

Is SPT Effective on Learning English Grammar?

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Abstract

There are many studies dealing with memory. Memory encoding tasks that involve performing actions are called SPTs (Subject Performed Tasks), while tasks encoding memory without actions are called VTs (Verbal Tasks). Previous studies have reported that the score of recall tests from SPTs is higher than that from VTs when encoding verbal phrases. This effect is known as the SPT effect. Although the SPT effect is documented in many studies, the reason behind it has not been understood. This report discusses SPTs, the theories supporting SPT effects, and the possibility of learning English grammar with the help of SPTs.

Keywords: Memory, SPT, English grammar

Introduction

In recent years, many English teachers have felt that Japanese university students' ability in using English is below expectations. Although many of them have studied English since junior high school (or some even since elementary school), they are unable to use what they have learned correctly, or sometimes they tend to forget it. Using impeccable English grammar, especially, is rare, thereby indicating that students do not learn effectively. According to the memory model of cognitive psychology, there are three processes involved in the formation of memory: 1) encoding, 2) storage, and 3) retrieval. Encoding refers to processing and combining information received from the outside. Storage refers to recording encoded information in short-term or long-term memory. Retrieval refers to recalling stored information in response to a certain cue for use in a process or an activity. One's first language is acquired by implicit learning. Implicit learning is what people learn unconsciously. To trace how the sounds or words of the first language are processed consciously is impossible. On the other hand, a foreign language is acquired by explicit learning because vocabulary and grammar are learned intentionally. From the perspective of cognitive science, it

is said that the possibility that the grammar of a foreign language will be constructed in implicit memory is very low. Therefore, a learning method is required that allows the form of foreign languages to be retained in explicit memory effectively, and to be used smoothly. This paper will discuss the memory system, a modality for encoding—the Subject Performed Task (SPT), and the possibility of a grammar-learning method using SPT based on previous studies.

A taxonomy of memory system

The field of cognitive psychology assumes that there are different memory systems, and it has developed the idea that divides each memory system. Tulving distinguished semantic memory from episodic memory, and suggested that these two memories are isolated memory systems. Semantic memory is the memory of general information or knowledge that is not related to a specific time or place. For example, the information, “The earth goes round the sun in 365 and a quarter days” is semantic memory. On the other hand, episodic memory is the memory of one’s experience related to a specific time or place. An experience, such as “I played soccer at school yesterday” is episodic memory. In addition, Cohen & Squire (1980) and Squire (1992) distinguished declarative memory from non-declarative memory. Declarative memory is the memory of facts explicable with words. Non-declarative memory is the memory of skills or movements not explicable with words (Figure 1).

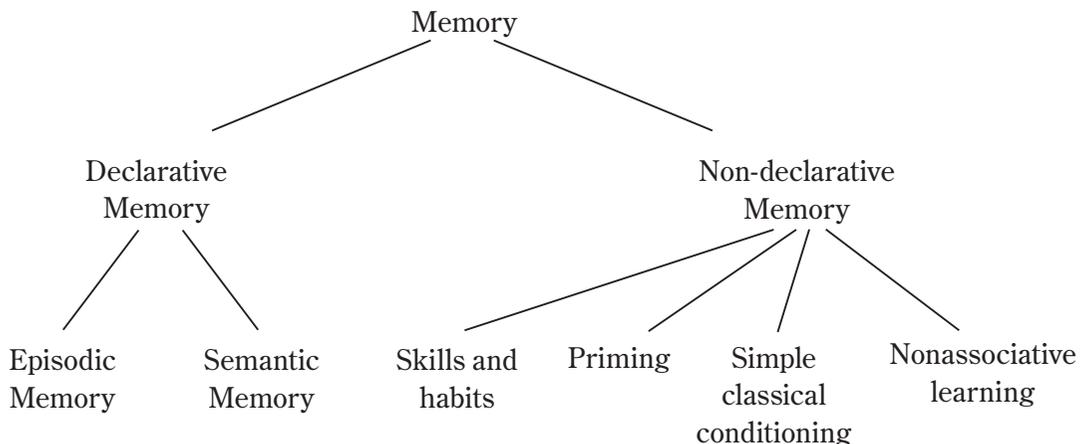


Figure 1. A taxonomy of mammalian long-term memory systems (Squire, 1992)

