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The Process of Retrieval in the Comprehension of Arabic Discourse

Prof. Dr. Shifaa Hadi Hussein ,Tikrit University, Al-Qadissiya, Tikrit, Iraq

shifaahissein@gmail.com

Lecturer Abed Khalaf Salih, Tikrit University, Al-Alam, Tikrit, Iraq

abed_khalaf@tu.edu.iq

Abstract: The current study aims at finding out how retrieval of discourse takes place during the process of comprehension. It is hypothesized that the process of retrieval is relative among language users in its capacity and ways. Most important , it is also hypothesized that this process is patterned in nature and such patterning is also relative from one language user into another. In other words, language users look for different patterns when comprehending discourse.

The above aim and hypotheses have been verified through an experiment conducted on 100 secondary school students. The subjects are asked to read an Arabic story and a mathematic text. Then , those participants are asked to answer a questioner conducted for the study to see how they could retrieve the materials given.

McDermott and Roediger model (2021) of analysis has been proposed as the model of comprehension adopted in this study. It is concluded that subjects look for specific patterns in the discourse in order to memorize and retrieve the data chosen. These patterns could be : rhematic, schematic, relevance, enjoyment, distinctiveness, familiarity, and linguistic. It is, also, found out that there are different factors which affect the process of retrieval including : interest, background knowledge, subjects capacity, emotions and frequency of repetition.



Key Words : Arabic narrative discourse, females, mathematic discourse, males, memory, memory cues, retrieval, stages of comprehension.

1. Introduction

Retrieval , the third and the most important stage of comprehension attracted the attention of so many scholars in different fields of study to unlock the mysterious nature of such a process. However, up to now, researchers are unable to give a clear picture of the way people retrieve materials (whether linguistic or non-linguistic) and answer the questions of why people differ in their capacities of retrieval and what factors affect retrieval in general? The current study does not attempt to give absolute answers to such questions since such a goal is too far to reach. However, it attempts to shed some lights on differences between females and males in the process of retrieval as well as figuring some factors which seem to affect such a process in one way or another.

Accordingly, the study attempts to answer the following questions:

1. Do females differ from males in the process of retrieval?
2. What times of reading do females and males need really to retrieve the materials they read?
3. What memory cues (MCs) do participants look for to help them in the process of retrieval?
4. Does the type of the discourse affect retrieval?
5. What factors affect the process of retrieval?

2. Literature Review

Psychologists throughout years try to speculate how comprehension of things and materials occur with human beings. The list of those psychologists is too long to put. Included here could be (Kintsch, 1977; Kintsch and Van Dijk, 1978; Roediger, 1980; Murdock, 1982 ; Gernabacher, 1990; Rajaram, 1993; Myers and O'Brein, 1998; Nairne, 2002 and McDermott and Roediger, 2021) among so many of others.

Mostly, such studies concentrate on memory, its works, types and how materials (whether linguistic and non-linguistic materials) are encoded, stored and then retrieved. Still, up to now, how human differ in comprehending materials is an open question. In this study, proposing a scientific answer to this question is so far to reach. However, some insights are given to describe how people retrieve given information and what tools do they use to conduct such a process.

Mainly, we start with the nature of memory as most psycholinguists do in order to explain how memory works. Generally speaking, memory can be defined as the part of brain responsible for encoding storage and retrieval of human experience of whatever type. Three types of memories can be recognized: sensory-memory, short-term memory and long –term memory (see Miller, 1956; Sperling, 1967; and Hissein and Saleh, 2019 for these terms).

2.1. Sensory Memory



Sensory memory is that temporal memory where input information is transferred from the outside world to the brain. It is the memory which keeps information for a long time enough to be transferred then to the next memory; i.e. the working memory through the five senses: seeing, hearing, tasting, smelling, and touching. It is the reaction human beings (or animates in general) propose to an outsider stimulus (being a linguistic cue , a movement, a signal, a sight, a smell or etc.). As its definition assumes, this memory last for less than seconds and then the in-put is transferred into the working memory after the process of reconstruction happens to remove any irrelevant materials that mind believe to be irrelevant (see Van Dijk, 2000: 235 for the process of reconstruction). It is believed that such a process is conducted to have space in mind for necessary operations only (Ibid; and see Hissein and Saleh, 2019: 2980).

