

# An Exploratory Study on Cardiovascular Terminology from the Perspective of Construal Theory

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## Abstract

Medical vocabulary is a hot topic for decades, and previous research are mostly explained by either etymology or semantics. This paper adopts construal theory to explore the most frequently-used academic vocabulary in cardiovascular medicine field and aimed to find out the hidden cognitive laws in cardiovascular terminology. Cardiovascular medicine vocabularies are analyzed from four aspects: a. background and prominence: highlighting the unique information of the term; b. perspective: identifying other terms related to this term and forming a term group; c. specificity: organizing a large and complicated terminology into a systematic tree-like terminology database; d. scope: reflecting relevant knowledge domains of the term.

## Keywords

Construal theory; Cardiovascular terminology; Linguistic features.

## 1. Introduction

Cardiovascular diseases (CVDs) are the leading cause of death globally, taking an estimated 17.9 million lives each year (<https://www.who.int/health-topics>). To better understand heart health, cardiovascular terminology is essential for successful comprehension of academic texts and for writing appropriately and professionally in particular subject areas. But the sheer volume and complexity of cardiovascular terminology has always been a problem for medical learners and language researchers.

In previous studies on medical English vocabulary, most were based on etymology (Sun & Li 2012, Zhao 2016, Liu 2017, Nybaken 1959 ), semantics ( Li 1999), and stylistics (Liang 2017). Medical terminology belongs to iconic language, which emphasizes the practicality and effectiveness of language and pursues semantic transparency, i.e., certainty of denotation and clarity of expression (Li & Chen, 2006). Medical terminology has to be strictly defined in terms of professionalism and accuracy (Li & Chen, 2006). The determination of modern medical terminology follows certain naming principles and is characterized by strong scientific, logical and univocal features (Sun & Li, 2012). Fang (2001) also mentioned that the translation of scientific terms and terminology should follow three criteria, namely, etymology, semantics, stylistics. In Farrell's (1990) view, medical English vocabulary is a type of academic vocabulary that is considered formal and context-independent and is usually used in scientific disciplines.

Previous studies have bettered our understanding of medical English vocabulary, but they are limited in the aspects of etymology, semantics, and stylistics. Further understanding and exploration of medical English vocabulary is necessary, especially under the background of the development of cognitive linguistics, which could help to understanding linguistics structures in a new and deeper way. Therefore, this paper attempts to apply construal theory to interpret the cognitive linguistic features of cardiovascular terminology. Construal theory is proposed by Langacker to analyze semantic structure and linguistic features from mental experience. This

theory emphasizes the importance of human subjectivity in the process of understanding the objective world, and asserts that linguistic expression is the result of speakers interpreting different contexts and in different ways. (Langacker, 1987).

We collected almost 3,000 medical English words for study and analysis from Cardiology (Zhang & Huo, 2019), Manual of Cardiovascular Medicine (Griffin & Venu 2018), Chinese-English Medical Terminology Cardiovascular Pathology, English-Chinese Medical Terminology (Chapter 4 Cardiovascular Pathology) (1996), A Clinical Manual of Cardiovascular Medicine (Chung, 1984), and The English-Chinese Medical Dictionary (Chen & Li, 2015). Afterwards, we selected 158 cardiovascular terms from the 3,000-word corpus as examples for analyzing the linguistic features of cardiovascular terminology.

The application of construal theory to interpret cardiovascular terminology does not only widen the study line of construal theory, but also offer a new angle for the study of medical English vocabulary. It is expected to provide medical learners and medical translation learners with a better understanding of medical English vocabulary, especially cardiovascular terms, and to be useful for researchers working on medical English vocabulary.

## 2. The Theoretical Foundation — Construal theory

Construal theory, a branch of cognitive linguistics, refers to the ability of people to interpret the same scene in different ways, especially from subjective mental experience (Langacker, 1990). The term construal theory is derived from the cognitive psychology term “imagery”, which refers to the abstract representations that people form during the perceptual experience of external objects, and which tend to remain in their minds for a longer period of time (Wang, 2006). To avoid confusion, Langacker (1990) decided to use the term “construal” instead and defined it as: We have the ability to construe the same situation in many different ways.