The memory of knowledge acquired in a lesson may be categorized as semantic memory. In a grammar lesson, the rule, “if the subject of the sentence is the third person singular, the verb requires –s” is a typical example. Many studies about memory deal with episodic memory. In an experiment, asking participants to recall words they memorized checks their episodic memory. Studies dealing with episodic memory usually use verbal stimuli (words or phrases), or visual stimuli (pictures) (Fujita, 1995). Effective memorization requires a stimulus associated with the information given at the stage of encoding. Tulving (1983) proposed that if some cues promote the recollection of a target word, they must be encoded together. This is called the Encoding Specificity Principle. In other words, if students perform something special when encoding new information, they can recall it effectively.

Subject Performed Task

Actions and linguistic information are related. Memorizing linguistic information with simultaneous actions will be effective when one tries to recall it later (Tulving, 1983; Tulving & Thomson, 1973). In the beginning of 1980, SPT was developed as an experimental paradigm for episodic memory. In SPT, the subjects are instructed to encode the linguistic information by performing actions. For example, the subjects are required to enact the TBR (verbal to-be-remembered) items, which consist of instructions or action phrases, by performing tasks (for example, point at the window). Later, the subjects are asked to recall the sentence without performing actions. A comparison with the task VT, such as a repetition of utterance, shows that the recall effect of SPT is higher than that of VT. It is called SPT effect.

Masumoto (2008) found that SPT improves recall effect and does not apply to some memory laws seen in VT so that SPT effect has attracted many researchers' interest. He gave the following examples of these memory laws with previous studies:

1) Forgetting effect

Nilsson, Cohen & Nyberg (1989) also reported that the difference of recall test between SPT and VT did not change after 2 minutes, 24 hours, and 1 week.

2) Primacy effect / Recency effect

When the list of words to be memorized is shown in order, the recall rate of the word at the beginning and the end is higher than the words at the middle. It is called primacy effect or recency effect. Bäckman & Nilsson (1984) reported that VT shows primacy and recency effect, while SPT does not.

3) Level of processing effect

Level of processing effect means that deep processing (for example, the meaning or sound of words) is superior to shallow processing (for example, the form of words) on memory tests (Craik & Lockhart, 1972). In VT, deep processing effect was recognized, while it was not in SPT.

4) Generation effect

For some subjects, generating own materials and encoding by themselves can result in higher score on recall test than receiving materials and encoding. This phenomenon is called the generation effect. Kausler & Lichtig (1988) conducted an experiment. Two groups were compared. The first group was instructed to perform using objects as an experimenter directed. The second group was instructed to perform using objects as usual. As a result, there was no significant difference for the recall test between these two groups, and they reported that there was no generation effect on SPT.

5) Metamemory

Metamemory refers to the knowledge and conviction about memory processing or memory capacity (Umeda, 2002). Cohen (1988) reported that the participants of VT predicted the score on memory test, while those of SPT could not.

6) Aging

There is a difference in the scores on memory test between the old and the young in VT, while there is no difference in SPT. Cohen, & Stewart (1982) conducted an experiment on the relation between aging and free recall. Among children aged 9, 11, and 13 years, older children marked higher score on recall test in VT, but there was no difference in SPT.

7) Mental faculties

It is said that there is a positive correlation between mental faculties and memory. Cohen & Bean (1983), however, reported that there was a difference between mentally retarded children and non-handicapped in terms of VT, while there was no difference in terms of SPT.

Theories supporting the SPT effect

1) Non-strategic theory

Cohen (1983) suggested that encoding by SPTs is automatic, therefore not requiring intentional effort or strategy, and that the processing in SPTs and VTs is qualitatively different. Evidence from the absence of a primacy effect or age differences mentioned above supports the non-strategic theory. In VTs, intentional tasks such as repeating sentences or doing rehearsals are combined.

