Finite Clause Complexes in English and Knowledge Construction:

A Case Study of University Textbooks

英语限定性小句复合体与知识建构

——以大学教科书为例

· 邓庆环 著

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序

得知邓庆环博士即将在其学位论文的基础上出版著作《英语限定性小句复合体与知识构建——以大学教科书为例》，我感到十分高兴。邓博士在厦门大学攻读博士学位期间，潜心做学问，刻苦钻研，给我留下了深刻的印象。她能广泛阅读有关功能语言学的各种论著，进行多方面的思考，这一切为其今后的学术研究打下了坚实的基础。

大学教科书在学科知识建构中发挥着重要的作用，而英语限定性小句复合体又是语言学界长期研究的对象之一，各种语言学理论从不同角度对它进行了探讨，但能把大学教科书的研究和限定性小句复合体结合起来的系统研究并不多见。邓庆环博士的这部著作以系统功能语言学理论为框架，详细探讨了大学物理学、经济学和心理学教科书中非限定性小句复合体的使用，分析了其中的动因及其在知识建构方面所发挥的作用。因此该书一方面提供了研究英语非限定性小句复合体的新视角，另一方面也丰富了英语教科书研究的内容，对英语教科书的编写和科学知识的教学有指导意义。

该书广泛回顾了不同学者对于限定性小句复合体、连词和教科书的研究，在此基础上，进行归纳分析，并对其进行了评价，从而提出自己的分析框架，把分析对象分为扩展型和投射型两大类，并对其在不同学科教科书中的使用情况展开了细致的分析。邓博士在研究中还建立了自己的语料库，通过量化方式分析了不同学科的教科书在限定性小句复合体使用上的差异，提高了结论的可靠性，同时也得出了很有意义的结论。

近年来，邓庆环博士在工作上踏实肯干，为人诚恳，在学业上认真刻苦，自强不息。我相信她在今后的研究和教学工作中能持之以恒，取得更大的成绩。

杨信彰

2014 年 11 月 18 日于厦门

前 言

本书试图以系统功能语言学的理论为框架，研究限定性小句复合体在大学教科书中的学科知识建构作用。小句复合体是系统功能语言学中重要的概念之一。其主要功能体现在两个方面：一是表达说话者对物质世界和精神世界的经验；二是通过衔接手段将语义上相互依赖的各个小句连成一体，共同表达一个完整的概念，从而描述了事物之间更抽象、复杂的内部关系。

文献综述表明，以往对小句以上单位的研究主要集中在小句复合体上，且仅关注它们的句法关系，缺乏系统、全面地探讨限定性小句复合体在特定的语境特征中的特点。从语类的角度考虑，本书选取了物理学、经济学和教育心理学三个学科的教科书。本书认为，限定性小句复合体在教科书中的作用不但具备解释和语言推理的功能，而且会根据学科知识性质的不同体现学科特征。本书根据系统功能语言学对小句复合体的论述提出了对限定性小句复合体的分析框架。这一框架中包括了延伸型限定性小句复合体、解释型限定性小句复合体、增强型限定性小句复合体和投射型限定性小句复合体。由于增强型限定性小句复合体体现的逻辑推理关系由连词实现，投射型限定性小句复合体的特征由投射者和动词体现，连词、投射者和投射动词也是本书理论框架中的一部分。它们相互作用，共同实现了教科书的解释和推理功能。在本书中，限定性小句复合体和学科知识建构是两个重要的概念。

本书以量化研究的结果为基础，对照不同学科教科书在使用扩展关系、投射关系的限定性小句复合体以及与它们相关的连词、投射者、投射动词方面的特点，并讨论了每种特征在知识建构方面发挥的作用。研究结果表明，物理学教科书的限定性小句复合体在数量上要远远多于其他两个学科，扩展型限定性小句复合体和投射型限定性小句复合体在三个学科的教科书中出现的频率极为相似。然而，其构成成分对照显示了它们的内在差异。如很大一部分的扩展型限定性小句复合体在物理学教科书中用于连接先后的动作，在教育心理学教科书中连接了相互对照的概念，而在经济学教科书中则更多地表现了因果关系。

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对于投射型限定性小句复合体来说，其内在差异更多的是通过投射者和投射动词之间的差异体现的。

本书指出，虽然可接受性是教科书作者在建构知识时要关注的一个主要问题，但不同学科使用限定性小句复合体的特征体现了不同的学科看待客观现实的方式。如限定性小句复合体在教育心理学教材中较为复杂，其原因在于人际特征在建构学科知识中的作用。对物理学教科书来说，准确性和客观性是重要的因素，限定性小句复合体的使用有助于作者阐明概念和树立权威。对经济学教科书来说，它与物理学教科书的相同之处在于强调知识的准确性和清晰性。与此同时，争论和冲突是学科知识建构的基础，这也是它与教育心理学教材的相似之处。本书的研究结果说明了限定性小句复合体与学科知识建构方面的关联。

