Effect of Conceptual Metaphors on Memory: A Preliminary Study on the Visual and Auditory Recalling

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Abstract

In this study, we examined the relationship between conceptual metaphor and recalling. For this purpose, 3 metaphorical and 3 equivalent non-metaphorical short texts were produced in 2 visual and auditory versions and 47 participants were exposed to the short-term and long-term recalling immediately after reading/listening to the texts and one week later. Results indicated that in some cases it is metaphorical one that has been recalled better than its non-metaphorical equivalent in both short-term memory and long-term memory. This finding can be interpreted as an evidence of the possible facilitative role of conceptual metaphors in memorization.

KEYWORDS: Conceptual metaphor, recalling, visual memory, auditory memory.

INTRODUCTION

The nature of metaphor, metaphoric understanding, and its functions have been recognized as three main issues in research and theoretical formulations on metaphor and metaphor processing (Allbritton, 1995). In general, metaphor is defined as understanding and experiencing one thing based on another (Lakoff and Johnson, 1980/2003: 5). Metaphor can also be considered as an expression that has two conceptual domains in which one of the domains is experienced and understood according to the other (Gentner, 1988; Gibbs, 1979; Ortony, 1979). These two conceptual domains are known as target domain and source domain (Gentner and Holyoak, 1997). Target domain refers to the domain that involves the main expression and source domain refers to the domain that is used for explaining the main expression. In the expression "Iron Willed" (in Persian Language), "iron" is the source domain and "will" is the target domain. In this compound, some properties of iron such as strength, stability, and inflexibility are attributed to willed, and we conclude that a strong and invincible phenomenon in a person is being discussed ("He is an iron willed"). Usually, it is said that in metaphorical expression, the element which has a more specific, familiar, and better-known concept (such as iron) transfers a relevant part of its meaning to another element which is seemingly less known and may not be directly accessible (such as will or willed). Obviously, except strength and stability, iron has other properties which are not transferred to the concept of will and it is believed that these properties are inhibited (Ghassemzadeh, 2006).

Metaphors have different cognitive and communicative functions and they can provide a compressed, memorable, and also understandable format for expressing many concepts and thoughts that may not be easily expressed in direct verbal expression. In an almost a comprehensive definition, Leary (1990) defines metaphor as assigning a name to something or proposing a description for something in such a manner that the name or description arbitrarily or commonly belongs to something else (cited in Ghassemzadeh, 2013: 10). In another definition, Vosniadou and Ortony (1983) define metaphors as analogies that allow us to express an experience based on other experiences and as a result, to achieve an understanding of complex issues or new situations.

Although metaphor goes beyond its components, words as psycholinguistic units play an important role in metaphoric understanding. Therefore, structural unit of metaphor can be considered as "word". Accordingly, metaphor is a tool and format of psycholinguistics and its main mechanism is formed based on polysemy (Carroll, 1964). As stated by Miller (1979), D’Andrade (1989), and Luria (1981), only rarely do words have just one meaning. Actually, it is the texture of discourse that selects a special meaning or meanings out of a set of probable and/or possible meanings and makes the speaker’s meaning clear. In fact, it can be said that metaphor is formed based on the great capacity of the word as a concept, and it is encoded as a network in the memory (Ghassemzadeh, 2013: 24-26).

From a cognitive perspective, Lakoff and Johnson (1980) consider metaphor as a cognitive phenomenon and they believe that meta-
phors are conceptual in nature. They suggest that metaphor flows in our daily life, not only in our language, but also in the way we think and act; and our usual conceptual system in which we think and act has a fundamentally metaphorical nature. Regarding the theoretical foundations that have been proposed about metaphor over the past few decades, it seems that metaphor has a very important role in memory and memorization processes. Metaphor comprehension involves forming an abstract connection between two concepts in semantic memory (Glucksberg, 2001, 2003). Such a link or attributive category, is established by extracting and relating similar properties of different concepts in memory (Benedek, et al., 2014). Memory for metaphors has been thought to depend on a number of different attributes such as metaphoricity, imagery, similarity between source and target domains, aesthetic quality, and comprehensibility (McCabe, 1988). Gibbs (1980) argued that the greater memorability of metaphorical sentences may stem from the fact that such sentences are an unconventional use of language (Gibbs, 1980).

