

Psycholinguistic Analysis of the Semantic Meaning of Sentences in Listening Comprehension and Its Implications

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Abstract: Listening comprehension is an important part in English teaching, and it is also an important research theme in second language acquisition (SLA). Through the application of psycholinguistic research results, this paper attempts to explore the process of comprehending semantic meaning of sentences in listening comprehension, thus providing solutions to improve listening skills.

Keywords: Listening comprehension; Semantic meaning; Listening skills

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1. Introduction

Sentence is a basic unit in language application. It is formed of words and/or phrases and can express a complete meaning. Listening skills enable foreign language learners to acquire language input and information, which can promote the internalization of language regularities and the development of other language skills. Listening skills have become an important measurement of learner's language proficiency and communication ability. Listening comprehension, which is the ability to perceive, store, decode, and comprehend input information, is an important aspect in the training of listening skills and an essential part of language skills. The effectiveness of listening comprehension is closely associated with sentence comprehension and word recognition. Besides that, listening comprehension is a necessary component in English examinations and also an important research theme in second language acquisition (SLA). Listening comprehension has been widely concerned in various teaching activities.

2. Status quo of research

In listening practice, the resources for listening materials have been greatly improved in the era of mobile networks. A large number of resources for listening materials are easily accessible to English language learners. Generally, the research methods for sentence comprehension in listening comprehension are mainly from two perspectives: theoretical research and experimental research. From the published works at home and abroad, the themes are mainly on English listening or teaching. The research on comprehending semantic meaning of sentences in listening comprehension is relatively limited. The theories put forward by scholars at home and abroad have their own emphasis and strengths. This paper attempts to explore the theoretical paths of comprehending semantic meaning of sentences in listening comprehension by using appropriate theoretical theories or models based on different levels of sentence comprehension.

3. Psycholinguistic analysis of sentence comprehension in listening comprehension

Listening is a dynamic process, which involves several sensory organs. Since the comprehension of sentence occurs in the process of listening comprehension, what the auditory organs receive is a sequence of speech signals with order and meaning; thus, it involves speech recognition and comprehension. Psychologists have conducted many studies on this field from different perspectives, and many of their research results may help deepen the understanding of sentence comprehension. In order to exemplify how the appropriate research results can be applied in the comprehension process, the listening comprehension part of China's College English Test (CET4) in December 2021 is taken as an example.

In order to comprehend a spoken message, four main types of knowledge may be drawn on: phonological (the sound system); syntactic (how words are put together); semantic (word and propositional knowledge); and pragmatic (the meaning of utterances in particular situations) ^[1]. These four types of knowledge play a role in the overall listening process since they are considered the mental knowledge of participants in the listening process. An additional type of meaning, kinesic knowledge, is conveyed by the speaker's facial and bodily movement. This type of meaning is present only in those types of listening where the speaker is visible. This paper only deals with the listening comprehension in second language teaching activity.

3.1. General analysis of the process of listening comprehension

According to Anderson, the process of listening comprehension can be divided into three stages: perceptual processing, parsing, and utilization ^[2]. Perceptual processing is a process where speech signal enters the sensory memory, wherein the information of speech signal is saved for less than one second; thereafter, some of them will enter into short memory for processing after being filtered. Parsing is a process when the information stored in short memory forms meaningful preposition after restructuring and coding. The listener needs to split the continuous flow of speech. Meaning is the main clue for splitting. Utilization is a process that connects the preposition formed with the known information stored in the long memory to determine the meaning of preposition. When the newly inputted information matches the known information stored in the long memory, comprehension is generated.

With regard to the stage of perception, based on the first principle of VanPatten's input processing theory, learners will process input meaning before processing input form, learners tend to process lexical items rather than grammar items (such as grammar mark) to obtain semantic meaning, and learners prefer to process the "meaningless" form before processing the "meaningful" form ^[3]. Semantic knowledge refers to the knowledge of the meaning of words and the meaning of relations between words in a sentence. It also refers to the relations between the meanings of individual sentences that make up a discourse. We have already seen that semantic knowledge plays a role in syntactic processing, insofar as understanding of lexical words and the relations of the elements in the sentence (agent, patient, etc.) is also necessary for that process. In normal sentence processing, semantic considerations tend to dominate understanding, while syntax plays a minor role in confirming any problematic semantic relations where necessary ^[4]. For example, the first question in CET4 listening comprehension is "What was the woman's problem?", and the first sentence in the speech content is "A 22-year-old Chinese woman who suffered from a persistent cough was shocked to learn that she had a piece of chicken bone lodged in her lung." When content words such as "women," "suffer," "cough," "chicken bone," and "lung" are heard, the semantic meaning of the sentence can be comprehended, that is the mentioned event and its course, and thus the answer to this question can be decided. As to the tenses used in this sentence, the listener need not to pay much attention to them or they can even overlook them as they have no influence on the understanding of the original sentence.

