A Quantitative Analysis of Differences and Similarities in Linguistic Memory Retrieval among Adults.

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Abstract

The current study analyzed adults' difference and similarities of memory retrieval of linguistic structures through Spreading Activation Theory suggested by Anderson (1976). This study adopted the quantitative descriptive approach. Thirty-three educated adults, from Mahrah University, who speak English, participated in the study. Participants took three tests derived from Spreading Activation Theory: Fact Retrieval (FR) test, Configured Cue (CC) test, and Schemata Sentences (SS) test. The study showed these results; similarity percentage between individuals in retrieval process throughout the four tests was high which scored (67.20%). While the difference percentage scored (32.80%). The differences between learners were statistically significant at a value of less than (0.01), with the (f) value across the tests scoring (75.105). The study concluded with recommendations in studying retrieval process of phones and morphemes.

Keywords: Linguistic structures, memory retrieval, spread activation theory, differences & similarities**.**

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التحليل الكمي للتشابه والاختلاف في عملية استذكار التركيبات اللغوية لدى البالغين.

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ملخص

هدفت الدراسة الحالية إلى تحليل التشابه والاختلاف لدى البالغين في عملية استذكارهم للتركيبات اللغوية من خلال نظرية تنشيط الانتشار لأندرسون (1976)، حيث اتبعت الدراسة المنهج الوصفي الكمي، وشارك في الدراسة 33 بالغًا متعلمًا من جامعة المهرة ممن يتحدثون اللغة الإنجليزية، وخاضت العينة ثلاثة اختبارات من نظرية تنشيط الانتشار: اختبار استرجاع الحقائق(FR) ، اختبار المثير والاستجابة(CC) ، واختبار الجمل النمطية(SS) ، وخلصت الدراسة إلى النتائج التالية: جاءت نسبة التشابه مرتفعة بين الأفراد في عملية الاستذكار خلال الاختبارات الثلاثة ككل حيث بلغت (67.20%)، بينما بلغت نسبة الاختلافات (32.80%)، وكانت الاختلافات ذات دلالة إحصائية بقيمة أقل من (0.01)، حيث بلغت قيمة (f) في الاختبارات ككل (75.105). واختتمت الدراسة بتوصيات تتعلق بدراسة عملية استرجاع الذاكرة للأصوات والصُغيم.

الكلمات المفتاحية: التركيبات اللغوية، الاستذكار، نظرية تنشيط الانتشار، نسب التشابه والاختلاف.

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1   Introduction

Anderson (1976) explained that memory retrieving is a process when a memory recalls a piece of information that has been stored in the long-term memory. This retrieval can be done through some motivations suggested by the theory of Spreading Activation. In this theory a code, a prose, a cue, or a stimulator is given to a target to relate it to a component, an image, or a term. The stimulation could spread through a network that are connected in the memory to recall the information. Spreading Activation Theory was first applied by Collins and Quillian (1972). A model that incorporated a spreading activation mechanism that played a comparable role to that in activation (ACT) was then proposed by Posner and Snyder (1975). In (1976), Anderson tested the Human Association Memory (HAM) theory and developed Spread activation theory in his book Language, Memory and Thought.

1.1   Problem Statement

Investigating how memory retrieves linguistic structures was a gap that needed to be filled in the studies of psycholinguistics as Polisenska et al (2015) reported. Spreading activation is an affected process that was tested and examined by many scientists to understand several secrets about memory and human's brain such as the studies of Collins and Loftus (1975), Bock (1986), and Pickering and Braningan (1998). So that, this study would apply the tests of spreading activation to inspect the linguistics structures in memory, how it retains and how it retrieves. This difference depends on many factors, some of which relate to age and others to health. This study examines the memory of healthy adults in regard to the difference of their mental levels.

1.2   Research objectives

The purpose of this study was to analyze statistically the LSs retrieved from the memory. The study employed the Spreading Activation theory (SAT) which was

suggested by Anderson (1976). It has applied several tests to generate its results. The present study attempted to achieve the following main objective:

- To compare numerically between individuals in their retrieval process of memory.

The sub-objectives were as follow:

1- To find out the similarities between learners in their retrieval process of LSs.

2- To examine the differences between learners in their retrieval process of LSs.

1.3   Research Questions

This study aimed to answer the main research question which was:

What are the differences and similarities between individuals in their retrieval process of memory?

The sub-questions were as follow:

1- What are the similarities between learners in their retrieval process of linguistc structures (LSs)?

2- What are the similarities between learners in their retrieval process of linguistic structures (LSs)?

1.4   Significance of the Study

By exploring the differences and similarities of individuals in their retrieval process of memory, psycholinguists can better understand the nature of memory with linguistic structures and teachers can identify potential issues that arise when learners have difficulties in memorizing information. Also, neurolinguists need it most to develop tests related to memory and syntax structures. Today, it could be helpful for artificial intelligence.

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1.5 Scope of the study

The current study mainly focused on Yemeni adults aged above 18 years. It took the adults at Mahrah University as a representative of the Yemeni adults during the year 2024. It focused on a learning environment where the need for memorizing and remembering increase. The study examined learners whose memories were trained in recalling and storing information, unlike the illiterate people. The data collection for this study was taken from both male and female participants. The study did not include other language domains, such as phonetic, phonological, morphological, and semantic domains. It was concerned on the syntactic structure (words, phrases, sentences and clause)

1.6 Key definitions

Spreading Activation Theory (SAT)

According to Anderson (1976), "Memory is a propositional network of interconnected nodes. A small portion of this network is active at any one time. Activation can spread down network paths from active nodes to activate new nodes and paths" (p.122).

