

# Online Semantic Mapping Strategies for Augmenting Retention of Lexical Fields: Applying Theory to Online Practices

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## Abstract

Vocabulary learning is a prominent aspect of attaining mastery in a language. At the same time, it is a complex cognitive process (Cook, 2001), that leaves the learners, especially the weak vocabulary learners, with learning difficulties. Enabling such learners to use strategies such as semantic mapping would help them navigate this complex process more effectively. Integrating the use of certain online learning tools available with the advent of web 2.0 technology could help this process further and lead to better retention of the lexical fields. This paper attempts to analyse these possibilities by drawing a link between vocabulary learning difficulties, use of semantic mapping strategy and the use of an online tool, MindMup 2.0. The paper begins by introducing the challenges in vocabulary learning and then brings in the prominence of semantic mapping strategy in addressing them. This is followed by a discussion on the multidisciplinary perspectives of the strategy and from this an outline of its theoretical framework has been critically drawn. Finally, the paper argues in favour of implementing the essence of the theoretical underpinnings of the strategy using online tools for better lexical retention.

## Vocabulary Learning

For successful language learning, vocabulary learning and the process involved in it play a prominent role. Vocabulary was a neglected domain of SLA and received attention much after the four language skills. Until then, despite adopting various methods for teaching the four language skills built on a strong theoretical base, there were still challenges in getting learners to attain the desired proficiency. Perhaps this was because the role of vocabulary was disregarded, and there was no explicit research to understand the process involved in learning it. Later research has established that vocabulary as "a core component of language proficiency and provides much of the basis for how well learners speak, listen, read and write" (Richard and Renandya, 2002, p. 255); also vocabulary learning involves a complex cognitive process (Cook, 2001). The traditional approach to learning vocabulary was through learning a word just by its form and its meaning and rote memorization. Such a surface approach coupled with lack of opportunities to learn and practice vocabulary results in the learners relying more on an instructional environment and traditional academic input, which in turn leads to vocabulary learning difficulties (Kumaravadivelu, 2006; Brown, 2014; Souleyman, 2009). For the last 3 years, there has been a strong opposition to the use of surface-level approaches (Khoii & Sharififar, 2013). This reluctance has favoured the argument for more constructivist and thought-oriented strategies such as semantic mapping. Therefore, researchers are inclined to move towards learning strategies to

explore how these could result in effective vocabulary learning. Enabling the learners to use specific strategies may go a long way in addressing these challenges. Semantic mapping is one such strategy as it involves a more in-depth processing approach (processing of word knowledge in the context). Additionally, it can be practised outside the classroom, which in turn increases the opportunities for vocabulary learning.

## Semantic Mapping Strategy

Semantic mapping strategy has been a part of almost every taxonomy of strategies that were proposed based on the cognitive mechanisms. It is treated as an important strategy in Oxford's (1990) taxonomy of strategies for language learning. Semantic mapping strategy falls under language learning strategies (LLS). LLSs are defined as "any set of operations, steps, plans, routines used by the learner to facilitate obtaining, retaining, retrieving and using the information" (Wenden & Rubin, 1987, p. 19). Semantic mapping is the categorical structuring of information in graphic form. "It is an individualized content approach in that learners are required to relate their new words to their own experiences and prior knowledge" (Johnson & Pearson, 1984). While doing this, learners carry out particular operations and steps, thereby turning semantic mapping into a strategy. Semantic mapping strategy is a cognitive vocabulary learning strategy that maps visually and displays a set of words/phrases (that are new to the learner) and a set of related

words/concepts (already known to the learner), with underlying meaning level associations. In other words, it is a way of visually representing the semantic connections between familiar and unfamiliar words in a language while learning vocabulary.

## Approaches to Semantic Mapping Strategy

There are multidisciplinary approaches to look at what necessitates the idea of bringing extensive use of semantic mapping strategy into L2 classroom practice.

### **Philosophical Approach**

A philosophical perspective questions how anything could mean anything. For instance, how could a noun denote an animate/inanimate object?