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Chapter 1

Introduction

In the current study, attention is focused on the use of finite clause complex (henceforth abbreviated as FCC) in textbooks (henceforth abbreviated as TBs) at the university level. FCC, as a concept taken from Halliday's theory of clause complex (henceforth abbreviated as CC), refers to the part of a clause complex which has the feature of being finite. The current research will describe linguistic choices in terms of FCCs for an effective disciplinary explanation in TBs. FCCs in different disciplinary TBs will be examined from the vantage point of systemic functional linguistics (henceforth abbreviated as SFL), in which grammar is seen as the means through which reasoning and explaining are realized (Halliday, 1993a), and knowledge is seen as being constructed in language. This study intends to provide for students the communication tools they must acquire to become fully socialized into their research community. This chapter will be devoted to a presentation of the background, rationale, objectives, data collection and methodology, and the organization of this book.

1.1 Background of the Study

The definition of FCCs in this book is based on the concept of finite clause. The 'finiteness' of a clause has been defined differently by different researchers. For example, Halliday (1994/2000: 227) defines finite as having "the same form as a defining relative clause". For Huddleston (1984: 388), a finite clause is indicated by "a nominative form" of the subject pronoun. Biber et al. (1999: 193) defines the finite clause as "a clause contains a verb phrase which is marked for tense or modality". As finite clause in this book refers to the structure with subject and finite verb, FCC in this book refers to the combination of two or more clauses in the form of a full clause with some connective devices. The result of the combination is two

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types of relationship between clauses: the INTERDEPENDENCY and the LOGICO-SEMANTIC RELATION. The difference between them, according to Halliday (1994/2000: 216), is that the former is general to all complexes (word, group, phrase and clause); whereas the latter is "specifically an inter-clausal relation". In terms of Halliday's metafunctional explanation to lexicogrammar, it is the logical metafunction that provides the resources for creating clauses complexes.

1.1.1 Functions of Logical Elements in Knowledge Construction

Knowledge is defined by Locke (1948: 252) as "the perception of the connection of and agreement, or disagreement and repugnancy, of any of our ideas". According to him, knowledge is derived from people's observation of the world and from the internal operations of the mind based on the observation. Ideas may be either simple or complex. The difference between them is that simple ideas are the whole materials of knowledge that is passively received by the mind, whereas complex ideas are actively created by the mind out of simple ones by combining several simple ideas into one compound one. In this sense, the notion of being complex implies two points. First, being complex is the result of mind activities. Second, elements forming a complex unit are put together in certain relations. As knowledge is about the ideas in which the act of the mind is indispensible for its identification, no knowledge can be obtained without reasoning or inference.

The importance of logic in thinking was noted more than two thousand years ago by Greeks, who took scientific knowledge as "mathematical derivation" and logic being "a codified set of principles of 'right reasoning' which guaranteed the validity or truth of a conclusion" (Weimer, 1977: 2). Philosophers including Aristotle, Cicero, and Aquinas tried to establish methods of reasoning that might be accepted because of their correctness. For example, the conclusion in a syllogism is derived on the basis of premises.

(1) All men are mortal.
Socrates is a man.
(Therefore) Socrates is mortal.

However, this type of reasoning is not very common in real life. Studies of logic present two main types of argumentation: deductive and inductive reasoning. In deduction reasoning, the correctness of the method ensures the validity or truth of the

conclusion. It is just the case with syllogism presented above. In inductive reasoning, there is first of all a hypothesis that is supported by a number of observations or experiments to reach a conclusion which is probabilistically valid. For instance,

> in case 1 circumstance C accompanies phenomenon P,
> in case 2 circumstance C accompanies phenomenon P,
> in case 3 circumstance C accompanies phenomenon P.
> (Then) in all the studied cases circumstance C accompanies phenomenon P.

The significance of the distinction between deductive reasoning and inductive reasoning is that they are the cornerstones upon which scientific knowledge is founded. Nippold (1988) takes verbal reasoning as a mental construct where language and cognition converge. According to him, there are inductive and deductive verbal reasonings. With inductive reasoning, the preceding information supports the conclusion but there is no sufficient evidence for it. With deductive reasoning, the preceding information is logically sufficient evidence for the conclusion.