In spite of the high importance of metaphorical functions in cognitive activities in general, and in memory and memorization specifically, there are not many studies dedicated to investigating this matter. Only studies conducted by Reynolds and Schwartz (1983), Allbritton, Mckoon, and Gerrig (1995) can be named so far. Allbritton, Mckoon, and Gerrig (1995) raised an issue in their study under the title of “Metaphor-based schemas” which refers to a schema which is created as a result of a conceptual metaphor in the text. In their study, they presented the subjects forty short texts, half of which had conceptual metaphors, and the other half had the literal equivalents. They concluded that at the time of remembering and recognizing the text with conceptual metaphors, metaphor-based schemas are automatically provoked in people’s mind, causing them to better remember and recognize the text (Allbritton, Mckoon, and Gerrig, 1995). In a coherent research, Reynolds and Schwartz (1983) investigated the relationship between metaphorical processing, perception, and memory. In their study, adults read eight short stories first, after which they evaluated the quality, effectiveness, and metaphorical aspects of the narratives. Half of those stories ended with a metaphorical conclusion and the other half ended with the literal equivalent of the metaphorical conclusion in the first group. Then, the stories were presented to the subjects as small booklets. When they read the text fully, they were given a memorization and recognition test immediately after and once two weeks later. The results of this study suggested that the texts with metaphorical conclusion were easier to memorize. Furthermore, Reynolds and Schwartz (1983) concluded from data analysis that not only the metaphorical conclusions have been memorized better than their literal equivalents, but more details of each text had been memorized, as well. The foregoing study was done in the framework of an educational approach (Reynolds and Schwartz, 1983).

To summarize, as Reynolds and Schwartz (1983) believe that, metaphors are necessary building blocks of language in that they allow ideas that were previously inexpressible to be expressed, frequently in a vivid, compact form. It is further supposed that the vividness of metaphors, along with the way in which they are comprehended, tends to enhance the memorability of metaphors themselves, as well as that of the information that appears with the help of metaphors (Reynolds and Schwartz 1983: 452). Following this direction, the main aim of the present study is to establish metaphor as a topic worthy of discussion in memory studies and to draw out some of its implication for the future studies. In fact, by considering the theoretical foundations of conceptual metaphor on the one hand, and memory-related studies on the other, this preliminary study, which may be considered the first one in the Persian language, is planned to find a possible connection between metaphor and memory, using short metaphorical texts. In addition, this study is intended to survey the way in which texts are presented, i.e. the visual or auditory format. Memory recall has been considered in many studies. The investigations have involved short-term memory, long-term memory, as well as different mediums, including auditory and visual processing (Linder, et al, 2009). The findings of the studies mainly indicate that recall is affected by the medium the information is presented (Pickering, et al, 1998). In some studies, it is auditory learning which leads to better short-term memory while visual learning results in better long-term memory (Watkins and Peynircioglu, 1986). Whereas in some other, the results indicate that overall, visual learning leads to better scores in both the immediate and delayed posttest conditions (Linder, et al, 2009). According to these researches’ results, it seems that medium by which words or texts are run is important to be considered too.

Method
The main goal of the study is the memorization of short metaphorical texts and memorization of the same short text in a non-metaphorical narrative. For this purpose, memorization of both metaphorical and non-metaphorical short texts is tested.

Participants
The sample was selected through convenience sampling which included 80 twenty to twenty-five-year-old students of Foreign Languages School and Management School of Allameh Tabatabai University in Tehran. Since variations in memory capacity can affect the test results, they were given a Persian word recognition test to ensure relative consistency among all participants’ memory capacity (Jarollahi, 2012). For this purpose, the students were divided into two 40-subject groups. Word recognition test was visually illustrated for one of the groups and for the other group it was presented as audio. The subjects getting the mean and standard deviation score of ±2 were selected for the main study and those getting a higher or lower score were excluded. At the end, 25 subjects including 15 female and 10 male students were selected for the visual task and 22 people including 13 female and 9 male students were selected for the auditory task. We designed and performed the task in both visual and auditory forms in order to see if there is any difference between the visual and auditory processing of conceptual metaphors. Moreover, it seems that in real life people are exposed to the auditory forms of conceptual metaphors in conversations more than reading them in texts.
Stimuli (tasks)

The main tools of the study were the texts written in fluent Persian and divided into two categories of metaphorical texts and their equivalent non-metaphorical versions. Both texts have had a shared schema. Furthermore, the number of words were equal in both texts. For the purpose of providing such tasks, the following steps were taken:

A. Writing the texts based on some of the metaphors existing in the book Metaphors We Live by (Lakoff and Johnson, 1980), that seemed to be common in Persian judged by the judgments of the researchers.