Philosophically, this implies that earlier there was just animate and inanimate reality around human beings and attributing a pattern of sound, a word or a meaning to an entity came much later. This implies that different aspects of an entity would have been attributed with words which are closely related in terms of what they mean, in order to recognize them as belonging to one collective entity. In other words, linguistically, the vocabulary of a language is not a body of isolated lexemes, but a collection of numerous interrelated lexical fields. Though while learning vocabulary, visualization of these lexical fields and an overview of their connections are necessary, it is hardly emphasized in traditional learning practices for certain practical reasons.

Although learners are taught dispersed vocabulary using different methods, they subconsciously try to integrate them with the relevant pre-existing items that they are familiar with and form a lexical network of their own. This integration implies that both the linguistic lexical system and the subconscious lexical network formed by the learner follow a lexical pattern that is governed by the internal semantic relativity of the learner. However, this pattern is never a part of the lexical input given to the learner. In such subconscious and implicit processes of forming networks, one might take a very long time to encounter a lexical item that was learnt much earlier and which is very close to the item in its lexical field. Such a process of reaching implicit learning is a convoluted one. It would be helpful if learners were explicitly instructed about pre-existing associations of the lexical items using semantic mapping strategy and trained to cognitively visualise the integral structure of the language vocabulary.

### **Psycholinguistic Approach**

A psycholinguistic approach is concerned with certain fundamental issues related to mental processing of meaning, such as how the mind represents a meaning or how a piece of intended information can be drawn from a lexical input instantly. Addressing this to an extent, Leslie, Friedman, & German (2001) state that there is an innate theory of mind that produces cognitive representations of a person's mental attitudes or states. A biological approach further addresses this mechanism and reveals the innate nature of the brain.

### **Biological Approach**

Hardcastle and Stewart (2002), posit, on the basis of brain imaging studies, single-cell recording and neurological studies, it

is evident that different parts of the brain carry out different activities; these activities are confined to specific processing streams. As per the current understanding of vocabulary learning, it is clear that the left half of the brain works logically, linking vocabulary to related schematic ideas; and the right half of the brain recognizes concepts by taking the image of the bigger picture into account (King, 2011). A semantic map would integrate both sides of the human brain, as it would engage the learners in establishing logical meaning level associations among the words, thereby forming a visual map. Such a map is altogether a better way of providing lexical input to the learners. Furthermore, neurological perspectives based on research in the field suggest that the closer the arrangement of input to the imprint of the lexical patterns in one's memory, the higher the chances of successful learning of vocabulary.

## Theoretical Framework for Semantic Mapping

### **Connectionism**

Since the mid-1980s, there have been a growing number of studies in language acquisition that have applied the connectionist framework. Advancement in computer technology has given a new shape to the theory of connectionism. According to this theory, information-processing in the brain is similar to that of a computer. The neural networks in the brain function just like the complex clusters of information in computer execution. Learning, therefore, occurs as an associative process. The human mind is predisposed to look for associations between elements and creates links

between them just as a computer does with different commands. The links become robust as these associations keep recurring. Some aspects of this theory are closely related to the vocabulary learning process. Unlike a generative grammar that has a set of rules, connectionism has no rules. The neurons "know" how to activate patterns; after the fact that data coding provides rules as a label for the sequence (Schunk, 2012).

### **Cognitive Theory**

The cognitive theory is not one theory but consists of the theories of Piaget, Vygotsky, Ausubel and Bruner to mention a few. Research into ESL learner strategies usually includes Piaget's cognitive perspective as a part of its theoretical framework (McLeod, 2018). Piaget argues that the way human knowledge is gradually constructed and used is similar to the nature of vocabulary building using learner strategies. This cognitive perspective has led to the emergence of a wealth of SLA studies in the recent time under cognitive psychology. The primary point of investigation for cognitivists is the processing involved and its development among the language learners. The semantic mapping strategy emphasizes on the process of analysing the lexical input, assimilating it with the existing knowledge, which in turn enhances the chances of retaining it for a longer time with the help of the semantic associations formed.

### **Assimilation Theory by Ausubel (1962)**

Ausubel's assimilation theory is a pre-eminent basis for semantic mapping strategy as it emphasizes meaningful learning. According to Ausubel (1968), meaningful learning results from the assimilation of new words/concepts into

existing words/concepts. Prior knowledge is an essential prerequisite for learning new words and concepts. The justification for the necessity of possessing previously acquired knowledge is that it assists the learner in resolving misinterpretation of the new word as well as in retaining the newly learned lexical information. Therefore, by consciously linking new information with earlier acquired lexical knowledge, learners attempt to construct an understanding of their own (Brown, 2000). As a consequence, meaningful learning takes place, which leads to better retention of the lexical field.