Three types can be realized in this memory: a. Iconic memory, b. Echoic memory and c. Haptic memory.

a. Iconic memory is the sight sensory memory of visual data (Sperling, 1967). This memory lasts for one second. It provides visual information of data to be transferred later on.

b. Echoic memory is the auditory sense of listening and hearing through waves of sounds in the ears. When the stimulus is heard, it is kept in the echoic memory in a period of time more than that in the iconic memory(see Carlson , 2010: 233). The term echoic memory is coined in 1967 by Ulric Neisser (Darwin et al 1972 and see also Clark, 1987). It is a “brief representation of acoustic information” (Neisser, 1967:8).

c. Haptic memory is related to the sense of touch (see Dubrowski et al 2009). This term is conducted by Bliss et al (1966). This memory lasts for 10 second after removing the stimulus (see Gilson and Baddeley ,1966).

2.2. Short-Term Memory

The most important type of memory is the short-term memory because it is here where sets of in-put information and the out-put information are processed to be encoded, comprehended and then retrieved. As founded by Miller (1956), short-term memory or working memory lasts to almost seven seconds. Accordingly, its capacity is very limited but it is considered the most important because of its role in transferring data into and out of the long-term memory (see Hussein and Saleh, 2019: 2981 and see also Miller, 1956). It is here, we believe, that the processes of manipulating data are conducted. So, it is, sometimes, referred to as working memory although some may find distinctions among these terms (see Cowan , 2008).

2.3. Long-Term Memory

When information is kept for so long time, it is believed that it has been transferred into the long-term memory where data and information is kept for long durations (Dudai, 2002). If information is encoded acoustically (mainly) in the short-term memory, it is encoded semantically in the long-term memory and this enables people relatively to store as much data as they want in their memories (cf Baddeley, 1966). Two main types of long term memory can be established : the explicit declarative which usually people consciously try to remember and the implicit non-declarative memory which is not part of our conscious. Explicit declarative memory is either episodic (where experienced events are kept and sometimes called autobiographic memory) or semantic (where knowledge and concepts are kept). Implicit non-declarative memory is either procedural (where skills and actions are kept like riding a cycle) or emotional conditioning (where emotions are kept). The following figure shows these types of the long-term memory (see figure 1).

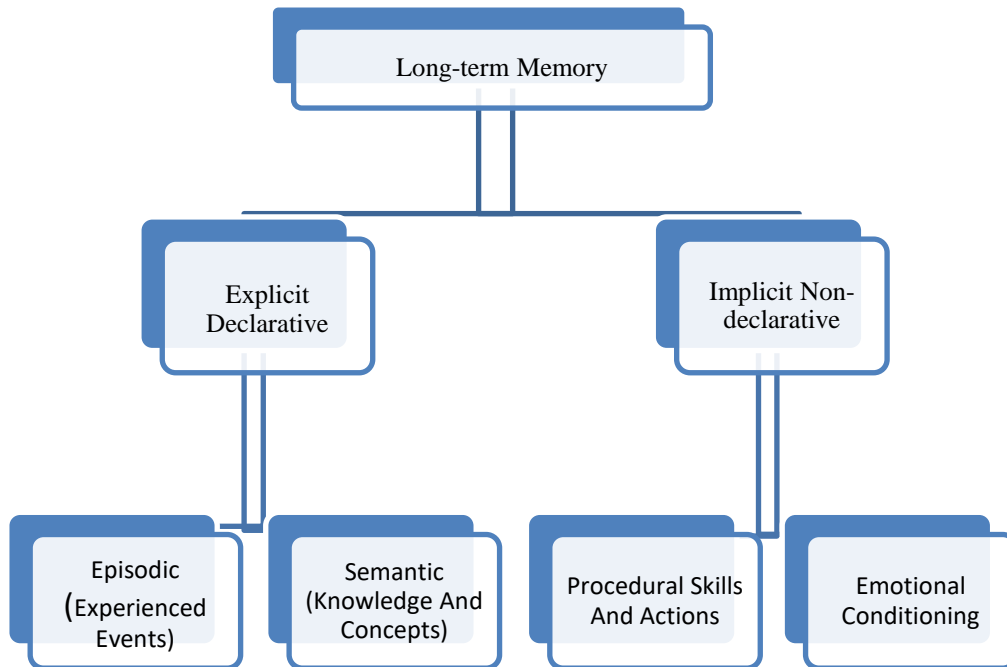


Figure (1) : Types of Long – Term Memory

3. Stages of Comprehension

According to McDermott and Roediger (2021:6) three stages of comprehension can be realized: encoding, storage, and retrieval (see also Melton 1963).