Spreading Activation

The technique of spreading activation is used to search semantic networks, associative networks, and biological and artificial neural networks. Once a set of source nodes (such as concepts in a semantic network) have been labeled with weights or "activation," the search process begins or "spreading" that activation to other nodes related to the source nodes is subsequent. (Patterson et al., 2007)

Language Structure (LS)

Language structure refers to sentence-level comprehension of text, including how the arrangement of words within sentences impacts the meaning.

Memory

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Memory possesses characteristics, arrangement, and framework; it possesses a system for storing, retrieving, and controlling information. We have various types of memory such as symbolic, echogenic, primary, secondary, short-term, medium-term, and long-term. (Field, 2004)

Retrieving

As oxford defines retrieving, is the act of bringing back, restoration, act of finding information and sending it elsewhere as an output.

2   Theoretical Background

This section explores how spreading activation works, how it affects memory and language, and how it helps us recall words and ideas. It also looks at how this theory explains differences in language processing between people by understanding the connection between memory and language. SAT gives us useful insights into how people store and retrieve language.

2.1.1   Spread Activation Theory (SAT)

Anderson (1984) explained that, when information is processed, it activates networks in the mind, resulting in the formation of mental images or words. These mental representations are then stored in working memory for a short period of time before being transferred to long-term memory. In long-term memory, information is organized as a network of connections between concepts. To retrieve information, the activation of concepts in working memory spreads through this network structure. The time it takes to retrieve information is influenced by the level of activation.

2.1.2   Spreading activation

Spreading activation is a concept used in Psychology, Psycholinguistics, and Cognitive Linguistics that explains how language production and comprehension

occur. This model suggests that, when we focus on a particular word, other related words are also activated to some extent through a process of activation spread or retrieval. Consequently, we respond more quickly to these related words than to completely unrelated ones. For example, processing the word "*learning*", will activate related words in terms of meaning, morphology, and syntax, such as vocabulary, structures, shapes. Thus, words in our mental lexicon bring along their synonyms and related terms. (Schmid, 2005)

2.1.3 SAT Process

As Anderson (1984) reported, when a person sees a stimulus or a cue, the concepts related to that stimulus are activated in his memory. For example, when someone sees a lawyer in a park, the concepts of lawyer, park, and in are activated. Activation occurs in both directions along a link. The recognition of a specific object occurs when the activation of different concepts reaches a certain threshold value. The propagation of activation determines the delay in making an identity judgment. It was suggested that each concept has a limited capacity for activation propagation. The more paths to a concept, the less activation is spread along each path, resulting in slower recognition judgment. This delay in perception is known as the fan-shaped effect.

2.1.4 Memory

According to Field (2004), early research on memory had led to the development of a model that included three types of memory: sensory memory, short-term memory, and long-term memory. The transfer of information between these memory stores was often depicted as being controlled by a central operator.

2.2 Overview of Relevant Studies in Memory and Language.

Understanding the processes adults use to retrieve linguistic structures is central to psycholinguistics and cognitive science. Linguistic retrieval involves accessing stored information about grammar, vocabulary, and syntax, which varies

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significantly between native and non-native speakers and among monolinguals and bilinguals. Theoretical models such as spreading activation emphasize how interconnected nodes in a cognitive network facilitate language recall, with retrieval efficiency influenced by language proficiency, exposure, and memory capacity (Collins & Loftus, 1975; Clahsen & Felser, 2006). Recent research highlights differences in retrieval mechanisms between groups, such as increased interference in bilinguals (Cunnings, 2017) and structural brain adaptations in multilinguals (Pliatsikas et al., 2017). Exploring these similarities and differences helps us better understand how language is processed and learned across diverse populations.

Catan (2019) discussed the effects of Arabic linguistic features verbal short-term memory. His study investigated the influence of both semantic and phonological features on STM by examining how readily people recalled lists of Arabic words that had varying degrees of semantic relatedness (e.g., chair, table, bed) or that incorporated common word construction patterns (root and pattern). The participants were between 20-25 male Iraqi-Arab postgraduate students from the University of Wollongong, (average age = 36.45). All of them were native Arabic speakers and none had speech or hearing defects. Most of them had been in Australia recently and finished their previous education in Iraq. Results indicated that both types of features had a significant impact on STM, demonstrating the close interplayed between LTM and STM in language processing.

Pliatsikas et al. (2017) studied structural brain adaptations in bilinguals, highlighting how immersion and proficiency levels influence retrieval processes. Both similarities in activated regions and differences in structural changes (e.g., in the putamen and caudate nucleus) are noted, emphasizing the dynamic nature of linguistic retrieval in multilingual contexts. Another study done by Cunnings (2017) examines how interference affects memory retrieval during sentence processing for bilinguals. Findings suggest that non-native speakers experience greater susceptibility to interference, affecting their ability to integrate linguistic

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structures in real-time. This highlights similarities in underlying cognitive mechanisms but also notable differences in processing efficiency.

A recent study conducted by Polisenska et al., (2015) examined the impact of semantic effects on sentence recall in language assessment. In this study, participants were 24 adults native speakers of English. They equally divided between genders. All were employees from one department within a local authority council office in south-east England. Participants were aged between 18 and 50 years. The study findings highlighted the significance of presentation conditions for the different language levels being tested. The researchers suggested that while both immediate and delayed recall are relevant to all language expression levels, their contributions differ. Immediate sentence recall primarily relies on lexical phonology and morphological syntax, whereas delayed sentence recall is more dependent on semantics. This has implications for the use of recall tasks in language assessment.