## Bringing Semantic Mapping Strategy into Practice

The potential of the semantic mapping strategy is immense, but its application has barely been studied. Moreover, the limited research available has been carried out in a traditional classroom setting in the Far East, the Middle East and the UK. Zahedia and Abdib (2012), in a study conducted on lower-intermediate learners in Iran, report that the strategy was successful with them. Khoii and Sharififar (2013) found in another study that learners did not prioritize semantic mapping strategy over rote memorization at Islamic Azad University, North Tehran. The reason behind this preference was shared by the learners and is most insightful. The learners in the study revealed that they tend to opt for an easy way of learning such as using an e-note book to search for meaning instead of engaging in a strategy that would demand a more cognitive process to learn a word. This finding brings up issues of perception and prior orientation to the semantic strategy and not that of strategy. Bringing

the strategy into the L2 classroom would be productive, and a further investigation into the strategy may yield better insights.

Moving a step ahead of practising the strategy in the traditional classrooms using pen and paper or board and marker, technology-enhanced online tools can also be used to draw semantic maps. The idea behind propagating such online tools into L2 classrooms is that these tools have learner-friendly multimodal affordances to better facilitate the strategy and not because they are available or that they introduce new practices.

## Online Tools for Semantic Mapping Strategy

There are many online mind mapping tools that can be adopted for practicing semantic mapping strategy. These include tools such as Popplet, MindMeister, Bubbl.us, MindMup2.0, Coggle, Webspiration classroom, etc. Some of these tools are freely available, others have paid access, and some others are available free for a limited time. They all function almost similarly in forming semantic maps. However, tools such as Coggle, MindMup 2.0 and Webspiration classroom have some additional learner-friendly features, such as adding visual images related to the word, adding a video clip if needed and transposing the maps formed into a hierarchical text document. The idea behind these tools is that effective integration of technology-enhanced tools makes it easier for learners to achieve their goals (learning vocabulary with a deeper approach, increasing learning opportunities outside the classroom, thereby reducing reliance

on instructional input, etc.). Research shows that this strategy was successfully explored in the traditional classrooms, to map difficult concepts in subjects such as natural and physical sciences. It was explored in traditional ESL learning spaces, and to some extent in the online learning spaces. This can perhaps be attributed to two reasons. First, that use of online tools is still in its emerging phase in many countries. Second, the available tools are not specifically designed for language learning, but for more generic purposes such as planning and organizing ideas and procedures in corporate and business sectors. Nevertheless, they can be adopted for language learning as their features and multimodal affordances are added advantages for the learners. I have attempted to use MindMup 2.0 to apply some of the theoretical underpinnings mentioned earlier and discuss how it can facilitate better retention of lexical fields.

## Practical Application of the Strategy

Semantic mapping strategy can be practised in two ways: theme based semantic mapping and word based semantic mapping.

### **Theme Based Semantic Mapping**

In theme-based semantic mapping, a selected theme acts as the core. This core theme is then associated with keywords, and these words are 'mapped' around the theme. The keywords are further associated with their related words to form a complex lexical field on the core theme.

### **Word Based Semantic Mapping**

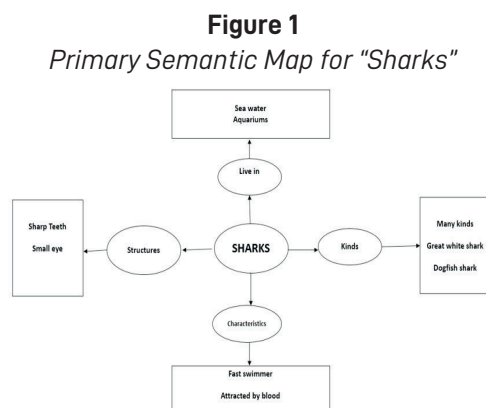
In word-based semantic mapping, the target word is placed at the core.

