A Cognitive Approach to English Vague ambiguous Sentences from the Perspective of Semantic Activation

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Abstract. The view of semantic activation provides a fair cognitive basis for English vague ambiguous sentences. Integrating the access-and-activation model with a chain of reference point relationships, this paper constructs an access and spreading activation network model of reference point relationships to probe into the cognitive interpretation of vague ambiguous sentences. Results indicate that the double-decoding conceptualization process involves the reference point’s activating and spreading to the target. Vague ambiguity takes place at the levels of lexeme, lemma and conceptual level. The research may shed new light on cognitive linguistics, language education and computer processing of natural language.

Keywords: English vague ambiguous sentences, cognitive approach, the access-and-activation model.

1. Introduction
Ambiguity refers to the phenomenon that “a language form has two or more meanings, resulting in different understandings” [1]. Scholars have investigated the phenomenon of language ambiguity mainly from both macro and micro perspectives. At the macro level, they discuss cross-language ambiguity comparison [2], the phenomenon of permanent ambiguity [3] and so on. At the micro level, they investigate the significance of the context on the ambiguity resolution [4] and ambiguity resolution methods [5] and so forth. However, the phenomenon of vague ambiguity in English doesn’t get enough focus. Plenty of scholars probe into semantic activation from different perspectives, which involve the cognitive processing model of English compounds from the view of the time course of the semantic activation of morphemes [6], the interpretation of the relationship between semantic activation and the cognitive mechanism from a cognitive perspective [7] and so forth. The research on the phenomenon of vague ambiguity in English from the view of semantic activation is seldom mentioned. This paper, therefore, intends to construct an access and spreading activation network model of reference point relationships to depict the process of semantic access of vague ambiguous sentences in English.

2. Theoretical framework
2.1. The chain of reference point relationships and the access-and-activation model
The term, cognitive reference points, is first proposed and gets proved in the experiments of prototype by the psychologist Rosch [8]. Langacker argues that the conceptualizer (the people), has the reference
point ability and tends to activate the more salient entity as the reference point. Based on that, Langacker develops the reference points into a chain of successive reference points to analyze more complicated sentence structures or discourses. This paper integrates a chain of successive reference points and a reference point relationship as depicted in Figure 1.

![Figure 1](image1)

**Figure 1.** Integration of a chain of cognitive reference points and reference point relationships.

In Figure 1, the circle labeled “C” represents the conceptualizer and “R” is the reference point. “T” is the target the reference point activates while “D” is the dominion, which stands for all the potential targets. The dashed arrows indicate the mental path the conceptualizer follows in reaching the target. “C”, “R0”, “T0” and “D0” constitute a reference point relationship. Figure 1 shows a chain of such relations. After the reference point serves its purpose to profile the target, each successive target functions in turn as the next reference point.

2.2. The access-and spreading activation network model of reference point relationships

The view of semantic activation proposes that meaning relies on activation in the semantic network. Semantics spread over the neural network of human mind and semantic comprehension refers to activation of the semantic network[9]. Hence, the view of semantic activation provides a fair cognitive basis for the cognitive study on vague ambiguous sentences in English.

The model of semantic activation is put forward with by cognitive psychologists Collins and Loftus[10]. In the spreading activation model, the semantic network consists of a bunch of nodes that are related with each other, each of which represents a concept. The nodes are organized along the lines of semantic similarities. Activation is like a signal from a source that is attenuated as it travels outward. Activation attenuates over distance, thus ensuring that closely related concepts are more likely to be activated than distant concepts [11]. According to the spreading activation theory, the retrieval of semantic information occurs by a process of spreading activation and the semantic information spreads over the whole semantic network that centers on a node. Bock and Levelt revise the model and solve the problem that it pays little attention to phonological, syntactic and morphological aspects of words[12].

Integrated with the spreading activation network model, an access and spreading activation network model of reference point relationships is constructed in this study to probe into the cognitive mode of vague ambiguous sentences in English (Figure 2).