Lovett et al. (2000) found that any computational model of working memory must be able to account for three key characteristics: (1) working memory capacity limits performance on demanding tasks, (2) individuals have different working memory capacities, and (3) these individual differences predict performance across various tasks. The authors conducted the MODC task and n-back task on twenty participants. MODS task required recalling set items, while the n-back task involved recognition of previously presented items. They proposed that their "source activation theory" fulfilled these criteria, accurately capturing working memory effected at both group and individual levels. This theory suggested that individual differences in working memory capacity could be modeled at the individual participant level, allowing for predictions of performance across different tasks. The authors highlighted that previous research had acknowledged individual differences in working memory but had not effectively modeled them at the individual level or used them to predict performance across tasks. Their

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approach, using the ACT-R architecture, overcame this limitation, demonstrating the power and generality of their model.

3   METHODOLOGY

The study adopted the quantitative method to analyze the data. It was used to examine similarities and differences among learners in their retrieval process using statistical analysis. Consequently, utilizing quantitative instrument to measure activation test results was more reliable and informative. The numerical representation of the findings clearly revealed the research questions' answers.

3.1   Population

The population of the study were students from the Faculty of Education and the Faculty of Art at Mahrah University which were about 74 students. The population from which the sample was selected had specific criteria. These criteria were:

All participants speak English language because the study investigated the English structures. They also must be educated, in which their memories were trained in retaining and retrieving information. Unlike the illiterate people, whose memories were surrounded by their environment only. Furthermore, none of the participants should have had any mental disorder, because the study focused on the normal memories. Participants' age must be above 18. According to Fry, Hale and Braink (1995), memory above 18 stops growing, so it is steady. And this age is the age of educating and learning.

3.2   Sampling

The sampling technique used in this study was simple random sampling, so that every individual had an equal probability of being selected from the population. When selecting individuals each member of the population was written on a slip of paper, which was then thoroughly mixed in a box. The required number of slips for

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the sample was drawn one by one, without replacement, without looking at them. The participants were 35. They represented 47% of the population. They were seven males and 27 females which represented 18% and 82% respectively of the sample. According to their level; six participants were in the first level, seven were in the second level, six were in the third level, eight were in the fourth level, eight were MA students. All participants' consent was taken and all participants had signed an informed consent form.

3.3   Data Source.

The current research relied mainly on primary data collected through activation tests, while previously published studies were compared and discussed in relation to the primary data results.

3.4   Instrument of Data Collection

As has been clarified, the main data were collected from 35 participants, two participants did not complete, so the total number was 33 participants. The instrument of collecting data was a group of tests suggested by Anderson and others (1976), in his book "Language, Thought and Memory" Language materials that were used in conducting tests consisted of 54 set of sentences. Sentences ranged in length from 8 to 22 words, with the average length 13.1 words.   Also, the researcher added two sentences with independent clauses (N.18 & 19) and two passive sentences (N.20 & 21) to vary the structures; because most sentences taken from the theory included active and dependent clauses.

The tests were described as experiments and paradigms by Anderson and others, to investigate memory. The researcher has selected the following tests among many other tests that Anderson had conducted, because each type of these tests examined different LS. Those tests were: Fact- Retrieval (FR) test, Configured Cues (CC) test; which was divided into two parts: A Word Cue (WC) and a Phrase Cue (PW), and Schemata Sentences (SS) test. In which FR test examined memory ability in

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retrieving a single word. WC test required a whole and complete sentence to be recalled. PC demanded recalling different phrases: NP, VP, PP and dependent clause phrase (d.CP). SS test investigated memory ability in recalling independent clauses (ind.C)

These tests were more suitable for the study than the others, because Anderson in these tests examined memory retrieval rather than memory comprehension or intelligence. Also, these tests serve in accomplishing the study aspects. In detail, based on Anderson experiment of FR test, it measures the strength of associations between words, i.e, between the person and his place, and that helps the researcher to gain insights into the organization of memory. So, it serves the researcher in examining memory ability in words retrieval.

While CC test as Anderson concluded that by manipulating cues a researcher can observe which pathways are activated which highlights the hierarchical structure of memory. So, it helps the researcher to understand how the memory navigates sentences and phrases during retrieval.

As for SS test, Anderson emphasized that, SS provide a structured and a coherent context that aids in understanding the role of a background knowledge in the recall process. So, it helps a researcher in examining different types of linguistic information that integrate semantic and syntactic. Thus, they are the most suitable for achieving the researcher's objectives. The structures participants retrieved via tests aimed to show the differences and similarities between individuals whether they retrieve the required whole structure or parts of them, which answered the research questions.

3.4.1 Test 1. Fact-Retrieval

As Anderson (1974) conducted FR, where subjects committed to memory 26 fact of the form A person is in the location and A person is adjective. Subjects typically learnt a set of manufactured facts, often simple and homogeneous. After

the subjects have learned this material, they were tested to determine how the information was retrieved from memory. Participants studied between one and three facts about a person and one to three facts about a location. Examples are:

- A doctor is in the bank.
- A fireman is in the park.
- A lawyer is in the church.
- A lawyer is in the park.