B. Writing non-metaphorical texts equivalent to the written metaphorical texts. In writing the primary version of the texts, researchers tried to keep the number of words equal in both texts having the common schemas.

C. Validation of the metaphorical/non-metaphorical versions by Persian speakers. For this purpose, a Likert table was prepared with the scores of 1 to 5 and each of them was assigned a score of 100 to 500. These scores were considered separately for each text. After explaining the conceptual metaphor for the audience, they were asked to assign a higher score to the text which was more metaphorical according to their idea, and assign the lower scores to the texts with lower metaphorical theme. For achieving the optimal result based on the scores of below 150 for non-metaphorical texts, and the scores of above 400 for metaphorical texts, the process of validation started in three stages by 58 Persian speakers. After each stage, researchers made some changes in the texts and tested them again in order to come up with a satisfying outcome. At the end, the texts that did not get the optimal score were excluded from the study and 4 metaphorical texts and their equivalent 4 non-metaphorical texts were selected as the main task. Then, in order to ensure accuracy of the schema selected by the researchers, the schema of non-metaphorical texts was also evaluated and the speakers were asked to write a main theme they judge appropriate for each text. According to the obtained results, the schemas of 3 texts out of the 4 presented texts were consistent with the schemas selected by the researchers and there were inconsistencies in one of the texts which was eliminated from the study. In order to prevent systematic errors, some texts were added as fillers.

Procedure

In order to compare memorization of short metaphorical texts and their corresponding short non-metaphorical texts, subjects’ short-term and long-term memory were measured in relation to the presented text immediately and two weeks after the task. After presenting/ playing each text, subjects were asked to write down whatever they remember from the presented text. This method was repeated without any changes regarding subjects and texts. After two weeks, participants were asked to write every sentence of any text they recall on the google form that they were provided. The test used in this study was designed by PsychoPy software. Before this stage, the testing tool was performed in a pilot study in order to evaluate its function and to work on its deficiencies. After doing the pilot study and making some necessary changes as well as validating the test, the task was designed in the visual version of PsychoPy software. Then, another pilot study was carried out in order to evaluate the test’s function within the software and overcome its probable inconsistencies. For the second part of the task (the assessment of the long-term memory when memorizing metaphorical and non-metaphorical texts) a google questionnaire form was prepared in which participants were asked to write down what they read or heard two weeks before the performance of first stage of experiment. This form was sent to the participants two weeks after the task performance through email.