3.2. Word recognition in the process of listening comprehension

Words place an extremely vital important role in transferring meaning. It is at the central position of speech comprehension. In listening comprehension, word recognition refers to oral words. Psycholinguists have pointed out that the processing of sentences by human beings is led by the information contained in particular words that are stored in the mental lexicon.

The phonological knowledge of words can promote lexical recognition to some extent. Phonological knowledge is needed in listening comprehension to enable message segmentation into its component sounds. We will begin with phonemes, the smallest unit of sound that can distinguish two words. For example, the words “big” and “pig” differ only in their initial sounds, /b/ and /p/, while “ship” and “sheep” differ in their vowels /ɪ/ and /i:/. /b/, /p/, /i/, and /i:/ are all phonemes. The so-called Standard or Received Pronunciation of British English has 44 phonemes, of which 24 are consonants and 20 are vowels. However, we would stress that the numbers and classes of phonemes vary among the different varieties of English^[5]. In addition, there are no such English words beginning with voiced sound plus voiced sound, such as /td/ and /tl/; thus, listeners can use this phonological information to determine the boundary between phoneme and word. Furthermore, since there are many words in which the first syllable is stressed, listeners can use this phonological feature to split the flow of the spoken signal into each individual word. The aforementioned phonological knowledge can help listeners find a way to split phonological signal.

Stress, which is the application of a greater force to a syllable, occurs at the level of word and sentence. Every word of more than one syllable will have a syllable that carries the primary stress. Stress is important in speech perception at the word level. In some cases, it is the only feature distinguishing between two words, such as “import” (noun) versus “im'port” (verb)^[6]. Meanwhile, in identifying content words, stress is important for comprehension. Stress patterns give a language its overall rhythm. Standard English is said to be one of those languages that tends toward a stress-timed rhythm (*i.e.*, stressed syllables tend to occur at regular intervals). In stress-timed languages like English, unstressed words tend to be spoken more quickly between the stressed words in order to maintain the overall rhythm. This differs with syllable-timed languages, in which each syllable tends to have the same duration^[7].

Recognizing and perceiving words are important tasks for listeners. The spoken information is instantaneous and fleeting, and it cannot be repeated. The process of listening is one-way dynamic process. The spoken signal itself is continuous, and it will not prompt the boundary between spoken segments and words. Listeners need to comprehend them as a sequence of separable speech units. Based on the heard information, listeners can then predict the next information. Features of spoken language, such as elision, reduction, liaison, assimilation, and contraction, may cause difficulties to listeners. Reductions are like “goodbye → g'bye” and “because → 'cause/coz/kaz/.” Contractions are like “we're,” “you're,” “they're,” “he's,” “I'll,” “I've,” “he'd,” “can't,” “don't,” and “aren't.” The common condensation in spoken American English are like “gonna = going to” and “kinda = kind of.” For liaison, it has vowel plus vowel liaison: in a sense group, vowel plus vowel liaison occurs when the word before ends with a vowel and the second word begins with a vowel. There are three conditions of supplementary sound in liaison: i phonetic system+/j/, u phonetic system+/w/, and a,e phonetic system+/r/, such as “the(j)end” and “how(w)about.” Phonetic knowledge can facilitate word recognition to some extent.

The cohort model, proposed by Marslen-Wilson *et al.*, is a model for word recognition. This model divides word recognition into two stages. In the first stage, the acoustic and phonetic information of certain words activate similar words stored in the memory. These activated words thus form a cohort^[8]. Take Question 18 as an example, the word “personalities” in “What does the passage say is still needed to understand the effects of the owners' personalities on their pets?”. When words with pronunciation starting with /'pɜ:sn/ are heard, then words like persons, personal, personality, and personalities are activated. In the second stage, influenced by all the interactive influence from all possible information, *i.e.*, the context factor

formed by all the words of this sentence, the choice range of the target words can be diminished until being recognized, in which this process occurs within one second. The possible information includes sound, grammar, semantics, syntax, and so on. In the aforementioned example, the target word “personalities” can be recognized ultimately according to the heard information before the word “personalities” and acoustic information after the word “personalities.”