The view of construal theory from Langacker is a specific way of forming a concept, semantic structure and linguistic expression that emphasizes the subjective human factor, and the semantic value is closely related to a specific method of interpretation. Langacker’s classification, entitled “focal adjustment”, suggests that five specific aspects can be described: specificity, scope, background, perspective, and prominence (Langacker, 1990). The five specific aspects of Construal theory provide a comprehensive description of people’s cognition.

### 2.1. Specificity

One dimension of construal theory is granularity and detail of the description of the situation - specificity (Langacker, 1990). An expression with high specificity describes a scenario in detail and has a high resolution, while an expression with low specificity is limited to a rough description and its low resolution reflects only its rough characteristics and overall organization. For example,

(1) hot → in the 90s → about 95 degrees → exactly 95.2 degrees

(2) rodent → rat → large brown rat → large brown rat with halitosis

(Example from Langacker, 1990)

As in the examples, when describing the temperature, I can say “it’s hot today”, but I can also say “it’s over 90 degrees”, “it’s about 95 degrees”, “Exactly 95.2 degrees” and so on. Similarly, “aunt” is more specific than “relative” and “large brown rat” is more specific than “rodent”. In this way, the words after the arrow have higher granularity and resolution than the words before (Langacker, 1990).

### 2.2. Scope

Scope, the configuration of the activated conceptual content, should include Base (a space to which a discourse refers) and Profile (a part of which is highlighted). Scope is basically

equivalent to the cognitive domain in traditional cognitive linguistics, also called the semantic domain (Wang, 2006). Scope can be activated by expressions and provide us with background knowledge for understanding the expression (Wu, 2011).

According to Langacker (1990), each linguistic expression has its corresponding cognitive scope. That is to say, when people understand a word, they will inadvertently learn the cognitive range that the word represents. Different words will have different sizes of cognitive scopes, which form the Scale. In many cases, the boundaries of the scope are blurred, but the scope in which an expression can be activated should be able to include at least the base and the profile. According to the size of the scope, it can be divided into “Maximal Scope (MS)” and “Immediate Scope (IS)” (Langacker, 1990). The former refers to the entire cause or the maximum content that can be activated by a single expression; and the latter is the most relevant and neighboring concept. Langacker describe it metaphorically as “onstage region”.

### 2.3. Background

Understanding the meaning or structure of an expression requires one or more expressions' as a basis, which is called Background (Wang, 2006). The first kind of background is what we can learn from metaphor, that is, the ontology provides the background for the metaphorical objects to be analyzed and understood. Another kind of background is the context, which is an indispensable reference for language understanding.

### 2.4. Perspective

Perspective refers to the angle of people's description, which related to the relationship between the observer and the matter. People's observation angle may directly affect the understanding of the matter and the expression of language. Different perspectives produce different cognitive reference points. Perspective can include many factors: (1) some words include perspectives such as time and space; (2) in the absence of special instructions, the speaker may be regarded as having no explicit perspective; (3) perspective also includes: visual scanning, summary scanning and sequential scanning; (4) diverge and converge, from the center of the item edge and edge to the center of the view, from the top to the bottom or vice versa, (5) subjective and objective observation (Wang, 2006)

### 2.5. Prominence

In cognitive linguistics, prominence is one of the main bases for classifying lexical categories and analyzing syntax. Each construal event has a profile plus a base, which is closely related to the perspective and subjective factors of the cognitive subject. Langacker (1987:118; 1991:5) distinguishes two different types of emergence:

#### (a) Profile-Base

Langacker argues that the meaning of words can be portrayed by a combination of the two. The base is the starting point of the side description, and the profile is the focus on the content of the base, indicating the exact point of the base. The semantic value of an expression resides in neither the base nor the profile alone, but only in their combination (Langacker, 1987: 183).