This study was performed in three stages. The first stage was done to select the subjects making sure of their relative consistency in terms of their ability to memorize texts. In this stage, word recognition test was performed in groups and in two groups of visual and auditory where 10 one-syllable words were presented consecutively and each one for 2 seconds on the screen in the visual group, and by 60-db speaker in the auditory group. Before performing the test, some sheets were distributed among the subjects containing a table of the 10 presented words and 15 additional one-syllable words. The subjects were asked to write some necessary information including their name and surname, phone number, gender, age, semester, and commencement year, and their major areas. Before the test, the procedure was explained for the subjects and they were asked to return the sheets after the end of presentation of the words, write down their identities, and then, tick the words that they thought to have heard or seen. The second stage of the study which was done after selecting the participants included comparing memorization of the metaphorical short texts and memorization of the equivalent non-metaphorical short texts in visual and auditory short-term memory. This stage was completed, through previous arrangements at Foreign Languages and Literature School of Allameh Tabatabai University in the presence of the researcher and each of the subjects individually. Distractions such as loud sounds, unnecessary traffic, and presence of other people in the room were prevented where possible. Visual test was given using R542UR Asus VivoBook laptop with a 15.5-inch screen, full HD, and resolution of 1920*1080 pixels. Also, the subjects were seated about 40 centimeters from the computer. However, this distance could change upon the participant’s request. In the auditory test, the same laptop was used with a Beats Studio headphone with the frequency response of 20 Hz to 20 kHz and wire connection with the cable length of 3.1 meters and intensity of 60-70 db. In the visual test, the texts and words were displayed on a screen with white background, using B Roya Persian font of size 28. In the auditory test, the texts were played on a headphone with the sound intensity of 60-70 db. Finally, in the third stage which participants completed at home, a google questionnaire form was sent to them in which they were asked to write whatever they could remember from the texts they exposed to them two weeks before. The participants did not have to write exactly what they read or heard. Instead, they could have recited the theme. Before performing the test, the researcher insured subjects that no personal information would be treated as data and what was important was the total score without considering individual scores. Then, the method and stages of the work were fully explained for them. The test started when the subjects declared to be ready and pushed a button on their keyboard. First a text was presented on the screen for 25 seconds in the
previous studies, this time was dependent on the length of the text and the study goal. In this study, this duration was determined in a pilot test). After that, a blank white page appeared for 10 seconds and then, a message appeared on the screen which led the subjects to push a button for starting the next test whenever they were ready, i.e. when they were done with writing the sentences for the previous text. There were eight texts including 3 metaphorical and 3 non-metaphorical ones plus 2 texts that were used as filler texts which were excluded from the final analyses. The texts were organized in such a manner that the metaphorical text played before its corresponding non-metaphorical text with an interval. At the next round, the non-metaphorical text was played before its metaphorical version.

The test processes in the visual and auditory tests were the same except in the method of presenting the texts on the screen or playing through the headphone.

Data analysis
In this study, descriptive and inferential statistical methods were used for analyzing the data and providing tentative answers to the research questions. All the analyses were implemented SPSS V.23 software. To analyse the data in each of the visual and auditory tasks separately, Friedman non-parameter test was used. For comparing the data of the visual and auditory tasks, Mann-Whitney test was used.

Result
A. Comparison of visual long-term recalling of metaphorical and non-metaphorical texts
According to the table of descriptive statistics (attachment 1), the average scores of long-term recalling metaphorical and non-metaphorical texts for visual stimuli are, respectively, 7.6 and 9.08. The difference is related to two pairs of texts: (1) metaphorical text No.1a and non-metaphorical text No.1b, and (2) metaphorical text No.3a and non-metaphorical text No.3b in particular. As shown in table 1, long-term recalling of non-metaphorical text No.1b is better than long-term recalling of metaphorical text No.1a. The difference in long-term recalling is reversed between texts No.3a and No.3b, meaning that the long-term recalling of metaphorical text No.3a is more considerable than long-term recalling of non-metaphorical text No.3b. The following table and figures present these findings.

Table 1. Comparison of visual long-term recalling of metaphorical and non-metaphorical texts

<table>
<thead>
<tr>
<th>Visual/LTM/Recall</th>
<th>comparison of recalled sentences of all texts</th>
<th>comparison of recalled sentences of text No.1a and No.1b</th>
<th>comparison of recalled sentences of text No.2a and No.2b</th>
<th>comparison of recalled sentences of text No.3a and No.3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>x² = 1.636</td>
<td>x² = 7.118</td>
<td>x² = 1.667</td>
<td>x² = 5.400</td>
<td></td>
</tr>
<tr>
<td>P = 0.201</td>
<td>P = 0.008</td>
<td>P = 0.197</td>
<td>P = 0.020</td>
<td></td>
</tr>
</tbody>
</table>

B. Comparison of auditory long-term recalling of metaphorical and non-metaphorical texts
According to the table of descriptive statistics (attachment 1), the average scores of long-term recalling metaphorical and non-metaphorical texts for auditory stimuli are, respectively 6.05 and 6.00. The observed difference is not statistically significant. However, by partitioning between texts, as shown in table 2, there is a significant difference between recalling of metaphorical text No.3a and non-metaphorical text No.3b. Long-term recalling of text No.3a is more considerable than long-term recalling of text No.3b. The following table and figures present these findings.
C. Comparison of auditory and visual long-term recalling of metaphorical and non-metaphorical texts

The average scores of recalling metaphorical texts in visual and auditory long-term recalling are 7.60 and 6.05, respectively. This average for non-metaphorical texts is 9.08 in visual long-term recalling and 6.00 for auditory long-term recalling. The following table and figure present these findings. According to table No.3 and figures C, the difference between auditory and visual long-term recalling is significant in metaphorical text No.1a. Auditory recalling of metaphorical text No.1a is more considerable than visual recalling of metaphorical text No.1a.