2) Multimodality theory

Bäckman & Nilsson (1984, 1985) proposed that enactment during encoding activates auditory and visual senses, in which characteristic information about objects or events (color, texture, shape, size, etc.) is stored. It may cause different results of recall between SPTs and VTs because VTs activate either the auditory or the visual sense. Subsequently, Bäckman, Nilsson, & Chalom (1986) proposed the dual encoding theory. In this theory, SPTs are superior to VTs in terms of recall because encoding of SPTs uses both the verbal component and the motor component, while VTs use only the verbal component. Engelkamp & Zimmer (1984, 1985) focused on the motor component and claimed that motor encoding is more efficient than verbal and visual encoding. There is evidence supporting this. Encoding SPTs led to higher recall than visualizing oneself perform the action or watching another individual perform the action (Engelkamp & Zimmer, 1985, 1997).

3) Item specific processing theory

Engelkamp explained the SPT effect in terms of relational processing and item specific processing. Under relational processing, subjects recognize the similarity of each item from the list including different items, put them together, and encode. The score of free recall tests tends to be higher for relational processing. Under item specific processing, subjects recognize the characteristics of each item, distinguish

them from each other, and encode them separately. For item specific processing, the score of recognition tests tends to be higher than that of free recall tests. Free recall is a task in which subjects indicate retained information by speaking or writing. The free recall test involves free writing about retained information. Recognition is a task in which subjects find out whether the information is retained. There are also recognition tests involving multiple-choice questions. Mohr et al (1989) compared SPTs and VTs by using the score from recall tests and recognition tests. They found that the difference in scores from recognition tests, between SPTs and VTs, is larger than that from the recall tests between them. Engelkamp & Zimmer (2002) investigated whether relational processing contributed to the score of free recall. They used a list including daily actions, and compared SPTs and VTs. As a result, there was no significant difference between SPTs and VTs although SPT effects were recognized in free recall. If SPT effects are recognized in free recall, there must be a difference between SPTs and VTs. Based on results from these studies, SPT effects are found related to item specific processing rather than relational processing.

4) Integration theory

Kormi-Nouri (1995) suggested a theory in which the motor component is not crucial for the SPT effect and SPTs are strategically and intentionally processed. According to Kormi-Nouri, the SPT effect is based on higher self-involvement, self-actualization, or self-reference of subjects during learning. These factors will cause an increased integration within action events at encoding. Within the events, the integration is increased between the verb and the noun, so that these are encoded together as one memory unit (or as two closely connected units). For example, in the verb clause “throw the ball,” the verb “throw” requires the object “the ball,” and “the ball” is a part of the action “throw.” When memorizing this clause, both the verb and the noun are not encoded separately, but encoded together as one memory unit. Kormi-Nouri (1995) suggested that by performing actions, integration between the noun and verb will be strong and promote the SPT effect.

Although these four theories are suggested, a definite explanation of SPT effects has not been given.

Summary

In early studies about memory, verbal stimuli or visual stimuli were used. In the 1980s, a new modality, using actions as stimuli, came in use. This modality is called SPT. The memory loss seen in verbal tasks is not seen in SPT. Many studies have reported that the score from recall tests by SPT is higher than that from verbal tasks. It is called the SPT effect. There are some theories supporting the SPT effect. However, which of them is valid is still contested.

Total Physical Response

Among foreign language teaching methods, Total Physical Response (TPR) is well known as a teaching method accompanied by actions. James Asher (1977) developed TPR. He noted that children are exposed to a lot of listening before they learn to speak in their first language and their listening is accompanied by physical response. The model of this approach is the process of how children acquire their first language. In a TPR classroom, students did a great deal of listening and acting. During the lesson, a teacher speaks the sentence and performs the action, such as "Sit on the chair." Students perform the same actions the teacher shows them. There are some advantages of TPR:

- 1) By using actions for comprehension, there is no need for support through the first language.
- 2) Since students react through actions; there is no stress to speak the target language.
- 3) Students can retain what they learn for a long period.