After studying the 26 sentences, subjects were asked to recall the information in response to questions like "Where are the lawyers?" and all of the people in response to questions like "Who is in the park?". It required three words from NPs shells and 12 words from PPs shells to be recalled. For more illustration see Appendix D.

3.4.2 Test 2. Configured Cues

Sentence cues/ probes were many, it could be a word, sound, picture, context, realia, or acting. In this study two types of cues were chosen, a word cue and a phrase cue.

These tests present structures like:

- Within-Propositional Structure, i.g: The boy hit the girl who ate in the attic.

- Between-Proposition Structure, i.g: The doctor who examined the patient was tall.

- Location-Name-Verb-Object structure.

- Subject- Verb- Adjective / object/ location structure.

In the second test CC, a word cue was used to retrieve a whole sentence. It needed 11 sentences to be recalled. While the LSC were four NPs, 21 VPs and five PPs to be retrieved. While a phrase cue was utilized to inspect memory ability to recall 66 phrases, in which they were 11 NPs, 18 VPs, five PPs, and 12 clauses.

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3.4.3   Test 3. Schemata test

Schemata was sets of sentences of actual event of participants' life. Participant were given one sentence related to the schemata to recall the related ones in order to inspect the independent clauses. For example:

The dog chased the cat. The schemata of the sentence were:

The dog chased the cat. He cornered the cat. The cat scorched him.

This test required six independent clauses to be recalled, so the LSC were six NPs, six VPs that consisted of seven Vs and seven NPs, and one PP. In the whole four tests, each phrase had one mark. Totally, LS were 98 structures while the constituents were 130 constituents.

3.5   Procedures

The procedures of conducting the tests were in three phases; an initial study phase, a study phase and test phase. The study took forty days from January 21st, to February 29th. The tests were varied in order to cover different types of sentences and examine different structures retrieval. These tests were conducted in the second and third phase. After the first phase in which participants saw the sentences and were encouraged to study them meaningfully, they moved to the study phase. In the test phase, participants were distributed into five different times to take the tests depending on their time table. Because the study required them to study and memorize the sentences carefully, away from exam stress or any responsibilities that could affect the results. The researcher was following them up regularly to check where they were in their studying process by creating five different groups in whatsup application.

3.6   Validity and Reliability

In order to check the validity of the material to the community culture, the researcher had given it to five doctors. Many statements were changed to suit the community culture and to be easy for participants to understand. They noticed

repetition of two answers for the same question, so it was deleted. Also, they recommended to add marks for each question. As well as they asked the researcher to make it clear whether the test would be taken orally or written, so the researcher did.

In order to check the reliability of the tests to participants' level, the researcher has conducted a pilot study. Ten participants were chosen randomly from the population who were different from the actual participants of the study. Then, Cronbach's alpha was used to measure tests' reliability, the results were presented in table 3-1. The researcher has followed the same procedures of conducting the study. It took only two weeks to conduct the three phases.

Additionally, the researcher has benefited from the pilot study many things. In which researcher found this out, the studied material and the tests were reliable to participants' level where their marks varied. Also, the researcher noticed the time which was suitable for them. They took 20 – 45 minutes to finish the tests. The researcher checked whether the direction was clear, or not, also the form of the test in which both were clear to them. Three questions in which the gaps were shorter than the answer, so the researcher fixed this matter. Also, one question, which was that " where is the lawyer?" made confusion to participants, because it had three answers. Therefore, it was changed to " Where are the lawyers?". Furthermore, the last test was not clear for participants in which it stated like this," Arrange the incidents related to the following statement". So that, it was changed to "Write the incidents related to this statement".

Table 1 3: The Reliability of Tests through Crnbach's Alpha

N	Tests	N. of Items	Cronbach's Alpha
1	T1	12	0.88
2	T2	5	0.88
3	T3	21	0.96
4	T4	6	0.79
The four tests		44	0.97

From table 3-1, it is noticed that the reliability coefficient of the tests as a whole scored more than (0.96) and it was a high score. As well as it scored high for each test. That meant the four tests in their final forms were reliable to be conducted on the study sample

Furthermore, the researcher followed specific procedures in correcting data. The researcher corrected them twice; the second time was after a week from the first one. The researcher corrected the results, test by test for all participants separately, then moving to the next test. When the researcher's objective focused on recalling information, the minor spelling mistakes were ignored, in which no marks were taken from these mistakes, such as recalling the word " bank", instead, the word "pank" was written, the word" Egyptian" was written in a small letter, or the word " president" written as " presdent". Moreover, the minor grammatical mistakes were ignored where no marks were taken from them, such as writing the present tense instead of the past tense, such as " cook", 'examine" or "shock". Also, the minor lexical mistake such as writing the synonym of a word instead of writing the same word, such as the word " rat" the word " mouse" was written, the word "slept" instead of the phrase " took a nap" or using " the" instead of "a"

3.7   Data analysis Procedures

This section provided an overview of the data analysis process, which was divided into two subsections. The first subsection discussed the coding and classification methods employed by the researcher in the current study. The second subsection explained how the responses were represented based on the study objectives.

The process of data analysis involved transitioning data from one test to the next test. Inserting data to excel program was done twice. The first one was to convey them from the papers to the program. While in the second time, data were checked. In this process the researcher asked an analyst to check whether the analysis was

conducted properly or not. Once the data was collected, each level was evaluated. The data was then coded and represented using figures. Additionally, the time it took in recalling was recorded, averaged, and presented in a chart illustrating LS per minute. This calculation was based on Measures of Central Tendency such as average, mean, frequency, range and percentage and ANOVA analysis.