![Figure 2](image2)

**Figure 2.** The access and spreading activation network model of reference point relationships.

This model integrates a chain of reference point relationships, the access-and-activation model and the spreading activation network model. As is sketched in the Figure, “C” stands for the conceptualizer. “R” represents the cognitive reference point, which is dynamic and changes along with the moving window. “T” means the target, which can be the new cognitive reference point with the focus changing. Window i, i+1 ... i+6 and so on represent the conceptualizer’s changing focus. “D1”, “D2”, “D3” stand for the dominions of “R1” and “T1”, “R2” and “T2”, “R3” and “T3” respectively. Figure 4 profiles
a dynamic mental path for semantic access, which provides an interpretation framework for vague ambiguous sentences in English. Vague ambiguous sentences in English can be represented to be a process, where the cognitive reference point activates a relatively typical target rather than the right one in line with the cognitive context. This process leads to invalid mental contact and inaccessible cognitive path. Afterwards, the conceptualizer needs to double decode the sentence and activate another target to realize semantic access. The mental path from the cognitive reference point to the target in vague ambiguous sentences refers to the spreading activation of targets. After the reference point profiles the grounded target and realizes its duty as a grounding element, the activated target functions in turn as the next reference point. The phenomenon of vague ambiguity in English happens at the lexeme level, the lemma level or the conceptual level with only one cognitive mental path accessible, that is to say, there doesn’t exist any permanent ambiguity in it.

3. The cognitive interpretation of vague ambiguous sentences in English

In terms of the linguistic levels, English vague ambiguous sentences can be divided into three levels, namely, the lexeme, lemma and conceptual levels.

3.1. The cognitive interpretation at the lexeme level

The phenomenon of vague ambiguity in vague ambiguous sentences may happen at the lexeme level and is influenced by words’ phonological properties, such as phonetic features or the pronunciation, which will result in the conceptualizer’s temporary ambiguity.

Example 1:

-“I had a round of golf with my wife this morning.”
-“Which won?” (in spoken language)

In terms of written form, the underlined sentence in Example 1 has only one semantic interpretation. However, it confuse the conceptualizer since “/wʌn/” matches with both “one” and “won” in pronunciation. The conceptualizer tends to take it as “which one” first and then modifies it to be “which won” judging from the semantic-pragmatic and common knowledge. Its mental path can be portrayed by the access and spreading activation network model of reference point relationships (see Figure 3).

Figure 3. The cognitive process of vague ambiguous sentences at the lexeme level.

Figure 3 profiles the schema of cognitive process of Example 1 from the perspective of the access and spreading activation network model of reference point relationships. Window i to i+2 describe Example 1 dynamically. “W” is equal to “which”. It is the starting point of the sentence and also the cognitive reference point. In the process of spreading activation, it tries to match the pronunciation “/wʌn/” with a specific word. Meanwhile, “which”, judging from common knowledge, carries out the spreading activation in “D1” with the help of “won”. Through running the access and spreading activation network model of reference point relationships, this process leads to the movement from window i, i+1 to i+2. Consequently, the meaning of Example 1 is accessible. However, the conceptualizer is easy to be influenced by “which one” and activates “one” in window i, only to find that “which one” doesn’t fit the context according to common knowledge. Therefore, there is finally only one interpretation for this sentence, that is to say, “which won”.
3.2. The cognitive interpretation at the lemma level

The phenomenon of vague ambiguity at the lemma level and is effected by words’ syntactic properties, such as part of speech or common collocations, which will lead to the conceptualizer’s temporary ambiguity, as is profiled in Example 3.

Example 3:
Fat people eat accumulates.

As is shown in the formal structure of Example 2, the sentence has only one semantic interpretation. However, there is a preferential understanding of “fat people” in the process of semantic integration since it is a typical usage. Judging from syntactic properties, “fat accumulates” is the main clause while “people eat” serves as a relative clause to modify the subject “fat”. The mental path can be described by the access and spreading activation network model of reference point relationships (see Figure 4).

