WORKING MEMORY AND SECOND LANGUAGE LEARNING

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ABSTRACT

Working memory is one of the crucial factors for language learning. It plays a vital role in the human capabilities to handle language which contributes to the human facility with language. Individually and in concert, the subsystems of working memory play a vital and highly specific role both in language learning in particular and in learning more generally. The multi-components of working memory are useful for language learning.

INTRODUCTION

Working memory is a critical aspect of our cognitive capacity as it provides the ability to retain task-relevant information in a highly activated and accessible state over time. Working memory is responsible for monitoring on-going cognitive process and actions, engaging selective attention to relevant representations and procedures. Working memory is engaged in the processing of verbal tasks, visuospatial tasks. It is important and distinct from other memory processes that make working memory special and important. It can shift attentional energy between the differing demands of any task. Working memory has a limited capacity that helps to hold the information in our mind for a short period and manipulate this information for completing some cognitive tasks.

The term working memory was coined by Miller Galanter and Pribram in 1960.
Cowan defines working memory as-

"Cognitive processes that retain information in an unusually accessible state"
According to Baddeley (1986) **"working memory refers to the temporary maintenance of verbal information."**

Over the last thirty years, the concept of working memory has been increasingly widely used, extending from its origin in cognitive science, neuroscience and has been applied within areas ranging from education through psychiatry to paleoanthropology

The concept of working memory and language is raised from multiple sub-fields of cognitive sciences, psychology, linguistics and neuroscience, biology, etc. The study from different sub-fields gave rise to integrate and incorporate multiple perspectives of working memory models in cognitive sciences towards a more comprehensive understanding of nature, structure and functioning of working memory to interpret the areas as cognitive development and academic learning.

Characterisation of working memory

There are three general characterizations of working memory as-

1.) **The limited capacity of working memory:**

Constraints the limited units of information that can be held temporarily for manipulation in our head in the service of task execution. Another aspect of the limited capacity of working memory lies in the transient duration of the simultaneous storage and processing of information in our head when carrying out a certain cognitive task.

More relevantly for the language, a significant proportion aspect of language acquisition and processing activities are subject to this working memory constraint. Working memory is postulated to underline not just phonological representation but also to shape a wide range of grammatical phenomena such as the typology of word order, the minimization of dependent distance, the interpretation of pronoun.

2.) **Working components and functions**

In terms of working memory structure, the classic standard model, Baddeley and Colleagues have postulated four key components. These are –

a) The phonological short term memory.
b) The visuo-spatial sketchpad that deals with visual and spatial information.
c) An episodic buffer that serves to integrate episodic information from all modality sources and connects closely with long term memory.
d) An executive component that is equivalent to the central executive components which encapsulate the various executive operations and functions responsible for the coordination of attention allocated to the three modality based buffer systems.
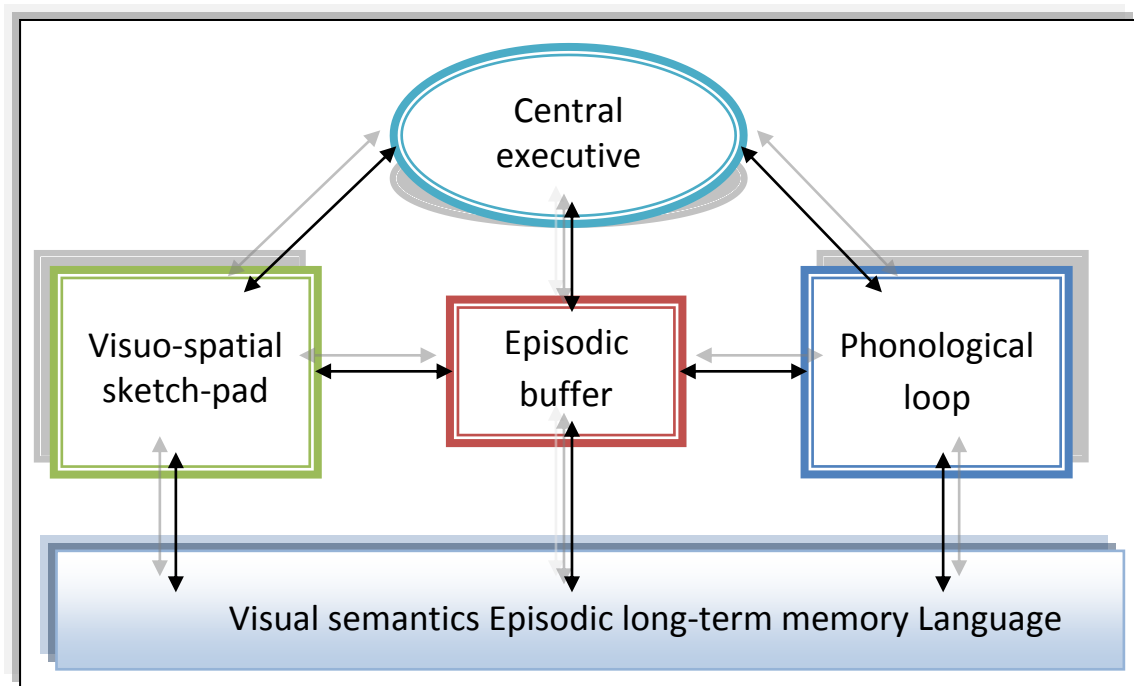
Among these four putative components of working memory, two of them have been researched quite thoroughly with language acquisition and processing.

