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Redefining the Association Between Memory, Mnemonics and Vocabulary Acquisition—Reviewing Paradigms in Research

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***Abstract*—The role of memory in language learning is indispensable. A child uses an extraordinary amount of memory when learning to recognise words in the language, creating rules for their use, and connecting speech to the environment and mind. Memory and learning are interdependent, as memory is the process of encoding, storing and retrieving information that is crucial to learning. The value of learning new words, along with the role of memory and mnemonic devices in the process of vocabulary acquisition, is rarely discussed. The article aims to give a comprehensive account of the word and its significance, as well as the numerous aspects that influence word learning, together with the value of learning new words and the functions of memory and mnemonic devices involved in the process of vocabulary acquisition. The various memory models, the efficient processing of information with the aid of mnemonics and how mnemonics have changed over time in studying languages and other subjects are reviewed here. The other major aspects of this study are the dual coding method and an explanation of how mnemonics operate and how mnemonics have evolved with time in studying languages and other subjects.**

***Index Terms*—vocabulary learning, second language learning, short-term memory, long-term memory, mnemonics**

I. Introduction

The role of vocabulary acquisition is indispensable, whether it be mastery of a language (Schmitt, 2008) or communicating the meaning (Wilkins, 1972). Moreover, it is impossible to communicate without having sufficient vocabulary (Mediha & Enisa, 2014). Vocabulary should be accorded the significance it deserves in the language literacy process from the initial stages. A bounteous number of words and expressions must be learned to better command a foreign language. Learners must, therefore, inexplicably be equipped with skill sets that allow them to widen their vocabulary. Instead of asking the students to memorize such lengthy lists, it would be better to help students stimulate their memory to improve their grasp of the language. Training learners on how to use the various vocabulary learning strategies can benefit them as it will help them make decisions about their applications and can also assist learners in becoming autonomous when choosing the strategies to employ. Learners rarely memorize a new term the first time they encounter it since it takes time to remember a new word. During vocabulary acquisition, students use a variety of tactics.

It will be challenging to communicate and convey ideas about people, places, or things, as well as actions, relations, and situations (Clark, 1993). A vocabulary or wordbook is a collection of words' pronunciations and definitions that is kept in memory (Gredler, 2002b). One can further emphasize whether one knows or does not know a word. Instead, the level of knowledge that "people can possess" about a word should be considered (Beck & Mckeown, 1991). A collection of words that someone can understand or comprehend can also be described as vocabulary. A person's ability to comprehend language well will affect his or her ability to communicate effectively (Nunan, 2006). Developing a vocabulary is a fundamental aspect of conveying meaning (Wilkins, 1972). When it comes to mastering a language, be it a foreign language or one’s mother tongue, vocabulary is one of the most significant as well as intractable aspects of learning any language. The foundation of a language is its vocabulary, which is why it is so important to language learners. Due to the fact that they give names to actions, objects, and thoughts, words are regarded as the key core components of a language. Without them, we are unable to transmit our true meaning (Hatch & Brown, 1995). In recent years, extensive research has been conducted on vocabulary knowledge in second languages. One notable theory is the Vocabulary Size Test theory, which suggests that a person's vocabulary knowledge is linked to their language proficiency. In relation to this theory, focusing on the acquisition of high-frequency, academic, technical, and low-frequency words is recommended to enhance overall vocabulary size. Cameron has specifically examined English as an additional language and highlights the significance of vocabulary size in educational attainment, showcasing the disparities in vocabulary knowledge between English as an additional language students and native speakers (Cameron,

2002a). These papers collectively underscore the importance of vocabulary size tests in evaluating language learning outcomes and informing effective teaching strategies.