1. Encoding is a process whereby the input information coming from the short term memory is manipulated into a kind of construct that can be retrieved from the long term memory (see Goldstein, 2015). It is just converting information from one shape into another to be read by a specific program which suits the kind of encoding.

The encoded information are usually those which are selective, distinctive and important (see McDermott and Roediger, 2021: 7-8). In this sense, we usually encode data which we select to assist our purposes, data which seem distinctive and strange for us and important for one reason or another are more encoded than others. The reason could be logical because such a datum is related to our experience or emotions because it moves our emotions in one way or another. It is the initial step to have a memory. It gives the permission to data (through analyzing them) to be changed to be stored in the mind in order to be able to be accessed to when needed.

2. Storage: when data are maintained in the memory, they are said to be stored. It is the retention of data through a long duration, through the consolidation process; i.e. the stabilization of data in the memory after being transferred from the short term memory. This process is reconstructive in the sense that what we remember is not exactly what we have as input but rather being helped by some memory traces being shaped by long-culminated experiences (McDermott and Roediger, 2021:14) causing, thus, retroactive interference (the effect of new input on the old memories) and proactive interference (the effect of old memories on the new input).

3. Retrieval

Retrieval is the evidence that encoding and storage of data have been conducted properly. For this, Tulving (1991:91) believes that the most important stage of comprehension is retrieval, "The key process in memory is retrieval" .It can be defined as "the subsequent re-accessing of events or information from the past, which have been previously encoded and stored in the brain"(Mastin, 2010). It is bringing the data from the long term memory to the short term memory. However, not all information can be retrieved though they are available in the mind. But, we can retrieve only those accessible data (see McDermott and Roediger, 2021:16). The type of the stimulus used to retrieve the data is the most important factor in the process of retrieving (ibid:17). This cue should be specific and emotive in place, time or context. Also, it should be distinctive. And here again distinctiveness is relative from one person into another. Also this cue should not be overloaded with other memories on the condition that the memory itself should be encoded properly.



Retrieval usually enhances memory in the sense that retrieved materials are strengthening in the memory. (See Rodiger and Karpicke, 2006). So, retrieval becomes in this sense reconstructive (see McDermott and Roediger , 2021:20 and Cf McDermott 2006).

Accordingly, memory is not static materials in the brain like a set of scenes in a movie. But rather, it is an active processing in the sense that whenever new inputs get into the mind, memory is enhanced. However, following Kintsch (1977), we believe that the stored materials are structured in cycles in the sense that when new inputs get into the long term memory, they look for similar connections in the memory to be connected with and building such connections is the work of memory throughout life-time.

The input b cannot be attached to cycle 2 simply because it is not related to it. If there is no connection, a new cycle can be created. But still it is weak in encoding, storage and retrieval unless enhanced by other inputs in the future time and if not enhanced, it fades away with time . If we imagine a linguist reading about atomic cells, he would definitely (if he had no past experience of atomic cells of course) find it difficult to comprehend most of what he is reading. But if this input is enhanced by other inputs, then he may comprehend some of these materials. This explains why we sometimes cannot comprehend a piece of knowledge but after making a research of it, we can comprehend it. But suppose that he read a linguistic material (that he has experienced before) , he will definitely find it easier to comprehend and then retrieve.

4. The Experiment

The subjects involved in this study are 100 students at secondary schools in Tikrit/ Iraq. 50 male students from the Private secondary school of Tikrit for males and 50 females from the governmental secondary school of Al-Aqeeda for females. All the subjects are native speakers of Arabic with the average of age between 15 and 17 years old.