However, there is a disadvantage as well. Since TPR is based on the process by which children acquire their first language, only simple phrases are used in the class. Thus, advanced learners or adults might find it of less value.

SPT and foreign languages

Most previous studies have used verbal phrases that subjects can perform, such as “Open the window,” as stimuli. Subjects will encode them by performing the specified action, and whether they can recall the information or not is measured. Since SPT is used for memory tests, the participants are diverse. In the study of Masumoto (2002), the participants were Alzheimer’s disease patients (n=10), elderly people (n=13), and young people (n=15). These three groups conducted four tasks, 1) SPT, 2) VT, 3) VT/O (Verbal / Objects task) and 4) EPT (Experiment Performed Task). The result indicated that the score of the recall test by SPT was the highest in all three groups. He suggests that Alzheimer’s disease patients retain the ability of processing information by performing actions and due to visual sensation. In addition, most previous studies were conducted using the native language of participants. However, a study by Matsumi & Habuchi (1999) showed the possibility of the SPT effect on the second language. In this study, Japanese students learning English participated, and the scores from the recall tests by SPT, IT (Imagery Task: the task encoding memory by visualization), and VT were compared. As a result, the scores of both SPT and IT were higher than that of VT, and there were no differences between the scores of SPT and IT. As another study of the SPT effect on the second language, Nakahara (2007) conducted an experiment investigating the effect of SPT in the context of second language learning. In this study, twelve college students studying Japanese as a second language were asked to encode verbal phrases that were written in Japanese and presented visually on a monitor. Three encoding tasks were presented: 1) SPT, 2) IT, and 3) VT. Under the SPT condition, the participants performed actions as they saw the phrases on the monitor. Under the IT condition, they drew an image of the action. Under the VT condition, they wrote down the sentences. After completing these three tasks, the participants took a free-recall test. The test confirmed that those participants who performed either SPT or IT outperformed those who performed VT.

Teaching English grammar by SPT

Although the studies mentioned above indicated the SPT effect on the second language, the task was simply to encode verbal phrases that participants were able to perform. Very few studies on the SPT effect have focused on the students' acquisition of grammatical concepts. Although various English grammatical concepts may not have a direct translation in L2 learners' mother tongues, SPTs may help facilitate comprehension of these concepts. Based on this hypothesis, Suzuki & Awazu (2009) examined whether SPTs facilitate Japanese students' learning of English indefinite pronouns, and proved that SPTs were effective in learning English pronouns. Since it is said that SPTs are superior to VTs in terms of free recall, they arranged for two groups. One group studied English indefinite pronouns through ITs. The other group studied the same through SPTs. Twenty university students were assigned to either of these two groups and the scores from grammar tests in both groups were compared. The group with SPTs outperformed the group with ITs. This result indicated that SPT can be effective for not only recalling words or sentences, but also learning grammar rules. Chikayama (2016) also examined the SPT effect on learning the difference between present participles and past participles. Two groups, the control group and the experiment group, were compared. The control group studied the difference between present participles and past participles by reading the handout, while the experiment group learned the same using SPTs. In SPTs, participants were asked to use their arms to indicate present participles or past participles. Extending the arms forward expresses present participles, while folding the arms towards themselves expresses past participles. After the lesson, a test with questions about participles was conducted. In the results of the test, the experiment group marked higher scores than the control group. These findings revealed that SPT is effective for not only memorizing verbal phrases, but also for learning grammatical concepts in a second language.

Challenges for the future

That SPT is effective for learning indefinite pronouns and participles has been established. However, there are still few studies dealing with the SPT effect on learning concepts, such as those found in English grammar. Other than indefinite pronouns and participles, there are English grammatical rules that most Japanese students find difficult to understand. For future research, the following two points should be investigated: 1) whether SPT is effective for other English grammatical rules, and 2) whether the process of recalling is similar to the Encoding Specificity Principle that Tulving (1983) proposed about students recalling the information encoded by SPT.

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