<table>
<thead>
<tr>
<th>Visual/LTM/Recall</th>
<th>comparison of recalled sentences of all texts</th>
<th>comparison of recalled sentences of text No.1a and No.1b</th>
<th>comparison of recalled sentences of text No.2a and No.2b</th>
<th>comparison of recalled sentences of text No.3a and No.3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x^2 = 0.053)</td>
<td>(x^2 = 2.250)</td>
<td>(x^2 = 2.571)</td>
<td>(x^2 = 5.333)</td>
<td></td>
</tr>
<tr>
<td>(P = 0.819)</td>
<td>(P = 0.134)</td>
<td>(P = 0.109)</td>
<td>(P = 0.021)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Comparison of auditory long-term recalling of metaphorical and non-metaphorical texts

C. Comparison of auditory and visual long-term recalling of metaphorical and non-metaphorical texts

The average scores of recalling metaphorical texts in visual and auditory long-term recalling are 7.60 and 6.05, respectively. This average for non-metaphorical texts is 9.08 in visual long-term recalling and 6.00 for auditory long-term recalling. The following table and figure present these findings. According to table No.3 and figures C, the difference between auditory and visual long-term recalling is significant in metaphorical text No.1a. Auditory recalling of metaphorical text No.1a is more considerable than visual recalling of metaphorical text No.1a.

<table>
<thead>
<tr>
<th>Visual/Auditory/LTM/Recall/2Independent samples</th>
<th>comparison of recalled sentences of all texts</th>
<th>comparison of recalled sentences of text No.1a and No.1b</th>
<th>comparison of recalled sentences of text No.2a and No.2b</th>
<th>comparison of recalled sentences of text No.3a and No.3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney (a) = 226.500</td>
<td>Mann-Whitney (1.a) = 195.000</td>
<td>Mann-Whitney (2.a) = 245.500</td>
<td>Mann-Whitney (3.a) = 216.500</td>
<td></td>
</tr>
<tr>
<td>(P = 0.297)</td>
<td>(P = 0.030)</td>
<td>(P = 0.446)</td>
<td>(P = 0.194)</td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney (b) = 223.000</td>
<td>Mann-Whitney (1.b) = 230.000</td>
<td>Mann-Whitney (2.b) = 249.000</td>
<td>Mann-Whitney (3.b) = 228.500</td>
<td></td>
</tr>
<tr>
<td>(P = 0.265)</td>
<td>(P = 0.318)</td>
<td>(P = 0.557)</td>
<td>(P = 0.249)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Comparison of auditory and visual long-term recalling of metaphorical and non-metaphorical texts
DISCUSSION

