjunctive mood structures are hard for the central mind to process, the informants will spend some time in recalling and deploying the structures from the module. The second is semantic pause. The informants stopped to think about nouns or choose words, which is meaning-biased. The central cognition can temporally forget syntax just for word choices. That doesn't occupy too much energy of the central cognition. However, syntactic module would take up much more consciousness of the central modules for syntactic production. This discussion is also intended to be syntactic. That is syntactic module can help the central mind to produce syntactic sentences and to create more relevant meanings. The role of semantic module is less obvious than syntactic module. Thus, semantic module can help the syntactic processing but rather little role. As for subjunctive mood production, syntactic module may play the most important role in spontaneous speech.

### *6.4 Discussion for Interactions among the Three*

In the above discussion, syntactic module interacts with the central modules, and so does semantic module. But the interactions among the results were not clearly illustrated yet. Hence, more illustration can be divided into three types of interactions—the interaction between syntactic module and the central modules, the interaction between semantic module and the central modules, and the interaction between syntactic and semantic modules. Therefore, these interactions can be discussed as follows:

According to the first set of data, the total number of full syntax and partial syntax is 39 much more than that of wrong syntax, which proves that syntactic structures of subjunctive mood in language module can access to the central modules which are aware of the structures. When the central mind pays more attention to subjunctive mood syntax, the awareness might be strong for syntactic processing. That may be stronger in full syntax than in partial syntax. For uttering full syntactic sentences, the central modules try to recall complete syntactic information on subjunctive mood from syntactic module, which may occupy most of their attention. But for partial syntactic sentences, the central modules may be interfered by semantic element which scatters the attention, leading to partial structures.

The consciousness on syntactic structure is weaker before more familiar syntax happen to be activated. Then easier syntax, such as present tense and future tense, is conscious to the central mind though the previous syntactic structure has been working but it is unconsciously recognized by the central cognition. In other words, subjunctive mood syntax must be consciously activated by the central mind otherwise wrong syntax may affect the mind in avoiding thinking about subjunctive mood. That's why wrong syntax occurred in the mind. In Table 2, numbers of syntactic repairs, repetitions and pauses are more than those of semantic and syntactic-semantic items. That is, syntactic module is activated for former repairs and later productions. For further illustration, syntactic repairs prove that the central modules focus their consciousness on syntax in syntactic module. If the central cognition recognizes something wrong with previous structures, it will search and revise the inaccurate parts with correct selections in syntactic module which provides more alternatives for repairs. The whole process



is actually an interaction. Next, repetitions and pauses which are ready for further information may demonstrate clues for interactions. Repeated words and phrases can leave time for the central cognition to think about following syntactic structures. The central cognition may also stop to think for awhile. Therefore, repetitions and pauses can only provide opportunities for the central mind recalling syntactic structures from the module which also responds by many relevant syntactic structures.

As for the above, syntactic module interacts with the central mind in subjunctive mood processing. When the retrieval is entirely occurred, syntactic module can facilitate the central modules in syntactic production; when recall is partially happened, syntactic module may help the central cognition with partial syntactic sentences; once the recall fails, easier syntax instead of unreal conditional syntax in syntactic module may appear in the mind, which produces no subjunctive mood sentences. Anyhow, the central modules recall syntactic knowledge from syntactic module and syntactic module can also access to the central mind. Therefore, there is an interaction between syntactic module and the central modules. Since syntactic module interacts with the central mind, there may be an interaction between semantic module and the central mind. From the result, the first set of data shows that the total number of completed meaningful sentences doubles any other two items. That indicates that semantic module can help the central cognition with semantic processing. When the central modules received the topic about subjunctive mood, they would grasp a main idea about the topic from semantic module which has been stored numerous relevant words.

Concerning semantic selections, the central cognition might activate the whole semantic module and part of it as well. As the former is finished, completed meaningful sentences can be formed in the mind; as the latter is activated, only related meanings can be obtained. However, if there were no similar ideas and no relevant words stored in semantic module, all the efforts made by the central mind could be unavailing. Thus, semantic module can offer and access its relevant information to the central cognition which can manage semantic knowledge in semantic module. Therefore, data about semantic errors can be inferred as an interaction between semantic module and the central mind.

With regard to the second set of data, semantic repairs, repetitions and pauses can evidence semantic thinking. Since semantic repairs can be examples for meaning revision by the central modules, such revision involves word selections. When the central modules got a first idea, they would quickly search a word for a particular meaning from semantic module. However, if the central modules found that they were not on the right track, they would revise the word into another. That's why semantic repairs could occur. When the central mind couldn't find out the right track, it would repeat old information or just stop for further meanings. Thus, repetitions and pauses can also help for semantic activation. Therefore, an inductive conclusion is that the central modules can select meanings from semantic module which can provide a lot of relevant words for the central mind, leading to interactions. In other words, there is an interaction between semantic module and the central mind.