By adding an argumentative function to Buhler's[1] hierarchical model of functions of language, Popper (1963: 135 original emphasis) argues that it is identical to the explanatory function of language because of "a logical analysis of *explanation and its relation to deduction (or argument)*". This means that, on the one hand, both explanation and argument depend on deduction; and on the other hand, deduction can not be made without logic. In this sense, logic is an inherent nature to explanation and reasoning.

Halliday (1998) argues that technicality and rationality are the semiotic foundations for scientific knowledge. This means that knowledge and reasoning are considered to be the most important targets in learning. Knowledge involves what learners need to know to solve problems and perform skills; reasoning is concerned with learners' ability to think about knowledge. Reasoning involves problem solving, inductive and deductive reasoning, strategies and critical thinking.

1.1.2 Complex Sentences and Knowledge Construction

Studies in cognitive science and SFL provide background information about the relationship between complex sentences and knowledge construction. As cognition

1 According to Buhler, the communicative function of language can be classified into three hierarchically related functions: (1) the expressive or symptomatic function, (2) the simulative or signal function, and (3) the descriptive function.

is defined as "the mental activities involved in acquisition, processing, organization, and use of knowledge"[1], cognitive studies of language take language as "part of a cognitive system which comprises perception, emotions, categorization, abstraction processes, and reasoning" (Dirven & Verspoor, 1999: x). On the relation between syntactic structure and meaning expression, Lakoff and Johnson (1999) point out that the syntax of a langauge is structured mentally as communicative strategies for expressing meaning in culture; and Croft (1999: 87) states that "the semantic structure corresponding to a syntactic construction represents a conceptualization of experience". They emphasize the idea that the linguistic structure is related to the communicative function of langauge and to the perception of knowledge. The syntactic structure has influences on the process of conceptualizing human experience.

By making use of the terms "settings" — "the objective and explicit construal of the circumstances in which a situation occurs" (Dirven, 2003: 64), Dirven (2003) argues that the settings of complex sentences are realized with the secondary clause, and complex sentences are developed as a result of the integration of two or more situations into one whole. Dirven (2003) further states that this integration process is achieved by means of the syntactic category of connectors, the most important sub-category of which is conjunctions.

Based on the above points, a very important observation can be made concerning the relationship between complex sentences and knowledge construction. That is, the construction of complex sentences is related to communicative purposes. Furthermore, the complexity of CCs has influences on the process of knowledge construction.

Obviously, the cognitive perspective on language focuses on the functions of language representing people's experiences in a perceptible form. This is partially in common with the functional approach to langauge. One of the purposes of SFL, according to Halliday (1994/2000: F55), is "to understand the nature and functions of language". Thus functional analysis of grammar is to account for how language is used, or, to describe how and why language varies in relation to who is using it and why it is used. SFL differs from other schools of linguistic study in that it assumes language as a system, sees language as a meaning-making resource, recognizes the influence of context on linguistic choice, and takes language as an inherently dynamic phenomenon. Thus its description of langauge is closely related to the uniqueness of language as meaning-making resources.

---

1 This is a definition taken from *Encyclopedia Britannica* (Vol. 6) (1968: 31).

In the case of CCs, Halliday (1987: 40) emphasizes that "the significant feature of clause complexes is … their dynamic, choreographic nature: you cannot foresee the ending from the beginning, nor recover the beginning by looking at the end". In other words, CCs display dynamically how ideas and facts are organized, and how they change in a meaningful way. Therefore, CCs work to produce a kind of knowledge path along which langauge users will move into discourses. Similarly, Matthiessen (1995: 140) states that "clause complexes are open-ended rather than pre-defined structures". Seen in this way, a study of CCs will offer an understanding of the phenomenon of clause combining as part of the process of making meaning as text unfolds. CCs not only display the manner of development in texts, but reveal the cognitive requirement for readers in reading texts. The focus in the study of CCs is to provide information regarding the discourse implications of clause complex choices and to help expand learners' resources for reasoning and for developing rhetorical patterns in discourse.

CCs have been classified by Halliday (1994/2000) into two categories: expansion and projection. In the part of expansion, for example, reasoning in text is achieved through the deployment of clause relations with the help of conjunctions. That is to say, reasoning can be more effective due to the extensive use of conjunctions. Conjunctions are used to background or foreground elements in different clause organizations. The choice of conjunctions is related both to meaning construction and to the cognitive domains in meaning interpretation. The importance of conjunctions in discourse has been discussed by Halliday and Hasan (1976) and Martin (1992), which make distinction between external conjunction and internal conjunction. According to them, external conjunctions are concerned with the logical relations among activity sequences in the material world, while internal conjunctions are concerned with the rhetorical organization of the text itself and the logical relations among textual sequences.