3.8   Coding and Classification

This subsection highlighted the style which was used to code and classify the data of this study. In terms of coding, each participant had a code. Coding the data was a crucial step that highlighted the results. In this step the researcher coded the data using Excel. In the case of classification, data were classified based on its role to answer research questions. Specifically, the Arabic numbers was used to order the responses during the data analysis and discussion. N represented Participant's number, FR represented fact retrieval test, WC represented word cue test, PC represented phrase cue test, and SS represented schemata sentences test.

4   DATA ANALYSIS AND DISCUSSION

This section examined and discussed the data that were collected from 35 members, two members of them did not complete, so the total number of participants were 33. It was done by conducting three tests that were extracted from SAT. The tests were Fact Retrieval (FR), Configured Cues (CC) test which was divided into two parts: A Word Cue (WC) and a Phrase Cue (PC) tests, and Schemata Sentences (SS) test. By conducting these tests, researcher aimed to achieve the research objectives which were: find out the similarities between learners in their retrieval process of LSs and examine difference among learners of their retrieval process of LSs.

4.1   Main Research Question

The main research question was: **what are the similarities and difference between learners in their retrieval process of LSs?**

The sub-questions of the main question are discussed in details below.

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4.2   The First Research Question

The first research question was**: What are the similarities between learners in their retrieval process of LSs?**

To answer this question, the results of the four tests were presented and then the percentages of the differences and similarities among individual in their retrieval process were calculated. Table 4-1 shows the degree of difference and similarity in retrieval process across the four tests:

Table 4-1: The Degree of Similarity and Difference in Retrieval Process overall the Four Tests.

T	Tests' Marks	Total Marks of all answers	Total Similarity of individuals' responses.	Total difference in individuals' responses	Similarity percentage between individuals	Difference percentage between individuals	Simila rity Rank	Similarity Degree
T1	15	495	400	95	80.81%	19.19%	1	Very High
T2	30	990	698	292	70.51%	29.49%	2	High
T3	66	2178	1379	799	63.31%	36.69%	4	High
T4	19	627	406	221	64.75%	35.25%	3	High
Total	**130**	**4290**	**2883**	**1407**	**67.20%**	**32.80%**		**High**

As seen in table 4-1, similarity percentage between individuals in retrieval process throughout the four tests scored (67.20%) and it shows a high similarity degree. On the other hand, difference percentage between individuals in retrieval process throughout the four tests scored (32.80%). The difference and similarity degree of participants' retrieval process was varied overall the four tests in which the similarity of retrieval process ranged between (80.81% - 63.31%). That means the degree was between (very high – high). While the difference of retrieval process ranged between (36.96% - 19.19%); consider figure 4-1.
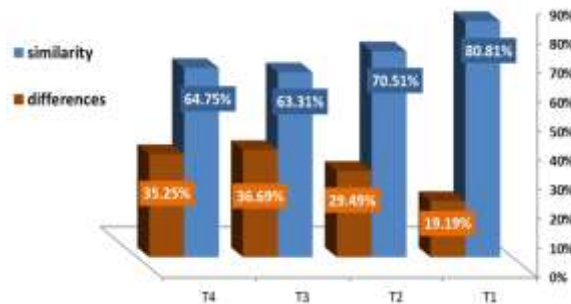
Figure 4-1: The Degree of Similarity and Differences among Individual.

These results matched Caplan and Waters' (1999) study. In which both studies proved individual similarity and differences regarding memory and language. In detail, they reported the results of two dual-task experiments. Experiment 1 was a self-paced reading task and a self-paced arithmetic, while experiment 2 performed a self-paced reading task and a self-paced spatial-rotation task to study the nature of the working memory (WM) resources used in language processing. There were two comprehension questions following each experimental trial. Participants similarity in the first experiment scored (80.2%), and the second experiment scored (78.1%). The difference between the current study and their study was that, they focused on the comprehension after reading while this study focused on remembering after studying.

Similarity degree of the four tests based on table 4-1 is arranged below:

In the first rank was (FR) test. Its similarity degree of retrieval process among members was (80.81%). It is a very high degree of similarity, while the difference degree of retrieval process among members in this test was (19.19%). The researcher claimed that, it scored very high because the tests examined facts about people and their places, so the brain makes a strong link between the person and his place, and vice versa. These results agreed with Anderson (1976) experiment of (FR). Anderson made (FR) task in different sessions, one was sentences had the form of *person is in the location* another session was of the form *person is adjective*. In both tasks the results scored a high degree of correct answers per time, when individuals took (114 mesc) for recalling person and (127 mesc) for recalling

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location. He said that the description of each sentence was stored in lower level in the brain as a string.

Next was WC test. Its similarity degree of retrieval process among members was (70.51%). It is a high degree of similarity, while the difference degree of retrieval process among members in this test was (29.49%).

In the third rank was SS test. Its similarity degree of retrieval process among members was (64.75%). It is a high degree of similarity, while the difference degree of retrieval process among members in this test was (35.25%). The researcher reasoned that, even though it required a full text to be retrieved, it was easy for participants to score high, because the context of the text related to peoples' lives, so the process of retrieving was easy. This matched Anderson's (1983) experiment of SS, he reported that, the schemata sentences could be actual events in a person's life even though a participant remembered only the first two sentences he can generalize the remaining incidents due to what his brain had been surrounded by.