Figure 1. A later development of the multicomponent model. It includes links to long-term memory and a fourth component, the episodic buffer that is accessible to conscious awareness.

3) **The interactions between working memory and long term memory.**

The third characterization of the working memory construct that can be derived readily from theories of working memory concerns its relationship with long term memory.

Long term memory is divided into declarative and procedural memory. Working memory serves as a gateway to the long term memory knowledge base.

The working memory research within second language acquisition considers the relationship between working memory and of second language acquisition research in terms the role of input delivery. The role of working memory in learning and its performance under different conditions is an active area of research.

Input delivery and working memory role for language learning:

Learning conditions vary on how input is presented processed, the produced, grammatical judgement task influence to some degree on second language acquisition. Input modality where the relation between working memory and second language performance in spoken and written tasks are modality independent and reading and listening are modality dependent. Cognitive processes for working memory plays a vital role in language processing. Working memory is closely linked to noticing or the subjective awareness of surface features of the input. Schmidt has specified that **"noticing is related to rehearsal within working memory and the transfer of information to long term memory to in-take and item learning."** Robinson has defined on this relationship by characterizing noticing as detection plus rehearsal and awareness in working memory. Awareness can give rise to metalinguistic knowledge and working memory may also be important to such understanding. The quality of input processing in working memory may also be crucial when learning is based on awareness at the level of understanding.

However, working memory relates to language aptitude is stated by cognitive psychology. It is hypothesized that working memory plays a recurring role in various aptitude constructs corresponding to stages of second language processing such as- segmentation, noticing and pattern identification. As already implied, the potential role of working memory and short term memory has been investigated in relation to numerous second language outcomes. Studies have explored the role of working memory abilities in the development of word meaning and morphological knowledge is a crucial one.

Role of working memory in language learning:

Working memory plays a vital role in the language process. The individual difference in working memory predicts the process of second language learning which shows a close relationship between language and working memory but still the link between the working memory and language is unspecified.

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Short term memory has an important role to play before the messages are transferred to the long term memory for second language learning. Short term memory has three important roles in the process of second language learning. They are:

1) In language comprehension (processing of language)
2) In the production of language
3) In the language acquisition

1.) Language comprehension

In this process, temporary storage for information is provided by working memory before it is transferred to the long term memory. A learner while comprehending the message should retrieve the meaning of each word and should determine the relation among the word, the meaning of which is dependent on the syntactic structure of the sentence.

When learners listen to others speaking, they recall five – nine chunks of information in a short time. This information should be recorded into analysis before to hold in working memory. When this process is followed, a learner learns to retrieve the meaning of each independent word and to determine the relation among word meaning based on the syntactic structure of the sentence.

2.) Language production

In the process of language production, working memory plays a role where pronunciation of the words are put in a linear order based on its syntactic and systematic relations before to develop a moral program that produces the utterances.

Before we say or produce the utterances in second language, certain sounds should be presented in working memory so that we can't make any error in speech.

3) The process of language acquisition

Vocabulary plays a vital role in the acquisition of new language. Working memory has limited capacity to acquire new language which is called the phonological loop. In the phonological loop, the phonologic material is stored, properly sequenced and rehearsed by a learner. A neuropsychological study of working memory suggested that phonological loop for vocabulary acquisition plays a crucial role.

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The phonological loop is a strong verbal material which is composed of two subsystems i.e. phonological and an articulatory rehearsal process. The phonological store gets any information auditory presented and stores it in terms of sound-based code. A stored material is interfered, maintained and in this way reinforced through the articulatory rehearsal mechanism. The phonological store also gets visually presented items but such items are conveyed to the store by the articulatory rehearsal process.

CONCLUSION

Working memory is a key to study the relationship between language and working memory and to understand the key features of the human cognitive system to interact second language learning.

Memory has very important roles that help for language learning. Working memory is the place where the process of language learning takes place. Working memory has temporary storage capacity which is very important for the process of language comprehension. When language production takes place working memory becomes too important as words pronunciation are put in linear order according to its systematic and syntactic relations in the utterances before the construction of a motor program that produces the utterance. Phonological loop helps to store and rehears the new vocabulary in working memory before to get transferred into long term memory.

All the above information for language learning is very essential and beneficial for the teachers who teach the second language in the class in a formal way and for a second language Learner who tries to learn it fluently. In this way the function of memory can be maximized in language learning. Hence there is a need to explore this area.

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