The subjects are asked to read carefully two discourses. The first contains a list of phone numbers chosen randomly (see below), it is referred to as mathematic discourse (henceforth MD).

List of mobile numbers

07717936561 ; 07739363993 ; 07722242310 ; 07701369621 ; 07730023121 ; 07769789789 ;
07701122446 ; 07751021510 ; 07701789435 ; 07728101214.

The second contains a story from Alf Layla wa Layla (A Night and a Thousand Night) (the story of the King Aumar Al-Numaan and his Sons; Sharkan and Dhay Al-Nahar) (p. 207-209), it is referred to as the narrative discourse (henceforth ND). The students, the teachers and the administration are all informed of this experiment and that it is conducted for research purposes and their identities (as well as their grades) are kept private. Students are motivated to take the test seriously by considering the test by the teachers, thankfully of course, as an exam of high marks. After collecting the materials; i.e. the two texts, from the subjects, they are asked to answer a list of questions in a booklet handed to them in a class test. The test lasts for two hours and the subjects are free of reading times in accordance with the scheduled time; they are free to read the materials the times they need to retrieve them.



The questioner consists of the following questions :

1. Are the materials new or old?
2. How many times of reading take from you to be able to retrieve the materials?
3. Do you have past experience of the materials?
4. What memory cues do you depend upon when retrieving the materials?
5. Do linguistic materials help you in retrieving?
6. What are the factors that affect your retrieval?

5. Discussion of the Result

Twenty of the answers are found to be unreliable since some questions are left unanswered. Thus, these answers are abandoned and ignored for sake of the objectivity of the research.

As shown in table (1) below, it seems that the females take more times of reading the MD and less times of the ND and the opposite is true for the males. If this proves something, it proves that females are more akin to the narrative texts than those of the mathematic texts. They find difficulties in memorizing the MD due to the fact that girls like to read stories because of their nature to be kept at home in their society ; Iraq and spend time in reading stories unlike males who are more free to go outside home and use mobiles more frequently than the girls. So, they are more familiar with phone numbers than girls.

As for the old and new materials, although all the subjects are familiar with phone numbers, the combination of the numbers are totally new for the subjects all; i.e. none of them marked any of the numbers as old information. The ND seems, also, to be new for the participants. This is due to the fact that the chosen discourse is somehow difficult to read specifically by young people because of the old lexicons and style found in the discourse. The same reason can be said about the factor of the past experience (the world knowledge of the discourses selected). Thus, it seems that the subjects are familiar with the MD but not with the ND. Both the females and the males answer that although they have heard of the " One Night and a Thousand Night", they have no chance to read.

Table (1): Times of Reading

Types of D	Females' times of reading	Males' times of reading
MD	5-6	3-4
ND	3-5	4-5

Let's consider now the memory cues (MCs) that the subjects look for in retrieving the materials. The following table (see table 2) summarizes the MCs which the subjects look for in the discourses to help them in the process of retrieval.

Table (2): Types of MCs for males and females in the ND and MD

Type of D.	Types of MC for females	Types of MC for males
ND	<ul style="list-style-type: none">- Rhematic pattern- Uniqueness- Prominence- Repetition	<ul style="list-style-type: none">- Repetition- Uniqueness- Prominence- Division



	<ul style="list-style-type: none">- Relevance to read word- Emotional effect	<ul style="list-style-type: none">- Emotional feature
MD	<ul style="list-style-type: none">- Repetition	<ul style="list-style-type: none">- Logical patterning- Division- Repetition- Background knowledge

As table (2) shows in the MD, females look for repetition in the phone numbers only. If there is no repetition, it is difficult for them to retrieve the text. The percentage of retrieval for MD for females is 20%. On the other hand, males are more successful with the percentage 46%. They mention that four cues are looked for in the discourse. First, males look for a logical patterning in the number. In the first number for instance, they try to find out a mathematic relation between the numbers with the aid of repetition since all the numbers in Iraq starts with (077), then followed by a number between 0 and 6 and no more as represented in the numbers given. Number one starts with 1 and ends with 1 and the relation between 7 and 9 is that $7+2=9$ and between 6 and 3 is that $3+3=6$ and so on. The second cue is division. Males are successful in retrieving the numbers somehow because of the technique of cutting the number into parts to be easier to memorize. Some of them mention that some parts of the number is similar to numbers they are already familiar with, which simplify the process of retrieval for them. The measurement and the percentages of success and failure are conducted on how many numbers can the participant retrieve. If one or two numbers from the phone number are wrong, still the retrieval is considered successful for the purpose of the study.