Researchers have examined various aspects of vocabulary acquisition, such as the effects of exposure, context, and word frequency. They have also explored different vocabulary learning strategies, such as explicit memorization and contextual guessing. Using a contextual guessing approach proved to be more advantageous for long-term memory retention than memorizing individual words in isolation (Samiyan, 2014b). The proposed idea is that intentionally learning explicit displays leads to enhanced search performance and sustained recognition (Kroell et al., 2019). In 1981 studies focused on the reader strategy of using context to decipher the meanings of unfamiliar words (Van Parreren & Parreren, 1981). Additionally, studies have investigated the incidental acquisition of vocabulary during language learning activities. While progress has been made, there is still a research gap regarding memory techniques and their effectiveness in vocabulary acquisition. Mnemonics, which use imagery and associations to aid memory, have shown promising results in learning studies but require further investigation. Although earlier research has shown encouraging results regarding the use of mnemonics in language learning, there is still a significant gap in the study of this field. A thorough investigation is required to gain a comprehensive understanding of the memory-related cognitive processes and their specific contributions to vocabulary acquisition in a second language. It is essential to conduct extensive research that would enable the development of more effective and targeted teaching strategies and instructional materials for individuals learning a new language. The foundation of any language that holds the content of any notion or conception is its vocabulary. With a basic understanding of vocabulary and the alphabet, people who speak different languages can easily converse with one another. It represents the foundation of linguistic literacy. Most preceptors focus on vocabulary when teaching a language to provide a strong foundation for learning. Greenberg and Knowlton emphasized the importance of visual imagery in autobiographical recall (Greenberg & Knowlton, 2014).

And Teng and Kravitz provided evidence of mutual disruption between visual working memory and low-level perception, showing that incoming stimuli can be influenced by the information held in mind (Teng & Kravitz, 2019). The exploration of the overlap in content between visual attention and visual working memory revealed that attention can be diverted by distractors related to specific memory content (Olivers et al., 2006). The above-mentioned studies elucidate how language learning outcomes and the retention of acquired vocabulary are positively impacted by the effective utilization of memory and mnemonic devices in vocabulary acquisition. The review is intended to highlight that, in comparison to conventional teaching methods, using memory strategies during learning vocabulary can improve memory performance for subsequent word and phrase recall. The research article aims to confirm this claim by giving insights into the relationship between language acquisition, recall, and memory from the available literature.

A. Decoding Word Learning

Prior to learning how to read, it is essential for a learner to grasp the concept of words. This understanding is crucial because it involves the awareness that spoken words, written words, and read words are all separate entities. Each syllable within a word holds its own significance, and not all words are simply a string of letters. Every word possesses a distinct meaning and function, and they differ from one another in various ways. The concept of "word" is often employed inexactly or ambiguously, even in the study of linguistics. Speakers typically comprehend intuitively that words are made up of sounds, have meaning, are used to form fundamental phrases and sentences, and are frequently included in dictionaries.

B. Components of Word Knowledge and Influencing Factors

A limitless number of delineations on how to “know a word" have been offered by researchers. Understanding a word's form and meaning are both integral components of knowing it (Kersten, 2010a), and the term "knowing a word" refers to having access to valuable information (Nation, 2001)". Open and fruitful knowledge is typically classified as either active or unresisted vocabulary knowledge. The many components of word knowledge include the term's meaning, verbal relationships, morphology, grammar, pronunciation, and so on (Nation, 2001). Nevertheless, understanding the relationship between form and meaning is the most crucial aspect of word knowledge (Laufer & Girsai, 2008).

Spelling, pronounceability, morphology, grammar, length, and semantic aspects are the seven factors that influence word learning (Schmitt, 1997). Pronounceability explains the sound system in English, while spelling represents how the sound system is written. Research has shown that a word can be correctly spelt if it can be accurately pronounced. L1 writing and orthography, the exact spelling of words, also play a role in second-language orthography. However, no definitive evidence suggests that word length affects word acquisition.

The complexities of morphology, such as irregular plural forms and the assignment of gender to inanimate nouns, may make it more difficult to become skilled in a language (Schmitt, 1997). The term "synformy" refers to the confusion that arises when students mix up words that have similar sounds or appearances. Categorizing words into grammatical categories like nouns, adverbs, verbs, and adjectives can be difficult to understand. Abstractness and register are examples of semantic characteristics of words. The process of learning words is believed to be influenced by idiomatic expressions and multiple meanings.