The interaction model, also known as the schemata theory, is a theory used by psycholinguists to interpret the psychological comprehension of the comprehension process. The schemata here refer to saving acquired knowledge of past experiences in the brain and the brain’s reflection of past experiences or active organization of them; it also involves the process of how information stored in a learner’s memory works on new information and how this new information is enriched from the learner’s knowledge base. The schemata theory holds that the brain has two ways of processing information during language comprehension: bottom-up processing model driven by language materials and top-down processing model driven by concepts ^[9]. Taking the second question in listening comprehension as an example, “How was the woman’s problem eventually solved?”. The bottom-up processing here is that when a listener catches certain content words like “doctors,” “perform,” “surgery,” “remove,” and “bone”, the listener will judge their pronunciation, meanings, tense, and sentence structure. At the same time, the listener will combine his/her own knowledge and life experiences into the following judgement: “What action did the doctor have?”. With the meaning of “operation” stored in the listener’s mind beforehand, the listener will be able to choose the right answer in relation to “operation.” Top-down processing is when the listener comprehends the acoustic information by utilizing the knowledge and experiences stored in his/her brain. When the language material heard by the listener coincides with a certain knowledge stored in the brain, comprehension is achieved. Word knowledge can influence the comprehension of phonemes. Under certain circumstances, it can restrain the generation of certain phonemes. On other occasions, some phonemes are continuously heard, which are probably not acoustic signals but noise. In brief, language comprises a two-level structure, in which the upper level consists of words and low-level sound. If the spelling and sound of certain words are not stored in the brain, listeners will be inhibited when hearing its sound. Taking the aforementioned example, if the spelling and sound of “surgery” do not exist in the brain, then the sound of “surgery” is likely a noise rather than an acoustic signal; in that case, its semantic meaning cannot be concluded. However, its meaning can still be concluded in consideration of other information contained in that sentence.

In contrast to the effect of top-down processing, the competition model holds that in spoken word recognition, there are two routes that race against each other: a pre-lexical route, which computes phonological information from acoustic signal; and a lexical route, in which the phonological information associated with a word becomes available when the word itself is accessed. When word-level information appears to affect a lower-level process, it is assumed that the lexical route wins the race. Simply speaking, the lexical route and acoustic route are both in processing; it depends on which route runs faster ^[10]. Taking the same example, “Doctors performed surgery and removed the bone.” For an individual who is already familiar with the term “surgery,” when he/she hears the acoustic signal /'sɜ:dʒəri/, he/she will immediately understand its meaning rather than having to guess it after hearing the pertinent information following that word. Therefore, the processing of information in acoustic route is quicker.

3.3. Comprehension of sentence in listening comprehension

Although word recognition is crucial, language comprehension is more complex than just a simple sum of the meanings of its constituent words. Additionally, we must be sensitive to metaphors and nonliteral usage and comply with grammar rules when combining the meaning of words. By analyzing the phenomena of sentence comprehension in different methods, the serial model and parallel model are applicable to sentence

comprehension in listening comprehension.

According to the serial model, the brain's comprehension of the constrained condition of language grammar is carried out sustainably and successively in extremely high speed during the listening process [11]. The serial model describes how human brain comprehends sentence based on limited and relevant information, forms one or many representations of a sentence, and then utilizes the relevant information to parse and evaluate these representations. Taking the first sentence heard in listening comprehension – “A 22-year-old Chinese woman who suffered from a persistent cough was shocked to learn that she had a piece of chicken bone lodged in her lung” – as an example, the listener would come to know the person's age, nationality, gender, the problem suffered, the cause of the problem, and so on; naturally, the listener would be able to predict how the problem will be solved.

The parallel model emphasizes that the brain is sensitive to a wide range of information, including grammar, lexicon, context information, the speaker's knowledge, and even the speaker's general knowledge about the world [12]. This model is similar to the schemata theory. The parallel model describes how the human brain quickly evaluates every possible comprehension of a sentence using all the relevant information. Generally, people may think that the reader or listener would apply grammar knowledge and context knowledge as a whole in comprehending sentences. The second question of Part One in listening comprehension – “How was the woman's problem eventually solved?” – is taken as an example. For those who are unfamiliar with the term “surgery,” they would be able to understand its meaning after hearing the relevant information (“remove the bone”) following the term “surgery” and integrating their own indirect knowledge and life experiences (“the doctor conducted the operation”). In that way, they would be able to conclude the meaning of “surgery.” During this process, the meaning contained in the content words are particularly important; other word categories and grammar can be omitted in the course of listening. Another example is Question 14, “What does the woman think of the Indian food?”. When the listener hears, “That's not the kind of hot I mean. I'm just not a fan of sauces. That made me sweat and cry. I need something mild”, the phonological information of “not the kind of hot,” “sweat and cry,” and “mild,” along with the his/her life experiences may help him/her decide that “spicy” is the right answer.

4. Implications

The whole process of listening is a dynamic process involving many psychological activities, such as receiving, parsing, predicting, affirmation, and negation. The process is featured as synchronism, transience, and instantaneity. The research results from studies conducted by psychologists have provided useful reference and instruction for improving listening comprehension. For second language learners, particular attention should be paid to prediction, overall comprehension, generalization, and summary training; building up the background knowledge of various topics; and strengthening the acquisition of acoustic information while memorizing the spellings of words. For second language listening teaching, the listening content should be in stages or levels, more guidance should be given to increasing the input of acoustic information, and relevant knowledge should be provided before the listening practice.

Disclosure statement

The authors declare no conflict of interest.

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