#### (b) Trajector-Landmark

In the description of each semantic relation, the individual highlighted participants are asymmetric. The most prominent one is called the Trajector (tr) (Langacker, 1987: 185). It is the figure within a relational profile that indicates the most prominent position in a pair or group of relationships in which a matter is focused. The other one is the Landmark (lm), which marks the other things in the relational profile that are sub-prominent and provides a reference point for the positioning of the trajector.

### 3. Meaning construction of cardiovascular terminology

#### 3.1. Meaning construction based on background & prominence

In the framework of background and prominence, we believe that the background of a group of words is basically the same, and the difference lies in the different factors of prominence, or each word has its own focus of prominence. In cardiovascular disease terminology, the reason why some different terminologies would belong to the same medical type is that these terms are all in the same background. They belong to the same category, but different terms appear due to different causes or symptoms, which means the factors highlighted are different.

In cardiovascular terminology, the background and prominence information of some can be seen from the term literally, while of the others the background and prominence information can only be gotten when the meaning of term is understood. The conceptual framework of the first group of disease names from one department is the same. The subtle differences lie in factors that are prominent, or in the fact that each disease name has its own focus. In such types of words, we can easily learn, literally, which department or type of disease the condition belongs to, for clear and obvious terminology signs on the wording of this term. For example, in pericarditis, pericardial diseases can be classified according to their etiology. There are primary infectious pericarditis, non-infectious pericarditis due to tumors, metabolic diseases, systemic immune diseases, uremia, etc. According to the progression of the disease, it can be classified as acute pericarditis (with or without pericardial effusion), adhesive pericarditis, and chronic constrictive pericarditis ((Handbook of Cardiovascular Medicine, 2008: 403)). We selected in the wide range of pericarditis terms for analysis 5 terms of pericarditis diseases, which can be divided into 2 parts -- classification and etiology.

**Table 1** Meaning Construction of Pericarditis

Terminology Framework	Classification	Etiology (Prominence)
constrictive pericarditis	pericarditis	Pericardial thickening, adhesions and even calcification caused by chronic inflammation of the pericardium
suppurative pericarditis	pericarditis	Inflammation caused by septic bacteria
tuberculous pericarditis	pericarditis	Tuberculosis infection
uremic pericarditis	pericarditis	Uremia complication symptoms
viral pericarditis	pericarditis	Viral infections

In Table 1, the main cause of constrictive pericarditis is chronic inflammation in the pericardial region resulting in thickening of the pericardium and narrowing of the pericardial space, so "constrictive" highlights the clinical symptoms of this disease. "Suppurative" means causing suppuration, which is the cause of suppurative pericarditis, also called purulent pericarditis, for a purulent bacterial infection of the pericardial region and inflammation is the cause of this disease. The condition of tuberculous pericarditis is due to the spread of tuberculous infection from other organs to the heart "tuberculous" Uremic, derived from the word urine, and Uremic pericarditis is caused by a complication of uremia. The autoimmune of viral pericarditis response to direct viral invasion of the infection, so "viral" highlights the etiology of this condition. (Collins English-Chinese Dictionary))

We can tell these 5 terms in Table1 all have two basic conceptual framework components -- classification and etiology. They are all in the same background, all belonging to pericarditis, but they are subdivided into various disease names because they have different etiologies, and have different prominence components in the lexical meaning. The nomenclature "background + prominence" of the above five terms clearly shows their respective prominence components

and deepens the reader's understanding of what is prominence; thus making the difference between the terms clear.

In the second type, in which the background and prominence information can only be gotten from the deep meaning, for the background and prominence information are behind the word instead of emerging literally. Take congenital heart disease as examples. We collected from cardiovascular disease corpus five congenital heart disease: Pulmonary stenosis, Primary pulmonary hypertension, and Patent ductus arteriosus (PDA). Literally, it is difficult to see that they are related. By definition, the differences in their meanings is easily identified, but the relationship between them is difficult to find out as well.