II. Working Memory and Second Language Learning

The capacity to acquire fluency in a second language is referred to as an individual's foreign language learning ability. Recent research has revealed that working memory, a central concept in cognitive psychology, significantly affects various aspects of language acquisition. These aspects include vocabulary learning, language comprehension, performance, analysis, and overall understanding. Consequently, working memory is recognized as an essential attribute for successfully learning a foreign language. Numerous studies have shown that it is one of the finest indicators of how well foreign language learning will improve (Pérez & Alvira, 2017). It is typically regarded as an indicator of how each person learns a second language differently. In fact, the American psychologist, Carroll, launched the current research. He said that in order to acknowledge one's capacity to learn a foreign language, one must have certain insights about how learning a foreign language affects learning a second language:

Passing a test and being able to learn a language are two entirely different aspects. Numerous studies have demonstrated that they are unrelated at the start of the lesson but related at the conclusion.

Foreign language acquisition is different from academic motivation in terms of learning capacity.

The capacity to acquire a foreign language is a characteristic trait that is less prone to change.

Rather than being a requirement, proficiency in a foreign language should be considered when determining the rate and depth of learning a second language.

General intellect and the ability to acquire a foreign language are not the same. The foundation of a language is its vocabulary, which is also one of the indicators of how well a language may be learned (Carroll, 1962).

The minor characteristic of cross-discipline is present in the learning of vocabulary in a second language. However, there are currently no widely recognised theories or models. There are just a few specialised models, such as the process model and the model of vocabulary knowledge.

Many theories and methods of learning a second language are inapplicable to vocabulary acquisition because their main focus is on grammar and pattern recognition. Vocabulary has unique characteristics, so it is necessary to undertake specific research or modify the acquisition theory. To explain language acquisition, which is influenced by psychology, researchers use a psychological model. For instance, it is beneficial to comprehend the linguistic and cognitive psychology of language learning. The discussion of morphology and collocations, however, highlights the linguistics discipline's constrained application. However, utilizing them to develop a theory on second language vocabulary acquisition can contribute to the progression of linguistic, cognitive science, and psychological theories.

Baddeley determined that working memory, an essential system for performing various tasks, has a limited capacity for processing and storing information, Baddeley put forth a conceptual model of working memory that consists of three elements: a central executive responsible for processing information within its limitations, along with two sub-components known as the phonological loop and visual-spatial sketchpad. These sub-components play a role in generating and temporarily retaining mental images. Learning to use vocabulary is the process through which a reader or listener becomes familiar with a difficult or unfamiliar phrase through a substantial amount of linguistic material. If a word has already been encountered, learning it again will be significantly quicker and require less storage space (Baddeley, 2003).

A. Language Learning and Long-Term Memory

Since nothing can be conveyed without vocabulary and no communication is feasible without language, researchers feel that learning vocabulary is an essential part of becoming functional in an EFL context. Due to the difficulty of being unable to express oneself due to a lack of knowledge of basic vocabulary words, students will always need to strengthen their capacity to accumulate more words (Folse, 2004). Some components of language usage are initially conscious but later become unconscious as a result of direct teaching or become automatic with repetition (Oxford, 1990b). The process of learning vocabulary involves not only labelling words but also categorizing them. This underscores the importance of training to effectively organize, integrate, and connect existing knowledge with new information to better handle unfamiliar content. Students can develop a word bank as a result, which they can utilize both actively and passively (Thornbury, 2004).

Establishing links between words is essential for vocabulary to be successfully retained in long-term memory (Arias, 2003). Memory studies suggest several techniques to ensure that knowledge is permanently stored in long-term memory (LTM). Thornbury offered a number of strategies in 2004 to help ensure that knowledge is permanently kept in long-term memory (LTM), including spacing, pace, application, cognitive depth, organisation, creativity, and mnemonics. Students can most surely acquire and apply language in an informative way by adhering to these principles because they are seen in memory techniques, including organising in order, generating associations, and reviewing (Oxford, 1990b). Indeed, research suggests that learned words are gradually forgotten (Schmitt, 2008). Forgetting happens following literacy lessons thus, first, recycling is crucial and must happen right away. After one, three, and eight consecutive weeks, the literacy rate decreases by 66, 48, and 39 per cent, respectively (Anderson & Jordan, 1928). These results underline the importance of repeatedly giving students opportunities to utilise the new phrases. The absence of a standardized approach to vocabulary instruction in handbooks, along with insufficient frequency of exposure to new words, highlights the significance of this criterion (Schmitt, 2014).A learner can use a variety of techniques to experience greater recall of previously learned language (Schmitt, 1997).