In comparison to WC, the PC was in the fourth and the last rank, where the similarity degree of retrieval process among members was (63.31%). It is a high degree of similarity, while the difference degree of retrieval process among members in this test was (36.69%). These results interpreted that, the less cues were used, the correct information was given. That matched Baddeley's (2012) report about memory ability, he said, when the smaller cues were presented the correct answer was recalled as the larger information was presented, the more confusion occurred. Anderson (1976) reported a similar result, "The effect of propositional fan should be greater for larger probe size. While the exact mathematical details are somewhat complex, the intuition behind this prediction is clear: It takes longer for all the sources of activation to intersect the more words there are in the probe" (p.303). In addition, below is more analysis and discussion about participants' similarity and difference regarding each question in each test.

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4.2.1 First: Fact Retrieval Test

Table 4-2: Participants' Similarity Degree in The First Test

N	Mark	Total Mark	Total Similarity mark	Total Difference mark	Similarity percentage	difference percentage	Similarity rank	Similarity degree
1	1	33	32	1	96.97	3.03	1	Very High
2	1	33	25	8	75.76	24.24	6	High
3	1	33	25	8	75.76	24.24	6	High
4	1	33	26	7	78.79	21.21	4	High
5	2	66	54	12	81.82	18.18	3	Very High
6	2	66	51	15	77.27	22.73	5	High
7	1	33	26	7	78.79	21.21	4	High
8	2	66	47	19	71.21	28.79	7	High
9	1	33	30	3	90.91	9.09	2	Very High
10	1	33	30	3	90.91	9.09	2	Very High
11	1	33	27	6	81.82	18.18	3	Very High
12	1	33	27	6	81.82	18.18	3	Very High
Total	15	495	400	95	80.81	19.19		Very High

Table 4-2 showed that, participants' similarity and difference varied. Their similarity degree ranged between (very high – high). As it is noticed, more than 96% could recall the first word in the first question, which was: *Where is the accountant*? And its answer was: *in the bank*. This could be justified that, memory ability responses strongly to the context of the required information. On the other hand, few participants could recall the eighth question, which was: *Where are the lawyers*? Its answer was: *in the cave and mosque*. This weak recall supported what the researcher explained about the amount of information affect remembering.

4.2.2 Second: Word Cue Test

Table 4-3: Participants' Similarity Degree in the second Test

N	Mark	Total Mark	Total Similarity mark	Total Difference mark	Similarity percentage	difference percentage	Similarity rank	Similarity degree
1	4	132	97	35	73.48	26.52	3	High
2	7	231	176	55	76.19	23.81	2	High
3	5	165	131	34	79.39	20.61	1	High
4	7	231	126	105	54.55	45.45	5	Medium
5	7	231	168	63	72.73	27.27	4	High
Total	30	990	698	292	70.51	29.49		High

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Table 4-3 showed that, participants' similarity and difference varied. Their similarity degree ranged between (very high – medium). As it is noticed, more than 79% could recall the third statements which were cued by the word: *Sami*. Its statements were: *Sami is president of the Iraqi people and swimmers. Sami is an Iraqi*. On the other hand, few participants could recall the fourth statements, which were cued by the word: *Library*: Its statements were: *In the library the banker coughed. In the library the warden took a nap*. Its weak recalled could be due to its varied constituents, which consisted of the most constituents. They were seven phrases.

4.2.3   Third: Phrase Cue Test

Table 4-4: Participants' Similarity Degree in the third Test

N	Mark	Total Mark	Total Similarity mark	Total Difference mark	Similarity percentage	difference percentage	Similarity rank	Similarity degree
1	2	66	50	16	75.76	24.24	3	High
2	6	198	97	101	48.99	51.01	18	Medium
3	2	66	43.5	22.5	65.91	34.09	8	High
4	5	165	96	69	58.18	41.82	14	Medium
5	4	132	93	39	70.45	29.55	5	High
6	2	66	39.5	26.5	59.85	40.15	12	Medium
7	5	165	96	69	58.18	41.82	14	Medium
8	2	66	45	21	68.18	31.82	6	High
9	2	66	41.5	24.5	62.88	37.12	10	High
10	4	132	76.5	55.5	57.95	42.05	15	Medium
11	2	66	33.5	32.5	50.76	49.24	17	Medium
12	2	66	48	18	72.73	27.27	4	High
13	4	132	123	9	93.18	6.82	1	Very High
14	3	99	60	39	60.61	39.39	11	High
15	5	165	110	55	66.67	33.33	7	High
16	6	198	115.5	82.5	58.33	41.67	13	Medium
17	1	33	21	12	63.64	36.36	9	High
18	3	99	43.5	55.5	43.94	56.06	19	Medium
19	2	66	43.5	22.5	65.91	34.09	8	High
20	3	99	85	14	85.86	14.14	2	Very High
21	1	33	18	15	54.55	45.45	16	Medium
Total	**66**	**2178**	**1379**	**799**	**63.31**	**36.69**		High

Table 4-4 showed that, participants' similarity and difference varied. Their similarity degree ranged between (very high – medium). As it is noticed, more than 93% could recall the thirteenth phrases which were cued by the NPs: *Salim ....., while Ali*. Their constituents were VPs and NP*:   Salim has a red car, while Ali has a white car.* These constituents are considered simple structure. On the other hand, few participants could recall the eighteenth phrases, which was this*: The fact that Ahmed said that the farmer had taken the book from the child to the police was to be expected. The required phrase were d.clause. So that, it supported what the researcher found about the clauses.*