**Table 2** Meaning Construction of Congenital Heart Disease

Clinic department	Disease type	Lesion	Pathogeny	Prone group
Internal-Medicine Cardiovascular Dept	Congenital heart disease	Pulmonary artery	narrowing of the pulmonary valve	\
			between the pulmonary artery and the right ventricle	
Internal-Medicine Cardiovascular Dept	Congenital heart disease	Pulmonary artery	increase pressure within the pulmonary arterial circulation	Women of childbearing age
Internal-Medicine Cardiovascular Dept	Congenital heart disease	Ductus arteriosus	abnormal persistence after birth of an open lumen	female
			in the ductus arteriosus, connecting the aorta and the pulmonary artery	

As in Table 2, the differences in this group of terms mainly lie in "lesion", "pathogeny" and "prone group", while "clinic department" and "diseased type" are the same. Therefore, we can consider "clinic department" and "diseased type" as background information, while "lesion", "pathogeny" and "prone group" prominence information. The definitions of the terms mainly describe the causes and symptoms of the disease, ignoring other information as the department, the type of disease and the prone group in which it is most prevalent.

All the three terms are constructed in the same way, we take patent ductus arteriosus (PDA) as an example, whose lesion is ductus arteriosus. The ductus arteriosus was originally a normal blood flow channel between the pulmonary artery and the aorta during fetal life and was therefore necessary for the specific circulatory pattern of the embryonic period. Shortly after birth, the ductus arteriosus closes its disuse, and if it remains unclosed, the normal function of the heart is compromised. The ductus arteriosus is formed in the foetus and is part of the heart, so the condition is part of the cardiology department and part of the congenital heart disease, which is its background information. The diseased region of it is the ductus arteriosus, which distinguishes it from other terms; it often occurs in the female population than in other conditions, so the lesion and risk group and its cause are its prominence information.

### 3.2. Meaning construction based on Perspective

Perspective refers to the angle from which people describe an event and involves the relative relationship between the observer and the event. People's perspective may directly affect the understanding and the expression of language, and different perspectives produce different points of cognitive reference (Wang, 2006). Take "myocarditis" and "myocardial bridge" as examples. From the perspective of "lesion", they share the same characteristics. However, from the perspective of "major method", "myocarditis" is mainly treated with drugs and devices, while "myocardial bridge" is mainly treated with surgery. From the perspective of "symptoms", "myocarditis" often presents with arrhythmias and heart failure, or even cardiogenic shock in severe cases, while "myocardial bridge" often present with arrhythmias alone.

**Table 3** Meaning Construction of “Myocarditis” and “Myocardial Bridge”

Perspective	Feature	Disease
Lesion	cardiac muscle	myocarditis, myocardial bridge
Major method	drugs	myocarditis
	devices	myocarditis
	surgery	myocardial bridge

We can tell from Table 3, terms may share the same features from one perspective, and differ in other features from other perspectives. The perspective construal approach is more appropriate for examining associations and distinctions between terms, while the background and prominence construal approaches in previous section focused on highlighting the features of the terms themselves.

### 3.3. Meaning construction based on Specificity

Terms can also be constructed according to different specificity. Specificity is the degree of detail and the level of detail of the description of a situation (Langacker, 1987). An expression constructed with a high level of specificity provides a detailed description of a situation with a high degree of resolution, while an expression constructed with a low level of specificity is limited to a cursory description, with a low resolution reflecting only its rough features and general organization (Langacker, 1987). For cardiovascular terminology, we can also classify the level of specificity of terms in two ways, one by length and the other by meaning.

In a group of terms whose specificity are divided up by their meaning, a term with a higher level of specificity contains a smaller range of meanings and is more precise in its meaning, while the lower specificity it has, the larger meaning scope it contains. Take the terms “heart disease”, “coronary artery disease”, “angina pectoris”, “angina pectoris at rest”, and “postinfarction angina” as examples. The five terms differ in meaning specificity, which cannot be told from length. The term “heart disease” has the largest scope of meaning and is the least specificity of the five terms, from which the other four are derived. In other words, “heart disease” and the other four terms are in an inclusive relationship. What’s more, “angina pectoris” belongs to “coronary artery disease”, and the specificity of the former one is higher than the latter. We can tell the specificity of terms “angina pectoris” and “angina pectoris at rest” from the length, for “angina pectoris at rest” is more detailed than “angina pectoris”, that is to say, term “angina pectoris at rest” is included in “angina pectoris”. The term “postinfarction angina” belongs to the category of “angina pectoris”, but due to “postinfarction angina” is caused spontaneously by the body, “postinfarction angina” also belongs to the category of “angina pectoris at rest”. The level of specificity of “postinfarction angina” is higher than that of “angina pectoris at rest”. Therefore, the taxonomies of these 5 terms are as follow.