B. The Information Processing Model and Memory Systems

Memory can be defined as the mental activity of storing information for future use and retrieval (Loftus & Loftus, 1976). Atkinson and Shiffrin proposed the first systematic and comprehensive information-processing model in 1968. Memory processing was divided into three scales: sensory memory, short-term memory, and long-term memory. Atkinson and Shiffrin's widely used stage theory model of information processing postulates that learning and memory include numerous stages. Long-term memory, working memory or short-term memory, and sensory memory are all included in this approach. Shortly after entering the sensory register, information is processed before being sent to the short-term memory. Short-term memory, a conscious and active stage, momentarily stores information and processes it through rehearsal. Then, the prepared information can be transferred to long-term memory, where it is organised and kept for a long time. Semantic memory, which deals with general knowledge, and episodic memory, which refers to one's own experiences, are both parts of long-term memory. There have also been suggestions for declarative, procedural, and imagery memory organisational systems (Atkinson & Shiffrin, 1968).

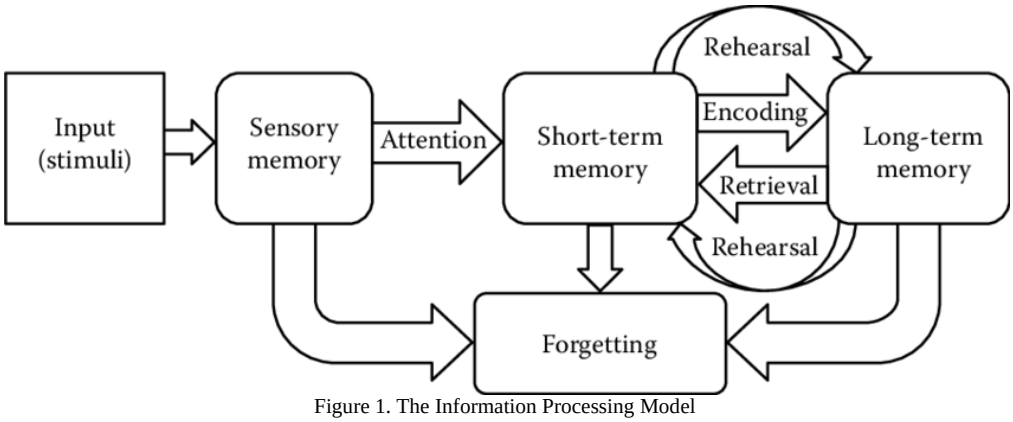

Figure 1. The Information Processing Model

Note- The Information Processing Model proposed by Atkinson and Shiffrin in 1968, explained how information is received, processed and stored based on maintenance and elaborate rehearsal. (Clark & complete profile, 2020)

Long-term memory and short-term memory are dynamic systems, hence it cannot be said that information can never be lost once it is stored in these memory systems. While forgetting can occur at any stage of memory development, there are multiple strategies that can facilitate the retention of information. Encoding, retrieval, rehearsal, and other processes are crucial for aiding in the memorization of information, as seen in the image above.

C. Role of Repetition and Elaboration in Vocabulary Learning

Words learned via word lists are remembered through practice, but words taught through sentence writing are remembered through semantic elaboration (Baddeley, 1997). In other words, semantic elaboration improves memory for word meaning and form. Loftus introduces the concept of the retention interval in retention studies to provide further clarity on the relationship between retention and memory. The time between the presentation of a word and its subsequent rehearsal is referred to as the retention interval. For example, a retention interval of four seconds implies that a word is seen and then repeated in one's mind within that timeframe. It is important to note that a retention interval can exceed a duration of four seconds. When a word is practised after a longer period (more than 15 seconds), it is more likely to be recalled as longer intervals tend to lead to forgetting (King et al., 2002). The length of the recall interval impacts the invasion of short-term memory (Loftus & Loftus, 1976).

Retention times vary depending on the extent of processing. Processing levels primarily relate to the function of coding in learning; it is important to process the content in various ways at first to ensure memory. Although Baddeley proposed flatness, richness, and breadth processing, the idea of processing depth is still viewed as an excessively simplified viewpoint on information processing (Kersten, 2010a). Researchers in the field of linguistics also suggest the involvement-load theory and the generative model. Writing sentences involves significantly more cognitive effort than learning words from lists, which is purely a memory-learning method. Writing sentences takes a higher level of processing than acquiring words from lists. In other words, vocabulary learned by creating sentences is easier to retain than vocabulary taught by creating lists.