![Figure 4](image-url)

**Figure 4.** The cognitive process of vague ambiguous sentences at the lemma level.

Figure 4 is the schema of cognitive process of Example 2 from the perspective of the access and spreading activation network model of reference point relationships. Window i to i+4 describe Example 3 dynamically, in which “P=people” and “F= fat”. “P” is the starting point of the sentence and activates “fat” through “eat”. There is a reference point relationship between “people” and “fat”. Window i+2, i+3 and i+4 are the description of the main clause while window i, i+1, and i+2 the relative clause. “Fat” activates its atypical usage of being used as a noun in the cognitive dominion D2 through running the access and spreading activation network model of reference point relationships. Therefore, the meaning of the sentence gets accessible along with the movement from window i+2, i+3 to i+4. The conceptualizer is easy to get effected by “people” in the process of activating the usage of “fat” and take it as an adjective since to modify a noun is its typical usage, such as “fat people”. However, “fat people eat” doesn’t fit the subject-verb-object construction in terms of the syntactic structure of the sentence. Instead, “people eat” works as a relative clause to modify the noun “fat” and there exists no ambiguity in the whole sentence.

3.3. The cognitive interpretation at the conceptual level

The phenomenon of vague ambiguity at the conceptual level may get influenced by diverse concepts and semantic relationships, which will lead to the conceptualizer’s temporary ambiguity.

Example 3:
The doctor examined the nurse of the old woman who had a stomachache.

As is shown in the symbolic structures of Example 3, the sentence has only one semantic interpretation. Nonetheless, it confuses the conceptualizer since “who” can match with both “the nurse” and “the old woman”. Judging from the semantic-pragmatic and common knowledge, it is more reasonable to believe that “who had a stomachache” modifies an old person who tends to be unhealthy rather than “the nurse” who has duty to take care of patients. Hence “who=the old woman”.

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Figure 5. The cognitive process of vague ambiguous sentences at the conceptual level.

Figure 5 is the schema of cognitive process of Example 4 from the perspective of the access and spreading activation network model of reference point relationships. Window i to i+6 describe Example 4 dynamically, in which “D=the doctor”, “N=the nurse”, “OW=the old woman” and “S=a stomachache”. “D” is the starting point of the sentence and the first cognitive reference point. It activates “the nurse” through “examine”. There is a possessive relationship and also a cognitive reference point relationship between “the nurse” and “the old woman”. Window i, i+1, i+2, i+3 and i+4 are the description of the main clause while window i+4, i+5 and i+6 the relative clause. “The old woman” activates “who” in the cognitive dominion D3 through running the access and spreading activation network model of reference point relationships. It further activates “a stomachache” due to common knowledge. Therefore, the meaning of the sentence gets accessible along with the movement from window i+4, i+5 to i+6. The conceptualizer is easy to get effected by “the nurse” in the process of activating “who” in window i+2. However, based on the cognitive context, it fits the common knowledge better for the relative clause “who had a stomachache” to modify an old who tends to be unhealthy. It is not accessible for “the nurse” to activate “a stomachache” in the dominion D2. Thus the relative clause modifies “the old woman” and there is no ambiguity in the whole sentence. It’s a matter of vague ambiguity in English. Figure 10 demonstrates the cognitive process of the phenomenon of vague ambiguity in the sentence with the help of the access and spreading activation network model of reference point relationships. “OW-W-S” constructs the final path to ambiguity resolution and highlights the explanatory power of this model to the study on the cognitive mechanism of vague ambiguous sentences in English.

4. Conclusion

This study, from the view of semantic activation, integrates the access-and-activation model with a chain of reference point relationships and then constructs an access and spreading activation network model of reference point relationships. The process of activation involves not only the spreading activation at the lexeme level, but also the lemma level and the conceptual level. Practically, a cognitive approach to vague ambiguous sentences in English from the view of semantic activation is able to gain insight into the cognitive mechanism of language and instruct English teaching more effectively with atypical usages. It also sheds new light on computer processing of natural language.

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