Thereafter it is extended towards the periphery by associating the word to related words in two major ways. Firstly, by associating the target word with its known synonym or antonym, or an example demonstrating the use of the word; secondly by associating it with a word drawn from the personal experience of the learner for better learning (Antonacci, O'Callaghan & Berkowitz, 2014).

A sample lexical field has been taken and analysed to understand how these two ways of forming semantic maps facilitate better retention of the lexical field, for all learners, more so for weak vocabulary learners (Gambrell, Wilson and Gantt, 1981). Teachers and teacher educators find enabling learners to form semantic maps by carrying out brainstorming even before exposing them to the target words in a selected text as a positive approach (Johnson, Pittelman, Bronowski & Levin, K. M., 1984). Therefore the analysis here is carried out for weak vocabulary learners and taking into account the context that they are made to form semantic maps before making them read the text with target words. An undergraduate learner sample (learning English as L2) seems to be suitable in this respect, as they are assumed to possess a minimum level of English vocabulary and technical skillset to use the online tools for forming the semantic maps. In the first example, the lexical field has been discussed in a traditional setting, and the semantic map has been formed using a pen-paper/board. In the second example, an online tool has been used to create a lexical map to demonstrate the advantages of online tools and to understand how these tools lead to better retention of the lexical field.

## Sample Analysis for Theme-Based Semantic Mapping

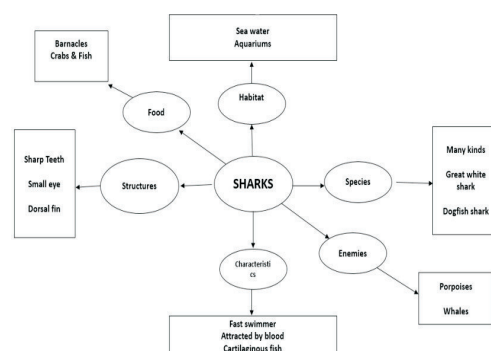
Let us assume that the theme in a given text is "sharks". The learners have to first draw a semantic map by linking everything they know about the given theme. The teacher has to assist the learners in brainstorming so that they can recollect their prior knowledge of sharks. The learners could start with basic information about sharks: where do they live, what are the different types of sharks, how do they look, what are their characteristic features, etc., and come up with a possible semantic map as shown in figure 1.



This primary map gives the teacher an idea of the vocabulary level of the learners and hence the target vocabulary that can be associated with their prior knowledge on sharks. For instance, if they use the words "live in", in their semantic map, they could be exposed to the word "habitat" from the text and replace it in their map. Similarly, the learners could replace the word "types" with "species", when they read about the different "species" of sharks in the text. This way,

the learners can replace a previously known phrase/word with a new word that is more academic and appropriate. The teacher could then add some theme-specific words that they had not thought of. For instance, if the text talks about the food habits and the enemies of sharks, these could be added as new associations to the central theme. In the end, the learners would come up with a probable semantic map as shown in figure 2. In both cases, (replacing or adding new words), learners do not just deal with words, but they go through a process of assimilating the new word knowledge with their prior knowledge.

**Figure 2**  
*Final Semantic Map for "Sharks"*



## Sample Analysis for Word-Based Semantic Mapping Using an Online Tool

The target word "induce" was chosen for the word-based semantic mapping. This word is drawn from the Sublist 8 of the Academic Word List (AWL). AWL consists of most frequently occurring words in the academic corpus. The list indicates the minimal word knowledge required for comprehending academic texts. The semantic map of "induce" is analysed to

show how the use of online semantic mapping strategies (such as MindMup 2.0) leads to better retention of its lexical field. These semantic mapping strategies include various other strategies such as grouping, organising, sharing in a group, etc., that interplay while practising online word-based semantic mapping. In order to learn a set of target words from AWL, learners are encouraged to form semantic maps for each word independently.