Repetition and rehearsal have essentially the same meanings. Repetition is one of the mental strategies known as rehearsal that aids in helping students recall knowledge. According to psychologists, there are two sorts of rehearsals: maintenance and extended rehearsals without deeper coding, maintenance rehearsal is simply remembering or preserving information (such as repeating it by heart). Although it is believed that information processed by maintenance rehearsal prevents forgetting, this knowledge does not result in long-term learning In contrast to maintenance rehearsal, elaborate rehearsal produces long-term memory and requires extensive semantic processing (such as composing phrases) (Baddeley, 1997). The extended rehearsal procedure is also a difficult one. In the process of elaborate rehearsal, students should mix prior knowledge with new knowledge (Sousa, 2006).

Information is regularly spoken out or pondered about during maintenance rehearsal. Short-term memory will momentarily store the knowledge; and will not make it to long-term memory. (Examples: Memorizing historical years,

learning musical keys.) In the case of elaborate rehearsal, the method of learning entails considering the significance of a subject and coming up with meaningful thoughts. Long-term memory is improved when the information is connected in meaningful ways. Examples include linking ideas and mnemonics.

III. Long-Term Memory and Vocabulary Learning

According to the multi-store memory model proposed by Atkinson and Shiffrin, the long-term memory (LTM), stage is responsible for the retention of information and skills over extended periods of time. The process of transferring information from short-term memory to long-term storage is crucial in the formation of lasting memories. Long-term storage has an unlimited capacity and can maintain stability for extended periods. The process of consolidation allows short-term memories to transform into long-term ones. Explicit (conscious) and implicit (unconscious) memory are two distinct classifications within long-term memory. Declarative and explicit memories both pertain to memories accessed by the conscious mind. Declarative memories, also known as explicit memories, encompass all memories accessible to conscious awareness. Explicit memory encompasses two categories: semantic memory, which involves knowledge about the world, and episodic memory, which pertains to specific experiences or events. The majority of implicit memories are unconscious and include procedural memory, involving the recall of body movements and the use of objects within an environment. Procedure-based memories include those required for operating an automobile or a computer. Long-term memory formation occurs largely outside of consciousness. Most of this information is present in our unconscious mind but can be brought back and saved in our working memory for later use. Retrieving certain memories can be easy, while others can be difficult.