4.2.4   Four: Phrase Cue Test

Table 4-5: Participants' Similarity Degree in the Fourth Test

N	Mark	Total Mark	Total Similarity mark	Total Difference mark	Similarity percentage	difference percentage	Similarity rank	Similarity degree
1	4	132	98	34	74.24	25.76	2	High
2	3	99	82	17	82.83	17.17	1	Very High
3	3	99	71	28	71.72	28.28	3	High
4	3	99	60	39	60.61	39.39	4	High
5	3	99	56	43	56.57	43.43	5	Medium
6	3	99	39	60	39.39	60.61	6	Low
Total	**19**	**627**	**406**	**221**	**64.75**	**35.25**		High

Table 4-5 showed that, participants' similarity and difference varied. Their similarity degree ranged between (very high – low). As it is noticed, more than 82% could recall the second ind.clause. On the other hand, few participants could recall the last ind.clauses. This interpreted that, first information is faster and easier to recall than the information that comes at the end of a text.

4.1 The Second Research Question

The second research question was**: What are the differences between learners in their retrieval process of LSs?**

To answer this research question, the researcher presented participants 'marks overall the four tests. Then the researcher has arranged descendingly participants'

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marks overall the tests. After that, participants were divided into three groups where (11 members in each group) regarding the whole marks they got (high, medium and low). After that, researcher has measured the degree of difference by means of one-way variance of ANOVA. The results of this analysis were presented in table 4-6.

Table 4-6: The Degree of the Difference among Participants

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
FR	Between Groups	6745.641	2	3372.820	19.336	.000
	Within Groups	5232.971	30	174.432		
	Total	11978.612	32			
WC	Between Groups	16612.750	2	8306.375	31.872	.000
	Within Groups	7818.417	30	260.614		
	Total	24431.167	32			
PC	Between Groups	23437.338	2	11718.669	69.076	.000
	Within Groups	5089.488	30	169.650		
	Total	28526.825	32			
SS	Between Groups	17331.276	2	8665.638	11.344	.000
	Within Groups	22916.358	30	763.879		
	Total	40247.634	32			
Four Tests	Between Groups	18227.026	2	9113.513	75.105	.000
	Within Groups	3640.316	30	121.344		
	Total	21867.342	32			

As seen in table 4-6, there were differences with statistical significance among participants in their retention and recalling processes of LSs. Where (f) value overall the tests scored (75.105). It was statically significant at a value of less than (0.01). Also, (f) value for the four tests was significant at the significance levels corresponding to each test. That means there was a difference among participants in their retention and recalling processes of LSs. To find out these differences attributed to what, the (Scheffe) test was used; see in table 4-6:

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Table 4-7:Comparison between Participants' Degree

Dependent Variable	(I) VAR00003	(J) VAR00003	Mean Difference (I-J)	Std. Error	Sig.
FR	1.00	2.00	-25.45402-*	5.51303	.000
		3.00	-34.12118-*	5.77068	.000
	2.00	1.00	25.45402*	5.51303	.000
		3.00	-8.66717-	5.65502	.323
	3.00	1.00	34.12118*	5.77068	.000
		2.00	8.66717	5.65502	.323
WC	1.00	2.00	-37.61485-*	6.73869	.000
		3.00	-54.53218-*	7.05362	.000
	2.00	1.00	37.61485*	6.73869	.000
		3.00	-16.91733-	6.91225	.065
	3.00	1.00	54.53218*	7.05362	.000
		2.00	16.91733	6.91225	.065
PC	1.00	2.00	-36.78985-*	5.43693	.000
		3.00	-66.61018-*	5.69101	.000
	2.00	1.00	36.78985*	5.43693	.000
		3.00	-29.82033-*	5.57695	.000
	3.00	1.00	66.61018*	5.69101	.000
		2.00	29.82033*	5.57695	.000
SS	1.00	2.00	-45.53364-*	11.53690	.002
		3.00	-51.67464-*	12.07607	.001
	2.00	1.00	45.53364*	11.53690	.002
		3.00	-6.14100-	11.83404	.875
	3.00	1.00	51.67464*	12.07607	.001
		2.00	6.14100	11.83404	.875
The four tests	1.00	2.00	-36.94795-*	4.59818	.000
		3.00	-57.89145-*	4.81307	.000
	2.00	1.00	36.94795*	4.59818	.000
		3.00	-20.94350-*	4.71661	.001
	3.00	1.00	57.89145*	4.81307	.000
		2.00	20.94350*	4.71661	.001

As seen from table 4-7, the differences of participants were attributed to the following points:

− The differences were in the first (FR), second (WC) and fourth (SS) tests were attributed to members who got (high & medium) degree over members who got (low) degree. While there were no differences between members who got high degree and who got medium degree.

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– In the third test (PC), and overall tests, the differences were attributed to members who got (high) degree upon members who got (medium & low) marks. As well as it attributed to members who got (medium) marks over members who got (low) degree.

As it was noticed, FR, WC & SS were respectively easy for participants to recall, while PC was the hardest one. The researcher reasoned that, PC test needed the largest amount of information to be recalled, so that it was the hardest one. On the other hand, FR required few units to be recalled. In other words, the larger the amount of information was needed to be recalled, the harder it was for the memory to recall. This was similar to a study done by Gorden et al., (2002) where the results indicated that comprehending complex sentences was more challenging than comprehending simple sentences. They utilized in their study a list of word to be remembered while reading simple and complex structures. To synthesize the current study and their study results, it proved that, memory works better when the required information are less, simple and direct.