The results of data analysis of this study show that auditory and visual long-term recalling of metaphorical text No.3a has taken place better than its equivalent non-metaphorical text. No difference is observed between recalling the metaphorical text No.2a and its equivalent non-metaphorical text No.2b. And finally, recalling the non-metaphorical text No.1b has been better than its equivalent metaphorical text No.1a. This procedure and these results have been exactly repeated in short-term recalling of the texts i.e. the subject’s immediate recalling of the texts after hearing them. At the first glance, it seems that the obtained data are idiosyncratic to some extent and the subjects have shown different behaviors in recalling each text. There are some reasons for this variation. First, text No.1a was the first text presented to the subjects and, at the time of hearing or reading this text, they were not familiar with the process. Therefore, the difference of recalling this text with its equivalent non-metaphorical text is probably due to the fact that the subjects were not aware of the test process and they could not pay enough attention to the task. On the other hand, non-metaphorical text No.3b was the last text to which the subjects were exposed, and therefore, the subjects were expected to recall better this text than its metaphorical version i.e. text No.3a that had been presented before text No.3b. However, the results of data analysis in both visual and in auditory versions show that the subjects had a better performance in recalling the metaphorical text No.3a. Furthermore, no difference in the recalling texts No.2a and No.2b can be due to the similar metaphorical or non-metaphorical nature of these two texts compared with other pairs. In validation of the extent of metaphorical/non-metaphorical nature of the texts, the difference between metaphorical/non-metaphorical nature of texts No.2a and No.2b was less than the difference between metaphorical/non-metaphorical nature of the other two pairs. Thus, these two texts were more similar to each other in terms of results in this regard. Hypothetically, the same extent of recalling of these two texts can be related to their similarity in terms of being metaphorical or non-metaphorical. Accordingly, if we exclude texts No.1a and No.1b from the analysis due to early exposure of the subjects to text No.1a and the difference of testing conditions, and on the other hand, if we do not consider texts No.2a and No.2b in the main analysis because of a smaller difference between their metaphorical/non-metaphorical nature than the other two texts, the only texts that remain for the final analysis are No.3a and No.3b. These two texts have a statistically significant difference in terms of recalling extent in both auditory and visual versions. The subjects had a higher performance in recalling the sentences, words, and concepts of the metaphorical text 3a than the non-metaphorical text 3b in terms of both short-term and long-term recalling.

As mentioned in introduction, conceptual metaphor is one of the psycholinguistic aspects of a cognitive process. In conceptual metaphors, there are two conceptual areas of origin and destination and the destination area is defined by adaptation or analogy between these two areas. When we talk about adaptation or analogy, memory is also involved. In a classical statement, Whorf (1956) believed that a person’s conceptual knowledge is formed by his/her language. Later, a weaker form of this hypothesis was introduced suggesting that language affects the formation of perception as well as memory. There is plenty of evidence showing that language directs thinking (Ervin-Tripp, 1967), affects the concepts of time and place (Boroditsky, 2001), and also affects memory (Loftus & Palmer, 1974). Language and memory are two important cognitive processes of human that are closely related to each other. In its simplest form, human needs memory to follow conversations (Goldstein, 2010). The relationship between language and memory may not seem clear at first, but when considering memory as a tool and process for storing and retrieving information, or a tool and process for transferring information, or a means of describing the content of our conscious experience, we may be able to better understand the importance and impact of each of these cognitive processes on the other.