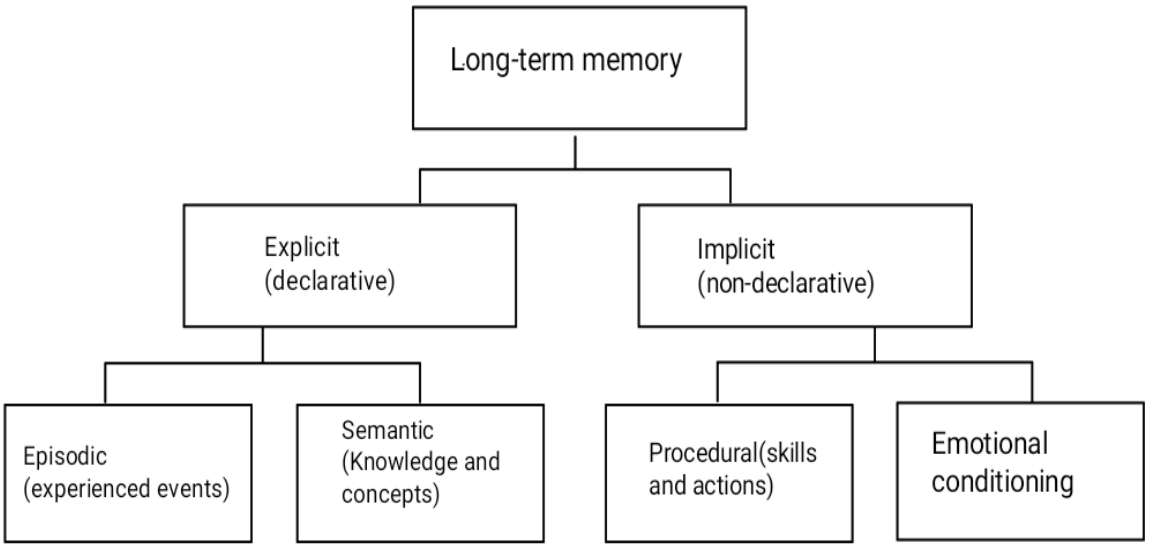

Figure 2. Long-Term Memory Classification

Note-Long-term memory can be categorized into two main types: Explicit and Implicit (Tulving, 2007). Semantic memory, which concentrates on knowledge of facts, and episodic memory, which refers to personal experiences, are categories of explicit memory. Contrarily, procedural memory, which entails knowing how to carry out specific activities, and information learned through training make up implicit memory.

Episodic memory is responsible for storing our actively experienced past events, such as our most recent birthday, in a narrative-like format. Tulving first suggested the idea of episodic memory in the 1970s, and has since been refined by Tulving and other researchers. Presently, researchers believe that episodic memory involves remembering the specific details of an event, including the "what", "where", and "when". This type of memory involves recalling vivid details and a sense of familiarity. In contrast, semantic memory pertains to storing information related to words, concepts, knowledge, and facts, and is typically expressed as factual statements. The term "semantic" refers to its connection to language and the study of language. Your semantic memory, for instance, stores the answers to questions like ‘What is the definition of psychology?’ and ‘Who was the first African-American president of the United States?’.

A. Role of Semantic and Episodic Memory in Vocabulary Acquisition

Semantic memory is a type of mental store that enables language use instead of episodic memory. Episodic memory involves storing temporally dated events and their temporal-spatial connections (Tulving, 2007). In comparison, semantic memory enables us to describe objects or concepts by recalling general knowledge about them, such as defining a bicycle as a two-wheeled vehicle with pedals and handlebars. On the other hand, recalling personal experiences, like being chased by a dog while biking around a pond, relies on episodic memory. Furthermore, unlike episodic memory, semantic memory does not require recalling a specific event. Both types of memory play a role in acquiring new information. Semantic memory aids in the formation of new episodic memories. Similar to how semantic memories serve as the building blocks from which sophisticated and in-depth episodic memories are built, episodic

memories make it easier to retrieve information from semantic memory. According to several scholars, these two types of memory regularly interact with one another in intriguing and theoretically significant ways rather than always functioning independently.

B. Mnemonics as Memory Techniques for Efficient Acquisition and Recall of Words

The "vocabulary learning strategy" (VLS) has garnered significant attention due to its effectiveness in facilitating vocabulary acquisition. This approach deviates from traditional teaching methods, focusing instead on the impact of learners' actions on vocabulary learning (Schmitt & Zimmerman, 2002). Strategies play a crucial role, particularly when encouraging children to learn independently and enhance their understanding and retention of new words (Celce-Murcia, 2001). One challenge often encountered is children's tendency to quickly forget recently learned words. To address this, researchers have explored various VLSs.

The mnemonic keyword method is an effective strategy to enhance vocabulary knowledge. Mnemonic instruction, involves strategies specifically designed to improve memory. This often includes modifying or connecting the content to be learned with the learner's existing knowledge Mastropieri and Scruggs (1991). The keyword method is recognized as one of the most effective mnemonic devices, particularly when students are unfamiliar with the material they need to learn.

The word "mnemonic" originates from the Greek term "Mnemosyne," which refers to the goddess of memory in ancient Greek mythology. The use of mnemonics dates back to around 500 B.C. (Yates, 2001). An early version of the contemporary method of loci was the first mnemonic device to be implemented, and many more have been created since then (Higbee, 1987). Memory plays a significant role in the development of vocabulary and grammar skills. Two main categories of memory are involved: short-term memory and long-term memory. Newly learned words are briefly stored in short-term memory, which has a limited capacity and can only hold onto knowledge for a brief period of time. In contrast, long-term memory has vast storage capacity but operates at a slower pace. The objective of vocabulary learning and teaching is to achieve the transfer of words from short-term memory to long-term memory, resulting in enhanced and long-lasting retention (Schmitt, 2014).