Also, the study of Lovett et al. (2000) in describing working memory phenomena identified three important characteristics that any computational model of working memory must be able to produce: (1) working memory resources limit performance on highly demanding tasks, (2) working memory resources differ in amount across individuals, and (3) these differences help predict individuals' performance across different tasks. The characteristics of individuals in the retention process was similar in participants' characteristics of the current study: (1) different tests produced different results, (2) participants' ability varied between perfect, good, and weak, and (3) their memory retrieval performance was better when they had to recall a smaller amount of information.

To generalize this point, most of previous studies supported the results of the first and second research question of the current study, in which individuals' ability

differed from one another depending on their level, type of task and the amount of the information.

5   Conclusion

The current study examined numerically the differences and similarities between learners in their retrieval process of LSs through spreading activation tests. The researcher has analyzed and discussed the results that achieved the goals of the study. The main objective was to compare numerically between individuals in their retrieval process of the memory, the researcher reported this result; similarity percentage between individuals in retrieval process throughout the four tests scored (67.20%) and it is a high similarity degree. On the other hand, difference percentage between individuals in retrieval process throughout the four tests scored (32.80%). The differences were in the first (FR), second (WC) and fourth (SS) tests attributed to members who got (high & medium) marks unlike the members who got (low) marks. In the third test (PC), and the whole four tests, the differences were attributed to members who got (high) marks better than members who got (medium & low) marks.

5.1   Recommendations

Based on the generalization, the researcher's recommendations are as follow:

- Tests and exams should be built on different forms that suits individual differences.
- Set up courses that clarify the suitable way in memorizing and restoring information, based on LSs to facilitate learning, and acquiring a foreign language

5.2   Suggestions for future researches

The researcher suggested some future topics that cover different areas of the current study; such as:

- Studying memory retrieval of LSs on different Yemeni universities.

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- Studying ability of memory retrieval on morphology and phonology.
- Studying memory retrieval of LSs on other languages.
- Studying memory retrieval of LSs on healthy and disorder children.

References

Anderson, J. R. (1974). Retrieval of propositional information from long-term memory. *Cognitive psychology*, 6(4), 451-474.

Anderson, J. R. (1976). Language, memory, and thought. *Psychology Press*.

Anderson, J. R. (1983). A spreading activation theory of memory. Journal of Verbal Learning and Verbal Behavior, 22(3), 261–295.

Anderson, J. R., & Bower, G. H. (1974). A propositional theory of recognition memory. *Memory & Cognition*, 2(3), 406-412.

Baddeley, A. (2012). Working Memory: Theories, Models, and Controversies. Annual Review of Psychology, 63, 1-29

Bock, J. K. (1986). Syntactic persistence in language production. *Cognitive psychology, 18*(3), 355-387.

Caplan, D., & Waters, G. S. (1999). Verbal working memory and sentence comprehension. *Behavioral and brain Sciences, 22*(1), 77-94.

Catan, H. (2019). The effects of Arabic linguistic features on verbal short-term memory. *not mentioned*

Clahsen, H., & Felser, C. (2006a). How native-like is non-native language processing? Trends in Cognitive Sciences, 10(10), 564–570.

Collins, A. M., & Loftus, E. F. (1975). *A spreading-activation theory of semantic processing, 407.*

Cunnings, I. (2017). Parsing and working memory in bilingual sentence processing. Bilingualism: Language and Cognition, 20, 659–671.

Field, J. (2004). *PSYCHOLINGUISTICS: The Key Concepts.* 11 New Fetter Lane, London EC4P 4EE: Routledge.

Fry, A. F., & Hale, S. (1996). Processing speed, working memory, and fluid intelligence: Evidence for a developmental cascade. Psychological science, 7(4), 237-241.

Hamrick, P., & Ullman, M. (2017). A neurocognitive perspective on retrieval interference in L2 sentence processing. Bilingualism: Language and Cognition, 20, 741–754.

Lovett, M. C., Daily, L. Z., & Reder, L. M. (2000). A source activation theory of working memory: Cross-task prediction of performance in ACT-R. *Cognitive Systems Research, 1*(2), 99-118.

Marslen-Wilson W, Tyler LK (1980) The temporal structure of spoken language understanding. *Cognition 8*:1-71.

Patterson, K., Nestor, P. J., & Rogers, T. T. (2007). Where do you know what you know? The representation of semantic knowledge in the human brain. *Nature reviews neuroscience, 8*(12), 976-987.

Pickering, M. J., & Branigan, H. P. (1998). *The representation of verbs: Evidence from syntactic priming in language production. (4*), 633-651.

Polišenská, K., Chiat, S., & Roy, P. (2015). Sentence repetition: What does the task measure?. *International Journal of Language & Communication Disorders, 50*(1), 106-118.

Pliatsikas, C., DeLuca, V., & Saddy, J. D. (2017). Immersion effects on brain structure in bilinguals. Bilingualism: Language and Cognition, 20(3), 516–527.

Schmid, Hans-Jorg (2005c), *Spreading Contextualisation: English Lexicology in Germany between 1970 and 2000*. In: Stephan Kohl, ed., Anglistik. Research Paradigms and Institutional Policies 1930- 2000, Trier: wvt, 293-311.