In the present study, the effect of one of the most important cognitive functions of language i.e. conceptual metaphor on one of the memory processes i.e. recalling in textual context was investigated. As the data indicate, it seems that when metaphor is used in a text, that text will become more memorable. It is probably due to the fact that metaphors create a wider network of communication in brain or it may be through providing strong cueing system related to metaphoric understanding. Metaphor is not encrypted and decrypted in vacuity. It is obvious that the creator and the hearer of metaphor refer to their memory for understanding the meaning of the metaphor and transmitting its concept. Memory can be considered as the mental capacity for keeping information over time. Based on this criterion i.e. time, three types of memory can be recognized: sensory memory that keeps information for less than one second or at most a few seconds; short-term memory or active memory that keeps information for about 30 seconds; and long-term memory that may keep information for life. Squire (1995) divides long-term memory into two types of indicative and non-indicative, and suggests that since different parts of indicative and non-indicative memory are involved in creating or understanding metaphor, it can be used in studies as an indicator of complex brain interactions. Organization of information is done by long-term memory and metaphorical combinations are stored in long-term formats in the form of simile, allegory, metonymy, and proverb. Activation of these combinations takes place through understanding the similarity of a situation of event to the stored schema and also understanding its correlation with those combinations. What happens in the brain when using, perceiving, or recalling metaphor cannot be precisely determined; but it is obvious that the condition of using the metaphor plays the role of activator and provides a processing network for us that is different from the common non-metaphorical processing network. On the other hand, in addition to the whole memory, meta-lingual context i.e. the conditions and agents used by the person in information exchange, also affect the perception of metaphor. All of these situational stimuli determine the type of information of long-term memory that are related to perception and interpretation of metaphor. In general, it can be said that metaphorical expression and the individual’s situation play the role of sings for retrieving information of long-term
memory. In mentioning the metaphor functions, Gibbs (1994, p.124) suggests that one of the major function of metaphor is providing a coherent and condensed method for communicating. Condensation occurs when a single idea that can include image, thought, or language is replaced for several ideas or associations. Accordingly, when the creator and hearer of metaphor are faced with coherent data, they will recall it more easily than large and scattered data. So, it may be concluded that the texts that are expressed metaphorically contain a great deal of information in a small language data. Therefore, when recalling them, their components can be accessed more easily than their equivalent non-metaphorical texts. Another explanation for metaphors to be better remembered may be that metaphor is based on mental imagery or even is its originator. It is well known that concrete, easily imagined literal sentences are remembered better than abstract, less imaged ones. But evidence concerning imagery and memory for metaphors is conflicting (McCabe, 1988). Mental imagery is quasi-perceptual experience and is something that people are aware of and experience (Pecher, Van Dantzig, & Schifferstein, 2009). It resembles perceptual experience, but occurs in the absence of appropriate external stimuli (Thomas, 2019 Edition). The central question about the role of mental imagery in metaphor understanding was raised some time ago by Gibbs and Bogdonovich (Carston, 2018). Gibbs and Bogdonovich (1999) thought that imagery has an essential role in an account of metaphor understanding. They said that metaphor theories must be amended to account for the prominence of imagery in metaphor use (Gibbs and Bogdonovich, 1999, p. 37). Based on the result of an empirical study, they concluded that mental imagery is essential in understanding at least some metaphors, those that they (following Lakoff & Turner, 1989) call “image metaphors” (Carston, 2018). Gibbs and Bogdonovich (1999) expected that participants interpret these metaphors based on mapping of an image from the source domain onto the target domain. However, As Carston (2018) says, it is difficult, of course, to detect the presence or absence of mental imagery in the mind/brain of the person understanding a metaphor and it is more difficult to tell whether the imagery of the target domain is being mapped onto the target domain. Carston, in a semi experimental study, argues that the experience of mental imagery during the comprehension of a metaphor is probably a by-product or side-effect of other processes, an outcome of such factors as the novelty, creativity, and extendedness of the metaphor. He continues that, however, even if mental imagery is (merely) a cognitive side-effect of standard linguistic processes, it can be of considerable significance, in respect of that it may be the most powerful and/or memorable effect a metaphor has on its audience (Carston, 2018, p. 215). Finally, the last but not the least possible mechanism that could be a reason for better remembering of metaphorical texts, is considering metaphor as a good sign or cue for recalling. A sign is an object, quality, or event whose presence or occurrence indicates the probable presence or occurrence of something else. The same description, somehow, might be true about metaphor. In metaphor, we encounter with something that stands for something else. In fact, we have something specific stored in connection with each metaphor that acts as a cue (Wearing & college, 2011). Activated cue leads to activate a conceptual network that connects to it and comes with it. Anyway, what mentioned in the explanation of probably better remembering of metaphorical texts is just some possible ways to express and, in this study, remain as a hypothesis or even question whose validity needs to test in future experimental works.

And finally, in comparison of auditory and visual processing, although the focus of the present study is primarily to compare metaphorical and non-metaphorical recalling of texts and not the medium represented texts, results indicate that there is no significant difference between visual and auditory long-term recalling of non-metaphorical texts. But about metaphorical texts the situation was somehow different. Auditory long-term recalling of metaphorical text No.1a has led to a greater recall on memory performance tests than visual learning. The difference between the results of the present study with previous studies (Linder, et al, 2009) which found that visual long-term memory performed better in recalling might be because of that we have tested long-term recalling in texture context while previous mentioned studies have done in words or even syllabus level.

One of the limitations of this study was the small number of subjects studied. By studying more subjects, more relevant and convincing results may be obtained. Furthermore, studying and considering the familiarity of metaphors (i.e. their novelty and conventionality) can affect the results of the study especially when discussing the reasons for different results when recalling metaphorical texts compared with each other. Moreover, conducting such a study in different cultures and languages may provide us with new findings about the role of metaphors in memory.

References

40. Miller, G. A. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. Psy-