Our mind functions similarly to the London Underground, where different pieces of stored information are interconnected (Atkinson, 2002). This analogy emphasizes the numerous relationships that exist between words within the mental lexicon, varying in strength or weakness.

The main approach to transferring vocabulary to long-term memory from short-term storage and establishing strong associations is by connecting new lexical items to existing concepts in the mental lexicon (Schmitt, 2014). Mnemonics, an educational method for enhancing memory, involves teaching individuals to link newly learned knowledge with previously acquired information. The preservation and retrieval of information from memory are aided by mnemonic strategies, which can be linguistic or visual Information is more likely to be retained for a longer period of time when it is communicated in a way that integrates or meaningfully ties to previous knowledge. This facilitates easier retrieval through verbal or visual cues. In essence, teachers can use mnemonic techniques to connect new information to facts already stored in students' long-term memory. They are used to connect a word to knowledge that has already been learned, typically through grouping or imagery (Mastropieri & Scruggs, 1991). Mnemonic devices can be used to speed up learning and improve memory (Thompson, 1987). By incorporating new knowledge into innate cognitive units and offering clues for retrieval or suggestions, mnemonic strategies accomplish the learning tasks.

Various scholars have proposed diverse classifications of mnemonic devices. As an illustration, in Thompson’s categorization, mnemonic techniques are divided into five categories: linguistic, spatial, visual, physical response, and verbal methods (Thompson, 1987). On the other hand, there are four key methods through which mental associations are created, including images and sounds, in-depth analyses are performed, and action is used (Oxford, 1990). In contrast, Baddeley classifies mnemonic methods into verbal and visual imagery strategies (Baddeley, 1999). The peg word method, keyword method, method of loci, narrative telling, spatial grouping, the finger method, and visual mnemonic techniques, which involve images, visualization, and imagery, are some common mnemonic strategies frequently used in language acquisition.

(a). Mnemonic Devices and History

Numerous studies have focused on identifying and teaching vocabulary learning strategies, both for specific languages and in general language learning. However, there have been limited studies conducted on mnemonic devices. Those who have examined mnemonic devices have found that they significantly enhance the retention of second language vocabulary words, both immediately and over time, in contrast to other learning methods. For example, when studying Spanish vocabulary, the effectiveness of the keyword strategy in other control procedures was evaluated by Raugh and Atkinson in 1975. The keyword strategy consistently yielded excellent results. In one experiment, the group using the keyword strategy achieved an overall test score of 88% compared to 28% for the control group. Additionally, Pressley & and Levin, conducted research with children aged 3 to 6, using the keyword technique to learn simple Spanish vocabulary. According to the findings, toddlers who used the keyword strategy retained more vocabulary than kids who weren't taught how to apply it (Pressley & Levin, 1981). A study conducted later by Carlson discovered that the group taught utilizing the method of loci exhibited significantly improved recall compared to a control group (Carlson et al., 1976). Specifically, when the order of the words was significant, the method of loci and the peg word

system proved to be superior techniques. Surprisingly, their statistical analysis showed that learning vocabulary in sets with unrelated semantic content was more effective than learning vocabulary in sets with linked semantic content. The study concluded that providing new vocabulary from the same semantic set together might actually hinder vocabulary learning due to cross-association and contradict conventional recommendations found in many course books. For a study on how memory strategy teaching and learning through context affected Turkish EFL learners' ESP vocabulary recall, it was found that mnemonic or memory techniques can enhance vocabulary learning. The study's findings also demonstrated that teaching strategies should be incorporated into contextual vocabulary learning (Atay & Ozbulgan, 2007). Students should be helped to recall a term using various memory techniques after learning its meaning in various circumstances. Second, instruction should emphasise the entire spectrum of methods rather than just one or two, and students should be encouraged to select the most useful one(s) for themselves.

(b). Mnemonics and the Dual Coding Theory

Pavio and other researchers initially proposed the Dual Coding Theory of Memory to explain the strong memory-enhancing effects of visual images. However, this theory goes beyond its initial purpose and has broader implications for cognitive theory. Since its introduction, it has sparked extensive debate and investigation in experimental psychology, significantly renewing interest in imaging from both scientific and philosophical perspectives. The theory has been successfully applied in various psychological domains, such as examining thinking processes, individual differences in thinking styles, and language comprehension. Dual coding theory also addressed the dichotomy between observational and theoretical thinking in science while attempting to explain bilingualism (Paivio & Desrochers, 1980).