*heart disease < coronary artery disease < angina pectoris < angina pectoris at rest < postinfarction angina*

We take another example of angioplasty to show specificity constructed by length. The longer the term, the higher level of detail, and the clearer and more detailed the information expressed.  
*angioplasty → transluminal angioplasty → percutaneous transluminal angioplasty → percutaneous transluminal renal angioplasty*

“Transluminal angioplasty” is more detailed than “angioplasty”, for it specifically indicates the “transluminal vessels” rather than the vessels in a broad sense. “Percutaneous transluminal angioplasty” is more detailed than “transluminal angioplasty”, as the former indicates a transdermal approach to the procedure. “Percutaneous transluminal renal angioplasty” is in turn more precise and specific than “percutaneous transluminal angioplasty”, which specifies

the transluminal vessels to the renal arteries. As an individual concept, the term cannot be further divided down.

From the example, we can tell specificity shows the inclusion relationship between terms. With lower levels of detail can be derived from a series of terms with higher levels of detail, so terms with different levels of detail form a tree structure with hierarchical relationships and affiliations. A systematic tree-structured thesaurus can make the originally numerous and complicated terms clear and help to sort out medical knowledge.

### 3.4. Meaning Construction Based on Scope

Constructed in each linguistic expression is its corresponding cognitive scope. Words different in sizes of cognitive scopes are called different in Scale. Scope, achieves the same result with specificity by different methods in which specificity focuses on the meaning precision of the term itself, while scope shows the semantic area of the term. For example:

*disease of aorta > aneurysms > dissecting aneurysms*

The concept of “disease of aorta” provides the semantic scope of “aneurysms”, the concept of “aneurysms” provides the semantic scope of “dissecting aneurysms”, and so on and so forth. A similar situation arises in the description of cardiac organs.

Another example: *body > heart > atrium > right atrium*

As we know, the heart is part of the body and the atria are part of the heart, which is further divided into the left and right atria. The meaning scope of “heart” directly belongs to the scope of “body”. And “heart” also has lower-meaning-level words, including: atria, ventricles, aorta, pulmonary veins, and so on. They can also be subdivided downward. However, the boundaries of scope are not completely clear.

## 4. Conclusion

Analyzing the linguistic features of cardiovascular terminology from the perspective of construal theory is a workable and practicable way. The concept of background and prominence can be used to analyze the internal framing components of a term and learn the information it emphasized. Perspective can be used to analyze terms from different observation perspectives and identifies relating terms to establish a related-terminology group. Specificity is often used in classifying complicated terms and make them into a systematic tree-like terminology database. And scope is used to reflecting relevant knowledge domains of the term. In identifying the majority of terms with similar meanings, perspective is often used firstly, background is approached to identify the framework components afterwards, and then the prominence concept to find the focal point of the components, and finally the specificity and scope are used to cascade the analysis.

In previous studies, construal theory has been applied to the analysis of highly subjective words or literary texts with distinctive national characteristics, but rarely to the analysis of scientific terms with strong practicality. Most previous studies on medical vocabulary have been conducted through theoretical studies such as etymology and stylistics instead of analyzing by cognitive or subjective theories. This paper breaks the wall and attempts to use a subjective theory to analyze objective terms through finding out the internal framework and external links between construal theory and cardiovascular terms. Fortunately, some valid results have been successfully produced from this research. For this successful application, we believe that construal theory can be applied to the analysis of medical terms in other departments, even involving the analysis of other specialized and practical words. What’s more, we can try to apply subjective theories to analyze objective vocabulary in the future.

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