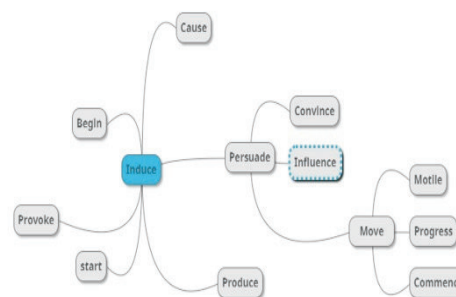
An orientation to online semantic mapping, such as MindMup 2.0, is given to explain mapping. When learners encounter a word for the first time, they are encouraged to use a lexical resource such as an online dictionary, to link the new word to the target word at the meaning level. The teacher also needs to provide an overview of the affordances of the platform to get them accustomed to drawing semantic maps. After forming the primary semantic map, the teacher gives an authentic text (created by the teacher if needed), integrating all the chosen target words to enrich the contextual word knowledge of the learners. This can be followed by an exercise to reinforce the words and so that the learners can gain mastery over the word. The online tool facilitates an easily accessible graphical interface for the learners to draw various shapes (and add the words within these shapes) that can be interconnected to represent the associations between the words.

One would think this could be done on a paper or a board as well. However, doing it using an online tool makes a difference to the learners and their active learning. The tool allows for flexibility in placing the words close to or further from the target word in the semantic map, based on the learners' prior knowledge of their relationship to the target word. Learners

can alter this relationship by relocating the boxes if they find that a word is not as closely related as they had thought. They can also add a supporting image, a video or a recording to the word to enrich its meaning and improve cognition; they can add a hyperlink to gain further knowledge. Learners can take this learning outside the classroom on a mobile device and continue with the semantic mapping in their own time and at their own pace. In addition, this online semantic map can be shared with peers to ask for feedback and refine it further. Similarly, one could also comment on another learners' map, hence resulting in collaborative learning. All this is possible only because this tool can be used anywhere, even outside the classroom, and more importantly at any time. Lastly, MindMup 2.0 can be used to transform a semantic map into a hierarchical outline auto-generated by the tool. The learner can take a printout of this outline or the semantic map and use it for offline learning.

Figure 3 shows a possible semantic map drawn on MindMup 2.0 for the target word "induce". Looking at the semantic map, we see that the target word "induce" is closer to the words "cause" or "start" and comparatively farther from the word "persuade". The learner could also relate

**Figure 3**  
*Semantic Map of the Word "Induce" Using MindMup 2.0*





the word "persuade" to "move" in a sense, and further relate the word "move" to "motile", with the sense of mobility. In the end, when the learner looks back at the map she/he finds "induce" at the core of the map "move" at the periphery and "motile" as a word no more related to the target word "induce". All the words and the associations around the target word "induce", right up to the periphery word "move" represents its lexical field. Moving a step ahead, the teacher can point out the beginning of a new lexical field of the word "move", which is on the periphery of the adjacent lexical field. Visualizing this, enables the learner to perceive the big picture of the complex lexical network of the lexemes, rather than looking at them as individual lexical items. The process involved in forming the map—identifying the semantically related words, grouping them under a common lexical field, organising them on the map based on the association they share, exploring a new lexical item further wherever needed, learning collaboratively through online sharing—facilitates a deep vocabulary learning approach. Following this, if the teacher introduces the authentic text of the target word to the learner, the level of comprehension of the target word would be much higher than if the learner directly accesses the text and encounters the word. Higher level of comprehension is because the learner do not just learn the new word in isolation, but assimilates the new word knowledge with the previous knowledge, thereby establishing a

connection that helps to overcome misinterpretation of the new word and contributes to better retention, as Ausubel's assimilation theory argues. In such a process of assimilation, the learners rely on their innate mind mechanism (Leslie, Friedman, & German 2001) and draw a semantic map that is unique to them. Therefore there is every possibility that one learner's semantic map may not be the same as that of another. In fact, even the sample semantic maps in the article would not be the ideal or the final maps, but liable to differ slightly from learner to learner.

Despite these variations, it is still productive to encourage learners to form individual semantic maps because the group of online semantic mapping strategies that interplay together ensure that a learner's map lies closer to the lexical pattern imprint of his/her memory. Further, as neurological research suggests, the closer the input to the memory's lexical pattern, the higher the chances of effective learning and augmented retention of lexical fields of the target words for a longer time. Thus, online tools would definitely do a better job in bringing the semantic maps closer to their cognitive imprint with a prior orientation. These tools also effectively integrate the left and the right half of the brain by engaging the learners in learning logical associations of the words and forming visual maps, respectively.

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