Based on the above illustration, syntactic module can interact with the central mind and so can semantic module. If the central mind is considered as a medium, syntactic module may also interact with semantic module. Therefore, inferences about this can be specified as follows. Seeing the first three figures, full syntax is decreasing but partial syntax is rising. This result shows that syntax influences semantics. To be specific, more full syntax obtains more completed meaning; less full syntax results in worse meaning; more partial syntax constructs less completed meaning. It is no doubt that syntactic module facilitates semantic production. If syntactic module is entirely motivated, the central modules have much time to activate semantic module; if it is partially activated, less time is left for semantic activation.

In a word, full activation of syntactic module accelerates entire activation of semantic module. Partial syntax has a rising tendency, which demonstrates that more partial syntax may result in worse meaning. Partial syntax can cause and be caused by less activated semantic module. In details, when the central mind starts a meaning about unreal conditionals, semantic module begins to work and tries to make all the alternatives available for the mind. Since the central cognition emphasizes its attention on semantic module, it can't fully attend to syntactic module though it accepts that it must find out appropriate structures from the module. When the central cognition recognizes the partial syntactic structures, it will make all its efforts to fulfill them. Then the central mind changes its channel to syntactic module that engages in syntactic selections. When the attention is on syntax, the central mind temporarily neglects the activation of semantic module, leading to less activated semantic module. But without meaning, syntactic module can't work well so it asks the central mind for help. Then the central modules activate semantic module again. During the process, semantic module subserves syntactic formation in which semantic module can play both positive and negative role. If semantic module is able to provide proper meaning at once, syntactic module will choose the best structures to match it and partial syntactic problem can

be solved; if semantic module affords irrelevant meaning, syntactic module can't be activated so much that partial syntax can be worse than before. Therefore, syntactic module and semantic module interact with each other.

As is shown from the data in Table 1, more completed meaning can result in more full syntax, which proves the influence of semantic module on syntactic module. When the central mind has a complete idea, it will consciously transform it into well-grammatical sentences. With the help of the central cognition, semantic module can have interactions with subjunctive mood in syntactic module as it is entirely motivated. That is the activation of semantic module can boost that of syntactic module. Besides, most wrong syntactic sentences are meaning-completed. That indicates meaning is focused but syntax about subjunctive mood is overlooked. Since semantic module can advance syntactic module, it is abnormal getting this result. However, wrong syntax is not really wrong in that present and future tenses used here are believed wrong. Therefore, the activation of semantic module boosts no subjunctive mood syntax but present and future tenses. Disregard with subjunctive mood, semantic module also facilitates syntactic module. When the central cognition focus its most attention on imagination, it couldn't have enough time and energy to find out relevant syntax but choose the most familiar structures present tense and future tense instead of past tense and past perfect to express subjunctive mood. In this case, the attention on meaning may ignore syntax. Therefore, more attention on semantic module can hinder the activation of syntactic module of subjunctive mood but interact with other syntactic structures from the module. Therefore, the interaction of semantic module with syntactic module is weaker than that of syntactic module with semantic module within subjunctive mood production.

As for subjunctive mood production, semantic module can interact with syntactic module but plays a weaker role for the interactions. However, syntactic module is different so that syntactic module is stronger than semantic module because full activation of syntactic module facilitates entire activation of semantic module but completed activation of semantic module is easier to process other syntactic structures rather than subjunctive mood though semantic module, with the help of special consciousness from the central cognition, also interacts with syntactic module. Finally, the extent of interactions between the two modules is different in that syntactic module plays greater role than semantic module in subjunctive mood production. All the above inferences derived from the results can prove the interactions between language modules and the central modules and also between syntactic module and semantic module. Thus, syntactic module can facilitate semantic thinking and semantic module can help the central mind for language production. In a word, syntactic module strongly interacts with semantic module which weakly responds to syntactic module.

## 7. Conclusion

Based on the above study, the findings show that there are interactions between syntactic module and semantic module. The effect of syntactic module was judged and analyzed individually and with that of semantic module together. This paper has done a qualitative study about language production for modularity. Chinese learners' spontaneous speeches were researched by the researcher to find out the effect of certain modules. To be specific, two sets of data—one is about syntactic error and semantic error; the other is about repairs, repetitions and pauses—can give us reliable results. Because of syntactic accessibility, syntactic module may occupy most of attention and energy of the central mind, resulting in poor meaning relations. Thus, the partial activation of syntactic structures can suppress that of semantic module. However, another result is that syntactic module can facilitate semantic processing. In this case, syntactic accessibility is so fast that it can leave attention and energy of the central modules for specific semantic choices. So the activation of either module will speed up speech processing of the other. Therefore in the teaching of Chinese learners' English spontaneous speech, the teachers should take measures to strengthen the input of the language modules in an applicable atmosphere, so that the two modules can reinforce each other, thus improving students' spontaneous speech ability effectively.

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