In SFL, linking of clauses is termed as "constructional", i.e. they are relations "of parts into wholes" (Halliday, 1994/2000: F46) and linear ordering is only a reflection. It is across clauses and sentences that "the sequence in which things occur is no longer a variable available for realizing functional relationships [...]. Changing the order of sentences in a text is about as meaningless an operation as putting the end before the beginning" (Halliday, 1994/2000: F47). In SFL, CCs include both finite

and non-finite clauses, as the following examples show[1]:

(2) He lives there while he's on the job.
α × β

(3) She set to work very carefully, nibbling first at one and then at the other,
α =β 1
and growing sometimes taller and sometimes shorter,
β + 2
until she had brought herself down to her usual height.
× γ

Ex. (2) consists of two finite clauses, with the second one becoming dependent with the introductory binding conjunction of *while*. However, Ex. (3) has two non-finite clauses which are by nature dependent (i.e. *nibbling first at one and then at the other*; *and growing sometimes taller and sometimes shorter*). Like these phrases, non-finite clauses in English are realized by participles, gerunds, or infinitive constructions. They are excluded from the discussion in this book due to a limitation of space.

An examination of the corpora shows that the most complex sentence has eight layers of meanings, which is found in one of the Psycorp. It is in the following pattern,

(4) One says that A is a graded Hopf algebra if the usual axioms are satisfied, except that δ
α "β ^βα1 +βα2
is replaced by its graded version, and that the structure maps of A are required to preserve
γ1
the graded structure, i.e. $\subset A_0$, εA_n ˜ if $n > 0, S(A_n)=A_n$, $_m \otimes A_n) \subset$ $_{m+n}$ and $\Delta(A_n) \subset$
=2 ^ γβ1 + β2
$\oplus_{p+q=n} A_p \otimes A_q$.

(Phycorp2)

---

1 This paper follows Halliday (1994) in signifying the clause relations. That is, paratactically related clauses are numbered 1, 2,… etc., with 1 for the initiating clause; while hypotactically related clauses are labeled α, β, γ, etc., with α reserved for the Head clause, wherever it occurs. In SFL, the clauses in a paratactic relation is labeled with the numerals 1, 2, etc. Hypotactic relations are conventionally labeled using the Greek alphabet symbols:

In paratactic relations, the sequence 1,2, etc., cannot be altered. However, the labels in the paratactic relations do not say anything about sequences.

In Ex. (4), the single FCC structure consists of eight clauses which show the following logical relationship: at the beginning there is a projection (*one says*), but within it there is first an enhancement construction (*if*-clause) which provides condition for its matrix clause (*A is a graded Hopf algebra*). It is then followed by two extensive FCCs (*except that δ is replaced by its graded version, and that...*) which add information to the conditional clause. As the knowledge in this extensive structure is a little bit complicated, the writer elaborates it with a formula, which is introduced by *i.e.* Conventionally, the relationship between these clauses can be represented as

α "β^βα1+βα2+ γ1=2^γβ

In this example, a projection is used to introduce one multiple hypotactic and several paratactic clauses. This *and,* instead of just providing links between clauses, links a paratactic structure as the projected clause and provides a broader level of discourse structure. Stylistically, such a kind of construction is elaborated and more involved, dialogic (Beaman, 1984; Martin, 1989; Thompson, 1984).

In SFL, the basic types and natures of clause complex (CC) in English can be represented with the following diagram.

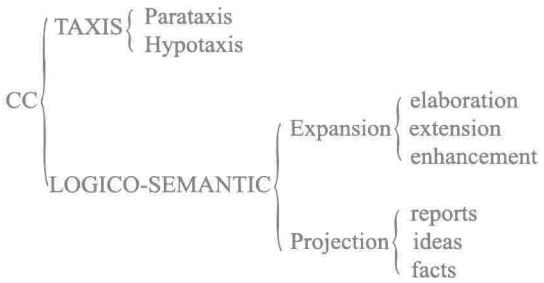

Figure 1.1 Types and Natures of CC in SFL (after Halliday, 1994/2000: 216-221)

Discussions on clause relations in SFL have been made mainly on CCs. For example, researches on the expressing of time and cause in textbooks (e.g. Christie, 1995; Charles, 2011) have shown the importance of CCs in constructing logical explanations for students. That is, they function to help readers navigate through the text. As FCCs are an indispensable part of CCs, such conclusions are mostly applicable to FCCs. That is to say, the use of FCCs can be seen as a persuasive mechanism by means of which writers wish to convince readers the facts presented in the text. Lemke (1991: 24) states "lexicogrammatical selections within clauses and

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