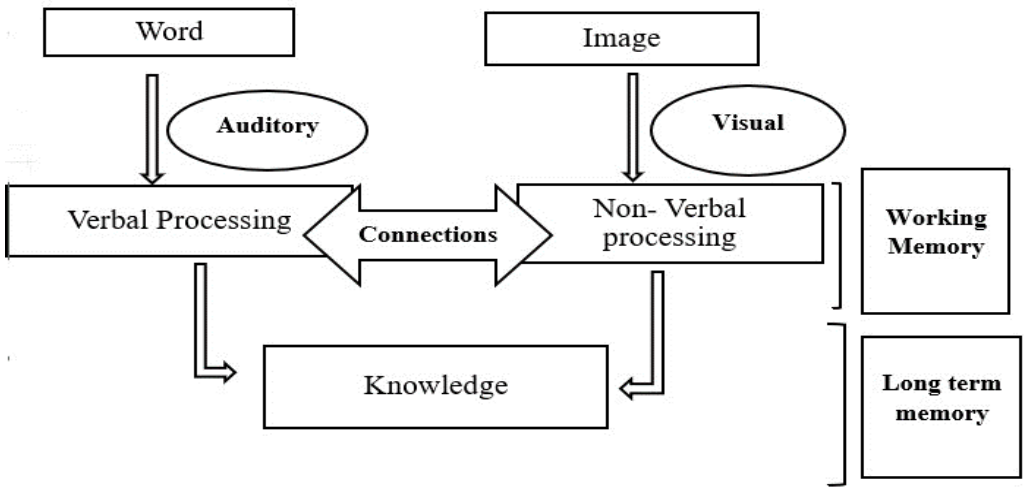

Figure 3. Dual Coding Mechanism

Note- Dual coding is a notion put forth by Paivio (1986) that suggests the human cognitive system codes information in two different ways to reflect the capacity of our cognitive architecture to handle both spoken and nonverbal objects and events at once. (www.theemotionallearner.com, n.d)

The theory proposed by Paivio known as the dual-coding theory, asserts that images are more effective in enhancing memory than words. According to this idea, human memory's verbal and visual subsystems are interconnected. While the vocal system manages language and abstract information, the visual system processes and stores concrete information, including images, sounds, and sensations. Despite their separate nature, these two systems are interconnected. A referential relationship occurs when a verbal representation is derived from a visual stimulus, or vice versa. This concept is called dual coding, which encompasses information that can be visually and verbally recognised (Paivio, 1986). Dual coding improves memory as it allows for the preservation of one memory trace even if the other is lost. Furthermore, images are more likely to activate connections between visual and verbal information, making them easier to recall compared to words.

IV. Conclusion

The ability to visualise ideas is crucial. When we need to recall a concept, we create an image of it or a related thought, a picture that only lives in our minds. However, when that happens, we perceive the image as though it were genuinely in front of us. The mnemonist has the potential to alter these images if he or she has a powerful imagination. The power to represent imaginary objects and the ability to modify them go hand in hand, so in addition to improving our memory by making up mental pictures on the spot, we can also gradually adjust these pictures to the topics, subjects, and other things we need to learn. Therefore, an object may have attributes and traits that it doesn't have in our memory.

The mnemonist must first consider how many more perceptual properties an object could possibly have. He must then be able to adapt these qualities to the demands resulting from analysing the material he must learn. All of these factors may cause the mnemonist to use different and occasionally inappropriate fictional objects compared to the genuine ones he was inspired by. In conclusion, engaging our imagination helps improve our memory. Memory theory understanding supports the resolution of memorisation and recall difficulties, and transferable skills allow participants to deploy mnemonic strategies in varied vocabulary learning contexts. In addition, teachers who understand these theories can create pedagogical practices that involve mnemonics in vocabulary teaching to maximize effectiveness and lengthen the duration of newly learned words. Ultimately, knowledge of memory and mnemonics empowers learners and educators to improve vocabulary learning outcomes.

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