As for the ND , participants mention more MCs. Females' percentage of retrieval success is 51%. The global meaning of the ND has somehow been successfully retrieved as far as the names and the actions are concerned. They look for the rhematic patterns at the end of sentences and between phrases. Proper nouns are retrieved successfully due to the existence of this pattern like :

نزهة الزمان ، ضوء المكان ، عمر النعمان ، شركان .

Also they look for uniqueness. Those unique materials are more likely to be retrieved than other materials like the description of the king's women, the palaces, etc. The females, also, look for the most important materials in the ND as they are familiar with this type of discourse. They realize that the names and the actions are the most important elements to be retrieved because they can capture the main idea of the story to tell later on. They, further, rely heavily on repetition of names and actions in the text to help them in the



process of retrieval. Another important cue here is the relation between what is there in the story and their real world experience. The scene of the lady giving birth to a twin is the most successful element in the retrieval of the discourse since the females relate it to their past experience about stories of such a kind. At last, the females list those materials which touch them emotionally like the happiness of the lady to have a boy something which touches their emotions effectively.

The males look for repetition mostly in the story and rely on uniqueness of elements as well as the emotional factors which touch their feelings a lot like the battles of Sharkaan and his averseness of having a brother as well as the courage of the king AL-Nu'man. They try to cut the text into parts to be easier for them to memorize. However, the percentage of their retrieval is not that high in comparison with the girls, it is 26%. Measurements and percentages of the success of retrieval in the ND depends on the answers the participants give to a list of questions about the story. These questions are:

1. What are the names of the participants involved in the story?
2. What are the actions of the story?
3. What is the description of the places mentioned in the story?
4. What are the descriptions of the participants involved in the story?

Of course, there are main and marginal participants, actions and places in the story. If the subject is able to retrieve more than half of the main participants, actions and places, he is considered successful for sake of the study.

What is interesting is that the subjects in these two types of discourse do not look for linguistic cues to help them in the retrieval of the texts. They do not look for any causal relations, nor any type of system or what so ever. Instead, they look for cognitive materials which help them most. This is may be due to the type of the selected materials and their length and that what is looked for in the retrieval process is not mere sentences but a global understanding of the discourse (especially for the ND)

6. Conclusions

According to the analysis conducted, the following points can be stated:

1. It seems that the males are more successful in retrieving the phone numbers than the females with the percentage 46% in contrast to the females 20%. The females, on the other hand, are more successful in retrieving the narrative discourse with the percentage 51% in contrast to the males with the percentage 26%. This result can be related to the field of interest for both the girls and the boys which differ in relation to their circumstances in their society as mentioned above.



2. Times of reading differ between females and males and in accordance with the type of the discourse selected. Males are in need for more time reading than the females in the ND and less time reading than females in the MD, a result which also is related to the field of interest of both the females and males.
3. It seems also that the more MCs found, the more successful the retrieval will be. The females look for more MCs in the ND than the males, and thus, their retrieval is more successful. The males look for more MCs in the MD than the females, so their retrieval is more successful than the females in the MD. In this case, we can conclude that the relation between the MCs and retrieval is covariant.
4. Subjects look for patterning in the process of retrieval to help them. This patterning could be rhematic, schematic (in the sense of relating materials to cognitive schemes), relevance (in the sense of relating materials to past experiences), or logical (in the sense of finding a logical relations between elements).
5. There are some factors which affect the process of retrieval including the emotional factors (when the materials; i.e. stimuli are powerful enough to touch the subjects' emotions, they are likely to be retrieved more than others), uniqueness (special elements are more akin to be retrieved), recurrence, ability to divide materials, enjoyment factors (those materials which can bring enjoyment to the subjects are more retrieved than others and this is a relative matter among the subjects).

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